

**INSTRUCTIONS  
TO  
BIDDERS**

**FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA**

**2019 Edition**

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**FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN THE  
REJECTION OF THE BID AS NOT RESPONSIVE.**

**SECTION 1. BID SUBMISSIONS.** To improve productivity and efficiency, and to streamline the process of construction management bidders are required to access the advertisement located in PA e-marketplace at [www.emarketplace.state.pa.us](http://www.emarketplace.state.pa.us).

**SECTION 2. WORK TO BE PERFORMED.** The work to be performed is described in the Contract Documents.

**SECTION 3. FAMILIARITY WITH PROPOSED WORK.** The Bidder is responsible for examining the nature and location of the work, the conformation of the ground, the soil and rock conditions, and the character, quality, and quantity of the materials that will be required. The Bidder shall also examine the proposed Contract Documents, including the plans, specifications, the General Conditions, Special Conditions (if applicable), Administrative Procedures, and all other documents and data pertaining to the Project. After the award of the contract, the Contractor may not submit any claim alleging insufficient data, incorrectly assumed conditions, or misunderstanding with regard to matters for which no such clarification was sought during the bidding phase of the Project, as described further in the General Conditions of the Construction contract.

**SECTION 4. INTERPRETATION OF CONTRACT DOCUMENTS.**

- A. Questions during the bid stage **shall be submitted electronically** to the Contracting Officer. All questions related to the proposed work or proposed Contract Documents must be submitted **no later than close of business ten (10) days prior to the Bid Opening Date**. Only questions received no later than ten (10) days prior to the date fixed for the opening of bids will be considered by the Department. If a question is submitted within 10 days of the Bid Opening Date, the Department may, in its sole discretion, answer the question.
  
- B. **NEITHER THE DEPARTMENT, THE PROFESSIONAL, NOR ANY REPRESENTATIVE OF THE CLIENT AGENCY SHOULD BE ASKED TO PROVIDE ANY ORAL OR WRITTEN INTERPRETATION TO ANY BIDDER REGARDING INTERPRETATION OF THE CONTRACT DOCUMENTS. ANY CONVERSATION OR WRITING BETWEEN A BIDDER AND EITHER THE DEPARTMENT, THE PROFESSIONAL, OR THE REPRESENTATIVE OF THE CLIENT AGENCY FOR WHOM THE PROJECT IS BEING CONSTRUCTED, SHOULD NOT BE RELIED UPON BY ANY BIDDER, IS NOT BINDING UPON THE DEPARTMENT, AND SHALL NOT BECOME PART OF THE CONTRACT DOCUMENTS UNLESS THE INFORMATION SUBSEQUENTLY APPEARS IN AN ADDENDUM or FLYER ISSUED BY THE DEPARTMENT.**
  
- C. The Department's response to any Question will be in the form of an Addendum and posted in eMarketplace. All Bidders that have created a user profile will be notified as addenda are issued. All Bidders are responsible for monitoring eMarketplace for addenda that are issued. **If an addenda is issued prior to the bid opening, but after the Bidder submitted its bid, the Bidder will need to resubmit its bid prior to the bid opening date and time.** All addenda become a part of the Contract Documents and all Bidders on any portion of the contract for the Project are bound by all addenda issued on the Project. The Bidder will be required to acknowledge all addenda prior to submitting a bid.

**SECTION 5. SUBMISSION/SIGNING OF BIDS.** All bids shall be submitted prior to the date and time scheduled for the bid opening. Only timely submissions will be accepted by the Department. **Paper, E-mail, fax or any other type of delivery of bid submissions will not be accepted by the Department and will be returned to sender.**

- A. **Base Bids.** All base bids will be considered separate and distinct bids. If a base bid is left blank or a zero (0) is present, the Department will interpret this to mean that the Bidder did not submit a bid on that base bid, but this will not invalidate any remaining base bids.

**SECTION 6. AWARD TO A DOMESTIC AND FOREIGN BUSINESS.**

- A. No contract will be awarded to a domestic business unless the Bidder has complied with, or agreed to comply with, the registration requirements under the Business Corporation Law of 1988 (15 Pa. C.S. §1101-§4131) and/or the Pennsylvania Uniform Partnership Act of 2016 (15 Pa. C.S. §8411-§8486), and/or the Pennsylvania Uniform Limited Partnership Act of 2016 (15 Pa. C.S. §8611-§8695), and/or the Pennsylvania Uniform Limited Liability Company Act of 2016 (15 Pa. C.S. §8811-§8898), and/or the Fictitious Names Act (54 Pa. C.S. §301-§332).
- B. No contract will be awarded to a Bidder which is a foreign business unless the Bidder has complied with or agreed to comply with Chapter 4 (relating to Foreign Associations) of Title 15 Corporations and Unincorporated Associations (15 Pa. C.S. §402-§419).

**SECTION 7. WITHDRAWAL OR MODIFICATION OF A SUBMITTED BID PRIOR TO BID OPENING.**

- A. **Complete Withdrawal Before Bid Opening Date and Time.** For a bid to be withdrawn before the date and time of bid opening, the Bidder must submit this request electronically in writing to the Contracting Officer.
- B. **Modification of a Bid Before Bid Opening Date and Time.** If, before the date and time of bid opening, a Bidder wishes to modify its bid already submitted, the Bidder must re-submit a bid with the modified amounts, indicate it replaces the original bid and clearly identify the updated bid. If the modified bid is not submitted, the previous bids are still effective.

**SECTION 8. BID OPENING PROCEDURE.** Bids will be opened by two (2) representatives of the Department at the date and time designated in the Notice, or as close after this time as reasonably possible. The Department will not, under any circumstances, open a bid before the Bid Opening Date and time. The Bid Opening is open to the public. The amount of each bid, together with the name of each Bidder will be recorded under a Bid Tabulation sheet. The Bid Tabulation shall be considered unofficial and shall be open to public inspection. The Bid Tabulation, listing the Bidders and their bid amount, will be available and posted to the Department's publicly accessible website within two (2) calendar days of the Bid Opening.

**SECTION 9. REJECTION OF BID.** The Department reserves the right to reject any or all bids or parts thereof. A bid may be rejected if it shows any omission, alterations of Form, scope of work, additions or deductions not called for, conditional language or uninvited alternate bids, or irregularities of any kind. The Department reserves the right, however, to waive technical defects or irregularities on bids. The Department may reject the bid of any Bidder failing to meet the requirements of these Instructions to Bidders or any other requirements of Bidders set forth in the Contract Documents. The reasons for rejection will appear next to the Bidder's name on the Bid Tabulation.

**SECTION 10. WITHDRAWAL OF BIDS AFTER BID OPENING.** Within three (3) days after the opening of the bids, but before award, a Bidder may request permission to withdraw its entire bid or a particular base bid if it submits a request in writing to the Contracting Officer. With the request for withdrawal, the Bidder must submit evidence that the reason for withdrawal is a clerical mistake, as opposed to a judgment mistake, and was actually due to an unintentional arithmetical error or an unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of its bid. The evidence should be attached to the e-mail at the time the request is submitted.

**SECTION 11. EXPERIENCE QUESTIONNAIRE AND FINANCIAL STATEMENT PROVIDED ON REQUEST.** At the Department's request, or if specifically required by the Invitation to Bid, Bidders shall attach an experience questionnaire and financial statement with the Department on the Form provided by the Department in the Supporting Documentation tab in the Invitation to Bid for the Project. The questionnaire and statement shall be certified to be true and correct by an affidavit sworn to or affirmed before a Notary Public, or other officer empowered to administer oaths or affirmations.

Falsification of any requested information shall result in a rejection of the bid as not responsible and/or cancellation of the Contract Award.

**SECTION 12. REFUSAL TO SUBMIT REQUESTED INFORMATION.** If the Bidder fails, refuses, or neglects to submit any requested information within the time stated in any request, the Bidder will fail to qualify as a responsible Bidder and its bid shall be rejected as not responsible and/or its Contract Award will be rescinded. Such event may result in the Bidder being entered into the Contractor Responsibility Program.

**SECTION 13. COLLUSIVE BIDS WILL BE REJECTED.** The bids of any Bidder or Bidders, who engage in collusive bidding or bid-rigging, as discussed in the Antibid-Rigging Act, will be rejected. 62 Pa. C.S. §§ 4501 – 4509. Any Bidder who commits a prohibited act under the Antibid-Rigging Act will be prosecuted to the fullest extent of the law

**SECTION 14. BID PROTEST PROCEDURE.** The Commonwealth Procurement Code (62 Pa. C.S. §1711.1, as amended) governs the protest procedure, which is summarized below. In the event that this general description conflicts with the statute, the statutory language controls.

**A. Who may File.** Any Bidder or Prospective Bidder who is aggrieved in connection with the bid or the award of a contract resulting from the bid may file a protest.

1. "Prospective Bidder" is defined as an entity that has not submitted a bid in response to the Notice to Bidders.
2. "Bidder" is defined as an entity that has submitted a bid in response to the Notice to Bidders.

**B. Time Limits.**

1. If a protest is filed by a Prospective Bidder, a protest must be filed prior to the Bid Opening Date and time established in the Notice to Bidders by either e-mail or regular mail.
  - i. **E-MAIL.** Prospective Bidders may submit a Protest via e-mail. The Protest, along with any supporting documentation, must be e-mailed, to the Contracting Officer.
  - ii. **MAIL.** Prospective Bidders may file a protest, in writing, with the Contracting Officer, Department of Military and Veterans Affairs, Building 0-47, Fort Indiantown Gap, Annville, PA 17003.
2. If a protest is filed by a Bidder, the protest must be filed within seven (7) days after the protesting Bidder knew or should have known of the facts giving rise to the protest, **except** in no event may a protest be filed later than 7 days after the Bid Tabulation is available and posted to the DMVA website. Bidders must file protests by either:
  - i. **E-MAIL.**
  - ii. **MAIL.**
3. "Filed" is defined as the date upon which the Department receives the written protest.
4. If the Bidder fails to file/submit a bid protest or files/submits an untimely protest, then the Bidder shall be deemed to have waived the right to protest the solicitation or award of the contract in any forum. Untimely protests will be disregarded by the Department.

**C.** The Department may cancel an Invitation for Bids or may reject all bids at any time prior to the time a contract is executed by all parties when it is in the best interests of the

Commonwealth. The Bidder may not submit a protest relating to cancellation of the bid or rejection of all bids.

D. A protest shall state all grounds upon which the protestant asserts that the solicitation or award of the contract was improper. The protestant may submit with the protest any documents or information it deems relevant to the protest.

E. The full text of the Bid Protest Procedure can be found at 62 Pa. C.S §1711.1 *et seq.*

**SECTION 15. BIDDER CERTIFIED NOT UNDER DEBARMENT.** The Bidder must certify that it is not currently under suspension or debarment by the Commonwealth, any other state, or the federal government; if the Bidder cannot so certify, then the Bidder shall submit, along with the bid, a written explanation of why such certification cannot be made. Written explanations, if provided, should be attached to the Supporting Documents Tab under the Invitation to Bid for the Project.

**SECTION 16. SUBCONTRACT WITH DEBARRED OR SUSPENDED FIRM.** If the successful Bidder enters into subcontracts, or employs any subcontractors/individuals who are currently suspended or debarred by the Commonwealth or the federal government, or who become suspended or debarred by the Commonwealth or federal government during the term of the contract, or any extensions or renewals thereof, the Commonwealth shall have the right to require the Contractor to terminate such subcontracts or employment.

**SECTION 17. REIMBURSEMENT OF COSTS OF INSPECTOR GENERAL INVESTIGATION.** The Bidder/Contractor shall reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of State Inspector General for investigations of the Bidder's/Contractor's compliance with the terms of the contract, or any other agreement between the Bidder's/Contractor and the Commonwealth, which result in the suspension or debarment of the Bidder's/Contractor. Such costs shall include, but are not limited to, the salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Bidder's/Contractor shall not be responsible for investigative costs for investigations which do not result in the Bidder's/Contractor's suspension or debarment.

**SECTION 18. CURRENT LIST OF SUSPENDED AND DEBARRED CONTRACTORS.** The Bidder/Contractor may obtain the current list of suspended and debarred Contractors by referring to the Department's website.

**SECTION 19. ASSIGNMENT OF ANTITRUST CLAIMS.** The successful Bidder/Contractor and the Commonwealth recognize that, in actual economic practice, overcharges by the successful Bidder's/Contractor's suppliers, resulting from the violations of State or Federal antitrust laws, are, in fact, borne by the Commonwealth. As part of the consideration for the award of the contract, and, intending to be legally bound, the successful Bidder/Contractor assigns to the Commonwealth all right, title and interest in, and to, any claims Contractor now has, or may hereafter acquire, under State or Federal antitrust laws relating to the goods or services, which are the subject of this contract.

**SECTION 20. NONDISCRIMINATION/SEXUAL HARASSMENT.** The successful Bidder/Contractor shall comply with all applicable provisions of state and federal constitutions, laws, regulations, and judicial orders pertaining to nondiscrimination, sexual harassment, and equal employment opportunity, including the provisions of the Nondiscrimination/Sexual Harassment Clause, which is attached hereto as Appendix A.

**SECTION 21. CONTRACTOR INTEGRITY PROVISIONS.** The successful Bidder/Contractor shall comply with the Integrity Provisions, which are attached hereto as Appendix B.

**SECTION 22. CONTRACTOR RESPONSIBILITY PROVISIONS.** All Bidders and the successful Bidder/Contractor shall comply with the Responsibility Provisions, which are attached hereto as Appendix C.

**SECTION 23. AMERICANS WITH DISABILITIES ACT.** The successful Bidder/Contractor shall comply with The Americans with Disabilities Act Provisions, which are attached hereto as Appendix D.

**SECTION 24. ENHANCED MINIMUM WAGE PROVISIONS.** The successful Bidder/Contractor shall comply with the Enhanced Minimum Wage Provisions, which are attached hereto as Appendix E.

**SECTION 25. OFFSET PROVISION.** The successful Bidder/Contractor agrees that the Commonwealth may set off the amount of any state tax liability or other obligation of the successful Bidder to the Commonwealth against any payments due the successful Bidder/Contractor under any contract with the Commonwealth.

**SECTION 26. PROJECT WAGES.** The successful Bidder/Contractor shall comply with the provisions, duties, obligations, remedies, and penalties of the Pennsylvania Prevailing Wage Act, 43 P.S. §§ 165-1 et seq., which is incorporated herein by reference. To the extent that the Project has federal funds involved, the Davis-Bacon Act may apply. **THE DAVIS BACON ACT APPLIES TO THIS PROJECT.**

**SECTION 27. STEEL PRODUCTS PROCUREMENT ACT.** The successful Bidder/Contractor agrees to comply with the provisions of the Steel Products Procurement Act of March 3, 1978, P.L. 6, as amended (73 P.S. §1881 et seq.). Information regarding the Act's requirements, including a list of exempt products, is available on the Department's web site at <http://www.dgs.pa.gov/Businesses/Design-and-Construction/Steel-Products-Act-Exemptions/Pages/default.aspx>.

**SECTION 28. PRODUCT DISCRIMINATION.** Successful Bidders agree to comply with the following Acts regarding Product Discrimination:

**A. Reciprocal Limitation Act.**

1. Background Requirements of the Reciprocal Limitations Act. The Act (62 Pa.C.S. (2008 Sup.) § 107) requires the Department:
  - i. In the award of contracts exceeding \$10,000 for the erection, construction, alteration, improvement, or repair of any building or other public work, or the purchase or lease of any goods, supplies, equipment, printing, or materials, to give resident Bidders a preference against a nonresident Bidder from any state that gives or requires a preference to Bidders from that state. The amount of the preference shall be equal to the amount of the preference applied by the state of the nonresident Bidder. A resident Bidder is a person, partnership, or corporation or other business entity authorized to transact business in Pennsylvania and having a bona fide establishment for transacting business within Pennsylvania at which it was transacting business on the date when bids for the public contract were first solicited.
  - ii. In the erection, construction, alteration, improvement, or repair of any public building or other public work, and in all purchases of goods, supplies, equipment, printing, or materials, not to specify, use or purchase any goods, supplies, equipment, printing, or materials which are produced, manufactured, mined, grown, or performed in any state that prohibits the specification for, use, or purchase of such items in or on its public building or other works, when such items are not produced, manufactured, mined, grown, or performed in such state.
2. **List of Discriminating States.**
  - i. States which apply preference favoring in-state Bidders and the amount of such preference (that may affect this contract), as found by the Department.

| <u>STATE</u> | <u>PREFERENCE</u>  |
|--------------|--|
| Arizona      | 5% (construction materials from Arizona resident dealers only) |

|               |  |
|---------------|--|
| Montana       | 3%   |
| West Virginia | 2.5% for construction, repair or improvements of any buildings |
| Wyoming       | 5%   |

ii. **States which prohibit the use of out-of-state goods, supplies, equipment, materials, or printing and the prohibition (that may effect this contract), as found by the Department.**

| <u>STATE</u> | <u>PREFERENCE</u>   |
|--------------|---|
| Georgia      | Forest products only  |
| Indiana      | Coal  |
| New Jersey   | For Bidders for the following items: major household appliances, chain link fence, portable sanitation units, glass, glazier supplies, storage batteries, carpet and cushion, shades, room air conditioning, electrical supplies, plumbing supplies, hardware supplies, fasteners, lumber, building supplies, audio-visual/video equipment, fire extinguishers, fire hose, motor oils, fuel oil, photographic supplies, Venetian blinds, drapes, paper towel dispensers, water hose |
| New Mexico   | Construction  |

3. Calculations of Preference.

- i. In calculating the preference, the amount of a bid submitted by a Pennsylvania Bidder shall be reduced by the percentage preference which would be given to a nonresident Bidder by its state of residence. Similarly, the amount of a bid offering Pennsylvania goods, supplies, equipment, materials, and printing shall be reduced by the percentage preference which would be given to another Bidder by the state where the goods, supplies, equipment, materials, or printing are produced, manufactured, mined, grown, or performed.

**B. Trade Practices Act.**

In accordance with the Trade Practices Act (71 P.S. §773.101 *et seq.*) the successful Bidder/Contractor shall not use, or permit to be used, in the work, any aluminum or steel products made in a foreign country that discriminates against aluminum or steel products manufactured in Pennsylvania. The countries of Brazil, South Korea, Spain, and Argentina have been found to discriminate against certain products manufactured in Pennsylvania. Therefore, the purchase or use of those countries' products, as listed below, is not permitted for a Project. Penalties for violation of this paragraph may be found in the Trade Practices Act. Penalties include becoming ineligible for award of any Public Works contracts for a period of three years.

1. **Brazil:** Welded carbon steel pipes and tubes; carbon steel wire rod; tool steel; certain stainless steel products, including hot-rolled stainless steel bar; stainless steel wire rod and cold-formed stainless steel bar; pre-stressed concrete steel wire strand; hot-rolled carbon steel plate in coil; hot-rolled carbon steel sheet and cold-rolled carbon steel sheet.
2. **Spain:** Certain stainless steel products, including stainless steel wire

rod; hot-rolled stainless steel bars and cold-formed stainless steel bars; pre-stressed concrete steel wire strand; certain steel products, including hot-rolled steel plate, cold-rolled carbon steel plate, carbon steel structural shapes, galvanized carbon steel sheet; hot-rolled carbon steel bars and cold-formed carbon steel bars.

- 3. **South Korea:** Welded carbon steel pipes and tubes; hot-rolled carbon steel plate and hot-rolled carbon steel sheet; and galvanized steel sheet.
- 4. **Argentina:** Carbon steel wire rod and cold-rolled carbon steel sheet.

**SECTION 29.      SMALL DIVERSE BUSINESS PARTICIPATION**

**A. Overview - Minimum Participation Level.**

- 1. The Department has established one minimum participation level (MPL) for utilization of Minority Business Enterprises (MBE), Women Business Enterprises (WBE), Veteran Business Enterprises (VBEs), Service-Disabled Veteran Business Enterprises (SDVBEs), Disability-Owned Business Enterprise (DOBE), and LGBT Business Enterprise (LGBTBE) (together referred to hereinafter as Small Diverse Businesses) subcontractors, manufacturers, and suppliers for this Project. This Small Diverse Business Participation (MPLs) applies when the amount bid exceeds \$50,000.
  - i. The MPL for each Prime Contractor is set forth in the Notice to Bidders in the following Form:

|    |                      | MPL  |
|----|----------------------|------|
| .1 | General Construction | 7.5% |
| .2 | HVAC                 | 7.5% |
| .3 | Plumbing             | 7.5% |
| .4 | Electrical           | 7.5% |

- 2. If the Bidder is a Small Diverse Business firm, DGS will not credit the value of the Bidder’s contract toward meeting the MPLs. All Bidders (including Bidders which are SDB) are required to comply with these Instructions to Bidders regarding Small Diverse Business Participation.
- 3. Bidders are not required to submit a Form regarding the MPL or solicitation efforts with the Bid Package.
- 4. The Administrative Procedures, which are included in the Contract Documents, have a chapter titled “Small Diverse Business Participation.” Should there be any conflict between these Instructions to Bidders and the Administrative Procedures, the Administrative Procedures govern.
- 5. Upon Notice of Award, the successful Bidder shall have the option of choosing to “Opt-in” or creating and maintaining documentation on its “Good Faith Effort” to meet the Project’s MPL. (See: subsection B(1) below). The successful Bidder/Contractor will have the full duration of its contract to meet the MPL.
- 6. The successful Bidder’s/Contractor’s commitments toward the MPL will be calculated and credited as follows:
  - i. **ONLY DGS-CERTIFIED SMALL DIVERSE BUSINESSES SHALL BE USED TO CALCULATE THE CONTRACTOR’S COMMITMENTS TO THE MPL.**

- ii. A contractor's Small Diverse Business participation level is calculated by adding all dollar commitments to DGS-certified Small Diverse Business subcontractors of all tiers, DGS-certified Small Diverse Business manufacturers, and DGS-certified Small Diverse Business suppliers, and dividing that total amount by the total contract award price. Small Diverse Business dollar commitments will not be double counted (see Section 5(vii) below).
- iii. Small Diverse Business subcontractors performing at least sixty percent of the subcontract with their own employees will be credited toward the MPL at 100 percent of the total dollar value of the subcontract/supply contract. Any Small Diverse Business subcontract, where the subcontractor performs less than 60 percent of the subcontract, will not be credited toward the MPL.
- iv. Small Diverse Business stocking suppliers are credited at 60 percent of the total cost of the materials or supplies purchased. A stocking supplier is a regular dealer that owns, operates, or maintains a store, warehouse, or other establishment, in which the materials, supplies, articles, or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.
- v. Small Diverse Business nonstocking suppliers are credited at only the amount of the fee or commission charged by the Small Diverse Business nonstocking supplier for assistance in the procurement of the materials and supplies, provided that the fees or commissions are reasonable and not excessive as compared with fees customarily allowed for similar services, and with the understanding that under no circumstances shall the credit for a Small Diverse Business nonstocking supplier exceed 10 percent of the purchase order cost. A nonstocking supplier does not carry inventory but orders materials from a manufacturer, manufacturer's representative, or a stocking supplier. In order for a nonstocking supplier to receive credit, it must perform a useful business function by engaging in meaningful work (i.e., negotiating price; AND determining quality and quantity; AND ordering materials; AND paying for the materials) and the fee or commission must be provided with the purchase order and the Small Diverse Business Utilization Report. Industry practices and other relevant factors will be considered.
- vi. Small Diverse Business manufacturers are credited at 100 percent of the total cost of the materials or supplies purchased.
- vii. All Small Diverse Business participation shall include all tiers of design and/or construction.
  - 1. The contractor is allowed to use contract amounts at any tier of supply or subcontracting provided that the Small Diverse Business is the initial Small Diverse Business firm in the organizational hierarchy. Therefore, if the contractor or any of its non-Small Diverse Business Subcontractors or Suppliers makes a commitment to a Small Diverse Business, the credit for the subcontract/purchase order commitment, regardless of the level or tier, shall be calculated as indicated in Section 5 and credited toward the contractor's Minimum Participation Level.
  - 2. The dollar value of any commitment to a Small Diverse Business cannot be double counted. In the event that the Small Diverse Business, whose entire subcontract value is counted towards the contractor's Participation Level, then subcontracts a portion of the work or supplies associated with this subcontract to another Small Diverse Business, the dollar value of the subcontract with/to this lower tier Small Diverse Business is NOT counted in the contractor's Participation Level in order to prevent the



duplicate counting of Small Diverse Business commitment dollars. In this case, the dollar value of this subsequent Small Diverse Business subcontract has already been included within the scope of work and dollar value of the Small Diverse Business commitment already counted as a part of the contractor's Participation Level.

**B. Upon Notice of Award.**

1. The successful Bidder shall, upon Notice of Award and receipt of the Construction Contract, determine whether to choose "opt-in" or to provide "Good Faith Effort" documentation of its efforts to meet the MPL by initialing the appropriate selection in Article 9 of the Construction Contract. (See Administrative Procedures for further information.)
  - i. Opt-in – A successful Bidder selecting "Opt-in" agrees to meet or exceed the Project's MPL by the time of the Close-Out Inspection of the project.
  - ii. Good Faith Effort – A successful Bidder selecting "Good Faith Effort" agrees to document its use of reasonable efforts to identify, solicit, and secure commitments with Small Diverse Businesses on all subcontractors, manufacturers, and suppliers greater than \$10,000 throughout the duration of the Project.
2. Article 9 of the Construction Contract lists both "Opt-in" and the "Good Faith Effort" options. The successful Bidder shall select and initial the option of their choice. Failure to select an option will be deemed an incomplete contract, and DGS may consider this a failure to execute the contract. (See Sections 31 and 32.)

**C. Upon Contract Execution.**

1. If Opt-in was selected, the contractor has until the time of Close-Out Inspection to meet or exceed the MPL for the Project. This will be tracked through the Small Diverse Business Utilization Report submitted with each Application for Payment.
2. If the Good Faith Effort was selected, the contractor must create and maintain documentation of its reasonable efforts to identify, solicit, and secure commitments with Small Diverse Businesses on all subcontractors and suppliers greater than \$10,000 throughout the duration of the Project. At a minimum, such documentation shall include the following ("Good Faith Effort documentation"):
  - i. A certification that the contractor accessed the DGS web site database of DGS-certified Small Diverse Businesses to identify DGS-certified Small Diverse Businesses for the subcontract or purchase order.
  - ii. A record of all companies solicited for the subcontract or purchase order that can perform the scope of work to be subcontracted, or supply to be delivered, identifying any DGS-certified Small Diverse Businesses. If a subcontractor is not properly licensed, or otherwise capable, of performing the scope of work, they are not eligible to receive the subcontract. (A painting subcontractor, for example, may not be eligible to receive a subcontract to perform electrical work.)
  - iii. A record of all quotes received showing company name and address, contact person, telephone number, Small Diverse Business status, subcontractor, manufacturer, or supplier, scope of work to be performed, or supply to be delivered, and the amount of the quote and identification of the selected subcontractor/manufacturer/supplier.

- iv. A certification that the Contractor negotiated fairly with responsive DGS-certified Small Diverse Businesses and, if commitments were not made, that such non-commitment related to the Small Diverse Business' capability or price.

Upon notice from DGS, the contractor will be required to submit, within ten (10) calendar days from the date such notice is received, the above Good Faith Effort documentation for review and compliance. Failure to submit such documents within the timeframe provided will result in a non-compliance entry into the Commonwealth's Contractor Responsibility Program and may be considered a substantial breach of the contract, as determined by the Department.

**3. Small Diverse Business Utilization Report**

- i. The contractor, regardless of the option it selects, shall submit a Small Diverse Business Utilization Report with each Application for Payment. Each Small Diverse Business Utilization Report must have current data (totals to date) identifying at least each element as follows:

- 1. Detailed information, including but not limited to, any subcontracts and purchase orders documenting the dollar value commitments, commission, or fees to Small Diverse Business firms to be used toward the satisfaction of the Project's MPL. All Small Diverse Businesses identified on the Utilization Report shall be retained on the Utilization Report throughout the duration of the Project.
- 2. Detailed information regarding any work that is claimed to be self-performed by the contractor and therefore, allegedly not eligible for subcontracting to a Small Diverse Business.

**3. Construction Subcontracts and Purchase Orders:**

- a. All Subcontract/Purchase Orders awarded to date are \$ \_\_\_\_\_
- b. Commitments to Small Diverse Businesses totals to date:
  - i. \$ \_\_\_\_\_ (dollars)
  - ii. % \_\_\_\_\_ (percentage)
- c. For each Small Diverse Business subcontract and purchase order awarded since the previous Application for Payment, the:
  - i. Identification and status of the Small Diverse Business as a MBE/WBE/VBE/SDVBE that will be performing the work; and
  - ii. The type of work, service, or material to be performed/supplied; and
  - iii. The amount paid to date on each Small Diverse Business subcontract/purchase order this month; and
  - iv. The designation of Small Diverse Business stocking suppliers as either an MEP (i.e., mechanical, electrical, and plumbing) stocking suppliers or a General Construction stocking supplier; and
  - v. The fee or commission paid to the nonstocking supplier. No MPL credit will be given if the fee or commission is not listed, and the maximum credit shall not exceed 10 percent of the purchase order cost.

- ii. Failure to submit a Small Diverse Business Utilization Report with each Application for Payment will result in an incomplete Application for Payment and it being returned to the contractor. An incomplete Application for Payment will not be processed.

#### **D. Resources.**

1. The Department is available for technical assistance to all Bidders submitting bids for this contract. Department certification of an entity as a Small Diverse Business means only that the applicant for certification has submitted information that qualifies it as a Small Diverse Business in terms of its ownership and control. It does not imply, and no Bidder shall infer, that the Department has in any way investigated or approved the entity's competence to perform work.
2. Contact the Bureau of Small Business Opportunities at (717) 783-3119.  
Bureau of Small Business Opportunities  
611 North Office Building  
Harrisburg, Pennsylvania 17125

**SECTION 30. PRE-AWARD OF CONTRACT.** Once DMVA determines the apparent lowest responsible bidder, the Bidder must comply with the Public Works Employment Verification Act, 43 P.S. §§ 167.1-167.11, by submitting to the Department a Commonwealth Public Works Verification Form ("Form") prior to the award of the contract. The Bidder shall within five (5) days after receipt of notice to provide the Form, send the Form to the Contracting Officer. Failure or refusal to provide the Form will be considered a refusal to comply with the bidding requirements, result in rejection of the bid, and the Bidder may be entered into the Contractor Responsibility Program.

The Form and relevant information are located on the DGS web page at [www.dgs.state.pa.us](http://www.dgs.state.pa.us).

**SECTION 31. AWARD OF CONTRACT.** If DMVA awards a contract, it will be made to the lowest responsible Bidder within sixty (60) days from the Bid Opening Date. This 60-day period may be extended by written consent of the lowest responsible Bidder(s). If the lowest Bidder is allowed to withdraw its bid, declines to extend the bid, or refuses the Award of Contract, the Department may award the contract to the next lowest responsible Bidder or reject all bids and re-bid the contract. **There will be no contract with the Department until all parties have fully executed the contract.**

- A. **Letter of Intent to Contract** – The Department may, in its sole discretion on particular Projects, elect to issue a binding Letter of Intent To Contract. An apparent low bidder who receives a Letter of Intent may rely upon the Letter to start the scope of off-site activities described in the Letter and to incur costs in preparation of the performance of the contract.

**SECTION 32. EXECUTION OF CONTRACT, SMALL DIVERSE BUSINESS PARTICIPATION, BOND, AND RETURN OF INSURANCE CERTIFICATES.** Within ten (10) days after receipt of the contract, the successful Bidder, must:

- A. Select the Small Diverse Business Participation MPL option in Article 9 of the contract; and
- B. Download, sign and return the contract to the Contracting Officer; and
  1. The contract must be signed by a senior corporate officer Chairperson, President, Vice President, Senior Vice President, Executive Vice President, Assistant Vice President, Chief Executive Officer, and Chief Operating Officer. If another person signs the contract, then evidence of that person's authority to sign the contract on the corporation's behalf must accompany the contract. This evidence can be in the form of a corporate resolution, an internal corporate delegation document, or a letter from one of the senior officers or the Secretary, authorizing the signatory to sign on behalf of the corporation. The letter must be on a corporate letterhead.

- C. Sign and return the Contract Bond, or Bonds in the penal sum equal to the amount of the awarded contract for the faithful performance of the contract, and to cover the prompt payment in full for all materials furnished and labor supplied or performed and equipment actually rented (but not sold.) The Bond, or Bonds, must be executed by a surety company or companies licensed to do business in Pennsylvania; and,
- D. Sign and return all insurance certificates required by the General Conditions and/or Special Conditions to the contract.
- E. Mail the original signed contract, Contract Bond(s), insurance certificates, and any evidence of signature authority to the Department of Military and Veterans Affairs, Contracting Officer for verification by the Department.
- F. After all Commonwealth signatures (handwritten or electronic) are obtained, and the contract is fully executed, the Department will forward a notification.
- G. Understand and agree that a stamped "APPROVED ELECTRONICALLY" or similar wording by the Commonwealth on the contract signature page constitutes a valid, binding contract with the Commonwealth and represents that all approvals required by Commonwealth contracting procedures have been obtained. The fully executed contract may not contain "ink" signatures by the Commonwealth.

**SECTION 33. FAILURE TO EXECUTE CONTRACT.** Failure or refusal of the successful Bidder to accept the Award of Contract or properly execute the Contract Documents, including selecting an MPL option in Article 9 and/or to furnish the required Contract Bond, and/or to furnish the required insurance certificates within the 10-day time, will be viewed as a refusal to accept the Award. In the event any of these documents are not provided as required by Section 32 of these Instructions, the successful bidder shall be entered into the Contractor Responsibility Program.

If the successful Bidder fails to execute the Contract Documents and provide the original documents as required, the Department may award the contract to the next lowest responsible Bidder, or reject all bids and re-bid the contract.

**SECTION 34. PROOF OF SURETY'S RESPONSIBILITY ON CONTRACT BOND.** The surety company, which is designated by the successful Bidder/Contractor for the faithful performance of the contract and prompt payment of materials, equipment, and labor, shall, with its Contract Bond, furnish to the Department a certificate showing that the amount of the Bond is within the limit of net retention, or evidence that appropriate reinsurance or other security has been obtained in conformance with Section 661 of the Pennsylvania Insurance Company Law of 1921 (40 P.S. § 832).

**SECTION 35. REINSURANCE.** If the surety has entered into an agreement for reinsurance under the foregoing paragraph, the Bond shall be supported by a duplicate original of the reinsurance agreement. The reinsurance agreement must contain a "direct liability to insured" clause, enabling the Department to maintain an action against the company reinsured jointly with the reinsurer, and, upon recovering judgment against such reinsured, to have recovery against such reinsurer, for payment to the extent to which it is liable under such reinsurance and in discharge thereof.

**SECTION 36. VETERAN'S PREFERENCE.** The Department strongly encourages that, all things being equal, Contractors give preference in employment on Projects of the Department to veterans of the Armed Services of the United States of America.

**SECTION 37. SMALL BUSINESS SUPPLIER PREFERENCE.** The Department strongly encourages that, all things being equal, Contractors give preference in material/equipment purchases on Projects of the Department to Small Business Suppliers.

**SECTION 38. ENVIRONMENTAL STATEMENT.** According to the Commonwealth Procurement Code, Act of May 15, 1998, P.L. 358, No. 57, 62 Pa. C.S. §§ 101-4509, all invitations for Bids and Requests for Bids for construction Projects issued by any government agency shall set forth any

provision of Federal and State statutes, rules, and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources that affect the Projects.

**SECTION 39. APPLICABLE LAWS.** The Bidder is hereby notified that this Project is subject to those statutes, rules and regulations shown on the following list and the work must be carried out in compliance with these statutes, rules and regulations. This listing does not represent the full listing of laws and regulations the Bidder and Awarded Contractor is required to comply with; the Awarded Contractor shall comply with all applicable local, state, federal laws, regulations and policies to include guidance on COVID-19 safety practices.

## **STATE LAW**

### **I. Purdon's Statutes - Title 3 (Agriculture)**

Fertilizer Act, Act of Dec. 13, 2001, 3 Pa. C.S.A. § 6701, et seq.

Soil and Plant Amendment Act, Act of Dec. 13, 2001, 3 Pa. C.S.A. § 6901, et seq.

PA Pesticide Control Act of 1973, Act of March 1, 1974 as amended, 3 P.S. § 111.21, et seq.

Agricultural Liming Materials Act, Act of March 17, 1978, as amended, 3 P.S. § 132-1, et seq.

The PA Plant Pest Act of 1992, Act of December 16, 1992 as amended, 3 P.S. § 258.1, et seq.

Noxious Weed Control Law, Act of April 7, as amended, 3 P.S. § 255.1, et seq.

Conservation District Law, Act of May 15, 1945 as amended, 3 P.S. § 849, et seq.

(Relating to weather modification), Act of January 19, 1968, as amended, 3 P.S. § 1101, et seq.

### **II. Purdon's Statutes - Title 16 (Counties)**

(Relating to land use), Act of January 13, 1966 as amended, 16 P.S. § 11941, et seq.

### **III. Purdon's Statutes - Title 18 (Crimes and Offenses)**

The Crimes Code, Act of December 6, 1972, as amended, 18 Pa. C.S.A. § 101, et seq.

### **IV. Purdon's Statutes - Title 24 (Education)**

Public School Code of 1949, Act of March 10, 1949, as amended, 24 P.S. § 7-731, et seq.

### **V. Purdon's Statutes - Title 30 (Fish)**

The Fish and Boat Code, Act of October 16, 1980, as amended, 30 Pa. C.S.A. § 101, et seq.

### **VI. Purdon's Statutes - Title 32 (Forests, Waters and State Parks)**

(Relating to water power and water supply permits), Act of June 14, 1923, as amended, 32 P.S. § 591, et seq.

Water Well Drillers License Act, Act of May 29, 1956, as amended, 32 P.S. § 645.1, et sec.

(Relating to Flood Control), Act of August 7, 1936, as amended, 32 P.S. § 653, et seq.

Flood Plain Management Act, Act of October 4, 1978, as amended, 32 P.S. § 679.101, et seq.

Storm Water Management Act, Act of October 4, 1978, as amended, 32 P.S. § 680.1, et seq.

Dam Safety and Encroachments Act, Act of November 26, 1978, as amended, 32 P.S. § 693.1, et seq.

(Relating to Stream Clearance), Act of June 5, 1947, as amended, 32 P.S. § 701, et seq.

(Relating to Potomac River Pollution), Act of May 29, 1945 (P.L. 1134, § 1), as amended, 32 P.S. 741 et seq. *Repealed in Part.* Section 4 of Act 1981, May 1, P.L. 22 No. 9, repeals this section to “the extent it required one of the members of the Interstate Commission on the Potomac River Basin to be a member of the Pennsylvania Commission on Interstate Cooperation.”

(Relating to Schuylkill River pollution), Act of June 4, 1945, as amend., 32 P.S. § 751.1, et seq.

(Relating to Delaware River pollution) Act of April 19, 1945 as amend. 32 P.S. § 815.31, et seq.

Delaware River Basin Compact, Act of July 7, 1961, as amended, 32 P.S. § 815.101, et seq.

Ohio River Valley Water Sanitation Compact, Act of April 2, 1945, as amended, 32 P.S. § 816.1, et seq.

Great Lakes Basin Compact, Act of March 22, 1956, as amended, 32 P.S. § 817.1, et seq.

Brandywine River Valley Compact, Act of September 9, 1959, as amend. 32 P.S. § 818, et seq.

Wheeling Creek Watershed Protection and Flood Prevention District Compact, Act of August 2, 1967, as amended, 32 P.S. § 819.1, et seq.

Susquehanna River Basin Compact, Act of July 17, 1968, as amended, 32 P.S. § 820.1, et seq.

Chesapeake Bay Comm. Agreement, Act of June 25, 1985, as amended, 32 P.S. § 820.11, et seq.

(Relating to Preservation and Acquisition of Land for Open Space Uses), Act of January 19, 1968, as amended, 32 P.S. § 5001, et seq.

Land and Water Conservation and Reclamation Act, Act of January 19, 1968, § 2), as amended, 32 P.S. § 5101, et seq.

Bluff Recession and Setback Act, Act of May 13, 1980, as amended, 32 P.S. § 5201, et seq.

Wild Resource Conservation Act, Act of June 23, 1982, as amended, 32 P.S. § 5301, et seq.

#### **VII. Purdon's Statutes - Title 34 (Game)**

The Game and Wildlife Code, Act of July 8, 1986, as amended, 34 Pa. C.S.A. § 101, et seq.

#### **VIII. Purdon's Statutes - Title 35 (Health and Safety)**

(Related to public eating and drinking places), Act of May 23, 1945, as amended, 35 P.S. 655.1 et seq. *Repealed in Part.* Section 6(b) of Act 1994, repealed this section in so far as it is inconsistent with said act (3 Pa. C.S.A. § 6501, et seq.).

The Public Bathing Law, Act of June 23, 1931, as amended, 35 P.S. § 672, et seq.

(Related to the protection of public water supply), Act of June 22, 1937, as amended, 35 P.S. § 691.1, et seq.

PA Safe Drinking Water Act, Act of May 1, 1984, as amended, 35 P.S. § 721.1, et seq.

PA Sewage Facilities Act, Act of January 24, 1966 as amended, 35 P.S. § 750.1, et seq.  
Repealed in Part. Section 15 of Act 1990, July 1, repealed this section insofar as it relates to fee payments.

PA Solid Waste-Resource Recovery Development Act, Act of July 20, 1974, as amended, 35 P.S. § 755.1, et seq.

(Related to pollution from abandoned mines), Act of December 15, 1965 as amended, 35 P.S. § 760.1, et seq.

Low-Level Radioactive Waste Disposal Act, Act of February 9, 1988, as amended, 35 P.S. § 7130.101, et seq.

(Related to Camp Regulation), Act of November 10, 1959 as amended 35 P.S. § 3001, et seq.

Air Pollution Control Act, Act of January 8, 1960, as amended 35 P.S. § 4001, et seq.

Solid Waste Management Act, Act of July 7, 1980 as amended, 35 P.S. § 6018.101, et seq.  
*Repealed in Part.* Section 905(b) of Act 1988, Feb. 9, the Low-Level Radioactive Waste Disposal Act (35 P.S. § 7130.101, et seq.), repealed this section insofar as it is inconsistent with said act.

Radiation Protection Act, Act of July 10, 1984, as amended, 35 P.S. 7110.101, et seq. *Repealed in Part.* Section 17(b) of Act 1992, Dec. 18, provides that this section is repealed insofar as it is inconsistent with said act.

Worker and Community Right-to-Know Act, Act of October 5, 1984 as amended, 35 P.S. § 7301, et seq.

#### **IX. Purdon's Statutes - Title 36 (Highways and Bridges)**

State Highway Law, Act of June 1, 1945, as amended, 36 P.S. § 670-101, et seq. *Repealed in Part.* Section 4 of Act 1985, July 3, repealed this act insofar as it's inconsistent with said act.

Junkyards along Highways), Act of July 28, 1966, as amended, 36 P.S. § 2719.1, et seq.

Highway Vegetation Control Act of December 20, 1983 as amended, 36 P.S. § 2720.1, et seq.

#### **X. Purdon's Statutes – Title 37 APPENDIX (Historical & Museums)**

History Code, Act of May 26, 1988, as amd, 37 Pa. C.S.A. § 101, et seq.

#### **XI. Purdon's Statutes - Title 43 (Labor)**

(Related to General Safety), Act of May 18, 1937, as amended, 43 P.S. § 25-1, et seq.

Seasonal Farm Labor Act, Act of June 23, 1978, as amended, 43 P.S. § 1301.101, et seq.

#### **XII. Purdon's Statutes - Title 52 (Mines and Mining)**

The Coal Mine Sealing Act of 1947, Act of June 30, 1947, as amended, 52 P.S. § 28.1, et seq.

Coal Refuse Disposal Control Act of September 24, 1968, as amended, 52 P.S. § 30.51, et seq.

(Related to Coal Land Improvement), Act of July 19, 1965, as amended, 52 P.S. § 30.101, et seq.

(Related to Mine Fires & Subsidence), Act of April 3, 1968, as amd. 52 P.S. § 30.201, et seq.

PA Anthracite Coal Mine Act, Act of November 10, 1965 as amended, 52 P.S. § 70-101, et seq.

(Related to discharge of coal into streams), Act of June 27, 1913 as amended, 52 P.S. § 631, et seq.

(Caving-in, Collapse, Subsidence), Act of May 27, 1921, as amended, 52 P.S. §661, et seq.

(Related to Subsidence), Act of September 20, 1961 as amended, 52 P.S. § 672.1, et seq.

Anthracite Strip Mining and Conservation Act, Act of June 27, 1947 as amended, 52 P.S. § 681.1, et seq. Repealed in Part. Section 16 of Act 1971, Nov. 30, provided that this section repealed insofar as it is inconsistent with Act No. 147.

(Related to control and drainage of water from coal formations), Act of July 7, 1955 as amended, 52 P.S. § 682, et seq.

PA Bituminous Coal Mine Act, Act of July 17, 1961 as amended, 52 P.S. § 701-101, et seq.

(Related to Abandoned Mines), Act of May 7, 1935, as amended, 52 P.S. § 809, et seq.

(Related to maps and plans of mines), Act of June 15, 1911, as amended, 52 P.S. § 823.

Surface Mining Conservation and Reclamation Act, Act of May 31, 1945 as amended, 52 P.S. § 1396.1 et seq. Repealed in Part. Section 27 of Act 1984, Dec. 19, provides that, except as provided in § 3304 of this title, this section "is repealed to the extent that it applies to the surface mining of minerals other than bituminous and anthracite coal."

The Bituminous Mine Subsidence and Land Conservation Act, Act of April 27, 1966, as amended, 52 P.S. § 1406.1, et seq.

(Related to cave-in or subsidence of surface above mines), Act of July 2, 1937, as amended, 52 P.S. § 1407, et seq.

(Related to Coal Stripping), Act of June 18, 1941 as amended, 52 P.S. § 1471, et seq.

(Related to Coal under State Lands), Act of June 1, 1933 as amended, 52 P.S. § 1501, et seq.

(Related to Mining Safety Zones), Act of Dec. 22, 1959 as amended, 52 P.S. § 3101, et seq.

(Related to Coal Mine Subsidence Insurance Fund), Act of August 23, 1961 as amended, 52 P.S. § 3201, et seq.

Interstate Mining Compact, Act of May 5, 1966 as amended, 52 P.S. § 3251, et seq.

Noncoal Surface Mining Conservation and Reclamation Act, Act of December 19, 1984, as amended, 52 P.S. § 3301, et seq.

### **XIII. Purdon's Statutes - Title 58 (Oil and Gas)**

Oil and Gas Conservation Law, Act of July 25, 1961 as amended, 58 P.S. § 401, et seq.

PA Used Oil Recycling Act, Act of April 9, 1982, as amended, 58 P.S. § 471, et seq.

Coal & Gas Resource Coord. Act, Act of Dec. 18, 1984, as amended, 58 P.S. § 501, et seq.

Oil and Gas Act, Act of December 19, 1984, as amended, 58 P.S. § 601.101, et seq. Repealed in part. Section 4 of Act 1985, July 11, repealed this act insofar as inconsistent with said act.

### **XIV. Purdon's Statutes Title 63 (Professions and Occupations)**

Sewage Treatment Plant and Waterworks Operators' Certification Act, Act of November 18, 1968 as amended, 63 P.S. § 1001, et seq.



**XV. Purdon's Statutes - Title 64 (Public Lands)**

PA Appalachian Trail Act, Act of April 28, 1978, as amended, 64 P.S. § 801, et seq.

**XVI. Purdon's Statutes - Title 71 (State Government)**

The Administrative Code of 1929, Act of April 9, 1929 as amended, 71 P.S. § 51, et seq.

**XVII. Purdon's Statutes - Title 72 (Taxation and Fiscal Affairs)**

Project 70 Land Acquisition and Borrowing Act, Act of June 22, 1964 as amended, 72 P.S. § 3946.1, et seq.

(Related to pollution control services), Act of March 4, 1971 as amended, 72 P.S. § 7602.1, et seq.

**XVIII. Purdon's Statutes - Title 73 (Trade and Commerce)**

Infrastructure Development Act, Act of July 11, 1996, as amended, 73 P.S. § 393.21, et seq.

(Related to Explosives), Act of July 1, 1937 as amended, 73 P.S. § 151, et seq.; *Suspended in Part.* This section is suspended insofar as it is in conflict with the provisions of Reorganization Plan No. 8 of 1981. See 71 P.S. § 751-35.

(Related to Explosives), Act of July 10, 1957 as amended, 73 P.S. § 164, et seq. *Suspended in Part.* Section 164 is suspended insofar as it is in conflict with the provisions of Reorganization Plan No. 8 of 1981. See 71 P.S. § 751-35.

(Related to Black Powder), Act of May 31, 1974, 73 P.S. § 169 et seq.

(Related to excavation and demolition), Act of Dec.10, 1974 as amended, 73 P.S. § 176, et seq.

**XIX. Purdon's Statutes - Title 75 (Vehicles)**

Vehicle Code, Act of June 17, 1976, as amended., 75 Pa. C.S.A. § 101, et seq.

Snowmobile Law, Act of June 17, 1976, as amended, 75 Pa. C.S.A. § 7701, et seq.

(Related to hazardous materials transport), Act of June 30, 1984, 75 Pa. C.S.A. § 8301, et seq.

**XX. Purdon's Statutes - Title 77 (Workmen's Compensation)**

Workers' Compensation Act, Act of June 2, 1915 as amended, 77 P.S. § 1, et seq.

PA Occupational Disease Act, Act of June 21, 1939, as amended, 77 P.S. § 1201, et seq.

**XXI. Other Statutes**

(Relating to Medical Waste-Manifesting and Transporter Licensing), Act of July 13, 1988, 35 P.S. § 6019.1, et seq.

Municipal Waste Planning, Recycling and Waste Reduction Act, Act of July 28, 1988, 53 P.S. § 4000.1501.

Hazardous Sites Cleanup Act, Act of October 18, 1988, 35 P.S. § 6020.101.

**XXII. Pennsylvania Constitution - Article I, Section 27**

**(Adopted May 18, 1971)**

**FEDERAL LAW**

Acid Precipitation Act of 1980 (42 U.S.C. § 8901-8912).

Act to Prevent Pollution from Ships (33 U.S.C. § 1901-1915).

Americans with Disabilities Act, (42 U.S.C. § 12101-12213 and 47 U.S.C. § 225 and 611).

Asbestos Haz. Emerg. Response Act of 1986 [see Toxic Substances Control Act secs. 201-214 (15 U.S.C. § 2641-2656)].

Atomic Energy Act of 1954 (42 U.S.C. § 2014, 2021, 2021a, 2022, 2111, 2113, 2114).

Aviation Safety and Noise Abatement Act of 1979 (49 U.S.C. § 47501-47510).

Clean Air Act (42 U.S.C. § 7401-7642).

Clean Water Act [see Federal Water Pollution Control Act].

Coastal Zone Management Act of 1972 (16 U.S.C. § 1451-1466).

Comp.Env. Response, Compensation, and Liability Act of 1980 (42 U.S.C. § 9601-9675).

Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. § 11001-11050).

Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. § 791-798).

Environmental Quality Improvement Act of 1970 (42 U.S.C. § 4371-4375).

Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. § 136-136y).

Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1701-1784).

Federal Water Pollution Control Act (33 U.S.C. § 1251-1387)

Geothermal Energy R& Development, Demonstration Act of 1974 (30 U.S.C. § 1101-1164).

Global Climate Protection Act of 1987 (15 U.S.C. § 2901 note).

Hazardous Substance Response Revenue Act 1980 (see 26 U.S.C. § 4611, 4612, 4661, 4662).

Low-Level Radioactive Waste Policy Act (42 U.S.C. § 2021b-2021d).

Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. § 1401-1445)

National Climate Program Act (15 U.S.C. § 2901-2908).

National Environmental Policy Act of 1969 (42 U.S.C. § 4321-4370f).

Noise Control Act of 1972 (42 U.S.C. § 4901-4918).

Nuclear Waste Policy Act of 1982 (42 U.S.C. § 10101-10270).

Outer Continental Shelf Land Act Amendments of 1978 (43 U.S.C. § 1801-1866).

Public Health Service Act (42 U.S.C. § 300f-300j-11).

Safe Drinking Water Act [ Public Health Service Act 1401-1451 (42 U.S.C. § 300f-300j-26)].

Soil and Water Resources Conservation Act of 1977 (16 U.S.C. § 2001-2009).

Solid Waste Disposal Act (42 U.S.C. § 6901-6991i).

Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. § 1201-1328)

Toxic Substances Control Act (15 U.S.C. § 2601-2692).

Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. § 7901-7942).

Water Resources Research Act of 1984 (42 U.S.C. § 10301-10309).

Master Cooperative Agreement (MCA) October 2018. Subrecipient and contractor requirements.

## APPENDIX A

### **NONDISCRIMINATION / SEXUAL HARASSMENT CLAUSE**

For the purposes of this provision, the term "Contractor" shall refer to the successful Bidder.

The Contractor agrees:

- A. In the hiring of any employee(s) for the manufacture of supplies, performance of work, or any other activity required under the contract or any subcontract, the Contractor, each subcontractor, or any person acting on behalf of the Contractor or subcontractor shall not discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the *Pennsylvania Human Relations Act* (PHRA) and applicable federal laws, against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.
- B. Neither the Contractor nor any subcontractor nor any person on their behalf shall in any manner discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, against or intimidate any employee involved in the manufacture of supplies, the performance of work, or any other activity required under the contract.
- C. The Contractor and each subcontractor shall establish and maintain a written nondiscrimination and sexual harassment policy and shall inform their employees in writing of the policy. The policy must contain a provision that sexual harassment will not be tolerated and employees who practice it will be disciplined. Posting this Nondiscrimination/Sexual Harassment Clause conspicuously in easily-accessible and well-lighted places customarily frequented by employees and at or near where the contracted services are performed shall satisfy this requirement for employees with an established work site.
- D. The Contractor and each subcontractor shall not discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of PHRA and applicable federal laws, against any subcontractor or supplier who is qualified to perform the work to which the contract relates.
- E. The  
Contractor and each subcontractor represents that it is presently in compliance with and will maintain compliance with all applicable federal, state, and local laws, regulations and policies relating to nondiscrimination and sexual harassment. The Contractor and each subcontractor further represents that it has filed a Standard Form 100 Employer Information Report ("EEO-1") with the U.S. Equal Employment Opportunity Commission ("EEOC") and shall file an annual EEO-1 report with the EEOC as required for employers' subject to *Title VII of the Civil Rights Act of 1964*, as amended, that have 100 or more employees and employers that have federal government contracts or first-tier subcontracts and have 50 or more employees. The Contractor and each subcontractor shall, upon request and within the time periods requested by the Commonwealth, furnish all necessary employment documents and records, including EEO-1 reports, and permit access to their books, records, and accounts, including EEO-1 reports, and permit access to their books, records, and accounts by the contracting agency and the Bureau of Diversity, Inclusion and Small Business Opportunities for purpose of ascertaining compliance with provisions of this Nondiscrimination/Sexual Harassment Clause.
- F. The Contractor shall include the provisions of this Nondiscrimination/Sexual Harassment Clause in every subcontract so that those provisions applicable to subcontractors will be binding upon each subcontractor.
- G. The Contractor's and each subcontractor's obligations pursuant to these provisions are ongoing from and after the effective date of the contract through the termination date thereof. Accordingly, the Contractor and each subcontractor shall have an obligation to inform the Commonwealth if, at any time during the term of the contract, it becomes aware of any actions or occurrences that would result in violation of these provisions.
- H. The Commonwealth may cancel or terminate the contract and all money due or to become due under the contract may be forfeited for a violation of the terms and conditions of this Nondiscrimination/Sexual Harassment Clause. In addition, the agency may proceed with debarment or suspension and may place the Contractor in the Contractor Responsibility File.

## APPENDIX B

### CONTRACTOR INTEGRITY PROVISIONS

It is essential that those who seek to contract with the Commonwealth of Pennsylvania ("Commonwealth") observe high standards of honesty and integrity. They must conduct themselves in a manner that fosters public confidence in the integrity of the Commonwealth contracting and procurement process.

**1. DEFINITIONS.** For purposes of these Contractor Integrity Provisions, the following terms shall have the meanings found in this Section:

**a. "Affiliate"** means two or more entities where (a) a parent entity owns more than fifty percent of the voting stock of each of the entities; or (b) a common shareholder or group of shareholders owns more than fifty percent of the voting stock of each of the entities; or (c) the entities have a common proprietor or general partner.

**b. "Consent"** means written permission signed by a duly authorized officer or employee of the Commonwealth, provided that where the material facts have been disclosed, in writing, by prequalification, bid, proposal, or contractual terms, the Commonwealth shall be deemed to have consented by virtue of the execution of this contract.

**c. "Contractor"** means the successful Bidder that enters into a contract with the Commonwealth.

**d. "Contractor Related Parties"** means any affiliates of the Contractor and the Contractor's executive officers, Pennsylvania officers and directors, or owners of 5 percent or more interest in the Contractor.

**e. "Financial Interest"** means either:

(1) Ownership of more than a five percent interest in any business; or

(2) Holding a position as an officer, director, trustee, partner, employee, or holding any position of management.

**f. "Gratuity"** means tendering, giving, or providing anything of more than nominal monetary value including, but not limited to, cash, travel, entertainment, gifts, meals, lodging, loans, subscriptions, advances, deposits of money, services, employment, or contracts of any kind. The exceptions set forth in the *Governor's Code of Conduct, Executive Order 1980-18*, the *4 Pa. Code §7.153(b)*, shall apply.

**g. "Non-bid Basis"** means a contract awarded or executed by the Commonwealth with Contractor without seeking bids or proposals from any other potential bidder or offeror.

**2.** In furtherance of this policy, Contractor agrees to the following:

**a.** Contractor shall maintain the highest standards of honesty and integrity during the performance of this contract and shall take no action in violation of state or federal laws or regulations or any other applicable laws or regulations, or other requirements applicable to Contractor or that govern contracting or procurement with the Commonwealth.

**b.** Contractor shall establish and implement a written business integrity policy, which includes, at a minimum, the requirements of these provisions as they relate to the Contractor activity with the Commonwealth and Commonwealth employees and which is made known to all Contractor employees. Posting these Contractor Integrity Provisions conspicuously in easily-accessible and well-lighted places customarily frequented by employees and at or near where the contract services are performed shall satisfy this requirement.

**c.** Contractor, its affiliates, agents, employees and anyone in privity with Contractor shall not accept, agree to give, offer, confer, or agree to confer or promise to confer, directly or indirectly, any gratuity or pecuniary benefit to any person, or to influence or attempt to influence any person in violation of any federal or state law, regulation, executive order of the Governor of Pennsylvania, statement of policy, management directive or any other published standard of the Commonwealth in connection with performance of work under this contract, except as provided in this contract.

**d.** Contractor shall not have a financial interest in any other contractor, subcontractor, or supplier providing services, labor, or material under this contract, unless the financial interest is disclosed to the Commonwealth in writing and the Commonwealth consents to Contractor's financial interest prior to Commonwealth execution of the contract. Contractor shall disclose the financial interest to the Commonwealth at the time of bid or proposal submission, or if no bids or proposals are solicited, no later than Contractor's submission of the contract signed by Contractor.

**e.** Contractor certifies to the best of its knowledge and belief that within the last five (5) years Contractor or Contractor Related Parties have not:

(1) been indicted or convicted of a crime involving moral turpitude or business honesty or integrity in any jurisdiction;

(2) been suspended, debarred or otherwise disqualified from entering into any contract with any governmental agency;

(3) had any business license or professional license suspended or revoked;

(4) had any sanction or finding of fact imposed as a result of a judicial or administrative proceeding related to fraud, extortion, bribery, bid rigging, embezzlement, misrepresentation or anti-trust; and

(5) been, and is not currently, the subject of a criminal investigation by any federal, state or local prosecuting or investigative agency and/or civil anti-trust investigation by any federal, state or local prosecuting or investigative agency.

If Contractor cannot so certify to the above, then it must submit along with its bid, proposal or contract a written explanation of why such certification cannot be made and the Commonwealth will determine whether a contract may be entered into with the Contractor. The Contractor's obligation pursuant to this certification is ongoing from and after the effective date of the contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to immediately notify the Commonwealth in writing if at any time during the term of the contract it becomes aware of any event which would cause the Contractor's certification or explanation to change. Contractor acknowledges that the Commonwealth may, in its sole discretion, terminate the contract for cause if it learns that any of the certifications made herein are currently false due to intervening factual circumstances or were false or should have been known to be false when entering into the contract.

**f.** Contractor shall comply with the requirements of the *Lobbying Disclosure Act (65 Pa.C.S. §13A01 et seq.)* regardless of the method of award. If this contract was awarded on a Non-bid Basis, Contractor must also comply with the requirements of the *Section 1641 of the Pennsylvania Election Code (25 P.S. §3260a)*.

**g.** When Contractor has reason to believe that any breach of ethical standards as set forth in law, the Governor's Code of Conduct, or these Contractor Integrity Provisions has occurred or may occur, including but not limited to contact by a Commonwealth officer or employee which, if acted upon, would violate such ethical standards, Contractor shall immediately notify the Commonwealth contracting officer or the Office of the State Inspector General in writing.

**h.** Contractor, by submission of its bid or proposal and/or execution of this contract and by the submission of any bills, invoices or requests for payment pursuant to the contract, certifies and represents that it has not violated any of these Contractor Integrity Provisions in connection with the submission of the bid or proposal, during any contract negotiations or during the term of the contract, to include any extensions thereof. Contractor shall immediately notify the Commonwealth in writing of any actions or occurrences that would result in a violation of these Contractor Integrity Provisions. Contractor agrees to reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of the State

Inspector General for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the Commonwealth that results in the suspension or debarment of the Contractor. Contractor shall not be responsible for investigative costs for investigations that do not result in the Contractor's suspension or debarment.

i. Contractor shall cooperate with the Office of the State Inspector General in its investigation of any alleged Commonwealth agency or employee breach of ethical standards and any alleged Contractor non-compliance with these Contractor Integrity Provisions. Contractor agrees to make identified Contractor employees available for interviews at reasonable times and places. Contractor, upon the inquiry or request of an Inspector General, shall provide, or if appropriate, make promptly available for inspection or copying, any information of any type or form deemed relevant by the Office of the State Inspector General to Contractor's integrity and compliance with these provisions. Such information may include, but shall not be limited to, Contractor's business or financial records, documents or files of any type or form that refer to or concern this contract. Contractor shall incorporate this paragraph in any agreement, contract or subcontract it enters into in the course of the performance of this contract/agreement solely for the purpose of obtaining subcontractor compliance with this provision. The incorporation of this provision in a subcontract shall not create privity of contract between the Commonwealth and any such subcontractor, and no third party beneficiaries shall be created thereby.

j. For violation of any of these Contractor Integrity Provisions, the Commonwealth may terminate this and any other contract with Contractor, claim liquidated damages in an amount equal to the value of anything received in breach of these Provisions, claim damages for all additional costs and expenses incurred in obtaining another contractor to complete performance under this contract, and debar and suspend Contractor from doing business with the Commonwealth. These rights and remedies are cumulative, and the use or non-use of any one shall not preclude the use of all or any other. These rights and remedies are in addition to those the Commonwealth may have under law, statute, regulation, or otherwise.

## APPENDIX C

### CONTRACTOR RESPONSIBIITY PROGRAM

For the purpose of these provisions, the term contractor is defined as any person, including, but not limited to, a bidder, offeror, loan recipient, grantee or lessor, who has furnished or performed or seeks to furnish or perform, goods, supplies, services, leased space, construction or other activity, under a contract, grant, lease, purchase order or reimbursement agreement with the Commonwealth of Pennsylvania (Commonwealth). The term contractor includes a permittee, licensee, or any agency, political subdivision, instrumentality, public authority, or other public entity in the Commonwealth.

1. The Contractor certifies, in writing, for itself and its subcontractors required to be disclosed or approved by the Commonwealth, that as of the date of its execution of this Bid/Contract, that neither the Contractor, nor any such subcontractors, are under suspension or debarment by the Commonwealth or any governmental entity, instrumentality, or authority and, if the Contractor cannot so certify, then it agrees to submit, along with its Bid/Contract, a written explanation of why such certification cannot be made.

2. The Contractor also certifies, in writing, that as of the date of its execution of this Bid/Contract it has no tax liabilities or other Commonwealth obligations, or has filed a timely administrative or judicial appeal if such liabilities or obligations exist, or is subject to a duly approved deferred payment plan if such liabilities exist.

3. The Contractor's obligations pursuant to these provisions are ongoing from and after the effective date of the Contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to inform the Commonwealth if, at any time during the term of the Contract, it becomes delinquent in the payment of taxes, or other Commonwealth obligations, or if it or, to the best knowledge of the Contractor, any of its subcontractors are suspended or debarred by the Commonwealth, the federal government, or any other state or governmental entity. Such notification shall be made within 15 days of the date of suspension or debarment.

4. The failure of the Contractor to notify the Commonwealth of its suspension or debarment by the Commonwealth, any other state, or the federal government shall constitute an event of default of the Contract with the Commonwealth.

5. The Contractor agrees to reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of State Inspector General for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the Commonwealth that results in the suspension or debarment of the contractor. Such costs shall include, but shall not be limited to, salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Contractor shall not be responsible for investigative costs for investigations that do not result in the Contractor's suspension or debarment.

6. The Contractor may obtain a current list of suspended and debarred Commonwealth contractors by either searching the Internet at <http://www.dgs.state.pa.us/> or contacting the:

Department of General Services  
Office of Chief Counsel  
603 North Office Building  
Harrisburg, PA 17125  
Telephone No: (717) 783-6472  
FAX No: (717) 787-9138



## APPENDIX D

### PROVISIONS CONCERNING THE *AMERICANS WITH DISABILITIES ACT*

For the purpose of these provisions, the term contractor is defined as any person, including, but not limited to, a bidder, offeror, supplier, or grantee, who will furnish or perform or seeks to furnish or perform, goods, supplies, services, construction or other activity, under a purchase order, contract, or grant with the Commonwealth of Pennsylvania (Commonwealth).

During the term of this agreement, the contractor agrees as follows:

1. Pursuant to federal regulations promulgated under the authority of the *Americans with Disabilities Act*, 28 C. F. R. § 35.101 et seq., the contractor understands and agrees that no individual with a disability shall, on the basis of the disability, be excluded from participation in this agreement or from activities provided for under this agreement. As a condition of accepting and executing this agreement, the contractor agrees to comply with the "General Prohibitions Against Discrimination," 28 C. F. R. § 35.130, and all other regulations promulgated under *Title II* of the *Americans with Disabilities Act* which are applicable to the benefits, services, programs, and activities provided by the Commonwealth through contracts with outside contractors.
2. The contractor shall be responsible for and agrees to indemnify and hold harmless the Commonwealth from all losses, damages, expenses, claims, demands, suits, and actions brought by any party against the Commonwealth as a result of the contractor's failure to comply with the provisions of paragraph 1.

## APPENDIX E

### ENHANCED MINIMUM WAGE PROVISIONS

1. **Enhanced Minimum Wage.** Contractor agrees to pay no less than \$12.00 per hour to its employees for all hours worked directly performing the services called for in this Contract, and for an employee's hours performing ancillary services necessary for the performance of the contracted services or lease when such employee spends at least twenty per cent (20%) of their time performing ancillary services in a given work week.
2. **Adjustment.** Beginning July 1, 2019, and annually thereafter, the minimum wage rate shall be increased by \$0.50 until July 1, 2024, when the minimum wage reaches \$15.00. Thereafter, the minimum wage rate would be increased by an annual cost-of-living adjustment using the percentage change in the Consumer Price Index for All Urban Consumers (CPI-U) for Pennsylvania, New Jersey, Delaware, and Maryland. The applicable adjusted amount shall be published in the Pennsylvania Bulletin by March 1 of each year to be effective the following July 1.
3. **Exceptions.** These Enhanced Minimum Wage Provisions shall not apply to employees:
  - a. exempt from the minimum wage under the Minimum Wage Act of 1968;
  - b. covered by a collective bargaining agreement;
  - c. required to be paid a higher wage under another state or federal law governing the services, including the Prevailing Wage Act and Davis-Bacon Act; or
  - d. required to be paid a higher wage under any state or local policy or ordinance.
4. **Notice.** Contractor shall post these Enhanced Minimum Wage Provisions for the entire period of the contract conspicuously in easily-accessible and well-lighted places customarily frequented by employees at or near where the contracted services are performed.
5. **Records.** Contractor must maintain and, upon request and within the time periods requested by the Commonwealth, furnish all employment and wage records necessary to document compliance with these Enhanced Minimum Wage Provisions.
6. **Sanctions.** Failure to comply with these Enhanced Minimum Wage Provisions may result in the imposition of sanctions, which may include, but shall not be limited to, termination of the contract or lease, nonpayment, debarment or referral to the Office of General Counsel for appropriate civil or criminal referral.
7. **Subcontractors.** Contractor shall include the provisions of these Enhanced Minimum Wage Provisions in every subcontract so that these provisions will be binding upon each subcontractor.

# BID PROPOSAL

**CONTRACT NO.  
DMVA 42080032**

## **NOTICE TO BIDDERS**

Department of Military and Veterans Affairs, Bureau of Office Services, Procurement and Contracting, Building 0- 47, Fort Indiantown Gap, Annville, Pennsylvania 17003-5002.

Project. ....CSMS New Calibration Laboratory

Location..... Area 10, Fort Indiantown Gap, Annville, PA.

Agency.....Department of Military and Veterans Affairs

Brief Description.....Project will be to provide all labor, materials, devices, tools, and equipment required for the construction of a new 6000SF, Calibration Laboratory for the CSMS

Contracting Officer:.....Tina Rebuck

Opening Date and Time..... June 12<sup>th</sup>, 2020 at 2PM

Contract Number.....DMVA. 42080032

Bid Guaranty .....Payable to the Commonwealth of Pennsylvania, Department of Military and Veterans Affairs, in an amount not less than ten (10%) percent of the bid.

Proposed Date of Completion .....325 Calendar Days from the Initial Job Conference

Period.....60 Days allowed from Bid Opening until Award of Contract

**MANDATORY Vendor Registration:** All Bidders must be registered to secure plans and specifications and must have a current, active vendor number. Register at [www.pasupplierportal.state.pa.us](http://www.pasupplierportal.state.pa.us).

**Public Works Employment Verification Act:** The Bidder must comply with the Public Works Employment Verification Act 127 of 2012 by submitting to the Department with your bid submission and prior to the award of the contract.

Forms that need to be completed and submitted with your bid:

Bid Proposal  
Bidder Certification  
Bid Bond  
Lobbying Certification Form  
Public Works Employment Verification Form  
Site Visit Form  
Reciprocal Limitations Form  
Addendums





# **BID PROPOSAL**

**Department of Military and  
Veterans Affairs  
Bldg 0-47, Fort Indiantown Gap  
Annville, PA 17003**

*Do not write in space below*

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

Bid Opening Witness:  
\_\_\_\_\_

Legal Review:  
\_\_\_\_\_

**CONTRACT NO. 42080032  
ELECTRICAL  
CSMS CALIBRATION  
LABORATORY  
AREA 10 – FORT  
INDIANTOWN GAP**

**Bidder Name and Address:**

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

**Bidder Phone #:**

**Bidder FAX #:**

**Bidder Email:**

**Bidder Federal ID #:**

**Vendor ID #:**

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

**BULLETIN INFORMATION:** Bidder acknowledges receipt of the following Addenda(s) and agrees they are part of this Bid Proposal.

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

**BASE BIDS**

**THE BIDDER MUST TYPE/WRITE ITS TOTAL BID PRICE FOR EACH SEPARATE  
BASE BID ON THIS "BASE BID" SHEET. DO NOT SOLELY WRITE ANY  
ADDITIONAL OR DEDUCTED AMOUNT ON THE BASE BID LINE.**

**Base Bid #1:**

For all **ELECTRICAL** the sum of

\_\_\_\_\_ Dollars (\$\_\_\_\_\_). (Written)



# **BID PROPOSAL**

**Department of Military and  
Veterans Affairs  
Bldg 0-47, Fort Indiantown Gap  
Annville, PA 17003**

*Do not write in space below*

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

Bid Opening Witness:  
\_\_\_\_\_

Legal Review:  
\_\_\_\_\_

**CONTRACT NO. 42080032  
GENERAL CONSTRUCTION  
CSMS CALIBRATION  
LABORATORY  
AREA 10 – FORT  
INDIANTOWN GAP**

**Bidder Name and Address:**

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

**Bidder Phone #:**

**Bidder FAX #:**

\_\_\_\_\_

**Bidder Email:**

**Bidder Federal ID #:**

\_\_\_\_\_

**Vendor ID #:**

\_\_\_\_\_

**BULLETIN INFORMATION:** Bidder acknowledges receipt of the following Addenda(s) and agrees they are part of this Bid Proposal.

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda# \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

**BASE BIDS**

**THE BIDDER MUST TYPE/WRITE ITS TOTAL BID PRICE FOR EACH SEPARATE  
BASE BID ON THIS "BASE BID" SHEET. DO NOT SOLELY WRITE ANY  
ADDITIONAL OR DEDUCTED AMOUNT ON THE BASE BID LINE.**

**Base Bid #1:**

For all **GENERAL CONSTRUCTION** the sum of

\_\_\_\_\_ Dollars (\$\_\_\_\_\_). (Written)





# **BID PROPOSAL**

**Department of Military and  
Veterans Affairs  
Bldg 0-47, Fort Indiantown Gap  
Annville, PA 17003**

*Do not write in space below*

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

Bid Opening Witness:  
\_\_\_\_\_

Legal Review:  
\_\_\_\_\_

**CONTRACT NO. 42080032  
HVAC  
CSMS CALIBRATION  
LABORATORY  
AREA 10 – FORT  
INDIANTOWN GAP**

**Bidder Name and Address:**

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

**Bidder Phone #:**

**Bidder FAX #:**

**Bidder Email:**

**Bidder Federal ID #:**

**Vendor ID #:**

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

**BULLETIN INFORMATION:** Bidder acknowledges receipt of the following Addenda(s) and agrees they are part of this Bid Proposal.

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda# \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

**BASE BIDS**

**THE BIDDER MUST TYPE/WRITE ITS TOTAL BID PRICE FOR EACH SEPARATE  
BASE BID ON THIS "BASE BID" SHEET. DO NOT SOLELY WRITE ANY  
ADDITIONAL OR DEDUCTED AMOUNT ON THE BASE BID LINE.**

**Base Bid #1:**

For all **HVAC** the sum of

\_\_\_\_\_ Dollars (\$\_\_\_\_\_). (Written)



# BID PROPOSAL

Department of Military and  
Veterans Affairs  
Bldg 0-47, Fort Indiantown Gap  
Annville, PA 17003

*Do not write in space below*

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

Bid Opening Witness:  
\_\_\_\_\_

Legal Review:  
\_\_\_\_\_

**CONTRACT NO. 42080032  
PLUMBING  
CSMS CALIBRATION  
LABORATORY  
AREA 10 – FORT  
INDIANTOWN GAP**

**Bidder Name and Address:**

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

**Bidder Phone #:**

**Bidder FAX #:**

**Bidder Email:**

**Bidder Federal ID #:**

**Vendor ID #:**

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

**BULLETIN INFORMATION:** Bidder acknowledges receipt of the following Addenda(s) and agrees they are part of this Bid Proposal.

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda# \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

Addenda # \_\_\_ Issue Date: \_\_\_\_\_

**BASE BIDS**

**THE BIDDER MUST TYPE/WRITE ITS TOTAL BID PRICE FOR EACH SEPARATE  
BASE BID ON THIS "BASE BID" SHEET. DO NOT SOLELY WRITE ANY  
ADDITIONAL OR DEDUCTED AMOUNT ON THE BASE BID LINE.**

**Base Bid #1:**

For all **PLUMBING** the sum of

\_\_\_\_\_ Dollars (\$\_\_\_\_\_). (Written)

# BIDDER ORGANIZATIONAL INFORMATION

---

## **BIDDER ORGANIZATION (Check applicable box)**

- The Bidder is a corporation, limited liability company, or partnership organized and existing under the laws of Pennsylvania and has been granted a certificate of authority to do business in Pennsylvania as required by the Business Corporation Law of 1988, as amended \_\_\_\_\_

OR

- The Bidder is a corporation organized and existing under the laws of \_\_\_\_\_ and **has or has not** (circle one) been granted a certificate of authority to do business in Pennsylvania as required by the Business Corporation Law of 1988 (15 Pa. C.S. §4121-§4131), as amended.

OR

- The Bidder is a limited liability company organized and existing under the laws of \_\_\_\_\_ and **has or has not** (circle one) registered to do business in Pennsylvania as required by the Limited Liability Company Law of 1994 (15 Pa. C.S. §8981-§8982), as amended.

OR

- The Bidder is a limited partnership organized and existing under the laws of \_\_\_\_\_ and **has or has not** (circle one) registered to do business in Pennsylvania as required by the Partnership Code (15 Pa. C.S. §8581-§8590), as amended.

OR

- The Bidder is an individual or partnership trading under a fictitious or assumed name and **has or has not** (circle one) registered under the Fictitious Names Act (54 Pa. C.S. §301-§332), as amended.

## **BIDDER RESIDENCE INFORMATION**

Bidder has a bona fide establishment in Pennsylvania at which it was transacting business when the Notice to Bidders for this Project was issued?

If **"Yes"**, insert address below if different than address on page 1:

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

If **"No"**, insert Bidder's office address if different than address on page 1.

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

**CERTIFICATION AND BID SIGNATURE**

To Department of Military and Veterans Affairs (DMVA), Annville, Pennsylvania,

In conformity with the plans and specifications prepared by the **PROFESSIONAL as** listed on the eMarketplace website under **solicitation number 42080032** and after an examination of the site of the work, and all the contract documents, including issued Addendums, which are made a part hereof as if fully set forth herein, the undersigned (hereinafter "Bidder") submits this bid and certifies by signing below:

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

**BIDDER AS AN INDIVIDUAL:**

Witness:

\_\_\_\_\_

By:

\_\_\_\_\_

Contractor – Individual

**BIDDER IS A PARTNERSHIP:**

Witness:

\_\_\_\_\_

By:

\_\_\_\_\_

Contractor – General Partner

**BIDDER IS A LIMITED LIABILITY COMPANY:**

Witness:

\_\_\_\_\_

By:

\_\_\_\_\_ Secretary

President

**BIDDER IS A CORPORATION:**

Attest:

\_\_\_\_\_

By:

\_\_\_\_\_

President

Secretary

**PROJECT MANUAL**

**DMVA PROJECT NO. 42080032**

**For**

**NEW CALIBRATION LABORATORY  
PENNSYLVANIA NATIONAL GUARD TRAINING CENTER  
AREA 10, FORT INDIANTOWN GAP  
ANNVILLE – LEBANON COUNTY – PENNSYLVANIA - 17003**

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF MILITARY AND VETERANS' AFFAIRS  
HARRISBURG, PENNSYLVANIA**

**Tom Wolf, GOVERNOR  
Major General Anthony Carrelli, ADJUTANT GENERAL**

**Date: 16, March 2020**

**DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
Office of Facilities and Engineering  
Bureau of Design and Project Management  
Bldg. 0-10, Ft. Indiantown Gap  
Anville, Lebanon County, Pa. 17003  
Phone: (717) 861-9748 Fax: (717) 861-8583**

## DRAWINGS

### NUMBER AND TITLE OF DRAWINGS

The drawings which form a part of this project are indicated in the following list.

|       |   |
|-------|---|
| G.1.0 | COVER SHEET                             |
| G.1.1 | ABBREVIATIONS, LEGEND AND GENERAL NOTES |
| C.1.0 | EXISTING SITE PLAN                      |
| C.2.0 | PROPOSED SITE PLAN                      |
| C.2.1 | CIVIL DETAILS                           |
| C.3.0 | E & S PLAN                              |
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## SECTION 010100 – SUMMARY OF WORK

### PART 1 – GENERAL

#### 1.1 STIPULATIONS

- a. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof. Contractor shall note that reference to “Project Design Documents” refers to any and all documentation included within the Project Bid and/or Award Package. This includes, but is not limited to drawings, specifications, Government forms, contractual literature, etc.

#### 1.2 SCOPE OF WORK, GENERAL

- a. The work under this Contract shall generally consist of, but not necessarily be limited to, providing all labor, material, devices, tools and equipment required for the construction of a new 6000 SF, Calibration Laboratory for the CSMS at the Fort Indiantown Gap Pennsylvania National Guard Training Center, located in Annville, Lebanon County, PA and shall be in total accordance with the specifications and drawings and subject to the terms and conditions of all other Contract Documents.

#### 1.3 PERFORMANCE PERIOD

- a. *Three Hundred and twenty-five* (325) calendar days from Government granted Notice to Proceed.

#### 1.4 WAGE SCALES

- a. Wage Scales ARE REQUIRED to be paid on this Project.

#### 1.5 QUESTIONS DURING BID PROCESS

- a. Direct all questions pertaining to the project as shown and described in the contract documents to both persons listed below.

Mr. Jason R. Nye, Architectural Designer II  
DMVA, Bureau of Military Construction & Engineering  
Bldg. 0-10, Fort Indiantown Gap  
Annville, PA 17003  
Email: [jnye@state.pa.us](mailto:jnye@state.pa.us)  
Ph.: 717.861.9748 Fax: 717.861.8683

Department of Military and Veterans Affairs State Contracting Office  
Building 0-47, Fort Indiantown Gap  
Annville, PA 17003

Ph.: 717.861.8794

Fax: 717.861.2932

- b. Should the contractor submit an RFI via email, the subject line shall appear as follows:
  - 1. **DMVA Project#: 42080032\_New Calibration Lab**
  - 2. Additional information can be included thereafter.

## 1.6 SUBMITTALS

- a. See individual Sections and “SCHEDULE OF MATERIAL SUBMITTALS (AF FORM 66)” included within the project Design Documents
- b. Submittals shall be forwarded to Department of Military & Veteran’s Affairs; Division of Engineering and Architecture, Building 0-10, Fort Indiantown Gap, Annville, Pa 17003
- c. Each submittal shall include the following:
  - 1. Project number
  - 2. Contract number
  - 3. Related specification section
  - 4. Contractor’s approval stamp
  - 5. Contractors initials and date
  - 6. Area for DMVA-BMCE review stamp
- d. All submittals must be approved by the discipline responsible, DMVA-BMCE **Design Professional** prior to incorporation into the project.

## 1.7 REQUIRED WARRANTIES

- a. Contractor shall provide all required warranties as outlined within the Project Design Specifications and on all included Government AF Form 66’s.

## PART 2 – OUTLINE OF REQUIRED WORK

- 2.1 The work of this project consists of but is not necessarily limited to the following. Detailed requirements of the work are described on the pertinent specification sections and/or shown on the drawings.
  - a. (GENERAL – POINT 1)
    - 1. Prepare and submit all necessary pre-construction documentation as outlined within the project Design Documents.
    - 2. Excavate/prepare site per Project Design Documents.
    - 3. Construct/Install all foundation aspects per Project Design Documents.
    - 4. Construct exterior masonry walls as per Project Design Documents.
    - 5. Install pre-manufactured roof trusses as depicted within the Project Design Documents.
    - 6. Install all additional exterior building and site features per the Project Design Documents.
    - 7. Install all interior facility features, to include but not limited to, stud walls, doors, flooring, ceilings, etc. as depicted within the Project Design Documents.

8. Complete Punch Lists and Final Cleaning.
  9. Provide all required closeout documentation and training per the Project Design Documents prior to deeming/granting the project complete.
- b. (HVAC – POINT 2)
1. Prepare and submit all necessary pre-construction documentation as outlined within the project Design Documents.
  2. Excavate for sanitary waste and water supply lines per Project Design Documents.
  3. Construct/Install all HVAC ductwork, duct accessories & Insulation per Project Design Documents.
  4. Install Air Handlers, Duct Furnaces & Condenser Units as per Project Design Documents.
  5. Install Duct Accessories, Diffusers and Registers as per Project Design Documents.
  6. Install all Exhaust fans related ductwork, and louver per the Project Design Documents.
  7. Install all Wall Heaters as per the Project Design Documents.
  8. Provide certified Testing, balancing and Adjustment to HVAC System and Reports.
  9. Provide all required closeout documentation and training per the Project Design Documents prior to deeming/granting the project complete.
- c. (PLUMBING – POINT 3)
1. Excavations & Installation of Sanitary Waste
  2. Indoor Sanitary Waste and Vent Line Installation
  3. Plumbing Fixtures Installation and Rough-Ins
  4. Indoor Domestic Water Line installation and related Insulation
  5. Installation of Tankless water heater and Venting
  6. Excavation & Installation of Domestic Water Service
  7. Testing and Adjusting.
  8. Final Cleaning, Punch List Items, Close-Out Documents.
- d. (ELECTRICAL – POINT 4)
1. Prepare and submit all necessary pre-construction documentation as outlined within the Project Design Documents.
  2. Excavate/prepare site for ground counterpoise and loop as per Project Design Documents.
  3. Provide all electrical service equipment per Project Design Documents.
  4. Provide all trenching, conduits, foundations, and equipment as per Project Design Documents.
  5. Provide all 15KV class work, transformer, foundation, and line work as per Project Design Documents.
  6. Provide all electrical distribution panels and equipment as per the Project Design Documents.
  7. Provide all lighting, controls, sensors, and devices as per the Project Design Documents.
  8. Install all branch circuits, outlets, devices, fixtures, and sensors as per Project Design Documents.
  9. Provide all communications equipment, cable, splices, terminations, testing, conduit, and the like as per Project Design Documents.

10. Complete Punch Lists and Final Cleaning.
11. Provide all required closeout documentation and training per the Project Design Documents prior to deeming/granting the project complete.

**END OF SECTION 010100**

## **SECTION 011200 – COORDINATION AND CONTROL**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

#### **1.2 SUMMARY**

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls that govern the performance of the work to complete this project.
- B. Specific requirements for work of each contract are also indicated in individual Specification Sections and on Drawings.

#### **1.3 PRIME CONTRACTS FOR CONSTRUCTION**

- A. Point 1 – General (Lead)
- B. Point 2 – HVAC
- C. Point 3 – Plumbing
- D. Point 4 – Electrical

#### **1.4 WORK HOURS**

- A. Regular work hours will be Monday through Friday, 7:00 am to 4:30 pm.
- B. Holidays: No work will be allowed on holidays observed by the State and Federal Government.
- C. Weekends: No work will be allowed on weekends.
- D. Exceptions: If deemed necessary, exceptions to the above can be made. Prime Contractors must submit, in writing, justification for such an exception and approval from the Department must be obtained prior to commencement of any work.
  - 1. Fort Indiantown Gap: Any and all work that takes place outside of the working hours as listed herein, shall be coordinated with the DMVA-FTIG Construction Manager. Contractor(s) performing work on approved dates shall submit, in writing, a list of all employees that will be on site for the days approved. This list of employees will be submitted to the Fort Indiantown Gap Police Dept. by the DMVA-FTIG Construction Manager.



## 1.5 COORDINATION

- A. The General Contractor shall be responsible for coordination between all contracts.
  - 1. Construction operations shall be coordinated to ensure efficient and orderly installation of each part of the work.
  - 2. Coordinate installation of different components with other Contractors to ensure accessibility for required construction operations.
  - 3. Make necessary provisions to accommodate items scheduled for later installation.

## PART 2 - TEMPORARY FACILITIES AND EQUIPMENT

### 2.1 GENERAL

- A. It shall be the responsibility of each Contractor to provide, maintain, and remove all facilities and equipment necessary for construction operations for individual Contracts. All restoration required due to contract operations, shall be the responsibility of each individual Contractor for his location/area of operation, at no expense to the Department. Where there is conflict with responsibility, the General Contractor shall be responsible for restoration, at no cost to the Department.
  - 1. These items include, but are not limited to:
    - a. Costs and use charges associated with the facility.
    - b. Plug-in cords, power cords, and extension cords, power tools.
    - c. Task lighting and special lighting necessary for construction operations.
    - d. Storage and fabrication structures/areas.
    - e. Temporary enclosures for construction activities.
    - f. Hoisting equipment for construction activities.
    - g. Waste disposal facilities, including collection and legal disposal of its own waste materials.
    - h. Daily cleaning of work area.
    - i. Secure lockup of tools, materials, and equipment.
    - j. Construction aids, services, and facilities necessary for individual construction activities.

### 2.2 FIELD OFFICES

#### A. CONTRACTOR TRAILERS/OFFICES

- 1. The Prime Contractor(s) shall provide and maintain, at their cost, a suitable office on the premises. Trailer/offices shall be located based on either the staging area depicted on the Project Design Documents and/or the location determined during the Pre-Construction Coordination Meeting. The Contractor shall provide and maintain all necessary services and utilities for their respective offices and/or trailers, to include, but not limited to; electrical services, sanitary and water services, heating and cooling, telephone/fax and internet services.

#### B. SANITARY FACILITIES

1. Portable Toilets (Porta Johns) – Point 1 General Contractor (Lead), at their costs, shall be responsible for providing and maintaining any and all temporary toilet facilities. Toilets are to be utilized by all persons (Contractors, Sub-Contractors, DMVA Personnel, etc.) associated with the project.
  - a. Cleaning, Pumping and Maintenance of the portable toilets shall be the responsibility of the Point 1 General Contractor.

### PART 3 - TEMPORARY SERVICES/UTILITIES DURING CONSTRUCTION

#### 3.1 CONTRACTOR RESPONSIBILITIES

- A. The General Contractor shall be responsible for all temporary heating, cooling, ventilation, power, lighting and water/sewer. This shall include, unless otherwise indicated, utility-use charges, temporary meters, and temporary connections, necessary during construction operations.
- B. The designated Contractor shall install, operate, protect and maintain the respective temporary services as specified herein during the duration of the entire project.
- C. Temporary connections to new and/or existing permanent service lines shall be made at locations as directed by the Department, and when the temporary service lines are no longer required, they shall be removed by the Contractor. Any part or parts of the permanent service lines, grounds and building, disturbed and damaged by the installation and/or removal of the temporary service lines, shall be restored to their original condition by the Contractor responsible for the temporary installation.
- D. If the Contractor fails to carry out its responsibility in supplying temporary services as set forth in this contract it is responsible for such failure and the Department may take such action as it deems proper for the protection and conduct of the work and shall deduct the cost involved from the amount due the Contractor. Only those temporary utilities required for construction need to be extended to the work area(s).

#### 3.2 INTERRUPTION OF SERVICES

- A. Each Prime Contractor shall have all needed equipment and material to complete planned work at the site prior to shutting down any system.
- B. No additional compensation or time will be given to the Contractor if work must be performed on State or National Holidays or on weekends or on overtime. See Paragraph 1.4 on 'Working Hours'.

#### 3.3 WELDING

- A. Any Contractor using electrical power for welding on the site shall use self-contained engine generating units.

#### 3.4 FIRE EXTINGUISHERS

- A. Each Contractor shall provide UL listed, NFPA approved fire extinguishers (ten (10) lb. minimum) at the construction site during operations, suitable for all types of fires in accordance with OSHA.

**END OF SECTION 011200**

## SECTION 013100 - SEQUENCE OF CONSTRUCTION AND MILESTONES

### Part 1 GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of Contract" and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### 1.2 GENERAL REQUIREMENTS

- A. Before beginning work, the Contractor will be required to prepare a schedule in consultation with the Department. The work must be carried out in full accordance with the schedule. The Contractor shall arrange without any unnecessary interference with the Institution's operation.

#### 1.3 CRITICAL MATERIALS AND EQUIPMENT

- A. The Contractor is cautioned that all necessary and required critical materials and equipment shall be ordered as quickly as possible, in order that the shipping will not delay the progress of the work or completion of the project.

#### 1.4 CRITICAL ITEMS TO BE NOTED AS MILESTONES

- A. Refer to the General Conditions regarding construction progress Milestones to be established by the Lead Contractor.
- B. The Lead Contractor shall submit a construction schedule, for the total project, including all prime contractors critical path work items. The schedule shall be submitted at the pre-construction meeting. The schedule will be reviewed and approved by the designer and the using agency to confirm compliance with construction sequencing and Using Agency training schedule.

#### 1. GENERAL CONSTRUCTION (.1)

##### a. Construction Sequencing

- 1) Submittals
- 2) Mobilization
- 3) Site Clearing and E&S Measures
- 4) Excavation – Foundation
- 5) Concrete – Foundation
- 6) Concrete - Floor Slab
- 7) Concrete - Sidewalk, Stoops, Fence Posts
- 8) Exterior Walls - Masonry
- 9) Exterior Walls - Metal Studs, Sheathing
- 10) Exterior Walls - Insulation & Elast. Barrier
- 11) Exterior Walls - EIFS
- 12) Roof – Trusses
- 13) Roof – Sheathing
- 14) Roof - Metal Panels
- 15) Vinyl Soffit, Trim
- 16) Interior Walls - Metal Studs
- 17) Insulation - Interior and Roof
- 18) Interior Walls - Gypsum Board
- 19) Doors & Windows - Exterior (Incl. Hardware)

- 20) Doors & Windows - Interior (Incl. Hardware)
- 21) Painting - Interior & Exterior
- 22) Flooring - Carpet, VCT & Wall Base
- 23) Cabinetry, T.R. Accessories, FE Cabinets
- 24) Final Grading, Seeding
- 25) Final Cleaning, Puch List Items, Close-Out Documents

2. HVAC (.2)

a. Construction Sequencing

- 1) Submittals
- 2) Mobilization
- 3) Concrete Pads
- 4) Metal Ductwork
- 5) Duct Insulation
- 6) Duct Accessories & VVT System
- 7) Diffusers and Grilles
- 8) Power Ventilators & Louver
- 9) Wall unit Heaters
- 10) Instrumentation and Controls
- 11) Air handlers & Condenser Units
- 12) Duct Furnace & Vents
- 13) Testing, Adjusting & Balancing
- 14) Interior Gas Lines & Valves
- 15) Exterior Gas Lines & Regulator
- 16) Excavation & Backfill for Gas Line

3. PLUMBING (.3)

a. Construction Sequencing

- 1) Submittals
- 2) Mobilization
- 3) Excavations & Installation of Sanitary Waste
- 4) Indoor Sanitary Waste and Vent Line Installation
- 5) Plumbing Fixtures Installation and Rough-Ins
- 6) Indoor Domestic Water Line installation and related Insulation
- 7) Installation of Tankless water heater and Venting
- 8) Excavation & Installation of Domestic Water Service
- 9) Testing and Adjusting
- 10) Final Cleaning, Puch List Items, Close-Out Documents

4. ELECTRICAL (.4)

a. Construction Sequencing

- 1) Submittals
- 2) Mobilization
- 3) Underground Rough-Ins to include trenching
- 4) Ground Counterpoise and Ring
- 5) 15KV Cable, Terminations and Testing
- 6) Transformer and Vault installation
- 7) Trench backfill, tamping up to rough-grade.
- 8) 15KV class work
- 9) Panel Rough-Ins
- 10) Branch Circuit Rough-Ins
- 11) Telecom Rough-Ins.
- 12) Branch Circuit Wiring

- 13) Telecom wiring and testing
- 14) Installation of Lighting
- 15) Installation of devices and outlets
- 16) Telecom Cable, Boxes and Outlets
- 17) Telecom testing and reports.
- 18) Testing and Adjusting
- 19) Final Connections
- 20) Final Cleaning, Punchlist Items, and Close-Out Documentation.

**END OF SECTION 013100**

## SECTION 013000 - SUBMITTALS

### Part 1 GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of Contract" and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### 1.2 SECTION INCLUDES/CONTENT

- A. Included in this section of the specifications is a list of approvals required for all materials incorporated into the project. The Department reserves the right to require additional approvals if necessary. No material, equipment or supplies listed herein shall be incorporated into the work until the Contractor has obtained prior approval from the Department.
- B. Submittals required by each prime contract are indicated within AF Form 66 "Schedule of Material Submittals" attached to the end of Section 01300.

#### 1.3 SUBMITTAL PROCEDURES

- A. Refer to 'Submittals' of the General Conditions.
- B. Comply with the following or resubmission will be required:
  - 1. Indicate contract number, specification section and building number (as shown on the drawings) on each item submitted.
  - 2. Signify approval by stamp, initialing and dating each item prior to submission to the Professional.
- C. Items requiring testing shall be forwarded directly to the approved laboratory. The Contractor shall pay all costs associated with testing.
- D. Expedite critical materials, equipment and shop drawings, and other required submissions.
- E. Incomplete submissions will be returned for resubmission.
- F. Use of substitutions for materials or details shown on the contract drawings or called for in these specifications require written approval from the Department. See General Conditions.

#### 1.4 PRODUCT DATA

- A. Manufacturer's printed directions and manufacturer's standard specifications showing all dimensions, cuts, finishes, etc., as well as catalog cuts and ratings of all material will be required and shall be submitted in advance prior to application and/or installation.

#### 1.5 TESTS

- A. Refer to 'Tests' of the General Conditions.
- B. Submit required reports listing items tested, tests conducted and results obtained as specified.

#### 1.6 CERTIFICATIONS

- A. Submit required certifications in written form identifying authorized representative, manufacturer, systems designer and other required data as specified.

#### 1.7 WARRANTIES

- A. Refer to Specifications for required warranties. Copies of proposed warranties specified for products shall accompany the designated submittal of that product.

#### 1.8 OPERATION AND MAINTENANCE MANUALS

- A. Manual Format (Use 3-ring binder):

1. Title page with the following information for each system covered:
  - a. Project Title and DMVA Contract Number (in capital letters)
  - b. Name of Company
  - c. Name of the individual to be called
  - d. Normal telephone numbers
  - e. Contractor's account number for project
2. Index listing all sections of the Manual.
3. Warranties for equipment furnished in contract. (Index tabbed)
4. Complete system circuit diagrams, block diagrams, copies of all approved shop drawings, which shall clearly illustrate how all the components relate and how they are interconnected and a point wiring diagram.
5. Reports, testing analysis.
6. Operating instructions and maintenance instructions for all equipment and finish materials furnished.

#### 1.9 SUBMITTALS LIST

- A. See attached AF FORM 66 "Schedule of Material Submittals" organized by prime contract.

**END OF SECTION 013000**



| SCHEDULE OF MATERIAL SUBMITTALS<br>(POINT 1 - GENERAL) |   |                              |               |         |                 |                                     |                              |              |                   |               | PROJECT NUMBER<br>DMVA/BMCE-<br>42080032  | PROJECT TITLE<br>New Calibration Lab | SOLICITATION/CONTRACT NUMBER<br>Point 1 - General |                              |                      |                   |                                |                  |                           |                |         |
|--|---|------------------------------|---------------|---------|-----------------|-------------------------------------|------------------------------|--------------|-------------------|---------------|---|--------------------------------------|---|------------------------------|----------------------|-------------------|--------------------------------|------------------|---------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER                    |   |                              |               |         |                 |                                     |                              |              |                   |               | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |                                      |   |                              |                      |                   |                                |                  |                           |                |         |
| LINE NUMBER  | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL<br><br>(DWG.'s.) SPEC SECTION | NUMBER OF COPIES REQUIRED    |               |         |                 |                                     |                              |              |                   |               |   | REQUIRED SUBMISSION<br>DATE          | DATE RECEIVED IN<br>CONTRACTING                   | DATE TO CIVIL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |                  | CONTRACTOR<br>RESUBMITTAL | FINAL APPROVAL | REMARKS |
|  |   | CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SAMPLES | COLOR SELECTION | MANUFACTURER ' S<br>RECOMMENDATIONS | MANUFACTURER ' S<br>WARRANTY | CATALOG DATA | AS-BUILT DRAWINGS | O & M MANUALS | OPERATIONS<br>DEMONSTRATION               |                                      |   |                              |                      |                   | APPROVED                       | DIS-<br>APPROVED |                           |                |         |
| 1  | (Struct) 033000<br>Stone Base   | 6                            |               |         |                 |                                     |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 2  | (Struct) 033000<br>Rebar & WWF  | 6                            |               |         |                 |                                     |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 3  | (Struct) 033000<br>Concrete/Mix Designs   | 6                            |               |         |                 |                                     |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 4  | (Arch) 033000<br>Vapor Barrier  | 6                            |               |         |                 |                                     |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 5  | (Struct) 042000<br>CMU – Shot Blast   | 6                            |               | 1       | 1               | 6                                   |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 6  | (Struct) 042000<br>CMU Sills  | 6                            |               | 1       | 1               | 6                                   |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 7  | (Struct) 054000<br>L.B. Metal Framing   | 6                            |               |         |                 | 6                                   | 6                            | 6            |                   |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 8  | 033000, 072100<br>Rigid Insulation – Found.   | 6                            |               |         |                 | 6                                   |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 9  | 072100<br>Rigid Insulation - Wall   | 6                            |               |         |                 | 6                                   |                              | 6            |                   |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 10   | 072100<br>Polyiso Insulation - Roof   | 6                            |               |         |                 | 6                                   |                              | 6            |                   |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 11   | (Arch, Struct) 076200<br>Sheet Metal Flashing   | 6                            |               |         |                 |                                     |                              | 6            |                   |               |   | NTP<br>+30                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 12   | (Arch, Struct) 061600<br>Sheathing – Walls  | 6                            |               |         |                 | 6                                   | 6                            | 6            |                   |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 13   | (Arch, Struct) 061600<br>Sheathing - Roof   | 6                            |               |         |                 | 6                                   | 6                            | 6            |                   |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |
| 14   | (Struct) 061753<br>Roof Trusses   | 6                            | 6             |         |                 | 6                                   | 6                            | 6            | 3                 |               |   | NTP<br>+45                           |   |                              |                      |                   |                                |                  |                           |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>(POINT 1 - GENERAL) |  |                              |               |         |                 |                                   |                            |              |                   |               | PROJECT NUMBER<br>DMVA/BMCE-<br>420540    | PROJECT TITLE<br>New DMVA Annex –<br>J.E.O.C | SOLICITATION/CONTRACT NUMBER |                      |                   |                                |          |                           |                   |         |
|--|--|------------------------------|---------------|---------|-----------------|-----------------------------------|----------------------------|--------------|-------------------|---------------|---|--|------------------------------|----------------------|-------------------|--------------------------------|----------|---------------------------|-------------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER                    |  |                              |               |         |                 |                                   |                            |              |                   |               | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |  |                              |                      |                   |                                |          |                           |                   |         |
| LINE NUMBER  | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL<br><br>(DWG's.) SPEC SECTION | NUMBER OF COPIES REQUIRED    |               |         |                 |                                   |                            |              |                   |               | REQUIRED SUBMISSION<br>DATE               | DATE RECEIVED IN<br>CONTRACTING              | DATE TO CIVIL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |          | CONTRACTOR<br>RESUBMITTAL | FINAL<br>APPROVAL | REMARKS |
|  |  | CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SAMPLES | COLOR SELECTION | MANUFACTURER'S<br>RECOMMENDATIONS | MANUFACTURER'S<br>WARRANTY | CATALOG DATA | AS-BUILT DRAWINGS | O & M MANUALS |   |  |                              |                      |                   | OPERATIONS<br>DEMONSTRATION    | APPROVED |                           |                   |         |
| 15   | (Struct) 061753<br>Roof Truss Anchors  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+45                                   |                              |                      |                   |                                |          |                           |                   |         |
| 16   | (Arch) 072100<br>Blanket Insulation  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+45                                   |                              |                      |                   |                                |          |                           |                   |         |
| 17   | (Arch, Struct) 072413<br>E.I.F.S   | 6                            | 6             | 1       | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+45                                   |                              |                      |                   |                                |          |                           |                   |         |
| 18   | (Arch/Struct) 074113<br>Metal Roof Panels  | 6                            | 6             | 1       | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 19   | (Arch/Struct) 074113<br>Snow/Ice Guards  | 6                            | 6             | 1       | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 20   | (Arch) 074600<br>Vinyl Soffit  | 6                            | 6             | 1       | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 21   | (Arch) 081113<br>Door Frames   | 6                            | 6             |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 22   | (Arch) 081113<br>Metal Doors   | 6                            | 6             |         |                 | 6                                 | 6                          | 6            | 3                 | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 23   | (Arch) 084113<br>AF Storefront/Entrances   | 6                            | 6             |         | 1               | 6                                 | 6                          | 6            | 3                 | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 24   | (Arch) 085113<br>Window Frames   | 6                            | 6             |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 25   | (Arch) 085113<br>AL Windows  | 6                            | 6             |         |                 | 6                                 | 6                          | 6            | 3                 |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
| 26   | (Arch) 087111<br>Door Hardware   | 6                            | 6             |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                           |                   |         |
|  |  |                              |               |         |                 |                                   |                            |              |                   |               |   |  |                              |                      |                   |                                |          |                           |                   |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>(POINT 1 - GENERAL) |   |                              |               |         |                 |                                   |                            |              |                   |               | PROJECT NUMBER<br>DMVA/BMCE-<br>420540    | PROJECT TITLE<br>New DMVA Annex –<br>J.E.O.C | SOLICITATION/CONTRACT NUMBER |                      |                   |                                |          |                        |                |         |
|--|---|------------------------------|---------------|---------|-----------------|-----------------------------------|----------------------------|--------------|-------------------|---------------|---|--|------------------------------|----------------------|-------------------|--------------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER                    |   |                              |               |         |                 |                                   |                            |              |                   |               | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |  |                              |                      |                   |                                |          |                        |                |         |
| LINE NUMBER  | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL<br><br>(DWG.'s.) SPEC SECTION | NUMBER OF COPIES REQUIRED    |               |         |                 |                                   |                            |              |                   |               | REQUIRED SUBMISSION<br>DATE               | DATE RECEIVED IN<br>CONTRACTING              | DATE TO CIVIL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |          | CONTRACTOR RESUBMITTAL | FINAL APPROVAL | REMARKS |
|  |   | CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SAMPLES | COLOR SELECTION | MANUFACTURER'S<br>RECOMMENDATIONS | MANUFACTURER'S<br>WARRANTY | CATALOG DATA | AS-BUILT DRAWINGS | O & M MANUALS |   |  |                              |                      |                   | OPERATIONS<br>DEMONSTRATION    | APPROVED |                        |                |         |
| 27   | (Arch) 088500<br>ATFP Compliance  | 6                            |               |         |                 | 6                                 | 6                          |              |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 28   | (Arch, Struct) 092216<br>N.L.B. Steel Framing   | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 29   | (Arch, Struct) 092900<br>Gypsum Board   | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 30   | (Arch) 095123<br>Ceiling Grid System  | 6                            |               |         | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 31   | (Arch) 095123<br>Ac. Ceiling Tile   | 6                            |               |         | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 32   | (Arch) 096519<br>Vinyl Comp. Tile   | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 33   | (Arch) 096519<br>Vinyl Wall Base  | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 34   | (Arch) 096816<br>Carpet   | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 35   | (Arch) 097200<br>Fiberglass Reinf. Panels   | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 36   | (Arch) 099123<br>Primer & Paint   | 6                            |               |         | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 37   | (Arch) 101400<br>Interior Signage   | 6                            |               |         | 1               | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 38   | (Arch) 102113<br>Partitions/Screens   | 6                            |               |         | 1               | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
|  |   |                              |               |         |                 |                                   |                            |              |                   |               |   |  |                              |                      |                   |                                |          |                        |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>(POINT 1 - GENERAL) |   |                              |               |         |                 |                                   |                            |              |                   |               | PROJECT NUMBER<br>DMVA/BMCE-<br>420540    | PROJECT TITLE<br>New DMVA Annex –<br>J.E.O.C | SOLICITATION/CONTRACT NUMBER |                      |                   |                                |          |                        |                |         |
|--|---|------------------------------|---------------|---------|-----------------|-----------------------------------|----------------------------|--------------|-------------------|---------------|---|--|------------------------------|----------------------|-------------------|--------------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER                    |   |                              |               |         |                 |                                   |                            |              |                   |               | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |  |                              |                      |                   |                                |          |                        |                |         |
| LINE NUMBER  | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL<br><br>(DWG.'s.) SPEC SECTION | NUMBER OF COPIES REQUIRED    |               |         |                 |                                   |                            |              |                   |               | REQUIRED SUBMISSION<br>DATE               | DATE RECEIVED IN<br>CONTRACTING              | DATE TO CIVIL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |          | CONTRACTOR RESUBMITTAL | FINAL APPROVAL | REMARKS |
|  |   | CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SAMPLES | COLOR SELECTION | MANUFACTURER'S<br>RECOMMENDATIONS | MANUFACTURER'S<br>WARRANTY | CATALOG DATA | AS-BUILT DRAWINGS | O & M MANUALS |   |  |                              |                      |                   | OPERATIONS<br>DEMONSTRATION    | APPROVED |                        |                |         |
| 39   | (Arch) 102800<br>Tlt Paper Holders  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 40   | (Arch) 102800<br>Paper Towel Disp.  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 41   | (Arch) 102800<br>Soap Disp.   | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 42   | (Arch) 102800<br>Mirrors  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 43   | (Arch) 102800<br>ADA Grab Bars  | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   |               |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 44   | (Arch) 104413<br>Extinguisher Cabinets  | 6                            |               |         |                 | 6                                 | 6                          | 6            | 3                 | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 45   | (Arch) 104416<br>Fire Extinguishers   | 6                            |               |         |                 | 6                                 | 6                          | 6            |                   | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 46   | (Arch) 123530<br>Cabinetry  | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            | 3                 | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 47   | (Arch) 123530<br>Countertop   | 6                            |               | 1       | 1               | 6                                 | 6                          | 6            | 3                 | 3             |   | NTP<br>+90                                   |                              |                      |                   |                                |          |                        |                |         |
| 48   | 221116- product data for<br>each pipe, fittings<br>material   | 6                            |               |         |                 |                                   |                            | 6            |                   |               |   | NTP<br>+10                                   |                              |                      |                   |                                |          |                        |                |         |
| 49   | 221116-water samples<br>and field test reports  | 6                            |               |         |                 |                                   |                            |              |                   | 6             |   |  |                              |                      |                   |                                |          |                        |                |         |
| 50   | 221316- product data for<br>each pipe, fittings<br>material   | 6                            |               |         |                 |                                   |                            |              |                   | 6             |   |  |                              |                      |                   |                                |          |                        |                |         |
| 51   | 221316- inspection and<br>field test reports  | 6                            |               |         |                 |                                   |                            |              |                   | 6             |   |  |                              |                      |                   |                                |          |                        |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>(POINT 1 - GENERAL) |  |                              |               |         |                 |                                   |                            |              |                   |               | PROJECT NUMBER<br>DMVA/BMCE-<br>420540    | PROJECT TITLE<br>New DMVA Annex –<br>J.E.O.C | SOLICITATION/CONTRACT NUMBER |                      |                   |                                |          |                        |                |         |
|--|--|------------------------------|---------------|---------|-----------------|-----------------------------------|----------------------------|--------------|-------------------|---------------|---|--|------------------------------|----------------------|-------------------|--------------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER                    |  |                              |               |         |                 |                                   |                            |              |                   |               | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |  |                              |                      |                   |                                |          |                        |                |         |
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|  |  | CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SAMPLES | COLOR SELECTION | MANUFACTURER'S<br>RECOMMENDATIONS | MANUFACTURER'S<br>WARRANTY | CATALOG DATA | AS-BUILT DRAWINGS | O & M MANUALS |   |  |                              |                      |                   | OPERATIONS<br>DEMONSTRATION    | APPROVED |                        |                |         |
| 52   | 312000- compaction test reports  | 6                            |               |         |                 |                                   |                            |              | 6                 |               |   |  |                              |                      |                   |                                |          |                        |                |         |
| 53   | 323113- product data   | 6                            |               |         |                 |                                   |                            |              | 6                 |               | NTP<br>+90                                |  |                              |                      |                   |                                |          |                        |                |         |
| 54   | 329200 – product data for seed formula   | 6                            |               |         |                 |                                   |                            |              | 6                 |               | NTP<br>+10                                |  |                              |                      |                   |                                |          |                        |                |         |
| 55   | 334100- product data for each type   | 6                            |               |         |                 |                                   |                            |              |                   |               | NTP<br>+10                                |  |                              |                      |                   |                                |          |                        |                |         |
|  |  |                              |               |         |                 |                                   |                            |              |                   |               |   |  |                              |                      |                   |                                |          |                        |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>HVAC Contract* |  |                                 |               |           |                 |                                |                         |              |                        |         | DMVA-BMC&E<br>42080032                    | PROJECT TITLE<br>New Calibration Lab |                                |                      |                   |                          |          |                        |                |         |
|---|--|---------------------------------|---------------|-----------|-----------------|--------------------------------|-------------------------|--------------|------------------------|---------|---|--------------------------------------|--------------------------------|----------------------|-------------------|--------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER               |  |                                 |               |           |                 |                                |                         |              |                        |         | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |                                      |                                |                      |                   |                          |          |                        |                |         |
| LINE NUMBER                                       | ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL | NUMBER OF COPIES REQUIRED       |               |           |                 |                                |                         |              |                        |         | REQUIRED SUBMISSION DATE                  | DATE RECEIVED IN CONTRACTING         | DATE TO MECHANICAL ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE CONTRACTOR NOTIFIED |          | CONTRACTOR RESUBMITTAL | FINAL APPROVAL | REMARKS |
|   |  | STEEL CERTIFICATE OF COMPLIANCE | SHOP DRAWINGS | SCHEDULES | COLOR SELECTION | MANUFACTURER'S RECOMMENDATIONS | MANUFACTURER'S WARRANTY | CATALOG DATA | OPERATING INSTRUCTIONS | REPORTS |   |                                      |                                |                      |                   | DELEGATED DESIGN         | APPROVED |                        |                |         |
| 1   | 230500-Fittings  | 5                               | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 2   | 230510 - Control Wiring, Starters, Disconnects, etc.               |                                 | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 3   | 236200 -Ductless Split Systems                                     |                                 | 5             |           |                 | 5                              | 5                       | 5            |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 4   | 230553-Mechanical Identification                                   |                                 | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 5   | 230593-Testing, Adjusting and Balancing                            |                                 |               |           |                 |                                |                         |              | 5                      |         |   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 6   | 230713-Duct Insulation   |                                 | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 7   | 237310- Ducted Split System  |                                 | 5             |           |                 |                                | 5                       | 5            |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 8   | 233113- Metal Ducts  |                                 | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 9   | 233300-Air Duct Accessories  |                                 | 5             |           |                 |                                | 5                       | 5            |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 10  | 233423 – HVAC Power Ventilators                                    |                                 | 5             |           |                 | 5                              | 5                       | 5            |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 11  | 233713-Diffusers and Grilles                                       |                                 | 5             |           |                 |                                | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 12  | 237300- DX Split Sysytem   | 5                               | 5             |           |                 | 5                              | 5                       |              |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 13  | 232700 - Air to Air Energy Recovery Equipment                      |                                 | 5             |           |                 | 5                              | 5                       | 5            |                        |         | NTP +10                                   |                                      |                                |                      |                   |                          |          |                        |                |         |
| 16  | Various – Equipment Training, O&M Manuals                          |                                 |               |           |                 | 3                              | 3                       |              |                        |         |   |                                      |                                |                      |                   |                          |          |                        |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>HVAC Contract* |   |                                    |               |           |                 |                                    |                             |              |                           |         | DMVA-BMC&E<br>42080032                    | PROJECT TITLE<br>New Calibration Lab |                                   |                      |                   |                                |          |                        |                |         |
|---|---|------------------------------------|---------------|-----------|-----------------|------------------------------------|-----------------------------|--------------|---------------------------|---------|---|--------------------------------------|-----------------------------------|----------------------|-------------------|--------------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER               |   |                                    |               |           |                 |                                    |                             |              |                           |         | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |                                      |                                   |                      |                   |                                |          |                        |                |         |
| LINE NUMBER                                       | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL | NUMBER OF COPIES REQUIRED          |               |           |                 |                                    |                             |              |                           |         | REQUIRED SUBMISSION DATE                  | DATE RECEIVED IN<br>CONTRACTING      | DATE TO MECHANICAL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |          | CONTRACTOR RESUBMITTAL | FINAL APPROVAL | REMARKS |
|   |   | STEEL CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SCHEDULES | COLOR SELECTION | MANUFACTURER' S<br>RECOMMENDATIONS | MANUFACTURER' S<br>WARRANTY | CATALOG DATA | OPERATING<br>INSTRUCTIONS | REPORTS |   |                                      |                                   |                      |                   | DELEGATED DESIGN               | APPROVED |                        |                |         |
| 17  | 017839 – Hard Copy of As-Built Drawings                                     |                                    |               |           |                 |                                    |                             |              | 3                         |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 18  | 017839 – CDRom of As-Built Drawings in AutoCAD                              |                                    |               |           |                 |                                    |                             |              | 3                         |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |

| SCHEDULE OF MATERIAL SUBMITTALS<br>HVAC Contract* |   |                                    |               |           |                 |                                   |                            |              |                           |         | DMVA-BMC&E<br>42080032                    | PROJECT TITLE<br>New Calibration Lab |                                   |                      |                   |                                |          |                        |                |         |
|---|---|------------------------------------|---------------|-----------|-----------------|-----------------------------------|----------------------------|--------------|---------------------------|---------|---|--------------------------------------|-----------------------------------|----------------------|-------------------|--------------------------------|----------|------------------------|----------------|---------|
| TO BE COMPLETED BY PROJECT ENGINEER               |   |                                    |               |           |                 |                                   |                            |              |                           |         | TO BE COMPLETED BY CONTRACT ADMINISTRATOR |                                      |                                   |                      |                   |                                |          |                        |                |         |
| LINE NUMBER                                       | ITEM OR DESCRIPTION OF<br>ITEM, CONTRACT<br>REFERENCE, TYPE OF<br>SUBMITTAL | NUMBER OF COPIES REQUIRED          |               |           |                 |                                   |                            |              |                           |         | REQUIRED SUBMISSION DATE                  | DATE RECEIVED IN<br>CONTRACTING      | DATE TO MECHANICAL<br>ENGINEERING | RETURN SUSPENSE DATE | SUBMITTAL NUMBERS | DATE<br>CONTRACTOR<br>NOTIFIED |          | CONTRACTOR RESUBMITTAL | FINAL APPROVAL | REMARKS |
|   |   | STEEL CERTIFICATE OF<br>COMPLIANCE | SHOP DRAWINGS | SCHEDULES | COLOR SELECTION | MANUFACTURER'S<br>RECOMMENDATIONS | MANUFACTURER'S<br>WARRANTY | CATALOG DATA | OPERATING<br>INSTRUCTIONS | REPORTS |   |                                      |                                   |                      |                   | DELEGATED DESIGN               | APPROVED |                        |                |         |
| 1   | 221116-Plumbing piping  | 5                                  | 5             |           |                 |                                   | 5                          |              |                           |         | NTP<br>+10                                |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 2   | 224000- Fixtures and accessories  |                                    | 5             |           |                 |                                   | 5                          |              |                           |         | NTP<br>+10                                |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 3   | Gas fired water heater  |                                    | 5             |           |                 | 5                                 | 5                          | 5            |                           |         | NTP<br>+10                                |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 4   | 221119- Valves and accessories  |                                    |               |           |                 |                                   |                            |              | 5                         |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 5   | 221319- Floor drains  |                                    | 5             |           |                 |                                   | 5                          |              |                           |         | NTP<br>+10                                |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 6   | Various – Equipment Training, O&M Manuals                                   |                                    |               |           |                 | 3                                 |                            | 3            |                           |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 7   | 017839 – Hard Copy of As-Built Drawings                                     |                                    |               |           |                 |                                   |                            |              | 3                         |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |
| 8   | 017839 – CDRom of As-Built Drawings in AutoCAD                              |                                    |               |           |                 |                                   |                            |              | 3                         |         |   |                                      |                                   |                      |                   |                                |          |                        |                |         |







## **SECTION 017700 - CLOSEOUT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran's Purchasing Department and/or the United States Fiscal and Property Office's Purchasing and Contracting Division.

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Warranties.
  - 3. Final cleaning.
- B. Related Sections include the following:
  - 1. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Divisions 2 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

#### **1.3 SUBSTANTIAL COMPLETION (BENEFICAL OCCUPANCY)**

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 3. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction, damage or settlement surveys, property surveys, and similar final record information.
  - 4. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  - 5. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 6. Complete startup testing of systems.
  - 7. Submit test/adjust/balance records.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction

- tools, and similar elements.
9. Advise Owner of changeover in heat and other utilities.
  10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  11. Complete final cleaning requirements, including touchup painting.
  12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Government Design Professional and Government Inspector will either proceed with inspection or notify Contractor of unfulfilled requirements. The Contracting Officer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Design Professional and/or Inspector, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

#### 1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to the Government Contracting Office's "Payment Procedures."
2. Submit certified copy of Government Design Professional's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the Design Professional. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Government Design Professional and Inspector will either proceed with inspection or notify Contractor of unfulfilled requirements. The Contracting Officer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first then proceeding on the interior from the Main Entrance clockwise throughout the facility.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

- a. Project name.
- b. Date
- c. Name of Contractor.
- d. Page number.

## 1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of the Government Design Professional (per FORM 66's) for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents within the Project Operation and Maintenance Manuals.

## PART 2 - EXECUTION

### 2.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

- 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - n. Replace parts subject to unusual operating conditions.
  - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
  - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  - s. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

## PART 3 - PRODUCTS

### 3.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

**END OF SECTION 017700**

## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran's Purchasing Department and or United States Fiscal and Property Office's Purchasing and Contracting Division.

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, sub-systems, and equipment.
  - 4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 3. Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

#### 1.3 DEFINITIONS

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

#### 1.4 SUBMITTALS

- A. Final Submittal: Submit one copy of each manual in final form at least 14 days before final inspection. Government Design Professional will return copy with comments within 7 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 7 days of receipt of Architect's comments.

#### 1.5 COORDINATION

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

representatives and prepare manuals.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Date of submittal.
  - 4. Name, address, and telephone number of Contractor.
  - 5. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents per CSI Specifications (Divisions 2-16). Within each organize each Division by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.



1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
  - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
  - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

### 2.3 EMERGENCY INFORMATION

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

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

## 2.4 OPERATION INFORMATION

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

## 2.5 PRODUCT MAINTENANCE

- A. Content: Organize into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to

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

- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE INFORMATION

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard printed maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance information.
- B. Emergency Information: Compile complete documentation of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Information: Compile complete documentation of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Information: Compile complete documentation of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

**END OF SECTION 017823**

## **SECTION 017839 - PROJECT RECORD DOCUMENTS**

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran's Purchasing Department and or United States Fiscal and Property Office's Purchasing and Contracting Division.

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings in CAD Format.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Project Cost Analysis
- B. Related Sections include the following:
  - 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
  - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Divisions 2 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

#### 1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. One (1) Hard Copy of Contractor As-Built Drawings. Drawing Size to be 24"x36".
  - 2. One (1) CD Rom containing CAD based Contractor As-Built Drawings.
- B. Record Product Data: Submit as part of the Project Operation and Maintenance Manuals.
- C. Project Cost Analysis: To be submitted when the Owner takes Beneficial Occupancy.

### **PART 2 - PRODUCTS**

#### 2.1 RECORD DRAWINGS

- A. Record Prints: Contractor to maintain one (1) red-lined set of drawings throughout the duration of the project construction phase. Prior to the substantial completion, contractor shall transfer all red-lined mark-ups to the Government provided CAD drawings.
  - 1. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or No Cost Field Change.
    - k. Changes made following Government Design Professional's written orders.
    - l. Field records for variable and concealed conditions.
  
- B. Preparation: Contractor to transfer all construction red-line mark-ups from the record set onto the Government provided CAD drawings. Government drawings are AutoDesk (AutoCad) format and this format shall be maintained by the contractor.
  - 1. Contractor to create a CAD layer within each Government provided CAD drawing and label it; "CONTR\_AS-BUILTS"  
Note: All contractor related As-Built changes shall be contained to this layer.
  
- C. Paragraph and subparagraphs below describe a procedure for assembling nearly correct reproducible Drawings. Add requirements for special printing methods on specific material, such as moisture-sensitive prints on mylar film. Delete if not required.
  
- D. Record Plans: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Government Design Professional and/or Contracting Officer. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.
  - 1. Refer instances of uncertainty to the Government Design Professional for resolution.
  
- E. Format:
  - 1. Record Prints: Contractor shall plot one (1) 24"x36" (min.) set of As-Built drawings to submit for review. As-Built set shall be organized and binded per the DMVA-BMCE Cover Sheet. Hardcopy set should contain an "AS-BUILT" stamp located in the lower right-hand corner of each sheet.
  - 2. AutoDesk (AutoCad) Format, Release 2004 (or newer).

## 2.2 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, Specifications and Record Drawings where applicable.

## 2.3 PROJECT COST ANALYSIS

- A. Preparation: Contractor shall maintain construction cost throughout the duration of the project. The following cost shall be submitted upon the Owner taking Beneficial Occupancy of the facility.
- B. Building Cost: Overall construction cost of the facility, excluding all site utilities. Cost shall incorporate all Change Order amounts into this breakout.
- C. Site Utilities: Contractor shall provide an updated cost and total linear footage for the following site utility installations:
  - 1. Domestic Water
  - 2. Sanitary Sewer
  - 3. Electrical Service
  - 4. Gas/Propane Service

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submit in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Government Design Professional, Government Inspector and/or Contracting Officer's reference during normal working hours.

**END OF SECTION 017839**



## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade (Floor Slabs, Aprons and Sidewalks)
4. Bollards

- B. Related Sections include the following:

1. Division 31 Section "Earthwork" for drainage fill under slabs-on-grade.

#### 1.3 DEFINITIONS and REFERENCES

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

- a.1. ACI = American Concrete Institute
- a.2. CRSI = Concrete Reinforcing Steel Institute
- a.3. ASTM = American Society of Testing and Materials
- a.4. PennDOT = Pennsylvania Department of Transportation

- A. The following referenced material shall apply to this specification and have the same force and effect as if printed in full herein:

|           |   |
|-----------|---|
| ACI 301   | Specifications for Structural Concrete," Sections 1 through 5.                |
| ACI 117   | Specifications for Tolerances for Concrete Construction and Materials.        |
| ACI 318   | Building Code Requirements for Reinforced Concrete                            |
| ACI 347   | Recommended Practices for Concrete Formwork                                   |
| ACI 304   | Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete |
| ACI 305R  | Hot Weather Concreting  |
| ACI 306R  | Cold Weather Concreting   |
| ACI 302   | Recommended Practices for Concrete Floor and Slab Construction                |
| ACI 315   | Detail Manual   |
| ACI 308   | Standard Practices for Curing Concrete  |
| CRSI      | Manual of Standard Practice   |
| CRSI      | Recommended Practice for Placing Reinforcing Bars                             |
| PennDOT   | Publication 408 (latest edition) with supplements                             |
| ASTM C 94 | Standard Specifications for Ready-Mixed Concrete                              |

|                      |   |
|----------------------|---|
| ASTM C 150           | Specification for Portland Cement   |
| ASTM A 497           | Standard Specification for Steel Welded Fabric, Deformed for Concrete Reinforcement           |
| ASTM A 185           | Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement                 |
| ASTM A 615<br>A 615M | Standard Specification for Deformed and Plain Billet Steel bars for<br>Concrete Reinforcement |
| ASTM C 260           | Standard Specifications for Air-Entrained Admixtures for Concrete                             |
| ASTM C 309           | Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete              |

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Note: The On-Site Government Inspector has the right to temporarily stall and/or cancel a pour if the information contained herein is not met or obtained.
- B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Only concrete obtained from a PennDOT approved/certified batch plant shall be used in conjunction with this project.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

- F. Prior to each pour, contractor shall provide a Concrete Plant Batch Slip for each batch utilized for the given pour. The Batch Slip shall be submitted to the Government Inspector by the first delivery truck for each batch. The Batch Slip shall contain the following information (at a minimum):
1. Date
  2. Plant Name and Location
  3. Batch Number
  4. Batch Time
  5. Dry materials and weights
  6. Liquids and volumes
  7. Admixtures and volumes
- G. Prior to the starting of a pour, concrete delivery drivers shall provide the on-site Government Inspector with a delivery slip. Delivery slips shall denote the following information:
1. Truck No., Driver's Name, and Batch Plant
  2. Time stamp for batch and/or time driver left plant.
  3. Concrete Mix
  4. Batch Slump
  5. Admixtures
  6. Time Mixer arrived at site.

Note: At no time will a driver be granted permission to off-load if a valid delivery slip is not provided.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

- a. High-density overlay, Class 1 or better.
  - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
  - c. Structural 1, B-B or better; mill oiled and edge sealed.
  - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, Bollards and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
- 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn by contractor's engineer.
- C. Deformed-Steel Wire: ASTM A 496.
- D. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, steel wire, with less than 2 percent damaged coating in each 12-inch wire length.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type 1, gray. Supplement with the following:
    - a. Fly Ash: ASTM C 61, Class F
- B. Normal-Weight Aggregates: ASTM C 33, Class 1M coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.

## 2.5 ADMIXTURES

- A. No admixtures will be permitted without prior notification and approval of the Government Design Professional and/or Government Inspector.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.6 VAPOR RETARDERS

- A. Plastic Vapor Retarder: Minimum of 6 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.7 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

## 2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approx. 9oz./sq.yd. when dry.
- C. Moisture Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable (It shall be the contractor's responsibility to verify availability of potable water. If potable water is NOT available at project site, contractor will be responsible for providing water tanks).
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Maximum VOC emission of 350 g/L or less. Product shall not interfere with bonding of floor covering where used.

## 2.9 RELATED MATERIALS

- A. Contraction Joint (C.J.)
  - a. Preformed two-piece plastic strip with a depth of 2".
  - b. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #324, Speed-E-Joint
- B. Keyed Construction Joint (K.C.J.)
  - a. 1/4" wide by the full thickness of concrete slab asphaltic type with centered key having pre-punched openings at 24" o.c. for steel stakes. Stakes shall be minimum 18 gauge steel, 3/8" channel type by 15" long.
  - b. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #321, Premoulded Tongue and Groove Joint.
- C. Expansion Joint (E.J. /E.E.J.)
  - a. 1/2" wide by the full thickness of concrete slab, asphaltic self-sealing type and shall conform to ASTM D 994.
  - b. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #320 Asphaltic Expansion Joint.

## 2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
- D. 1. Fly Ash: 25 percent
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
  - 2. Use water-reducing, high range water-reducing or plasticizing admixture in concrete as required for placement and workability.
  - 3. Use water-reducing and retarding admixture when required by high temperature. Low humidity or other adverse placement conditions.
  - 4. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structural slabs, concrete required to be watertight and concrete with a water-cementitious materials ratio below .50.

## 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
  - 3. Slump Limit: 4 inches plus or minus 1 inch.
- B. Foundation Walls, Grade Beams, Column Piers: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
  - 3. Slump Limit: 4 inches plus or minus 1 inch.
  - 4. Air Content: When determined necessary, 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 3500 psi at 28 days.
  - 2. Maximum Cementitious Materials Content: .50
  - 3. Slump Limit: 4 inches, plus or minus 1 inch.
  - 4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
- D. Sidewalks:
  - 1. Minimum Compressive Strength: 3000 psi at 28 days.
  - 2. Maximum Cementitious Materials Content: .45
  - 3. Slump Limit: 4 inches, plus or minus 1 inch.
  - 4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

## 2.12 FABRICATING REINFORCEMENT

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

## 2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
  - 2. Class B, 1/4 inch for rough-formed finished surfaces
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Do not chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.



- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

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

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Government Inspector.

### 3.4 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

### 3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  3. Locate joints for beams, slabs, joists and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls at underside of slabs and at the top of footings or floor slabs.
  5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
  2. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joint after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete. Contractor shall contact the Government Inspector at least 24 hours prior to a pour to schedule all necessary inspections. Contractor shall not proceed with a concrete pour without the knowledge of a Government Inspector and/or Design Professional.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Government Inspector and/or Design Professional.

- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and only under supervision of the on-site Government Inspector.
- D. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- H. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
- B. Apply to concrete surfaces not exposed to public view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces approved for “broom” finish by the Government Design Professional. While concrete is still plastic, slightly scarify surface with a fine broom.
  - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

### 3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### 3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry or windy conditions cause moisture loss approaching 0.2 lb/sq. ft x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water
    - b. Continuous water-for spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-in lap over adjacent absorptive covers.
  - 2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application.
    - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recom

### 3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

### 3.13 CONCRETE SURFACE REPAIRS

- A. General Note: It will be at the Government's discretion to request the repair of an area due to damage and/or flaws in materials or installation. A repair will only be granted to areas smaller than 100 sf. Areas in excess of 100 sf. will be evaluated by the Government and determined if necessary to completely remove and replace the defective area. At no time will the cost of repair and/or replacement be the burden of the Government.

- B. Defective Concrete: Repair and patch defective areas when approved by the Government Inspector, Design Professional and/or Contracting Officer.
- C. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, pop outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  - 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor shall engage an independent qualified testing agency to perform tests and test report submittals.
- B. Contractor shall notify Government Inspector and/or Design Professional at least 24 hours prior to a concrete pour. The Government Inspector will provide an inspection of the pour area and determine if all aspects are suitable for the pouring of concrete. The following is a lists of items that will be included in the Government's Pre-Pour Inspection:
  - C. 1. Steel Reinforcement Placement (Rebar and/or Welded Wire Fabric).
  - D. 2. Reinforcement Welds
  - E. 3. Headed Bolts
  - F. 4. Forms
  - G. 5. Stone Base (Thickness and Compaction)
  - H. 6. Pour area is clear of all foreign materials, water, mud, etc.
  - I. 7. Verification of Design Mix
  - J. 8. Approval of placement procedure.
- K. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
- L. 3. Testing Frequency: It shall be at the discretion and right of the On-Site Government Inspector to request testing at closer intervals.
  - 4. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each concrete mixture.
  - 5. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each concrete mixture.
  - 6. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when concrete temperature is 40 deg F and below.
  - 7. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.  
Cast and field cure one set of two standard cylinder specimens for each composite sample.

PART 4 - Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

- b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  - 1. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  - 2. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  - 3. Test results shall be reported in writing to Government Inspector, Design Professional, Contracting Officer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  - 4. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Government Inspector but will not be used as sole basis for approval or rejection of concrete.
  - 5. Additional Tests: Testing agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Government Inspector.
  - 6. Additional testing at Contractor's expense will be performed to determine compliance of replaced or additional work with specified requirements.
  - 7. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
  
- B. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

**END OF SECTION 033000**



## **SECTION 042000 - UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete Masonry Units
  - 2. Mortar and grout.
  - 3. Reinforcing steel.
  - 4. Masonry joint reinforcement.
  - 5. Ties and anchors.
  - 6. Embedded flashing.
  - 7. Miscellaneous masonry accessories.
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

#### **1.3 DEFINITIONS**

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

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For the following:
  - 1. Small-Scale Samples of each different block style, to include manufacturer's full range of color selections.
  - 2. Colored mortar.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
  - 2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

- E. Anchors, Ties and Reinforcing.

## 1.5 QUALITY ASSURANCE

- A. 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.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- C. 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 other means, as acceptable to authorities having jurisdiction.

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 1.7 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 spreading coverings 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: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed work or will impair the quality of completed masonry.

### 2.2 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  2. Provide square-edged units for outside corners, unless otherwise indicated.
- B. Hollow Concrete Masonry Units: ASTM C 90.
1. Weight Classification: Normal Weight
  2. Size: As depicted on Contract Design Drawings.
  3. Color: All below grade block to be standard grey. Above grade and exposed block, color to be selected by Government Design Professional.
- C. Shot- Blasted Block: ASTM C 90/C 129
1. Weight Classification: Normal weight
  2. Size: As depicted on Contract Design Drawings
  3. Pattern and Texture:
    - a. Standard pattern
  4. Colors: As selected by Government Design Professional.

## 2.3 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, Type S.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Cement: ASTM C 1329.
- F. 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.
- G. Colored Cement Product: Packaged blend made from masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
  - 2. Pigments shall not exceed 10 percent of portland cement by weight.
  - 3. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
- H. Aggregate for Mortar: ASTM C 144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- I. Aggregate for Grout: ASTM C 404.
- J. Cold-Weather Admixture: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- K. Water: Potable.

## 2.4 REINFORCEMENT

- A. Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60. (Size and locations per Project Structural Design Documents)
- B. Masonry Joint Reinforcement, General: ASTM A 951.
  - 1. Exterior Walls: Hot-dip galvanized, carbon or Stainless steel.
  - 2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
  - 3. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
  - 4. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
  - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
  - 6. Provide in lengths of not less than 10 feet.
  - 7. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

## 2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
  2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
  3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
  4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
  5. Stainless-Steel Sheet: ASTM A 666, Type 304.
  6. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- B. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.
  2. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.
  3. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.053-inch thick steel.
  4. Tie Section for Concrete: Corrugated metal ties with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.

## 2.6 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed or L-shaped 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/A 153M, Class C; of dimensions indicated.

## 2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with the follows:
1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
  2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
  3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
  4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counter flashing.
  5. Fabricate through-wall flashing with drip edge, unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
  6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

- B. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
- C. Solder and Sealants for Sheet Metal Flashings:
  - 1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
  - 2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Provide one of the following configurations:
    - a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
    - b. Strips, not less than 3/4 inch thick and 10 inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
    - c. Sheets or strips full depth of cavity and installed to full height of cavity.
    - d. Sheets or strips not less than 3/4 inch thick and installed to full height of cavity with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from being clogged with mortar.

## 2.9 MASONRY CLEANERS

- A. 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.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended 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. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
  - 1. For masonry below grade or in contact with earth, use Type M.
  - 2. For reinforced masonry, use Type S.
  - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required.
  - 1. Mix to match Government Design professional's selected block sample.
- E. 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 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness depicted on design drawings. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges.

Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
  - 1. 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 or 1/2 inch maximum.
  - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2 inch maximum.
  - 3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, or 1/2 inch maximum.
  - 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
  - 5. 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.
  - 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
  - 7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

### 3.3 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: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated or shown on Project Structural Design Documents.



### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, and other special conditions.

### 3.6 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 and other rigid materials.
  - 2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
  - 1. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants," but not less than 3/8 inch.
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### 3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows, unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, 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.
  - 2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
  - 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
  - 4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
  - 5. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

### 3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms 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 in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

### 3.10 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

### 3.11 REPAIRING, POINTING, AND CLEANING

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

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste and legally dispose of off Owner's property.

**END OF SECTION 042000**

## SECTION 055213 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Aluminum pipe and tube railings.

#### 1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Railing brackets.
  - 3. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- F. Evaluation Reports: For post-installed anchors, from ICC-ES.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 1.8 FIELD CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Aluminum Pipe and Tube Railings:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ATR Technologies, Inc.
    - b. Superior Aluminum Products, Inc.
    - c. Thompson Fabricating, LLC.
    - d. Wagner, R & B, Inc.

e. "Or Approved Equal"

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

## 2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

## 2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Tubing: ASTM B 221, Alloy 6063-T5/T52.

C. Extruded Structural: Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.

- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

## 2.5 FASTENERS

- A. General: Provide the following:

1. Aluminum Railings: Type 304 stainless-steel fasteners.
2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

- C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

- D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

## 2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.



- E. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Intermediate Coats and Topcoats: Provide products that comply with Section 099123 "Interior Painting."
- H. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

## 2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings 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.
- C. 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.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with either welded or non-welded connections unless otherwise indicated.
- H. 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.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

- J. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- K. Form Changes in Direction as Follows:
  - 1. As detailed.
  - 2. By bending or by inserting prefabricated elbow fittings.
- L. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- M. Close exposed ends of railing members with prefabricated end fittings.
- N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

## 2.8 ALUMINUM FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44.
  - 1. Color: As selected by Government Design Professional from full range of industry colors and color densities.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: As selected by Government Design Professional from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### 3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.3 RAILING CONNECTIONS

- A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

### 3.4 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using non-welded connections.

- B. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
  - 4. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
  - 5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
  - 6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

### 3.5 ADJUSTING AND CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

### 3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

**END OF SECTION 055213**

## **SECTION 061000 - ROUGH CARPENTRY**

### **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. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Wood blocking, cants and nailers.

##### **B. Related Requirements:**

1. Division 06 Section "Sheathing."
2. Division 06 Section "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

#### **1.3 DEFINITIONS**

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  1. NeLMA: Northeastern Lumber Manufacturers' Association.
  2. NLGA: National Lumber Grades Authority.
  3. RIS: Redwood Inspection Service.
  4. SPIB: The Southern Pine Inspection Bureau.
  5. WCLIB: West Coast Lumber Inspection Bureau.
  6. WWPA: Western Wood Products Association.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. LEED Submittals:

1. Certificates for Credit MR & 6 Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
2. Product Data for Credit EQ 4.1: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
  2. Engineered wood products.
  3. Power-driven fasteners.
  4. Powder-actuated fasteners.
  5. Expansion anchors.
  6. Metal framing anchors.

### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings.

## 2.3 DIMENSION LUMBER FRAMING

- A. Ceiling Joists: Construction or No. 2 grade.
- B. Joists, Rafters, and Other Framing Not Listed Above: Construction or No. 2 grade.

- C. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
  - 1. Application: Exposed exterior indicated to receive a stained or natural finish.
  - 2. Species and Grade: Spruce-pine-fir; No. 1 grade; NLGA.

#### 2.4 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.
- B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Georgia-Pacific.
    - b. Standard Structures Inc.
    - c. Weyerhaeuser Company.
    - d. Or Approved Equal

#### 2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Furring.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and **any of the** following species and grades:
  - 1. Spruce-pine-fir (south) or spruce-pine-fir; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.



## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A ; with ASTM A 563 hex nuts and, where indicated, flat washers.

## 2.7 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cleveland Steel Specialty Co.
  - 2. Simpson Strong-Tie Co., Inc.
  - 3. Or Approved Equal
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.
  - 1. Thickness: 0.062 inch.
- F. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

- G. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- H. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches (914 mm) long.

## 2.8 MISCELLANEOUS MATERIALS

- A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.

2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

### 3.2 WOOD SLEEPER, BLOCKING AND NAILER INSTALLATION

- A. Install where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

### 3.3 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
1. Where supported on wood members, by toe nailing or by using metal framing anchors.
  2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.
- C. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- D. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- E. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- F. Provide solid blocking between joists under jamb studs for openings.
- G. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.
  2. Steel bridging installed to comply with bridging manufacturer's written instructions.

### 3.4 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
  - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal size or 2-by-4-inch nominal-size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

### 3.5 STAIR FRAMING INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
  - 1. Size: 2-by-12-inch nominal- size, minimum.
  - 2. Material: solid lumber.
  - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
  - 4. Spacing: At least three framing members for each 36-inch clear width of stair.
- B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

### 3.6 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION 061000**

## **SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Wood blocking, cants, and nailers.
  - 2. Wood shelving
- B. Related Sections include the following:
  - 1. Division 22 Section "Plumbing Fixtures"

#### **1.3 DEFINITIONS**

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NHLA: National Hardwood Lumber Association.
  - 3. NLGA: National Lumber Grades Authority.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

#### **1.5 QUALITY ASSURANCE**

- A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
  - 1. Miscellaneous lumber.
  - 2. Shelving

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat all miscellaneous carpentry, unless otherwise indicated.
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood floor plates that are installed over concrete slabs-on-grade.

### 2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.
- B. Other Framing: Construction or No. 2 grade and the following species:

### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Furring.
  - 5. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content.
- D. For exposed boards, provide lumber with 19 percent maximum moisture content.
- E. For concealed boards, provide lumber with 19 percent maximum moisture content.
- F. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- G. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- H. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

### 2.5 SHELVING (CLOSETS)

- A. Shelving: Made from one of the following materials, 3/4-inch thick. Do not use particleboard or medium-density fiberboard that contains urea formaldehyde.
  - 1. Melamine-faced particleboard with radiused and filled front edge.
  - 2. Particleboard with solid-wood front edge.
  - 3. Medium-density fiberboard with solid-wood front edge.
  - 4. Wood boards of same species and grade indicated above for interior lumber trim for transparent finish.
- B. Shelf Cleats: 3/4-by-3-1/2-inch boards, of same species and grade indicated above for interior lumber trim for opaque finish.
- C. Shelf Brackets: Prime-painted formed steel with provision to support clothes rod where rod is indicated.

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

## 2.7 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations where stainless steel is not indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.



- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
  - 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
  - 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
  - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
- I. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

### 3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

### 3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal size furring vertically at 16 inches o.c.

### 3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION 061053**

## **SECTION 061600 - SHEATHING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Wall sheathing.
  - 2. Roof sheathing.
  - 3. Building Wrap.
  - 4. Flexible flashing at openings in sheathing.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 3. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.

#### **1.4 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

### **PART 2 - PRODUCTS**

## 2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
- B. Oriented Strand Board: DOC PS 2.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

## 2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWA C9.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

## 2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior sheathing.
  - 1. Span Rating: Not less than 32/16.
  - 2. Nominal Thickness: Not less than 1/2 inch.
- B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.
  - 1. Span Rating: Not less than 32/16.
  - 2. Nominal Thickness: Not less than 1/2 inch.

## 2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior sheathing.
  - 1. Span Rating: Not less than 48/24.
  - 2. Nominal Thickness: Not less than 1/2 inch.

## 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.

- C. Wood Screws: ASME B18.6.1.
- D. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
  - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

## 2.6 WEATHER-RESISTANT SHEATHING PAPER

- A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
    - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek .
    - c. Raven Industries Inc.; Rufco-Wrap.
  - 2. Water-Vapor Permeance: Not less than 125 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).
  - 3. Allowable UV Exposure Time: Not less than three months.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

## 2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
  - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
    - b. MFM Building Products Corp.; Window Wrap.
    - c. Polyguard Products, Inc.; Polyguard 300.
- C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
  - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
  - 4. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
  - 5. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."
- D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.

### 3.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper as follows:

1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

### 3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

**END OF SECTION 061600**

## SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

### 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. Wood roof trusses.
  - 2. Metal truss accessories.
- B. Related Requirements:
  - 1. Division 06 Section "Sheathing" for roof sheathing.
- C. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Division 01 Section "Allowances."

#### 1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For wood-preservative-treated lumber, metal-plate connectors, metal truss accessories, and fasteners.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
  - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Shop Drawings: Show fabrication and installation details for trusses.
  - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  - 2. Indicate sizes, stress grades, and species of lumber.
  - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.



5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated lumber.
  2. Metal-plate connectors.

#### 1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to the Government Design Professional and authorities having jurisdiction.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
  1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
  2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
  3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Manufacturer and/or Contractor to engage a qualified professional engineer to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
  - 1. Design Loads: All loads and design criteria shall be determined by the contractor/manufacturer engaged engineer.
- C. Comply with applicable requirements and recommendations of the following publications:
  - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
  - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
  - 3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

### 2.2 DIMENSION LUMBER

- A. Certified Wood: For metal-plate-connected wood trusses and permanent bracing, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Provide dressed lumber, S4S.
  - 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- C. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for both top and bottom chords.
- D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Miscellaneous Rough Carpentry."

### 2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed trusses indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat all trusses unless otherwise indicated.

#### 2.4 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alpine Engineered Products, Inc.; an ITW company.
  2. CompuTrus, Inc.
  3. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
  4. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
  5. Truswal Systems Corporation; an ITW company.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with TPI 1.
- D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
1. Use for wood-preserved-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304, and not less than 0.035 inch thick.
1. Use for exterior locations, wood-preserved-treated lumber, fire-retardant treated lumber, and where indicated.

#### 2.5 FASTENERS

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

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

## 2.6 METAL FRAMING ANCHORS AND ACCESSORIES

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

1. Cleveland Steel Specialty Co.
2. Simpson Strong-Tie Co., Inc.
3. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

D. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

E. Stainless-Steel Sheet: ASTM A 666.

1. Use for exterior locations and where indicated.

F. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

H. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

## 2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

- B. Protective Coatings: SSPC-Paint 22, epoxy-polyamide primer or SSPC-Paint 16, coal-tar epoxy-polyamide paint.

## 2.8 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

## 2.9 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
  - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
  - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses a minimum of 16 inches o.c. and no more than 24 inches o.c.; adjust and align trusses in location before permanently fastening.

- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
  - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Division 06 Section " Miscellaneous Rough Carpentry."
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
  - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design and when approved by Government Design Professional.

### 3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- D. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
  - 1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

**END OF SECTION 061753**

## SECTION 072100 - THERMAL INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Perimeter wall insulation (supporting backfill).
  - 2. Cavity-wall insulation.
  - 3. Concealed building insulation.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for insulation installed in cavity walls and masonry cells.
  - 2. Division 6 Section "Sheathing" for exterior building wrap.

#### 1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
  - 1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm air velocity.
  - 2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Surface-Burning Characteristics: ASTM E 84.
  - 2. Fire-Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
  - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type I with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
  - 1. Manufacturers:
    - a. DiversiFoam Products.
    - b. Owens Corning
    - c. Or Approved Equal



2. Thicknesses and required R-values as indicated on Project Design Documents.

### 2.3 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
  1. CertainTeed Corporation.
  2. Guardian Fiberglass, Inc.
  3. Owens Corning.
  4. Or Approved Equal
- B. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.
- C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
  1. 3-1/2 inches thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F.
  2. 5-1/2 inches thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F.

### 2.4 AUXILIARY INSULATING MATERIALS

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

### 2.5 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
  1. Products:
    - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
    - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
    - c. Or Approved Equal
  2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Products:
  - a. AGM Industries, Inc.; RC150.
  - b. Gemco; Dome-Cap.
  - c. Or Approved Equal
  
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
  1. Products:
    - a. AGM Industries, Inc.; TACTOO Adhesive.
    - b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
    - c. Gemco; Tuff Bond Hanger Adhesive.
    - d. Or Approved Equal

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

#### 3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

#### 3.4 INSTALLATION OF PERIMETER INSULATION

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.

### 3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. On units of foam-plastic board insulation, install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates indicated.
  - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 4 Section "Unit Masonry Assemblies."
- B. Insulation installed on sheathing and/or directly to wall studs, shall be installed horizontally with staggered joints. Apply adhesive to back of insulation board and press units firmly into place. Fasteners with retainage washers shall then be installed per stud spacing. All fasteners shall penetrate through insulation and securely into wall studs. No fewer than six (6) fasteners shall be used per 48" x 96" sheets.

### 3.6 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated.
  - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.

4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
  5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
  6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- E. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
  2. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
  3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

### 3.7 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION 072100**

## **SECTION 072413 - EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Exterior insulation and finish system (EIFS) applied over plywood sheathing.
- B. Related Sections:
  - 1. Division 06 Section "Sheathing" for sheathing.
  - 2. Division 07 Section "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants.

#### **1.3 SYSTEM DESCRIPTION**

- A. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

#### **1.4 PERFORMANCE REQUIREMENTS**

- A. EIFS Performance: Comply with the following:
  - 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
  - 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.

#### **1.5 SUBMITTALS**

- A. Product Data: For each type and component of EIFS indicated.
- B. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
  - 1. Include similar Samples of joint sealants and exposed accessories involving color selection.
- C. Qualification Data: For Installer and testing agency.

- D. Manufacturer Certificates: Signed by manufacturers certifying that EIFS and joint sealants comply with requirements.
- E. Material or Product Certificates: For cementitious materials and aggregates and for each insulation and joint sealant, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each water-/weather-resistive barrier, insulation, reinforcing mesh, joint sealant, and coating.
- G. Compatibility and Adhesion Test Reports: For joint sealants 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.
- H. Maintenance Data: For EIFS to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
  - 1. Fabricator/Erector Qualifications: Certified in writing by EIFS manufacturer as qualified to fabricate and erect manufacturer's prefabricated panel system using skilled and trained workers.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Fire-Test-Response Characteristics: Provide EIFS and system components with the following fire-test-response characteristics as determined by testing identical EIFS and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
  - 2. Radiant Heat Exposure: No ignition of EIFS when tested according to NFPA 268.
  - 3. Potential Heat: Acceptable level when tested according to NFPA 259.
  - 4. Surface-Burning Characteristics: Provide insulation board, adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
  - 1. Stack insulation board flat and off the ground.
  - 2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions required for prefabricated panels by field measurements before fabrication.

## 1.9 COORDINATION

- A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind flashing and barrier coating of EIFS.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  1. Acrocrete, Inc.
  2. Finestone; Degussa Wall Systems, Inc.
  3. Total Wall Inc.
  4. "Or Approved Equal"

### 2.2 MATERIALS

- A. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
- B. Exterior Cement Board: Not less than 5/16-inch- thick, fiber cement board complying with ASTM C 1186, Type A, for exterior applications.
  1. Fasteners: Wafer-head or flat-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.
    - a. Size and Length: As recommended by sheathing manufacturer for type and thickness of sheathing board to be attached.

- C. Primer/Sealer: EIFS manufacturer's standard substrate conditioner with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
- D. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- E. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate; with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and complying with[ one of] the following:
  - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
  - 2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
- F. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
  - 1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
  - 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
  - 3. Dimensions: Provide insulation boards not more than 24 by 48 inches and in thickness indicated, but not more than 4 inches thick or less than thickness allowed by ASTM C 1397.
  - 4. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
- G. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per ASTM E 2098; complying with ASTM D 578 and the following:
  - 1. Intermediate-Impact Reinforcing Mesh: Not less than 10 oz./sq. yd.
  - 2. High-Impact Reinforcing Mesh: Not less than 15 oz./sq. yd.
  - 3. Heavy-Duty Reinforcing Mesh: Not less than 20 oz./sq. yd.
  - 4. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd.
  - 5. Detail Reinforcing Mesh: Not less than 4.0 oz./sq. yd. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd.
- H. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following:
  - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  - 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
  - 3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
- I. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) complying with one of the following:



1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
- J. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- K. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
  2. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
    - a. Aggregate: Marble chips of size and color as selected by Government Design Professional from manufacturer's full range.
  3. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
  4. Colors: As selected by Government Design Professional from manufacturer's full range.
- L. Water: Potable.
- M. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
1. For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C 954.
  2. For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C 1002.
  3. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
  4. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
  5. For attachment, provide manufacturer's standard fasteners suitable for substrate.
- N. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
  2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
  3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
  4. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.

## 2.3 ELASTOMERIC SEALANTS

- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
  - 1. Multicomponent, nonsag urethane sealant.
  - 2. Single-component, nonsag, neutral-curing silicone sealant.
  - 3. Provide sealants, used inside the weatherproofing system, with a VOC content of **250** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants."
- C. Sealant Color: As selected by Government Design Professional from manufacturer's full range.

## 2.4 MIXING

- A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Begin coating application only after surfaces are dry.
  - 2. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

### 3.3 EIFS INSTALLATION, GENERAL

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

### 3.4 SUBSTRATE PROTECTION APPLICATION

- A. Primer/Sealer: Apply over sheathing substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
- B. Waterproof Adhesive/Base Coat: Apply over sloped surfaces and window sills to protect substrates from degradation.
- C. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

### 3.5 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
  1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
  2. Window Sill Flashing: Use at windows unless otherwise indicated.
  3. Expansion Joint: Use per manufacturer's installation recommendations.
  4. Casing Bead: Use at other locations.

### 3.6 INSULATION INSTALLATION

- A. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:
  1. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than 1/4 inch for factory mixed and not less than 3/8 inch for field mixed, measured from surface of insulation before placement.
  2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
  3. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
  4. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:

- a. Steel Framing: 5/16 inch
  - b. Wood Framing: 1 inch
  - c. Concrete and Masonry: 1 inch
5. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
  6. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
  7. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
    - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
    - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
  8. Interlock ends at internal and external corners.
  9. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
  10. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
  11. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch.
  12. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
  13. Install foam shapes and attach to sheathing.
  14. Interrupt insulation for expansion joints where indicated.
  15. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
  16. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
  17. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
  18. Treat exposed edges of insulation as follows:
    - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
    - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
  19. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS protective-coating lamina.
- B. Expansion Joints: Install at locations where required by EIFS manufacturer, and as follows:
1. At expansion joints in substrates behind EIFS.
  2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.

3. Where wall height or building shape changes.
4. Where EIFS manufacturer requires joints in long continuous elevations.

### 3.7 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.
- B. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
  1. Intermediate-impact reinforcing mesh
- C. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.
  1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches wide.
  2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- D. Foam Shapes: Fully embed reinforcing mesh in base coat.
- E. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

### 3.8 FINISH-COAT INSTALLATION

- A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
- B. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
  1. Texture: As selected by Government Design Professional from manufacturer's full range.
  2. Embed aggregate in finish coat according to EIFS manufacturer's written instructions to produce a uniform applied-aggregate finish of color and texture matching approved sample.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

### 3.9 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
  1. Apply joint sealants after base coat has cured but before applying finish coat.
  2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.

3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
6. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. EIFS Tests and Inspections: For the following:
  1. According to ICC-ES AC219.
- C. Remove and replace EIFS where test results indicate that EIFS do not comply with specified requirements.
- D. Prepare test and inspection reports.

### 3.11 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

**END OF SECTION 072413**

## SECTION 074113 - METAL ROOF PANELS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Factory-formed and field-assembled, standing-seam metal roof panels.
  - 2. Metal Rain Gutters and Downspouts
  - 3. Snow/Ice Accessories
- B. Related Sections include the following:
  - 1. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, copings, flashings and other sheet metal work not part of metal roof panel assemblies.
  - 2. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

#### 1.3 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.
- B. Solar Flux: Direct and diffuse radiation from the sun received at ground level over the solar spectrum, expressed in watts per square meter.
- C. Solar Reflectance: Fraction of solar flux reflected by a surface, expressed as a percent or within the range of 0.00 and 1.00.
- D. Steel Sheet Thickness: Minimum thickness of base metal without metallic coatings or painted finishes.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
  - 1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft.
  - 2. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft.

3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
  4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- C. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft.
  2. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft..
  3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
  4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- D. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.
- E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.
- F. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
1. Fire/Windstorm Classification: Class 1A-60
  2. Hail Resistance: MH.
- G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
1. Wind Loads: Determine loads based on the following minimum design wind pressures:
    - a. Uniform pressure of 20 lbf/sq. ft., acting inward or outward.
  2. Snow Loads: 30 lbf/sq. ft.
  3. Deflection Limits: Engineer metal roof panel assemblies to withstand design loads with vertical deflections no greater than 1/180 of the span.
- H. Seismic Performance: Provide metal roof panel assemblies capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- I. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- J. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 236 or ASTM C 518.



- K. Solar Reflectance for Roofs with Slopes Steeper Than 2:12: Initial solar reflectance of not less than 0.25 when tested according to ASTM E 903, and maintained, under normal conditions, solar reflectance not less than 0.15 for 3 years after installation.

## 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
  - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
    - a. Flashing and trim.
    - b. Gutters.
    - c. Downspouts.
    - d. Roof curbs.
    - e. Snow guards.
  - 2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
  - 1. Roof panels and attachments.
  - 2. Purlins and rafters.
  - 3. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs.
- D. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.
  - 1. Include similar Samples of trim and accessories involving color selection.
- E. Material Certificates: For thermal insulation and vapor retarders, signed by manufacturers.
- F. Maintenance Data: For metal roof panels to include in maintenance manuals.
- G. Warranties: Special warranties specified in this Section.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
  - 1. Installer's responsibilities include fabricating and installing metal roof panel assemblies and providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of data for metal roof panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

- B. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal roof panels and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Combustion Characteristics: ASTM E 136.
  - 2. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
  - 3. Metal roof panels shall be identified with appropriate markings of applicable testing and inspecting agency.
- E. Surface-Burning Characteristics: Provide insulated metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Flame-Spread Index: 25 or less, unless otherwise indicated.
  - 2. Smoke-Developed Index: 450 or less, unless otherwise indicated.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.
- E. Protect foam-plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
  - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

#### 1.8 PROJECT CONDITIONS

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

#### 1.9 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Division 7 Section "Roof Accessories."
- B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, purlins and rafters, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including rupturing, cracking, or puncturing.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.
- C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
  2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

### 2.2 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
  2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
  3. Surface: Smooth, flat finish.
  4. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
    - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified below:
        - a) Humidity Resistance: 1000 hours.
        - b) Salt-Spray Resistance: 1000 hours.
      - 2) Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
        - a) Humidity Resistance: 2000 hours.
        - b) Salt-Spray Resistance: 2000 hours.
  5. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304 or Type 316L, fully annealed.

1. Exposed Finishes:
  - a. Surface: Smooth, flat finish.
  - b. Bright, Directional Polish: No. 4 finish. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2-inch-wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.3 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL ROOF PANELS

- A. Polyisocyanurate Rigid Insulation: ASTM C 1289, 8'x4'x1" sheets with minimum "R value of 7.5.

2.4 UNDERLAYMENT MATERIALS

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

1. Products:
  - a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start "A."
  - b. Owens Corning; WeatherLock.
  - c. Polyguard Products, Inc.; Polyguard Deck Guard.
  - d. "Or Approved Equal"

2.5 MISCELLANEOUS METAL FRAMING

- A. General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with manufacturer's standard corrosion-resistant zinc coating.
- B. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch.
  2. Depth: 1-1/2 inches.
- C. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange.
1. Depth: 3/4 inch.

2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
- D. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- E. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

## 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.
1. Fasteners for Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
  2. Fasteners for Roof Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal roof panels.
  3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
  4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.7 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
  2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.
- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and snapping panels together.
1. Manufacturers:
    - a. Architectural Building Components.
    - b. ATAS International, Inc.
    - c. Metal-Fab Manufacturing, LLC.
    - d. Perma-Clad Products.

- e. "Or Approved Equal"
- 2. Material: Zinc-coated (galvanized) steel sheet, 0.0159 inch thick.
  - a. Exterior Finish: Fluoropolymer.
  - b. Color: As selected by Government Design Professional from manufacturer's full range.
- 3. Material: Aluminum-zinc alloy-coated steel sheet, 0.0159 inch thick.
  - a. Exterior Finish: Fluoropolymer.
  - b. Color: As selected by Government Design Professional from manufacturer's full range.
- 4. Batten: Same material, finish, and color as roof panels.
- 5. Clips: Floating to accommodate thermal movement.
  - a. Material: 0.0209-inch thick, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
- 6. Panel Coverage: 16 inches (minimum).
- 7. Panel Height: 1.75 inches
- 8. Uplift Rating: UL 30.

## 2.8 ACCESSORIES

- A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
  - 2. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.
  - 3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- thick, stainless-steel or nylon-coated aluminum sheet.
  - 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- C. Gutters: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 36 inches o.c., fabricated from same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at outlets. Finish gutters to match roof fascia and rake trim.

- D. Downspouts: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; in 10-foot- long sections, complete with formed elbows and offsets. Finish downspouts to match metal roof panels.
- E. Snow Guards: Prefabricated, non-corrosive units designed to be installed with minimal to no penetrating of the roof panel.
  - 1. Stainless Steel, Seam Clamped, Horizontal Rod(s) or Bar w/ Cleat or Plate to prevent movement of snow and ice beneath guard.
    - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Metal Roof Innovations, Ltd.: SnoRail and SnoFence
      - 2) SNO GEM: Snow Barricade System
      - 3) "Or Approved Equal"

## 2.9 FABRICATION

- A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

## 2.10 FINISHES, GENERAL



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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
  - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
  - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
  - 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- C. Install fascia and copings to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- D. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written recommendations.
  - 1. Soffit Framing: Clip furring channels to supports, as required to comply with requirements for assemblies indicated.

### 3.3 UNDERLAYMENT INSTALLATION

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

### 3.4 METAL ROOF PANEL INSTALLATION, GENERAL

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cutting of metal roof panels by torch is not permitted.
  - 2. Install panels perpendicular to purlins.
  - 3. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.
  - 4. Provide metal closures at peaks, rake edges rake walls and each side of ridge and hip caps.
  - 5. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  - 6. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 7. Install ridge and hip caps as metal roof panel work proceeds.
  - 8. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 9. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.
- B. Fasteners:
  - 1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
  - 2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
  - 3. Copper Roof Panels: Use copper or stainless-steel fasteners.
  - 4. Stainless-Steel Roof Panels: Use stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
  - 1. Coat back side of stainless-steel roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
  - 1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

### 3.5 THERMAL INSULATION INSTALLATION FOR FIELD-ASSEMBLED METAL ROOF PANELS

- A. Board Insulation: Extend insulation in thickness indicated to cover entire roof. Comply with installation requirements in Division 7 Section "Building Insulation."
  1. Erect insulation horizontally and hold in place with Z-shaped furring members spaced 24 inches o.c. Securely attach narrow flanges of furring members to roof deck with screws spaced 24 inches o.c.

### 3.6 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
  1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
  1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
- C. Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

### 3.7 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
  1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
  1. Provide elbows at base of downspouts to direct water away from building.
  2. Tie downspouts to underground drainage system indicated.
- E. Snow/Ice Guards: Attach snow guards as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.

### 3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### 3.9 CLEANING AND PROTECTION

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

**END OF SECTION 07411**

## **SECTION 074600 – VINYL SOFFIT**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Vinyl soffit.
- B. Related Sections include the following:
  - 1. Division 7 Section "Sheet Metal Flashing and Trim" for flashing, gutters, and other sheet metal work.
  - 2. Division 7 Section "Joint Sealants."

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For soffit and decorative accessories.
- C. Product Certificates: For each type of soffit, signed by product manufacturer.

#### **1.4 QUALITY ASSURANCE**

- A. Source Limitations for Soffit: Obtain each type, color, texture, and pattern of soffit, including related accessories, through one source from a single manufacturer.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials in a dry, well-ventilated, weathertight place.

#### **1.6 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with siding installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions.

#### **1.7 SEQUENCING**

- A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace siding that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering.
  - 1. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 5 Hunter color-difference units as measured according to ASTM D 2244.
  - 2. Warranty Period: 25 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 SOFFIT

- A. Vinyl Soffit: Integrally colored, vinyl soffit complying with ASTM D 4477.
  - 1. Manufacturers:
    - a. CertainTeed Corp.
    - b. Owens Corning.
    - c. "Or Approved Equal"
  - 2. Pattern: 12-inch exposure in V-grooved, triple 4-inch board style.
  - 3. Texture: Smooth.
  - 4. Ventilation: Provide perforated soffit.
  - 5. Minimum Nominal Thickness: 0.040 inch.
  - 6. Minimum Profile Height: 1/2 inch.
  - 7. Colors for Vinyl Soffit: As selected by Government Design Professional from manufacturer's full range.

### 2.3 ACCESSORIES

- A. Vinyl Accessories: Where vinyl accessories are indicated, provide integrally colored vinyl accessories complying with ASTM D 3679 except for wind-load resistance.
  - 1. Texture: Smooth.

- B. Flashing: Provide aluminum flashing complying with Division 7 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- C. Elastomeric Joint Sealant: Multicomponent urethane joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.
- D. Fasteners:
  - 1. For fastening to wood, use siding nails or ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
  - 2. For fastening vinyl, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

#### 3.3 INSTALLATION

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Overlap joints to shed water away from direction of prevailing wind.
- B. Install vinyl soffit and accessories according to ASTM D 4756.

#### 3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective siding materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

**END OF SECTION 07460**

## **SECTION 076200 - SHEET METAL FLASHING AND TRIM**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following sheet metal flashing and trim:
  - 1. Formed wall flashing and trim.
- B. Related Sections include the following:
  - 1. Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
  - 2. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
  - 1. Include similar Samples of trim and accessories involving color selection.



## 1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

## 1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and non-corrosive installation.

## PART 2 - PRODUCTS

### 2.1 SHEET METALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
  - 1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.
    - b. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with AAMA 2605.
      - 1) Color: As selected by Government Design Professional from manufacturer's full range.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
  - 1. Finish: No. 2D (dull, cold rolled).

- C. Pre-painted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
  2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
  3. Exposed Finishes: Apply the following coil coating:
    - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      - 1) Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified below:
        - a) Humidity Resistance: 1000 hours.
        - b) Salt-Spray Resistance: 1000 hours.
      - 2) Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
        - a) Humidity Resistance: 2000 hours.
        - b) Salt-Spray Resistance: 2000 hours.
      - 3) Color: As selected by Government Design Professional from manufacturer's full range.

## 2.2 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.
- C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..

## 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
  1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.

2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
  3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
  4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
  - D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.
  - E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
  - F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
  - G. Epoxy Seam Sealer: Two-part, non-corrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
  - H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
  - I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

#### 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
  1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
  - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

## 2.5 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12 foot long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high end dams. Fabricate from the following material:
  - 1. Stainless Steel: 0.0156 inch thick.
- B. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high end dams. Fabricate from the following material:
  - 1. Aluminum: 0.0320 inch Insert thickness thick.
  - 2. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
  - 3. Pre-painted, Metallic-Coated Steel: 0.0217 inch thick.

## 2.6 FINISHES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
  - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings,

separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
  1. Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
  3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
  1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
  2. Aluminum: Use aluminum or stainless-steel fasteners.
  3. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
  1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

### 3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
  - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
  - 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

### 3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of formed through-wall flashing is specified in Division 4 Section "Stone Veneer Assemblies."
- C. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

### 3.5 CLEANING AND PROTECTION

- A. Clean and neutralize flux materials. Clean off excess solder and sealants.
- B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 076200**

## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes joint sealants for the following applications:
  - 1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:
    - a. Construction joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Joints between metal panels.
    - d. Joints between different materials listed above.
    - e. Perimeter joints between materials listed above and frames of doors and windows.
    - f. Other joints as indicated.
  - 2. Exterior joints in the following horizontal traffic surfaces:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Tile control and expansion joints.
    - c. Other joints as indicated.
  - 3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
    - 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. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - e. Other joints as indicated.
  - 4. Interior joints in the following horizontal traffic surfaces:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
  - 2. Division 8 Section "Glazing" for glazing sealants.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

#### 1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Warranties: Special warranties specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

#### 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. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.7 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.



2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 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 sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. 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 indicated by manufacturer's designations.

### 2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- D. Multicomponent Pourable Neutral-Curing Silicone Sealant:
  1. Type and Grade: M (multicomponent) and P (pourable).
  2. Class: 25.
  3. Uses Related to Exposure: T (traffic) and NT (non-traffic).
  4. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: Galvanized steel.
- E. Single-Component Pourable Neutral-Curing Silicone Sealant:
  1. Type and Grade: S (single component) and P (pourable).
  2. Class: 100/50.
  3. Uses Related to Exposure: NT and T (traffic).
  4. Uses Related to Joint Substrates: M, A and O, as applicable to joint substrates indicated.
    - a. Use O Joint Substrates: Galvanized steel.

- F. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:
1. Type and Grade: S (single component) and NS (non-sag).
  2. Class: 25.
  3. Use Related to Exposure: NT (non-traffic).
  4. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel and ceramic tile.

- G. Multicomponent Pourable Urethane Sealant:
1. Type and Grade: M (multicomponent) and P (pourable).
  2. Class: 25.
  3. Use Related to Exposure: T (traffic).
  4. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: Ceramic tile.

- H. Multicomponent Pourable Urethane Sealant:
1. Type and Grade: M (multicomponent) and P (pourable).
  2. Class: 25.
  3. Uses Related to Exposure: T (traffic) and NT (non-traffic).
  4. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: Color anodic aluminum and aluminum coated with a high-performance coating.

## 2.3 SOLVENT-RELEASE JOINT SEALANTS

- A. Butyl-Rubber-Based Solvent-Release Joint Sealant: Comply with ASTM C 1085.
- B. Pigmented Narrow-Joint Sealant: Manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch or smaller in width.

## 2.4 PREFORMED JOINT SEALANTS

- A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
- B. Preformed Foam Sealant: Manufacturer's standard preformed, pre-compressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in pre-compressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:
1. Properties: Permanently elastic, mildew resistant, non-migratory, non-staining, and compatible with joint substrates and other joint sealants.

- a. Density: Manufacturer's standard.

## 2.5 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are non-staining; 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. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.6 MISCELLANEOUS MATERIALS

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

### 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, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. 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 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 type 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. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

### 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.

### 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.

**END OF SECTION 079200**

## SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Standard hollow-metal steel doors.
  - 2. Standard hollow-metal steel frames.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting standard steel frames in masonry construction.
  - 2. Division 8 Sections for door hardware for standard steel doors.
  - 3. Division 8 Sections for Blast Resistant Ratings
  - 4. Division 9 Painting Sections for field painting standard steel doors and frames.

#### 1.3 DEPARTMENT OF DEFENSE REQUIREMENT

- A. All exterior doors and windows, to include, but not limited to frames, glazing, anchoring, etc. **must** comply with the following regulation(s):
  - 1. Unified Facilities Criteria (UFC) 4-010-01 and (UFC) 4-020-01: DoD Minimum Antiterrorism Standards for Buildings

#### 1.4 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

#### 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating and finishes for each type of steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details.
  - 3. Frame details for each frame type, including dimensioned profiles.
  - 4. Details and locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Details of conduit and preparations for electrified door hardware and controls.

C. Qualification Data: For Installer.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.
  1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

#### 1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

#### 1.9 COORDINATION

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

### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ceco Door Products; an ASSA ABLOY Group Company.
  2. Fleming Door Products Ltd.; an ASSA ABLOY Group Company.
  3. Kewanee Corporation (The).
  4. Steelcraft; an Ingersoll-Rand Company.
  5. "Or Approved Equal"

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- G. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.3 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
1. Design: Flush panel.
  2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polyurethane, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.



- a. Fire Door Core: As required to provide fire-protection ratings indicated.
  - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft. /Btu when tested according to ASTM C 1363.
    - 1) Locations: Exterior doors.
3. Vertical Edges for Single-Acting Doors: Beveled edge.
- a. Beveled Edge: 1/8 inch in 2 inches.
4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
- 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
  - 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
  - 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
  - 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- C. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

## 2.4 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
- 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
  - 2. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet, unless otherwise indicated.
- C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
- 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints, unless otherwise indicated.
  - 2. Fabricate knocked-down frames with mitered or coped corners, for field assembly.
  - 3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
  - 4. Frames for Wood Doors: 0.053-inch- thick steel sheet.
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
- 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
  - 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.

3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

F. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Slip-on Frames: Adjustable compression anchors.

G. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

H. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

## 2.5 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.

B. Astragals: Provide Astragals and/or Astragal Weather Strips at all exterior double doors.

## 2.6 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

- 1) Two anchors per jamb up to 60 inches in height.
  - 2) Three anchors per jamb from 60 to 90 inches in height.
  - 3) Four anchors per jamb from 90 to 120 inches in height.
  - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.
- b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
- 1) Three anchors per jamb up to 60 inches in height.
  - 2) Four anchors per jamb from 60 to 90 inches in height.
  - 3) Five anchors per jamb from 90 to 96 inches in height.
  - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
  - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- c. Compression Type: Not less than two anchors in each jamb.
5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
1. Reinforce doors and frames to receive non-templated mortised and surface-mounted door hardware.
  2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  2. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

## 2.7 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Finish standard steel door and frames after assembly.
- B. Metallic-Coated Steel Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
    1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
  1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
  2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  3. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
  1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

#### 3.3 INSTALLATION

- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
  
- B. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install door silencers in frames before grouting.
    - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - e. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - f. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreeze agents.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post installed expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
  - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
  - 5. In-Place Gypsum Board Partitions: Secure frames in place with post installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  - 6. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
  
- C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

#### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

**END OF SECTION 081113**

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior and interior aluminum-framed storefronts.
    - a. Glazing is retained mechanically with gaskets on four sides.
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
  - 2. Division 8 Section "All-Glass Entrances and Storefronts" for systems without aluminum support framing.
  - 3. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.
  - 4. Division 8 Section "Blast Resistant Openings" for complete DoD requirements.

#### 1.3 DEPARTMENT OF DEFENSE REQUIREMENT

- A. All exterior doors and windows, to include, but not limited to frames, glazing, anchoring, etc. **must** comply with the following regulation(s):
  - 1. Unified Facilities Criteria (UFC) 4-010-01 and (UFC) 4-020-01: DoD Minimum Antiterrorism Standards for Buildings

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Performance requirements outlined in Section 1.3, supersede the requirements under this section. Manufacturer is to base all performance requirements on Section 1.3 unless specified otherwise.
- B. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
  - 1. Structural loads.
  - 2. Thermal movements.
  - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
  - 4. Dimensional tolerances of building frame and other adjacent construction.
  - 5. Failure includes the following:

- a. Deflection exceeding specified limits.
  - b. Thermal stresses transferred to building structure.
  - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
  - d. Noise or vibration created by wind and thermal and structural movements.
  - e. Loosening or weakening of fasteners, attachments, and other components.
  - f. Sealant failure.
- C. Structural Loads:
- 1. Wind Loads: 40 mph.
  - 2. Seismic Loads: NA
- D. Deflection of Framing Members:
- 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch and clearance between members and operable units directly below to less than 1/16 inch.
- E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
- 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- F. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
  - 2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
    - a. Test High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    - b. Test Low Exterior Ambient-Air Temperature: 0 deg F.
    - c. Test Interior Ambient-Air Temperature: 75 deg F.
- G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft..
- H. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..



- I. Water Penetration Under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
  - 1. Maximum Water Leakage: No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.
- J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- K. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- L. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

#### 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Qualification Data: For Installer.
- E. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- F. Warranties: Special warranties specified in this Section.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
  - 1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one

another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Government Design Professional, except with approval. If modifications are proposed, submit comprehensive explanatory data to Government Design Professional for review.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.8 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration caused by thermal movements.
    - c. Deterioration of metals and other materials beyond normal weathering.
    - d. Water leakage through fixed glazing and framing areas.
  2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
  1. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Commercial Architectural Products, Inc.
  2. Kawneer.
  3. Vistawall Architectural Products.
  4. "Or Approved Equal"

## 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Sheet and Plate: ASTM B 209.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
  - 4. Structural Profiles: ASTM B 308/B 308M.
  
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
  - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Construction Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.
  
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
  
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
  - 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
  - 2. Reinforce members as required to receive fastener threads.
  
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
  
- E. Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
  
- F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

## 2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 8 Section "Glazing" & "Security Glazing".
  
- B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

## 2.5 ACCESSORY MATERIALS

- A. Insulating Materials: As specified in Division 7 Section "Building Insulation."
- B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."
- C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.6 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
  - 4. Physical and thermal isolation of glazing from framing members.
  - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or panels.
  - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
- D. Storefront Framing: Fabricate components for assembly using head-and-sill-receptor system with shear blocks at intermediate horizontal members.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.
  - a. Color: As selected by Government Design Professional from manufacturer's full range.
- D. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.
  1. Color and Gloss: As selected by Government Design Professional from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General:
  1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.
  3. Fit joints to produce hairline joints free of burrs and distortion.
  4. Rigidly secure non-movement joints.
  5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
  6. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:
  1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
  2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weather tight installation.
- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

- F. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
  2. Alignment:
    - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
  3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

**END OF SECTION 084113**

## **SECTION 087111 - DOOR HARDWARE**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Drawing A.3.3 contained within the Project Design Documents.

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Commercial door hardware for the following:
    - a. Swinging doors.
    - b. Other doors to the extent indicated.
  - 2. Cylinders for doors specified in other Sections.
- B. Related Sections include the following:
  - 1. Division 8 Section "Steel Doors and Frames" for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
  - 2. Division 8 Section "Aluminum Entrances and Storefronts" for entrance door hardware, except cylinders.

#### **1.3 SUBMITTALS**

- A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
  - 1. Include lists of completed projects with project names and addresses of architects and owners, and other information specified.
- D. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
- E. Warranties: Special warranties specified in this Section.

#### **1.4 QUALITY ASSURANCE**

- A. **Installer Qualifications:** An experienced installer who has completed door 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.
- B. **Supplier Qualifications:** Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  - 1. **Scheduling Responsibility:** Preparation of door hardware and keying schedules.
- C. **Source Limitations:** Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. **Regulatory Requirements:** Comply with provisions of the following:
  - 1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," 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. **Door Closers:** Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
    - c. **Thresholds:** Not more than 1/2 inch high.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. 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.
- C. Keys to be handed over to the Government Representative at final Construction Progress Meeting.

#### 1.6 WARRANTY

- A. **General Warranty:** 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. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of operators and door hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: Three (3) years from date of Substantial Completion, unless otherwise indicated.
- D. Warranty Period for Manual Closers: Ten (10) years from date of Substantial Completion.

#### 1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and 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 this Section, the Door Hardware Schedule located on sheet A.3.3
  - 1. Door Hardware Sets: Requirements for quantity, item, design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

#### 2.2 HINGES AND PIVOTS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Hinges:
    - a. Stanley Commercial Hardware; Div. of The Stanley Works.
  - 2. Continuous Geared Hinges:
    - a. McKinney Products Company; Div. of ESSEX Industries, Inc.
- B. Standards: Comply with the following:
  - 1. Butts and Hinges: BHMA A156.1.
  - 2. Template Hinge Dimensions: BHMA A156.7.
- C. Quantity: Provide the following, unless otherwise indicated:
  - 1. Two Hinges: For doors with heights up to 60 inches.

2. Three Hinges: For doors with heights 61 to 90 inches.
3. Four Hinges: For doors with heights 91 to 120 inches.
4. 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.

D. Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

| Maximum Door Size (inches) | Hinge Height (inches) | Metal Thickness (inches) |              |
|----------------------------|-----------------------|--------------------------|--------------|
|                            |                       | Standard Weight          | Heavy Weight |
| 34 by 84 by 1-3/8          | 3-1/2                 | 0.123                    | -            |
| 36 by 84 by 1-3/8          | 4                     | 0.130                    | -            |
| 36 by 84 by 1-3/4          | 4-1/2                 | 0.134                    | 0.180        |

E. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

F. Hinge Applications: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard-weight hinges.

G. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel, with stainless-steel pin.
2. Interior Hinges: Stainless steel, with stainless-steel pin.
3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.

H. Hinge Options: Comply with the following:

1. Nonremovable 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:
  - a. Outswinging exterior doors.
  - b. Outswinging corridor doors with locks.
2. Corners: Square.
3. Reverse Safety Stud: Metal stud extension on back of each leaf that engages hole in reinforcing plate.
4. Safety Stud: Metal stud extension on exposed side of one leaf that engages hole in opposite leaf when door is closed.

I. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors. Finish screw heads to match surface of hinges.

## 2.3 HINGES

- A. Antifriction-Bearing, Full-Mortise (Butt) Hinges: Standard weight; BHMA Grade 2, with 2 ball bearings; button tips; non-rising removable pins; and base metal as follows:
  - 1. Base Metal: Stainless steel.
- B. Plain-Bearing, Standard-Weight, Full-Mortise (Butt) Hinges: BHMA Grade 3, button tips, non-rising removable pins, and base metal as follows:
  - 1. Base Metal: Stainless steel.

## 2.4 LOCKS AND LATCHES, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Mechanical Locks and Latches:
    - a. Best Access Systems – **DMVA STANDARD – NO SUBSTITUTIONS ALLOWED.**
- B. Standards: Comply with the following:
  - 1. Bored Locks and Latches: BHMA A156.2.
  - 2. Mortise Locks and Latches: BHMA A156.13.
  - 3. Interconnected Locks and Latches: BHMA A156.12.
  - 4. Auxiliary Locks: BHMA A156.5.
  - 5. Push-Button Combination Locks: BHMA A156.2.
- C. Bored Locks: BHMA Grade 2; Series 4000.
- D. Mortise Locks: Stamped steel case with steel or brass parts; BHMA Grade 2; Series 1000.
- E. Interconnected Locks: BHMA Grade 1, unless Grade 2 is indicated; Series 5000.
- F. Auxiliary Locks: BHMA Grade 1, unless Grade 2 is indicated.
- G. Certified Products: Provide door hardware listed in the following BHMA directories:
  - 1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."
- H. Lock Trim: Comply with the following:
  - 1. Lever: Wrought, forged, or cast.
  - 2. Knob: Wrought, forged, or cast.
  - 3. Escutcheon (Rose): Wrought, forged, or cast.
  - 4. Dummy Trim: Match lever lock trim and escutcheons.
  - 5. Lockset Designs: Provide lockset design designated below or, if sets are provided by another manufacturer, provide designs that match those designated:
    - a. Bored Locks: Best Access Systems – Post Standard, no substitutions allowed
- I. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Bored Locks: BHMA A156.2.
2. Mortise Locks: BHMA A156.13.
3. Interconnected Locks: BHMA A156.12.

J. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
3. Deadbolts: Minimum 1-inch bolt throw.

K. Rabbeted Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.

L. Backset: 2-3/4 inches, unless otherwise indicated.

## 2.5 MECHANICAL LOCKS AND LATCHES (Door 120)

A. Bored Auxiliary Locks: Comply with the following:

1. Material: Stainless steel.
2. Deadlocks: Deadbolt operated by key either side.

## 2.6 HIGH SECURITY LOCKS AND LATCHES

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

1. High Security Locks and Latches:
  - a. KABA MAS Security and Control: **CDX-09**
  - b. "Or Approved Equal"

B. Operation: Lock opens by entering a digital numeric code via twist dial. Comply with the following:

1. Power: Internal, self-powered.
2. Combinations: 3 modes:
  - Single: 1 million combinations
  - Dual: 500 billion combinations
  - Supervisor/Subordinate: 2 million combinations
3. Direct Dial: No need to clear before entering combination. Once you stop turning the dial, the power will shut down after 40 seconds.
4. Dead Zones: None
5. Memory: Non-volatile
6. LCD: Limited View Liquid Crystal Display with indicator arrows.
7. Combination Changes: (LCD indicator in change key mode). Combination changed with correct combination or serial number.
8. Random Number View: True Scramble
9. Daylocking: No
10. Back Dialing: No
11. Lock Reset: Automatic when bolt is thrown or 40 seconds after turning has stopped.
12. Manipulation: Fail secure against high-voltage attack, robot attack, X-ray methods, magnetic, vibration, and R/F.

13. Wrong Try Penalty: 10-14 errors results in a 3 minute time out. 15 errors or greater results in a 4 minute time out. Both error count and penalty time resets with valid combination.
14. Back Cover: Lock On Back Cover pin prevents removing the back cover without the combination.
15. Exit/Panic Hardware: Lock shall be interconnected with exit device releasing deadbolt and latch bolt when touch bar is depressed.

## 2.7 DOOR BOLTS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Flush Bolts: Best Access Systems – Post Standard, no substitutions allowed
- B. Standards: Comply with the following:
  1. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
  2. Manual Flush Bolts: BHMA A156.16.
- C. Flush Bolts: BHMA Grade 2, designed for mortising into door edge.
- D. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
  1. Mortise Flush Bolts: Minimum 3/4-inch throw.

## 2.8 DOOR BOLTS

- A. Automatic Flush Bolts: Fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger. Provide brass or stainless-steel cover plate, top and bottom strikes, guides, guide supports, wear plates, and shims.
- B. Self-Latching Flush Bolts: Fabricated from steel and brass components, with spring-activated bolts that automatically engage when active door depresses trigger. Bolts are manually retracted by a slide in the bolt face. Provide brass or stainless-steel cover plate, top and bottom strikes, guides, guide supports, wear plates, and shims.

## 2.9 EXIT DEVICES, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc.
- B. Standard: BHMA A156.3.
  1. BHMA Grade: Grade 1, unless Grade 2 is indicated.
- C. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

- E. Outside Trim: Knob with cylinder; material and finish to match locksets, unless otherwise indicated.
  - 1. Match design for locksets and latch sets, unless otherwise indicated.
- F. Through Bolts: For exit devices and trim on metal doors.

## 2.10 EXIT DEVICES

- A. Mortise Exit Devices: Comply with the following:
  - 1. Type: Type 3.
  - 2. Actuating Bar: Push pad.
  - 3. Material: Stainless steel.

## 2.11 CYLINDERS AND KEYING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cylinders: Same manufacturer as for locks and latches.
- B. Standards: Comply with the following:
  - 1. Cylinders: BHMA A156.5.
- C. Cylinder Grade: BHMA Grade 2.
- D. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
  - 1. Number of Pins: Six.
  - 2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
  - 3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 4. Bored-Lock Type: Cylinders with tailpieces to suit locks.
    - a. High-Security Grade: BHMA Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements of UL 437 (Suffix A).
- E. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
  - 1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders.
  - 2. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- F. Construction Keying: Comply with the following:
  - 1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
  - 2. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 5 construction master keys.

- a. Furnish permanent cores to Owner for installation.
- G. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:
  - 1. Master Key System: Cylinders are operated by a change key and a master key.
  - 2. Keyed Alike: Key all cylinders to the same change key.
    - a. Cylinders shall be master keyed.
- H. Keys: Provide nickel-silver keys complying with the following:
  - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: Information to be furnished by Owner.
  - 2. Quantity: In addition to one extra blank key for each lock, provide the following:
    - a. Cylinder Change Keys: Three.
    - b. Master Keys: Five.

## 2.12 STRIKES

- A. Standards: Comply with the following:
  - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 2. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 3. Strikes for Interconnected Locks and Latches: BHMA A156.12.
  - 4. Strikes for Auxiliary Deadlocks: BHMA A156.5.
- B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

## 2.13 OPERATING TRIM, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Stanley Commercial Hardware; Div. of The Stanley Works.
- B. Standard: Comply with BHMA A156.6.
- C. Materials: Fabricate from stainless steel, unless otherwise indicated.

## 2.14 OPERATING TRIM

- A. Flat Push Plates: 0.050 inch thick, 4 inches wide by 16 inches high; with square corners and beveled edges, secured with exposed screws.
- B. Single Push Bar: Horizontal bar, with minimum clearance of 1-1/2 inches from face of door, and as follows:
  - 1. Shape and Size: Minimum 3/8-by-1-1/4-inch flat bar.
  - 2. Mounting: Surface applied with concealed fasteners.

## 2.15 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Flat Overlapping Astragals: BHMA A156.22; flat stainless steel metal bar, surface mounted on face of door with screws; minimum 1/8 inch thick by 2 inches wide by full height of door.
- D. CLOSERS, GENERAL
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Surface-Mounted Closers:
- F. Standards: Comply with the following:
  - 1. Closers: BHMA A156.4.
- G. Surface Closers: BHMA Grade 2.
- H. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."
- I. Power-Assist Closers: As specified in Division 8 Section "Power Door Operators" for access doors for the disabled or where listed in the Door Hardware Schedule. Provide electrohydraulic, electromechanical, and pneumatic types as indicated.
- J. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

## 2.16 CLOSERS

- A. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in cover indicated; complying with the following:
  - 1. Mounting: Hinge side.



2. Type: Delayed action closing.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Cover Material: Aluminum.
5. Closing Power Adjustment: At least 35 percent more than minimum tested value.

#### 2.17 PROTECTIVE TRIM UNITS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Metal Protective Trim Units:
    - a. Baldwin Hardware Corporation.
- B. Standard: Comply with BHMA A156.6.
- C. Materials: Fabricate protection plates from the following:
  1. Stainless Steel: 0.050 inch thick; beveled top and 2 sides.
- D. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.
- E. Furnish protection plates sized 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in schedule.

#### 2.18 PROTECTIVE TRIM UNITS

- A. Kick Plates: 12 inches high by door width, with allowance for frame stops.

#### 2.19 STOPS AND HOLDERS

- A. Stops and Bumpers: BHMA A156.16, Grade 1 unless Grade 2 is indicated.
  1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
- B. Combination Floor and Wall Stops and Holders: BHMA A156.8, Grade 1 unless Grade 2 is indicated.
- C. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall, with back plate for concealed fastener installation; with concave bumper configuration.

#### 2.20 DOOR GASKETING, GENERAL

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

- a. Reese Enterprises, Inc.
- B. Standard: Comply with BHMA A156.22.
- C. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-erosive fasteners for exterior applications and elsewhere as indicated.
  - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- D. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

#### 2.21 DOOR GASKETING

- A. Adhesive-Backed Perimeter Gasketing: Gasket material applied to frame rabbet with self-adhesive.
  - 1. Gasket Material: Sponge neoprene.
- B. Exterior Door Sweeps: Nylon brush gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

#### 2.22 THRESHOLDS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Reese Enterprises, Inc.
- B. Standard: Comply with BHMA A156.21.

#### 2.23 THRESHOLDS

- A. Plate Thresholds: Solid metal plate; and base metal as follows:
  - 1. Top Surface: Fluted with slip-resistant abrasive.
  - 2. Base Metal: Stainless steel.

#### 2.24 MISCELLANEOUS DOOR HARDWARE, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Standard: Comply with the following:
  - 1. Auxiliary Hardware: BHMA A156.16.

- C. Auxiliary Hardware: BHMA Grade 2, unless otherwise indicated.

## 2.25 MISCELLANEOUS DOOR HARDWARE

## 2.26 FABRICATION

- A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.
  - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  - 2. Steel Machine or Wood Screws: For the following fire-rated applications:
    - a. Mortise hinges to doors.
    - b. Strike plates to frames.
    - c. Closers to doors and frames.
  - 3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
    - a. Closers to doors and frames.
  - 4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
  - 5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

## 2.27 FINISHES

- A. Standard: Comply with BHMA A156.18.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 600: Primed for painting, over steel base metal.
2. BHMA 605: Bright brass, clear coated, over brass base metal.
3. BHMA 606: Satin brass, clear coated, over brass base metal.
4. BHMA 609: Satin brass, blackened, satin relieved, clear coated, over brass base metal.
5. BHMA 611: Bright bronze, clear coated, over bronze base metal.
6. BHMA 612: Satin bronze, clear coated, over bronze base metal.
7. BHMA 613: Dark-oxidized satin bronze, oil rubbed, over bronze base metal.
8. BHMA 618: Bright nickel plated, clear coated, over brass or bronze base metal.
9. BHMA 619: Satin nickel plated, clear coated, over brass or bronze base metal.
10. BHMA 622: Flat black coated, over brass or bronze base metal.
11. BHMA 623: Light-oxidized statuary bronze, clear coated, over bronze base metal.
12. BHMA 624: Dark-oxidized statuary bronze, clear coated, over bronze base metal.
13. BHMA 625: Bright chromium plated over nickel, over brass or bronze base metal.
14. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
15. BHMA 627: Satin aluminum, clear coated, over aluminum base metal.
16. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
17. BHMA 629: Bright stainless steel, over stainless-steel base metal.
18. BHMA 630: Satin stainless steel, over stainless-steel base metal.
19. BHMA 651: Bright chromium plated over nickel, over steel base metal.
20. BHMA 652: Satin chromium plated over nickel, over steel base metal.
21. BHMA 689: Aluminum painted, over any base metal.
22. BHMA 690: Dark bronze painted, over any base metal.
23. BHMA 691: Light bronze painted, over any base metal.
24. BHMA 717: Bright aluminum, uncoated; aluminum base metal.
25. BHMA 718: Satin aluminum, uncoated; aluminum base metal.
26. BHMA 722: Dark-oxidized bronze, oil rubbed, over architectural bronze base metal.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Wood Doors: Comply with DHI A115-W series.

#### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

- B. Install each door hardware item to comply with manufacturer's 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.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

### 3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed 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.
  - 1. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:
  - 1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
  - 2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
  - 3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

**END OF SECTION 087111**

## SECTION 088500–BLAST RESISTANT OPENINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes security/blast requirements as determined by the United States Department of Defense for the following products:
  - 1. Steel Doors and Frames
  - 2. Storefronts and Entrances
  - 3. Windows and Frames
  - 4. Security Glazing for Doors and Windows
- B. Products and applications specified in other sections where requirements are specified by reference to this Section:
  - a. 081113 – Steel Doors and Frames
  - b. 084113 – AF Storefronts and Entrances
  - c. 085113 – Aluminum Windows
  - d. 087111 – Door Hardware
- C. NOTES:
  - 1. This section is to be utilized in conjunction with sections listed in Part 1.2.B.
  - 2. **All requirements contained herein shall supersede any/all like requirements referenced within other project specification sections.**

#### 1.3 DEPARTMENT OF DEFENSE REQUIREMENT

- A. All exterior doors, windows, associated framing and glazing, **must** comply with the latest versions of the following regulation(s):
  - 1. Unified Facilities Criteria (UFC) 4-010-0: *DoD Minimum Antiterrorism Standards for Buildings*
  - 2. Unified Facilities Criteria (UFC) 4-020-01: *DoD Security Engineering Facilities Planning Manual*

#### 1.4 DEFINITIONS

- A. Manufacturer: A firm that produces and/or fabricates products referenced herein.
- B. DoD: United States Department of Defense
- C. ATFP: Antiterrorism – Force Protection

- D. ATFP Threat Assessment: Facility Assessment completed by PA Department of Military & Veterans' Affairs personnel and reviewed by National Guard Bureau in conjunction with the Department of Defense and utilized to determine specific security and blast resistant requirements for a given facility, whether it be of new construction, retrofit of an existing building or a combination of both.
- E. Stand-Off Distance: Measurement (in meters or feet) from exterior face of opening to the closest perimeter threat (i.e. road, parking lot, fence, etc.)
- F. Explosive Weight: Given as a WI or WII rating and utilized in conjunction with the stand-off distance to determine the equivalent 3-second duration design loading.

## 1.5 PERFORMANCE REQUIREMENTS

- A. General: Contractor and Manufacturer shall provide products/materials capable of complying with the requirements as specified herein and based on the following Government provided data. The information provided is based on the Facility ATFP Threat Assessment and can be found within the Door and Window Schedules (Drawing Sheet A.4.3):
  - 1. Stand-Off Distance: **82 ft**
  - 2. Explosive Weight: **WII**
  - 3. DoD Window Type: **Type B throughout**
  - 4. DoD Door Type: **Type B**
- B. Design Methods:
  - 1. General - Windows fabricated using laminated glass may be designed using ASTM F 2248 and ASTM E 1300 in accordance with the requirements outlined within the UFC 4-010-01. The application of ASTM F 2248 and ASTM E 1300 results in higher levels of protection than those required in the UFC 4-010-01. In order to reduce the conservatism associated with using the ASTM methodology, the window systems may be designed using dynamic analysis or may be dynamically tested.
  - 2. Dynamic Analysis – Any of the glazing, framing members, connections and supporting structural elements may be designed using dynamic analysis to prove the window systems will provide performance equivalent to or better than hazard rating associated with the applicable level of protection as required by the UFC-010-01 and all associated requirements contained within the project design documents.
  - 3. Dynamic Testing – Window systems may be dynamically tested to demonstrate performance equivalent to or better than the hazard rating associated with the applicable level of protection as required by the UFC-010-01 and all associated requirements contained within the project design documents.
- C. Structural Performance: In conjunction with and as outlined within the UFC-010-01 and UFC -020-01, the following standards shall be utilized to determine proper structural performance of all fabricated doors and windows:
  - a. ASTM E 1300-09 – *Standard Practice for Determining Load Resistance of Glass in Buildings*
  - b. ASTM F 2247-03 – *Metal Doors Used in Blast Resistant Applications (Equivalent Static Method)*
  - c. ASTM F 2248-09 – *Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass*
  - d. PDC Technical Report 10-02 – *Blast Resistant Methodologies for Window Systems Designed Statically and Dynamically*

## 1.6 SUBMITTALS



- A. Product Data: For each DoD ATRP Type of door and window as depicted on the Project Design Drawings.
- B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- C. Glazing Accessories: To include, but not limited to; Glazing Sealants, Tapes, Gaskets, etc.
- D. Product Certificates: Signed by manufacturers of products certifying that products furnished comply with requirements.
- E. Professional Engineer Certification: Shop Drawings for all products contained within this section shall be sealed and signed by a Structural Engineer certifying that the following meet and or exceed the requirements as stated in Part 1.3.A and Part 1.5.B of this section:
  - 1. Materials for window frames, glazing, doors and door frames
  - 2. Fabrication methods
  - 3. Glazing
  - 4. Connection Design
- F. Qualification Data: For Installer.
- G. Product Test Reports: For each type of product indicated.
- H. Warranties: Special warranties specified in this Section.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glazing installations with a record of successful in-service performance; and who employs glazing installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- B. Source Limitations for Glazing: Obtain products from a single manufacturer for all glazing products.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- D. Source Limitations for Doors: Obtain products from a single manufacturer for all doors and associated framing.
- E. Source Limitations for Window Frames: Obtain products from a single manufacturer for all window framing.
- F. Glazing Publications: Comply with published recommendations of glazing product manufacturers and organization below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
- G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Deliver window frames, doors and door frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.
  - 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

### 2.2 DoD ATFP DOOR TYPES (Refer to Design Drawings for door types required under this project)

- A. TYPE A: Standard Hollow Metal Door
- B. TYPE B: Hollow Metal Door with Backing Wall
- C. TYPE C: 4 PSI (28kPa) Blast Door
- D. TYPE D: 7 PSI (48kPa) Blast Door
- E. NOTE: Glazed doors shall fall within the Window Types as detailed in Part 2.3

### 2.3 DoD ATFP Window (Glazing) TYPES (Refer to Design Drawings for window types required under this project)

- A. TYPE A: 1/4 in (6mm) + 2 x 1/8 in (3mm) glass + 0.030 in (0.75mm) PVB
- B. TYPE B: 1/4 in (6mm) + 2 x 5/32 in (4mm) glass + 0.060 in (1.5mm) PVB
- C. TYPE C: 1/4 in (6mm) + 2 x 3/16 in (5mm) glass + 0.060 in (1.5mm) PVB
- D. TYPE D: 1/4 in (6mm) + 4 x 5/32 in (4mm) glass + 3 x 0.045 (1mm) PVB

### 2.4 FRAMES (Doors and Windows):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Provide frames, mullions and sashes of aluminum or steel. In accordance with ASTM F 2248, ensure that framing members restrict deflections of edges of the blast resistant glazing the support to 1/160 of the length of the supported edge to allowable stress levels under the equivalent 3-second design loading.
- C. Punched windows: Supported edge length will be taken as equal to the span of the glass, regardless of any intermediate support connections.
- D. Multi-panel glazing systems: Supported edge length to be considered shall be taken as equal to the span of a single glass panel and the deflection will be calculated based on simple support conditions for that length.
- E. Glazed doors: Framing, connection and supporting structure provisions as outlined within UFC-010-01, Standard 10, do not have to be applied. Glazing requirements detailed in the UFC-010-01, Standard 10 shall be incorporated into the design of glazed doors and entrances.

2.5 GLAZING (Door and Window):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. All glazing, door and window, shall meet the requirements as outlined herein and all referenced standards.
- C. Determine the required thickness of laminated glass and associated polyvinyl-butylal interlayers in single panes and insulating glass unit (IGU) windows using the UFC 4-010-01.
  - 1. Guidance within the UFC 4-010-01 is based on the application of ASTM F 2248 and E 1300, which result in higher levels of protection than those required within the UFC 4-010-01. The following adjustments to the ASTM standards are made to provide the appropriate performance:
    - a. Where the UFC 4-010-01 indicate ASTM F 2248 and/or E 1300, determine the glass thickness using the procedures in ASTM F 2248 and E 1300, respectively based on the applicable charge weight and stand-off distance.
    - b. Do not use less than 1/4 in (6mm) nominal laminated glass for any single pane exterior window. The 1/4 in (6mm) laminated glass consists of two (2) nominal 1/8 in (3mm) annealed glass panes bonded together with a minimum of a 0.030 in (0.75mm) polyvinyl-butylal (PVB) interlayer. For insulating glass units, use 1/4 in (6mm) laminated glass for the inboard pane as a minimum.
  - 2. **NOTE:** ASTM F 2248 can only be utilized for a limited range of charge weights and stand-off distances, included those covered within the UFC 4-010-01. For charge weights and stand-off distances outside of the range of ASTM F 2248 and for glazing alternatives to laminated glass that provide equivalent levels of protection, refer to PDC Technical Report 10-02.

2.6 GLAZING FRAME BITE (Door and Window):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.

- B. Refer to ASTM F 2248 for glazing frame bite requirements for structurally and non-structurally glazed windows and doors.
- C. Structurally Glazed Applications: Apply silicone bead to both sides of the glass panel for single pane glazing. For insulating glass units, apply silicone bead to only the inboard side.

2.7 CONNECTION METHODS (Door and Window): Refer to UFC 4-010-01, Appendix B for Requirements

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Design for connection of door and windows to surrounding walls, of hardware and associated connections, of glazing stop connections and of other elements in shear shall be based upon allowable stress levels.
- C. Connection Design: Connections of window frames to surrounding walls, of hardware and associated connections, of glazing stop connections and of other elements in shear shall be designed for the connection design load determined in accordance with ASTM F 2248 and will account for the geometry of the particular frame and the connection configuration being used when calculating bending, shear, bearing and pull out loads for the connections.
- D. Fastener Loads: As recommended by the fastener manufacturer for the materials to which the door and/or window system is being connected.
- E. All connections shall be capable of preventing the frame from being dislodged from the supporting structural element.
- F. NOTE: The actual connection design load is dictated by the glass type and thickness determined by ASTM E 1300. In order to keep connection loads reasonable, utilize a glass type and thickness that just exceeds the required glazing resistance.

**END OF SECTION 088500**

## **SECTION 092216 - NON-STRUCTURAL METAL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes non-load-bearing steel framing members for the following applications:
  - 1. Interior framing systems.
- B. Related Sections include the following:
  - 1. Division 7 Section "Building Insulation" for insulation installed with Z-shaped furring members.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.

#### **1.4 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### **PART 2 - PRODUCTS**

#### **2.1 NON-STRUCTURAL METAL FRAMING, GENERAL**

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  - 2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

## 2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
  - 1. Minimum Base-Metal Thickness: 0.0179 inch.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
  - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  - 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  - 1. Minimum Base-Metal Thickness: 0.0179 inch.
- D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
  - 1. Depth: As indicated on Drawings.
  - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  - 1. Minimum Base Metal Thickness: 0.0179 inch.
  - 2. Depth: As indicated on Drawings.
- F. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
  - 1. Configuration: Asymmetrical or hat shaped.
- G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
  - 1. Depth: As indicated on Drawings.
  - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
  - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
- H. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

## 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.

- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb, unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Fire-stop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- D. Direct Furring:
1. Screw to wood framing.
  2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- E. Z-Furring Members:
1. Erect insulation (specified in Division 7 Section "Building Insulation") vertically and hold in place with Z-furring members spaced 24 inches o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

**END OF SECTION 092216**



## **SECTION 092900 - GYPSUM BOARD**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Interior gypsum board.
- B. Related Sections include the following:
  - 1. Division 7 Section "Building Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
  - 2. Division 9 Section "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board.
  - 3. Division 9 Painting Sections for primers applied to gypsum board surfaces.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.

#### **1.4 STORAGE AND HANDLING**

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

#### **1.5 PROJECT CONDITIONS**

- A. The following conditions **MUST BE** met prior to the installation of gypsum board.
- B.
  - 1. Hanging Gypsum Board: Building envelope shall be permanently sealed so that to prevent the infiltration of outside elements (wind, rain, etc.) and a minimum temperature of 40° F shall be established and maintained throughout installation.
- C.
  - 2. Finishing Gypsum Board: Areas to be finished shall maintain a minimum temperature of 50° F for at least 24 hours prior to the start of the finishing process and be held during and after completion of work.
- D.
  - 3. Contractor shall contact the On-Site Government Inspector at least 48 hours prior to the start of any gypsum board work. Work will not be permitted until space conditions, as detailed above, are verified by the Government Inspector.

- E. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- F. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Gypsum Co.
    - b. G-P Gypsum.
    - c. USG Corporation.
- B. Gypsum Board: ASTM C 1396/C 1396M.
  - 1. Thickness: 5/8 inch
  - 2. Long Edges: Tapered.
- C. Moisture and Mold Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
  - 1. Core: 5/8 inch, Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10.

### 2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
  - 2. Shapes:
    - a. Cornerbead.
    - b. Bullnose bead.

- c. Expansion (control) joint.

## 2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

## 2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.

- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: 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 for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Regular Type: As indicated on Drawing A.3.2.
  - 2. Moisture- and Mold-Resistant Type: As indicated on Drawing A.3.2.
- B. 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 horizontally (perpendicular 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.

#### 3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
  1. Cornerbead: Use at outside corners, unless otherwise indicated.
  2. Bullnose Bead: Use at outside corners.

#### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  1. Level 3: Throughout.
    - a. Primer and its application to surfaces are specified in other Division 9 Sections.

#### 3.6 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION 092900**

## SECTION 095123 - ACOUSTICAL TILE CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes acoustical tiles for ceilings and the following:
  - 1. Concealed suspension systems.
  - 2. Acoustical Ceiling Tiles
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

#### 1.3 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light-Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, to include manufacturer's full range of color and texture selections.
- B. Qualification Data: For testing agency.
- C. Maintenance Data: For finishes to include in maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
  - 1. Acoustical Ceiling Tile: Obtain each type through one source from a single manufacturer.

2. Suspension System: Obtain each type through one source from a single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
  1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
    - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
    - b. Identify materials with appropriate markings of applicable testing and inspecting agency.
  2. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class B materials as determined by testing identical products per ASTM E 84:
    - a. Smoke-Developed Index: 450 or less.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

#### 1.8 COORDINATION

- A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

#### 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
  - 2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL TILES, GENERAL

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
  - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

### 2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING (Drawing A.1.3)

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Armstrong World Industries, Inc.; Cortega Lay-in Tile
  - 2. USG Interiors, Inc.
  - 3. "Or Approved Equal"
- B. Color: White.
- C. LR: Not less than 0.80.
- D. NRC: Not less than 0.55.
- E. CAC: Not less than 30.
- F. AC: Not less than 170.
- G. Edge/Joint Detail: Based upon selected manufacturer's standard.
- H. Thickness: 5/8 inch.

### 2.3 METAL SUSPENSION SYSTEMS, GENERAL



- A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

#### 2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Armstrong World Industries, Inc.; Prelude ML 15/16" Exposed Grid System.
  - 2. USG Interiors, Inc.
  - 3. "Or Approved Equal"
- B. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.
  - 1. Structural Classification: Intermediate-duty system.
  - 2. Access: Upward and end or side pivoted, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

#### 2.5 METAL EDGE MOLDINGS AND TRIM

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Armstrong World Industries, Inc.; Prelude ML 15/16" Exposed Grid System.
  - 2. USG Interiors, Inc.
  - 3. "Or Approved Equal"
- B. Hot-dipped Galvanized Steel, Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

- A. General: Install acoustical tile ceilings to comply with UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
  1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
  1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
  3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
  4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other

- devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  9. Do not attach hangers to steel deck tabs.
  10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  11. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Arrange directionally patterned acoustical tiles as follows:
1. Install tiles with pattern running in one direction parallel to short axis of space.
- G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
  2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.
  3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**END OF SECTION 095123**

## **SECTION 096519 - RESILIENT TILE FLOORING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Vinyl composition tile (VCT).
  - 2. Resilient wall base.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Maintenance Data: For resilient products to include in maintenance manuals.

#### **1.4 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store tiles on flat surfaces.

#### **1.6 PROJECT CONDITIONS**

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

#### 1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish 1 box for every 25 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
  - 2. Resilient Wall Base: Furnish not less than 10 linear feet for every 200 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products listed in other Part 2 articles.

#### 2.2 COLORS AND PATTERNS

- A. Colors and Patterns: As selected by Government Design Professional from manufacturer's full range.

#### 2.3 VINYL COMPOSITION TILE

- A. Vinyl Composition Tile (VCT): ASTM F 1066.
  - 1. Armstrong World Industries, Inc.
  - 2. Congoleum Corporation
  - 3. "Or Approved Equal"
- B. Class: 1 (solid-color tile) or 3 (surface-pattern tile).
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Fire-Test-Response Characteristics:
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

#### 2.4 RESILIENT WALL BASE

- A. Wall Base: ASTM F 1861.
  - 1. Armstrong World Industries, Inc.
  - 2. Johnsonite
  - 3. "Or Approved Equal"
- B. Type: TV (vinyl).
- C. Group: I (solid, homogeneous)
- D. Style: Butt-to cove with extended square-edge toe that fits flush to floor covering.
- E. Minimum Thickness: 0.080 inch.
- F. Height: 4 inches.
- G. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
- H. Outside Corners: Pre-molded.
- I. Inside Corners: Pre-molded.
- J. Surface: Smooth.

## 2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. VCT and Asphalt Tile Adhesives: 50 g/L.
    - b. Cove Base Adhesives: 50 g/L.
    - c. Rubber Floor Adhesives: 60 g/L.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
  3. Moisture Testing:
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- E. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- F. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
  1. Do not install resilient products until they are same temperature as space where they are to be installed.
- G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 TILE INSTALLATION

- A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  1. Lay tiles square with room axis.
- B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.



1. Lay tiles with grain running in one direction.
- C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- D. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, non-staining marking device.
- F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

#### 3.4 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Pre-molded Corners: Install pre-molded corners before installing straight pieces.

#### 3.5 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
  1. Remove adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
    - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
  1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.

- a. Use commercially available product acceptable to manufacturer.
  - b. Coordinate selection of floor polish with Owner's maintenance service.
2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

**END OF SECTION 096519**

## **SECTION 097200 - WALL COVERINGS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. FRP (Fiber-glass Reinforced Panels)

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- B. Samples for Initial Selection: Manufacturer's standard brochure for color and texture selection.
- C. Maintenance Data: For wall coverings to include in maintenance manuals.

#### **1.4 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.

#### **1.5 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install wall coverings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install wall covering until a lighting level of not less than 15 fc is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

## 1.6 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Provide two (2) extra panels per each room covering is being installed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in Part 2 "Wall-Covering Products" Article.
  - a. Sequentia: StructoGlas FRP
  - b. "Or Approved Equal"

### 2.2 WALL-COVERING PRODUCTS

- A. General: Provide rolls of each type of wall covering from the same run number or dye lot.
- B. FRP (Fiber-glass Reinforced Panels):
  - 1. Size: 48 inches by 96 inches by .090 inches
  - 2. Colors, Textures, and Patterns: As selected by Government Design Professional from manufacturer's full range.

### 2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, non-staining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer.
- B. Seam Tape: As recommended in writing by wall-covering manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.

- B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
  - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete and concrete masonry units when tested with an electronic moisture meter.
  - 2. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
- D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- E. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

### 3.3 INSTALLATION

- A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.
- C. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

### 3.4 CLEANING

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

**END OF SECTION 097200**

## **SECTION 099123 - INTERIOR PAINTING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Gypsum board.
- B. Related Sections include the following:
  - 1. Division 9 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection and Verification: For each type of topcoat product indicated.
  - 1. Prior to the start of painting, contractor shall prepare (1) 24"x24" mock-up for each color selected by Government Design Professional. Contractor shall utilize the same application methods detailed herein for each mock-up and allow a 24 hour drying period prior to the observation by the Government Inspector and/or Design Professional. Contractor may only begin interior top coats upon receiving approval of the mock-ups from the appointed Government Inspector.
- C. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

#### **1.4 QUALITY ASSURANCE**

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. M.A.B. Paints.
  - 2. Sherwin-Williams Company (The).
  - 3. "Or Approved Equal"

2.2 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Non-flat Paints and Coatings: VOC content of not more than 150 g/L.
3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. Restricted Components: Paints and coatings shall not contain any of the following:
  - a. Acrolein.
  - b. Acrylonitrile.
  - c. Antimony.
  - d. Benzene.
  - e. Butyl benzyl phthalate.
  - f. Cadmium.
  - g. Di (2-ethylhexyl) phthalate.
  - h. Di-n-butyl phthalate.
  - i. Di-n-octyl phthalate.
  - j. 1,2-dichlorobenzene.
  - k. Diethyl phthalate.
  - l. Dimethyl phthalate.
  - m. Ethylbenzene.
  - n. Formaldehyde.
  - o. Hexavalent chromium.
  - p. Isophorone.
  - q. Lead.
  - r. Mercury.
  - s. Methyl ethyl ketone.
  - t. Methyl isobutyl ketone.
  - u. Methylene chloride.
  - v. Naphthalene.
  - w. Toluene (methylbenzene).
  - x. 1,1,1-trichloroethane.
  - y. Vinyl chloride.

C. Colors: As selected by Government Design Professional from manufacturer's full range.

### 2.3 PRIMERS/SEALERS (1 Coat)

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: 200 per liter maximum

### 2.4 METAL PRIMERS

A. Rust-Inhibitive Primer (Water Based): MPI #107.

1. VOC Content: 200 per liter maximum

### 2.5 TEX PAINTS (2 Coats)

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

1. VOC Content: 100 per liter



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

- G. Aluminum Substrates: Remove surface oxidation.
- H. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### 3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

### 3.5 CLEANING AND PROTECTION

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

### 3.6 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board Substrates:
  - 1. Latex System: MPI INT 9.2A.
    - a. Prime Coat: Interior latex primer/sealer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (flat).

**END OF SECTION 099123**

## **SECTION 101400 – INTERIOR SIGNAGE**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Interior Signage.
- B. Related Sections include the following:
  - 1. Division 08 Section "Steel Doors and Frames"

#### **1.3 DEFINITIONS**

- A. Accessibility Guidelines: "Americans with Disabilities Act (ADA) - Accessibility Guidelines for Buildings and Facilities and Architectural Barriers Act (ABA) - Accessibility Guidelines."

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
  - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 2. Provide message list, typestyles, and graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Sign Schedule: Use same designations indicated on Drawings.
- D. Warranty: Special warranty specified in this Section.

#### **1.5 QUALITY ASSURANCE**

- A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Field Limitations: Signage shall be installed only after all required field painting has been completed and field conditions meet that of the manufacturer's written installation recommendations.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Deterioration and/or fading of colors.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SIGNAGE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:

1. Best Manufacturing Sign Systems
2. Seton Identification Products.
3. Or "Approved Equal"

- B. Plaques:

1. Material: Melamine Plastic Laminate, approx. 1/8" thick, one-piece construction. Impervious to most acids, alkalis, alcohol, solvents, abrasives and boiling water.
2. Minimal Sizes:
  - Toilet Rooms – 6"x8"
  - Room Id & Numbers - 6"x8"
  - Room Identification Only – 6"x6"
  - Room Numbers Only – 6"x2"
3. Background: Painted and rated non-static, fire-retardant and self-extinguishing.
4. Finish: Background, letters, numbers and characters to be Matte finish.
5. Color: As selected by Government Design Professional from manufacturer's full range of available colors.
6. Border Style: 3/8" wide, 1/32" raised perimeter with 1/8" inside radius.
7. Letters & Numbers: 5/8" High and raised 1/32" from plate face. Upper Case centered on sign and contrasting with background color.
8. Characters/Symbols: 3" high, raised 1/32" from plate face and contrasting with background color.
9. Braille: Grade 2, placed directly below last line of letters or numbers, except for room number signs, where Braille shall be placed directly behind the last number.

C. Rooms to Receive Signage:

| <u>Room #</u> | <u>Label</u>            |
|---------------|-------------------------|
| 103           | OFFICE                  |
| 104           | OFFICE                  |
| 106           | JANITOR CLOSET          |
| 107           | FEMALE                  |
| 108           | MALE                    |
| 109           | CALIBRATION LAB         |
| 110           | RADIATION EQUIPMENT     |
| 111           | ELECTRICAL ROOM         |
| 112           | TELECOMMUNICATIONS ROOM |
| 114           | OFFICE                  |
| 116           | STORAGE AREA            |

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
  - 1. Install all signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
  - 3. Door Signs: Install signs centered on door and at heights per all applicable codes and as detailed on design documents.
- B. Mounting: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
  - 1. Two-Face Tape: Mount signs to clean, smooth, nonporous surfaces.

2. Mechanical Fasteners: Use mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

### 3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

**END OF SECTION 101400**

## SECTION 102113 - TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

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

- B. Related Sections:

- 1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking overhead support of floor-and-ceiling-anchored compartments.
  - 2. Division 10 Section "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of cutouts for compartment-mounted toilet accessories.
  - 2. Show locations of reinforcements for compartment-mounted grab bars.
  - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. Product Certificates: For each type of toilet compartment, from manufacturer.
- E. Maintenance Data: For toilet compartments to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.



1. Flame-Spread Index: 75 or less.
  2. Smoke-Developed Index: 450 or less.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

## 1.5 PROJECT CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z.
  2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvanized.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- G. Stainless-Steel Castings: ASTM A 743/A 743M.
- H. Zamac: ASTM B 86, commercial zinc-alloy die castings.
- I. Particleboard: ANSI A208.1, Grade M-2 with 45-lb density, made with binder containing no urea formaldehyde.
- J. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, 0.048-inch nominal thickness.

### 2.2 SOLID-POLYMER UNITS (Drawings A.1.1 and A.3.1)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Accurate Partitions Corporation.
  2. Bradley Corporation; Mills Partitions.
  3. Partition Systems Incorporated of South Carolina.
  4. "Or Approved Equal"

- B. Toilet-Enclosure Style: Floor anchored or Floor and ceiling anchored.
- C. Urinal-Screen Style: Wall hung.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
  - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
  - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
  - 3. Color and Pattern: in each room as selected by Government Design Professional from manufacturer's full range.
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- F. Brackets (Fittings):
  - 1. Stirrup Type: Ear or U-brackets, stainless steel.
  - 2. Full-Height (Continuous) Type: Manufacturer's standard design..

### 2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
  - 1. Material: Stainless steel.
  - 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
  - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
  - 4. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

### 2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

- C. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch wide, in-swinging doors for standard toilet compartments and 36-inch wide, out-swinging doors with a minimum 32-inch wide, clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.
    - b. Panels and Walls: 1 inch.
  - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
    - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- E. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.2 ADJUSTING

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

**END OF SECTION 102113**

## **SECTION 102800 - TOILET AND BATH ACCESSORIES**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Public-use washroom accessories.
  - 2. Underlavatory guards.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated on Drawing A.1.1 and A.3.1.
  - 2. Identify products using designations indicated on Drawing A.3.1.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

#### **1.4 QUALITY ASSURANCE**

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Government Design Professional.

#### **1.5 COORDINATION**

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

## 1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 15 years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Kimberly-Clark Professional (Government Preferred)
  - 2. "Or Approved Equal"
- B. Toilet Tissue (Roll) Dispenser (KC Model: 09612)
  - 1. Description: Single-Jumbo roll dispenser.
  - 2. Mounting: Surface mounted.
  - 3. Operation: Noncontrol delivery with standard spindle.
  - 4. Capacity: Designed to dispense 9." dia tissue rolls
  - 5. Material and Finish: ABS Plastic in Smoke Grey.
- C. Paper Towel (Roll) Dispenser (KC Model: 09736)

1. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
2. Mounting: Surface mounted.
3. Capacity: 8-inch wide with 1.5" core
4. Material and Finish: ABS plastic, Smoke Grey.
5. Lockset: Key Activated

D. Liquid-Soap Dispenser (KC Model: 91180)

1. Description: Designed for dispensing soap in liquid or lotion form.
2. Mounting: Vertically oriented, surface mounted.
3. Capacity: 500 or 1000ml (1 pack).
4. Lockset: Keyless lock.
5. Refill Indicator: Window type.

E. Grab Bars:

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 0.05 inch thick.
  - a. Finish: Smooth, No. 4, satin finish.
3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings.

F. Mirror Unit (American Specialties Model: 0600)

1. Frame: Stainless-steel angle, 0.05 inch thick.
  - a. Corners: Manufacturer's standard.
2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
  - a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
  - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
3. Size: As indicated on Drawing A.3.1.

## 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **three** keys to Owner's representative.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

**END OF SECTION 10801**

## **SECTION 104413 - FIRE EXTINGUISHER CABINETS**

### **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. Fire protection cabinets for the following:
    - a. Portable fire extinguishers.
- B. Related Sections:
  - 1. Division 10 Section "Fire Extinguishers."

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
  - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

#### **1.4 QUALITY ASSURANCE**

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

#### **1.5 COORDINATION**

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.



- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

## 1.6 SEQUENCING

- A. Apply decals or vinyl lettering on factory-painted, fire protection cabinets after painting is complete.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
  - 1. Sheet: ASTM B 209
  - 2. Extruded Shapes: ASTM B 221
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Copper-Alloy Brass Sheet: ASTM B 36/B 36M, alloy UNS No. C26000 (cartridge brass, 70 percent copper).
- E. Copper-Alloy Bronze Sheet: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal, 60 percent copper).
- F. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick.
- G. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).
- H. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.
- I. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.
- J. Wire Glass: ASTM C 1036, Type II, Class 1, Form 1, Quality q8, Mesh m1 (diamond), 6 mm thick.
- K. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 mm thick, with Finish 1 (smooth or polished).
- L. Acrylic Bubble: One piece.

### 2.2 FIRE PROTECTION CABINET (Drawing A.1.1 and A.5.1)

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. J. L. Industries, Inc., a division of Activar Construction Products Group;

- b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc; Larsen's
  - c. "Or Approved Equal"
- B. Cabinet Construction: Nonrated.
  - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch thick, cold-rolled steel sheet lined with minimum 5/8-inch thick, fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Aluminum or Stainless-steel sheet.
  - 1. Shelf: Same metal and finish as cabinet.
- D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
  - 1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
  - 2. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
  - 3. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
- E. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
  - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- F. Cabinet Trim Material: Aluminum sheet or Stainless-steel sheet.
- G. Door Material: Aluminum sheet, Extruded-aluminum shapes or Stainless-steel sheet.
- H. Door Style: Fully glazed panel with frame.
- I. Door Glazing: Tempered break glass.
  - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- K. Accessories:
  - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
  - 3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
  - 4. Door Lock: Manufacturer's Standard..

5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Government Design Professional.
  - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
    - 1) Location: Applied to cabinet door.
    - 2) Application Process: Decals.
    - 3) Lettering Color: White.
    - 4) Orientation: Horizontal.

L. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
  - a. Exterior of cabinet, door, and trim except for those surfaces indicated to receive another finish.
  - b. Interior of cabinet.
2. Aluminum: Baked enamel or powder coat.
3. Steel: Baked enamel or powder coat.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
  1. Weld joints and grind smooth.
  2. Provide factory-drilled mounting holes.
  3. Prepare doors and frames to receive locks.
  4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
  2. Fabricate door frames of one-piece construction with edges flanged.
  3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.

- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, or thicker.
- B. Color Anodic Finish: AAMA 611, or thicker.
  - 1. Color: As selected by Government Design Professional from full range of industry colors and color densities.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: As selected by Government Design Professional from manufacturer's full range.

## 2.6 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling".
- B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  - 1. Color and Gloss: As selected by Government Design Professional from manufacturer's full range.

## 2.7 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 1. Run grain of directional finishes with long dimension of each piece.
  - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - 3. Directional Satin Finish: No. 4.
  - 4. Dull Satin Finish: No. 6.
  - 5. Reflective, Directional Polish: No. 7.
  - 6. Mirrorlike Reflective, Nondirectional Polish: No. 8.
- C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

### 3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
  - 1. Fire Protection Cabinets: 54 inches above finished floor to extinguisher hanging bracket.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
  - 2. Provide inside latch and lock for break-glass panels.
  - 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply decals at locations indicated.

### 3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 104413**

## SECTION 104416 – FIRE EXTINGUISHERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Portable fire extinguishers.

#### 1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
  - 1. Fire Extinguishers: Include rating and classification.
- B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure of hydrostatic test according to NFPA 10.
    - b. Faulty operation of valves or release levers.
  - 2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PORTABLE FIRE EXTINGUISHERS

- A. General: Contractor shall provide a minimum of (3) three fire extinguishers, unless noted otherwise, of type, size, and capacity for each cabinet location indicated.
  - 1. Valves: Manufacturer's standard.
  - 2. Handles and Levers: Manufacturer's standard.
  - 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 10 lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install fire-protection specialties in cabinet locations as indicated on drawing A.1.1.

**END OF SECTION 104416**

## **SECTION 123530 - RESIDENTIAL CASEWORK**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Kitchen cabinets.
  - 2. Plastic-laminate countertops and backsplashes.
- B. Related Sections include the following:
  - 1. Division 15 Section "Plumbing Fixtures" for sinks and plumbing fittings.

#### **1.3 DEFINITIONS**

- A. Exposed Surfaces of Cabinets: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.
- B. Semi-exposed Surfaces of Cabinets: Surfaces behind opaque doors or drawer fronts, including interior faces of doors and interiors and sides of drawers. Bottoms of wall cabinets are defined as "semi-exposed."
- C. Concealed Surfaces of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of cabinets installed directly against and completely concealed by walls or other cabinets. Tops of wall cabinets and utility cabinets are defined as "concealed."

#### **1.4 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Plastic-laminate countertops.
  - 2. Cabinet hardware.
- B. Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, methods of joining countertops, and cutouts for plumbing fixtures.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Product Certificates: Signed by manufacturers of casework certifying that products furnished comply with requirements.



## 1.5 QUALITY ASSURANCE

- A. Source Limitations for Cabinets: Obtain cabinets through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, configurations, and finish material of cabinets by referencing designated manufacturer's catalog numbers. Other manufacturers' cabinets of similar sizes and door and drawer configurations, same finish material, and complying with the Specifications may be considered. Refer to Division 1 Section "Product Requirements."
- C. Quality Standards: Unless otherwise indicated, comply with the following standards:
  - 1. Cabinets: KCMA A161.1.
    - a. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with the above standard.
  - 2. Plastic-Laminate Countertops: KCMA A161.2.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- C. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.
- D. Field Measurements for Countertops: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

## 1.7 COORDINATION

- A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.
- B. Coordinate locations of utilities that will penetrate countertops or backsplashes.

## PART 2 - PRODUCTS

### 2.1 CABINET MATERIALS

- A. General:
  - 1. Adhesives: Do not use adhesives that contain urea formaldehyde.
  - 2. Hardwood Lumber: Kiln dried to 7 percent moisture content.
  - 3. Softwood Lumber: Kiln dried to 10 percent moisture content.
  - 4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.

5. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
6. Hardboard: AHA A135.4, Class 1 Tempered.

B. Exposed Materials:

1. Exposed Wood Species: Oak.
  - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
  - b. Staining and Finish: As selected by Government Design Professional from manufacturer's full range.
2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.

C. Semi-exposed Materials: Unless otherwise indicated, provide the following:

1. Vinyl-Faced Particleboard: Medium-density particleboard with embossed, wood-grain-patterned vinyl film adhesively bonded to particleboard.
  - a. Provide vinyl film on both sides of shelves, dividers, drawer bodies, and other components with two semi-exposed surfaces and on semi-exposed edges.
  - b. Colors, Textures, and Patterns: As selected by Government Design Professional from cabinet manufacturer's full range.

D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; medium-density fiberboard; or hardboard.

## 2.2 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Government Design Professional from manufacturer's full range.
- B. Pulls: Surface-mounted decorative pulls.
- C. Hinges: Concealed self-closing hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or B05091.

## 2.3 COUNTERTOP MATERIALS

- A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Formica Corp.
    - b. Lamin-Art.
    - c. Wilsonart International.
    - d. "Or Approved Equal"

2. Provide through-color plastic laminate.
3. Grade for Backer Sheet: BKL.
4. Colors, Textures, and Patterns: As selected by Government Design Professional from plastic-laminate manufacturer's full range.

- B. Particleboard: ANSI A208.1, Grade M-2.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- D. Adhesives: Do not use adhesives that contain urea formaldehyde.
- E. Solid Wood Edges and Trim: Clear red oak lumber, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.

## 2.4 CABINETS

- A. Available Products: Subject to compliance with requirements, cabinets that may be incorporated into the Work include, but are not limited to, the following:
- B. Face Style: Reveal overlay; door and drawer faces partially cover cabinet fronts.
- C. Cabinet Style: Face Frame.
- D. Door and Drawer Fronts: Solid-wood stiles and rails, 5/8 inch thick, with 3/4-inch- thick, solid-wood center panels.
- E. Face Frames: 3/4-by-1-5/8-inch solid wood[ with glued mortise and tenon or doweled joints].

## 2.5 PLASTIC-LAMINATE COUNTERTOPS

- A. Configuration: Provide countertops with the following front, cove (intersection of top with backsplash), backsplash, and end splash style:
  1. Front: Bevel or Self-edge.
  2. Cove: Cove molding (one-piece post-formed laminate supported at junction of top and backsplash by wood cove molding).
  3. Backsplash: Square edge without scribe.
  4. End splash: None.
- B. Plastic-Laminate Substrate: Particleboard not less than 3/4 inch thick.
  1. For countertops at sinks and lavatories, use Grade M-2-Exterior-Glue particleboard or exterior-grade plywood.
  2. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of particleboard laminated to top.
- C. Backer Sheet: Provide plastic-laminate backer sheet on underside of countertop substrate.
- D. Paper Backing: Provide paper backing on underside of countertop substrate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit openings and are aligned. Complete installation of hardware and accessories as indicated.
- C. Install cabinets and countertop level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Fasten cabinets to adjacent units and to backing.
  - 1. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
  - 2. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o.c., with toggle bolts through metal backing behind gypsum board.
- E. Fasten plastic-laminate countertops by screwing through corner blocks of base units into underside of countertop. Form seams using splines to align adjacent surfaces, and secure with glue and concealed clamping devices designed for this purpose.
  - 1. Provide cutouts for sinks and lavatories, including holes for faucets and accessories.
  - 2. Seal edges of cutouts by saturating with varnish.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- B. Clean casework on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

**END OF SECTION 123530**

## SECTION 220500 – COMMON WORK RESULTS FOR PLUMBING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Equipment installation requirements common to equipment sections.
  - 7. Supports and anchorages.
  - 8. Cast-in-Place Concrete

#### 1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

#### 1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and

connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.

### 2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

### 2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

## 2.7 GROUT

- A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## 2.8 CAST-IN-PLACE CONCRETE

- A. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.45.
  3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  4. Slump Limit: 4 inches, plus or minus 1 inch.
  5. Air Content: Maintain within range permitted by ACI 301 (ACI 301M). Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

## PART 3 - EXECUTION

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.



- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Non-pressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Non-pressure Transition Fittings: Join according to ASTM D 3138 Appendix.

G. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

H. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.

### 3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

### 3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

### 3.7 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

**END OF SECTION 220500**

## SECTION 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of Contract" and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Pipe labels.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

#### 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.3 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule:

1. Domestic Cold Water Piping:
  - a. Background Color: [Blue].
  - b. Letter Color: [White].
2. Domestic Hot Water Piping:
  - a. Background Color: [Red].
  - b. Letter Color: [Black].
3. Sanitary Waste Piping:
  - a. Background Color: [Green].
  - b. Letter Color: [White].
4. Storm Drainage Piping:
  - a. Background Color: [White].
  - b. Letter Color: [Black].
5. Natural Gas Piping:
  - a. Background Color: [Yellow].
  - b. Letter Color: [Black].
  - c. All exterior and interior natural gas piping and fittings shall be painted with semi-gloss high visibility bright yellow paint, before labels are attached.

**END OF SECTION 220553**

## SECTION 220700 – PLUMBING INSULATION

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Insulation Materials:
    - a. Mineral fiber.
    - b. Flexible elastomeric.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

### PART 2 - PRODUCTS

#### 2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Johns Manville; Micro-Lok.
    - b. Knauf Insulation; 1000 Pipe Insulation.
    - c. Owens Corning; Fiberglas Pipe Insulation.
    - d. Or Approved Equal.
  2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Aeroflex USA Inc.; Aerocel.
    - b. Armacell LLC; AP Armaflex.
    - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
    - d. Or Approved Equal.

## 2.2 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.



- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
  - N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
  - O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
  - P. For above ambient services, do not install insulation to the following:
    1. Vibration-control devices.
    2. Testing agency labels and stamps.
    3. Nameplates and data plates.
    4. Manholes.
    5. Handholes.
    6. Cleanouts.

### 3.3 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
  1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Floor Penetrations:
  1. Pipe: Install insulation continuously through floor penetrations.

### 3.4 MINERAL-FIBER INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes:
  1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

### 3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

### 3.6 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
  - 1. Drainage piping located in crawl spaces.
  - 2. Underground piping.
  - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

### 3.7 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold, Hot and Hot Recirculation Water: Insulation shall be one of the following:
  - 1. Flexible Elastomeric: 1 inch thick.
  - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Roof Drain Bodies and Rainwater Conductors: Insulation shall be one of the following:
  - 1. Flexible Elastomeric: 1 inch thick.
  - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

**END OF SECTION 220700**

## SECTION 221116 – DOMESTIC WATER PIPING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes: Aboveground domestic water pipes, tubes and fittings inside the building.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

### PART 2 - PRODUCTS

#### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

#### 2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
  - 1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
  - 2. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

#### 2.3 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

## 2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
  - 1. Description:
    - a. Pressure Rating: 150 psig at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Nipples:
  - 1. Description:
    - a. Electroplated steel nipple complying with ASTM F 1545.
    - b. Pressure Rating: 300 psig at 225 deg F.
    - c. End Connections: Male threaded.
    - d. Lining: Inert and noncorrosive, propylene.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install shutoff valve immediately upstream of each dielectric fitting.
- C. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- G. Install piping adjacent to equipment and specialties to allow service and maintenance.
- H. Install piping to permit valve servicing.

- I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- M. Install sleeves for piping penetrations of walls, ceilings, and floors.
- N. Install sleeve seals for piping penetrations of concrete walls and slabs.
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors.

### 3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

### 3.3 VALVE INSTALLATION

- A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller

### 3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.

- B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

### 3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions or nipples.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Support vertical piping and tubing at base and at each floor.
- B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
- C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
- D. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### 3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

### 3.8 FIELD QUALITY CONTROL

- A. Piping Inspections:



1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
  - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

C. Domestic water piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

### 3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

- a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
- b. Fill and isolate system according to either of the following:
  - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
  - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
- c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
- d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

### 3.10 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
  - 1. Hard copper tube, ASTM B 88, Type L; wrought- copper solder-joint fittings; and soldered joints.

### 3.11 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

**END OF SECTION 221116**

## SECTION 221119 – DOMESTIC WATER PIPING VALVES AND SPECIALTIES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Balancing valves.
  - 2. Water-hammer arresters.
  - 3. Bronze ball valves.
- B. Related Requirements:
  - 1. Section 224000 "Plumbing Fixtures" for supports and guards for plumbing fixtures.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

#### 2.3 BALANCING VALVES

- A. Memory-Stop Balancing Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Hammond Valve.
  - c. NIBCO INC.
2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
3. Pressure Rating: 400-psig minimum CWP.
4. Size: NPS 2 or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

#### 2.4 WATER-HAMMER ARRESTERS

##### A. Water-Hammer Arresters, WHA:

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

#### 2.5 BRONZE BALL VALVES

##### A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. NIBCO INC.
  - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
  - a. Standard: MSS SP-110.
  - b. SWP Rating: 150 psig.
  - c. CWP Rating: 600 psig.
  - d. Body Design: Two piece.
  - e. Body Material: Bronze.
  - f. Ends: Threaded.
  - g. Seats: PTFE or TFE.
  - h. Stem: Bronze.
  - i. Ball: Chrome-plated brass.

- j. Port: Full.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install balancing valves in locations where they can easily be adjusted.
- B. Install water-hammer arresters in water piping according to PDI-WH 201.
- C. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- D. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- E. Locate valves for easy access and provide separate support where necessary.
- F. Install valves in horizontal piping with stem at or above center of pipe.
- G. Install valves in position to allow full stem movement.

### 3.2 ADJUSTING

- A. Set field-adjustable flow of balancing valves.
- B. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

### 3.3 DOMESTIC, COLD- AND HOT- WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
  - 2. Ball Valves: Two piece, full port, bronze with bronze trim.
  - 3. Bronze Swing Check Valves: Class 125, bronze disc.

**END OF SECTION 221119**

## SECTION 221123 – FACILITY NATURAL GAS PIPING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of Contract" and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Pipes, tubes, and fittings.
  - 2. Piping specialties.
  - 3. Piping and tubing joining materials.
  - 4. Valves.
  - 5. Pressure regulators.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
  - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
  - 2. Pressure Regulators: 65 psig minimum unless otherwise indicated.
- B. Natural-Gas System Pressures within Buildings: One pressure range, 2.0 psig or less.

### PART 2 - PRODUCTS

#### 2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
  - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
  - 2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
  - 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
  - 4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
    - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
- B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. OmegaFlex, Inc.
  - b. Titeflex.
  - c. Tru-Flex Metal Hose Corp.
  - d. Or Approved Equal.
2. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
3. Coating: PE with flame retardant.
  - a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - 1) Flame-Spread Index: 25 or less.
    - 2) Smoke-Developed Index: 50 or less.
4. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
5. Striker Plates: Steel, designed to protect tubing from penetrations.
6. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
7. Operating-Pressure Rating: 5 psig.

## 2.2 PIPING SPECIALTIES

### A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches.

### B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller.
3. Strainer Screen: [40] [60]-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (862 kPa).

## 2.3 JOINING MATERIALS

### A. Joint Compound and Tape: Suitable for natural gas.

## 2.4 MANUAL GAS SHUTOFF VALVES

### A. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
5. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

### B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. BrassCraft Manufacturing Company; a Masco company.
  - b. Conbraco Industries, Inc.; Apollo Div.
  - c. Lyall, R. W. & Company, Inc.
2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

## 2.5 PRESSURE REGULATORS

### A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller.

### B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. American Meter Company.
  - b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
  - c. Maxitrol Company.



2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 2 psig.

## 2.6 DIELECTRIC UNIONS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Hart Industries International, Inc.
  2. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
  3. Wilkins; Zurn Plumbing Products Group.
- B. Minimum Operating-Pressure Rating: 150 psig.
- C. Combination fitting of copper alloy and ferrous materials.
- D. Insulating materials suitable for natural gas.
- E. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

## PART 3 - EXECUTION

### 3.1 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 for installation and purging of natural-gas piping.
- B. Steel Piping with Protective Coating:
  1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
  2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
  3. Replace pipe having damaged PE coating with new pipe.
- C. Install fittings for changes in direction and branch connections.
- D. Install pressure gage upstream and downstream from each service regulator.
- E. All gas piping and fittings shall be painted semi-gloss high visibility bright yellow.

### 3.2 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Locate valves for easy access.
- G. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Verify final equipment locations for roughing-in.
- K. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
  - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- M. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- N. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- O. Connect branch piping from top or side of horizontal piping.
- P. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
- Q. Do not use natural-gas piping as grounding electrode.
- R. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

- S. Install sleeves and escutcheons for piping penetrations of walls, ceilings, and floors.
- T. All gas piping and fittings shall be painted semi-gloss high visibility bright yellow.

### 3.3 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or inline in hard piped connection.

### 3.4 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
  - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
  - 2. Cut threads full and clean using sharp dies.
  - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
  - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
  - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

### 3.5 HANGER AND SUPPORT INSTALLATION

- A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
  - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
  - 2. NPS 1-1/4 to NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
- B. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:
  - 1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
  - 2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.
  - 3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

### 3.6 CONNECTIONS

- A. Connect to existing building gas piping according to NFPA 54 and industry standards.
- B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.

- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

### 3.7 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.
- B. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.8 OUTDOOR PIPING SCHEDULE

- A. Aboveground natural-gas piping shall be steel pipe with malleable-iron fittings and threaded joints.

### 3.9 INDOOR PIPING SCHEDULE

- A. Aboveground natural-gas piping shall be one of the following:
  - 1. Steel pipe with malleable-iron fittings and threaded joints.
  - 2. Corrugated stainless steel tubing with PVC jacketing with mechanical fitting having socket or threaded ends to match adjacent piping.

### 3.10 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves for pipe sizes NPS 2 and smaller at service meter shall be two-piece, full-port, bronze ball valves with bronze trim.

**END OF SECTION 231123**

## SECTION 221316 – SANITARY WASTE AND VENT PIPING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Pipe, tube, and fittings.
  - 2. Specialty pipe fittings.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

### PART 2 - PRODUCTS

#### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

#### 2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.

#### 2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ANACO-Husky.
  - b. Dallas Specialty & Mfg. Co.
  - c. Fernco Inc.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ANACO-Husky.
  - b. Clamp-All Corp.
  - c. Dallas Specialty & Mfg. Co.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- C. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

- A. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Adhesive Primer: ASTM F 656.
  1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:
  - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Dallas Specialty & Mfg. Co.
    - 2) Fernco Inc.
    - 3) Mission Rubber Company; a division of MCP Industries, Inc.
  - b. Standard: ASTM C 1173.
  - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - d. Sleeve Materials:
    - 1) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
    - 2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- J. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
  1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
  2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
  3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- L. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- M. Install aboveground PVC piping according to ASTM D 2665.
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.



### 3.2 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- C. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
- D. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

### 3.3 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
  - 1. Install transition couplings at joints of piping with small differences in OD's.
  - 2. In Drainage Piping: Unshielded, nonpressure transition couplings.

### 3.4 HANGER AND SUPPORT INSTALLATION

- A. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- D. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  - 2. NPS 3: 60 inches with 1/2-inch rod.
  - 3. NPS 4: 60 inches with 5/8-inch rod.
  - 4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- E. Install supports for vertical cast-iron soil piping every 15 feet.
- F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 and NPS 4: 10 feet with 1/2-inch rod.

- G. Install supports for vertical PVC piping every 48 inches.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

### 3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
  1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
  1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

### 3.6 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

### 3.7 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

### 3.8 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
  1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
  3. Copper DWV tube, copper drainage fittings, and soldered joints.
  4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.
- C. Aboveground, vent piping NPS 4 and smaller shall be the following:
  1. Cellular-core PVC pipe, PVC socket fittings, and solvent-cemented joints.
  2. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

- D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
  3. Copper DWV tube, copper drainage fittings, and soldered joints.
  4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

**END OF SECTION 221316**

## SECTION 221319 – SANITARY WASTE PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Floor cleanouts.
  - 2. Floor drains.

#### 1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FRP: Fiberglass-reinforced plastic.
- C. HDPE: High-density polyethylene plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include materials and finishes, and dimensions, construction details.

### PART 2 - PRODUCTS

#### 2.1 CLEANOUTS

- A. Metal Floor Cleanouts, FCO:
  - 1. ASME A112.36.2M, Cast-Iron Cleanouts:

2. Standard: ASME A112.36.2M for adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Not required.
7. Closure: Brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron with threads.
9. Frame and Cover Material and Finish: Polished Nickel-bronze.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Cast-Iron Wall Cleanouts WCO:

1. Standard: ASME A112.36.2M. Include wall access.
2. Size: Same as connected drainage piping.
3. Body: Hub-and-spigot as required to match connected piping.
4. Closure: Countersunk brass plug.
5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
6. Wall Access: Round, flat, chrome-plated brass cover plate with screw.

## 2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains, FD-1:

1. Zurn model ZN460B or approved equal
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Cast iron.
5. Seepage Flange: Required.
6. Anchor Flange: Not required.
7. Clamping Device: Required.
8. Outlet: Side.
9. Coating on Interior and Exposed Exterior Surfaces: Not required.
10. Strainer Material: Polished nickel bronze.
11. Strainer Shape: Round.
12. Dimensions of Top or Strainer: 6 inch diameter.
13. Top Loading Classification: Heavy Duty.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller.

4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
  - C. Install floor drains at low points of surface areas to be drained.
    1. Position floor drains for easy access and maintenance.
    2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
      - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
      - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
      - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
    3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
    4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

### 3.2 CONNECTIONS

- A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

### 3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

**END OF SECTION 221319**

## SECTION 223400 PLUMBING EQUIPMENT

### Part 1 GENERAL

#### 1.1 STIPULATIONS

- A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

#### 1.2 SECTION INCLUDES

- A. Work in this Section includes the following:
  - 1. Water Heaters

### Part 2 PRODUCTS

#### 2.1 WATER HEATERS

##### 1. GAS-FIRED, TANKLESS, DOMESTIC-WATER HEATERS

- a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - (1). Rinnai
  - (2). Or approved equal
- b. Standard: ANSI Z21.10.3/CSA 4.3 for gas-fired, instantaneous, domestic-water heaters for indoor application.
- c. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
  - (1). Tappings: ASME B1.20.1 pipe thread.
  - (2). Pressure Rating: 150 psig.
  - (3). Heat Exchanger: Copper tubing.
  - (4). Insulation: Comply with ASHRAE/IESNA 90.1.
  - (5). Jacket: Metal, with enameled finish.
  - (6). Burner: For use with tankless, domestic-water heaters and natural-gas fuel.
  - (7). Automatic Ignition: Manufacturer's proprietary system for automatic, gas ignition.
  - (8). Temperature Control: Adjustable thermostat.
- d. Support: Bracket for wall mounting.
- e. Capacity and Characteristics:
  - (1). Flow Rate: 3.25 gpm at 100 deg F temperature rise.
  - (2). Temperature Setting: 120 deg F.
  - (3). Maximum Fuel Gas Input: 199,900 Btu/h.
  - (4). Electrical Characteristics:



- (a). Volts: 120.
- (b). Phase: Single.
- (c). Hertz: 60.
- (d). Full-Load Amperes: 2.
- (e). Maximum Overcurrent Protection: 15.

- (5). Vent Diameter: 3 inches.
- (6). Combustion Air Diameter: 3 inches.

2.2 EXPANSION TANK

- A. Pre-pressurized diaphragm type steel expansion tank. Tank shall conform to ASME Section VIII construction for 125 psig, (200 psig WOG), tank shall have rigid polypropylene lining for corrosion control, butyl rubber diaphragm. Provide pressure gage on system connection piping. (When system water pressure exceeds 80 psig provide a pressure regulating valve on the cold water supply to the water heater.)
- B. Thermal expansion tank shall be installed to absorb expansion from hot water generator and storage tanks under no-flow or low-flow conditions. System connection shall be not located upstream of check valves or regulating valves or downstream of mixing valves or in a manner that shall negate this purpose.
- C. Thermal expansion tank pressurization shall be field charged to match the domestic water system pressure when pumps are energized but when water temperature in storage tank is at 40 to 80°F temperature. Acceptance volume shall be based upon the difference between system pressure and temperature relief valve pressure).

- 1. Amtrol, Inc.
- 2. Bell & Gossett
- 3. Thrush
- 4. Wellels Company

STORAGE TANK SIZE  
Up to 250 gallon

EXPANSION TANK MODEL  
ST-30V

Part 3 EXECUTION

3.1 INSTALLATION

- A. All equipment, piping and accessories shall be installed in strict accordance with manufacturer's requirements.
- B. Piping shall be all of the same material, mixed copper, steel installations are prohibited.
- C. Provide isolation valves for all equipment, and accessories.
- D. Unions shall be provided adjacent to all equipment or wherever necessary to facilitate the removal of equipment for repair or replacement. Unions for copper tubing up to and including 2" diameter shall be brass ground joint with socket ends for solder. Unions for copper tubing 2-1/2" in diameter and over shall be standard brass flanges with socket ends for solder. Flanges to be drilled for ASA Standard 125 lbs. flanges and so stamped. No lip type unions or long screws will be permitted. The

Contractor shall furnish and install all structural steel angles, channels, etc. necessary to properly support all fixtures and equipment to the satisfaction of the Professional.

- E. Furnish and install isolation valves at the cold water and hot water supply tapings and an AGA/ASME pressure and temperature relief valve for each water heater.

**END OF SECTION 223400**

## SECTION 224000 – PLUMBING FIXTURES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. This Section includes the following conventional plumbing fixtures and related components:
  - 1. Faucets for lavatories.
  - 2. Toilet seats.
  - 3. Protective shielding guards.
  - 4. Fixture supports.
  - 5. Water closets.
  - 6. Urinals.
  - 7. Lavatories.
  - 8. Showers.
  - 9. Mop receptors.
  - 10. Electric water coolers.

#### 1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.

- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

### 1.3 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- C. Warranty: Special warranty specified in this Section.

### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
  1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- C. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

### 1.5 WARRANTY

1. Warranty Period for Commercial Applications: One year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 LAVATORY FAUCETS

- A. Lavatory Faucets (ADA), P-3, P-3A:
  1. Product: Subject to compliance with requirements, provide product by one of the following:
    - a. Delta Faucet Company.
    - b. Kohler Co.
    - c. Moen, Inc.
    - d. Or approved equal.

2. Description: Two-handle mixing valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
  - a. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
  - b. Body Material: Commercial, solid brass.
  - c. Finish: Polished chrome plate.
  - d. Maximum Flow Rate: 0.5 gpm.
  - e. Centers: 4 inches
  - f. Mounting Type: Deck.
  - g. Valve Handle(s): Wrist blade, 4 inches.
  - h. Inlet(s): NPS 1/2 male shank.
  - i. Spout: Rigid.
  - j. Spout Outlet: Vandal resistant spray head.
  - k. Operation: Quarter-turn cartridges.
  - l. Drain: Grid.
  - m. Tempering Device: Below the deck mechanical mixing valve, ASSE 1070 approved for temperature and pressure protection.

## 2.2 FLUSHOMETERS

### A. Flushometers, P-1, P-1A:

1. Product: Subject to compliance with requirements, provide product by one of the following:
  - a. Delta Faucet Company.
  - b. Zurn Plumbing Products Group; Commercial Brass Operation.
  - c. TOTO USA, Inc.
  - d. Or Approved Equal.
2. Description: Flushometer for water-closet-type fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
  - a. Internal Design: Diaphragm operation.
  - b. Style: Exposed.
  - c. Inlet Size: NPS 1.
  - d. Trip Mechanism: Oscillating, lever-handle actuator.
  - e. Consumption: 1.6 gal./flush.
  - f. Tailpiece Size: NPS 1-1/2 and standard length to top of bowl.

### B. Flushometers, P-2, P-2A:

1. Product: Subject to compliance with requirements, provide product by one of the following:
  - a. Delta Faucet Company.
  - b. Zurn Plumbing Products Group; Commercial Brass Operation.

- c. TOTO USA, Inc.
  - d. Or Approved Equal.
2. Description: Flushometer for urinal-type fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
- a. Internal Design: Diaphragm operation.
  - b. Style: Exposed.
  - c. Inlet Size: NPS 3/4.
  - d. Trip Mechanism: Oscillating, lever-handle actuator.
  - e. Consumption: 0.5 gal./flush.
  - f. Tailpiece Size: NPS 3/4 and standard length to top of bowl.

## 2.3 TOILET SEATS

### A. Toilet Seats, P-1, P-1A:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Beneke 523 or a comparable product by one of the following:
- a. American Standard Companies, Inc.
  - b. Church Seats.
  - c. Olsonite Corp.
  - d. Or Approved Equal.
2. Description: Toilet seat for water-closet-type fixture.
- a. Material: Molded, solid plastic.
  - b. Configuration: Open front without cover.
  - c. Size: Elongated.
  - d. Hinge Type: CK, check.
  - e. Class: Heavy-duty commercial.
  - f. Color: White.

## 2.4 PROTECTIVE SHIELDING GUARDS

### A. Protective Shielding Piping Enclosures, P-3, P-3A:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. TRUEBRO, Inc.
  - b. Or Approved Equal.
2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

## 2.5 FIXTURE SUPPORTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Smith, Jay R. Mfg. Co.
  2. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
  3. Zurn Plumbing Products Group; Specification Drainage Operation.
  4. Or Approved Equal.
- B. Urinal Supports, P-2, P-2A:
1. Description: Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture for wall-mounting, urinal-type fixture. Include steel uprights with feet.
  2. Accessible-Fixture Support: Include rectangular steel uprights.
- C. Lavatory Supports, P-3, P-3A:
1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
  2. Accessible-Fixture Support: Include rectangular steel uprights.

## 2.6 WATER CLOSETS

- A. Water Closets, P-1:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Kohler Wellworth K-3574 or a comparable product by one of the following:
    - a. American Standard Companies, Inc.
    - b. Crane Plumbing, L.L.C./Fiat Products.
    - c. TOTO USA, Inc.
  2. Description: Floor-mounting, floor-outlet, vitreous-china fixture designed for flush tank operation.
    - a. Style: Close coupled.
      - 1) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
      - 2) Height: Standard.
      - 3) Design Consumption: 1.6 gal./flush.
      - 4) Tank: Class Five type with trim. Include cover.
      - 5) Trip Mechanism: Lever-handle actuator.
      - 6) Color: White.
    - b. Supply: NPS 1/2 chrome-plated brass or copper with screwdriver stop.
    - c. Toilet Seat: P-1.
- B. Water Closets, P-1A:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Kohler Highline K-3493 or a comparable product by one of the following:
    - a. American Standard Companies, Inc.
    - b. Crane Plumbing, L.L.C./Fiat Products.
    - c. TOTO USA, Inc.

2. Description: Floor-mounting, floor-outlet, vitreous-china fixture designed for flushometer operation.
  - a. Style: Close coupled.
    - 1) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
    - 2) Height: ADA.
    - 3) Design Consumption: 1.4 gal./flush.
    - 4) Tank: Flushmate with trim. Include cover.
    - 5) Trip Mechanism: Lever-handle actuator.
    - 6) Color: White.
  - b. Supply: NPS 1/2 chrome-plated brass or copper with screwdriver stop.
  - c. Toilet Seat: P-1A.

## 2.7 URINALS

### A. Urinals, P-2, P-2A:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Kohler Dexter K-5016-ET or a comparable product by one of the following:
  - a. American Standard Companies, Inc.
  - b. Crane Plumbing, L.L.C./Fiat Products.
  - c. TOTO USA, Inc.
  - d. Or Approved Equal.
2. Description: Accessible, wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
  - a. Type: Siphon jet.
  - b. Strainer or Trapway: Open trapway with integral trap.
  - c. Rim Height (P-2): 24 inches above floor.
  - d. Rim Height (P-2A): 17 inches above floor.
  - e. Water Consumption: 0.5 gal./flush.
  - f. Spud Size and Location: NPS 3/4; top.
  - g. Color: White.
  - h. Outlet Size: NPS 2.
  - i. Flushometer: P-2, P-2A.

## 2.8 LAVATORIES

### A. Lavatories (ADA), P-3:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Kohler Kingston K-2005 or a comparable product by one of the following:
  - a. American Standard Companies, Inc.
  - b. Crane Plumbing, L.L.C.
  - c. TOTO USA, Inc.
  - d. Or Approved Equal.



2. Description: Wall-mounting, vitreous-china fixture.

- a. Type: Ledge back.
- b. Size: 21 by 18 inches rectangular.
- c. Faucet Hole Punching: Three holes, 4-inch.
- d. Faucet Hole Location: Top.
- e. Color: White.
- f. Faucet: Lavatory P-3, P-3A.
- g. Protective Shielding Guard(s): P-3, P-3A.
- h. Fixture Support: Lavatory P-3, P-3A.

#### 2.9 Kitchen Sink P-4

A. 25"x 22", self rimmed single compartment sink. Sink shall be eighteen (18) gauge, type 302 and 304 stainless steel. Faucet shall be Chicago **200 (with hose spray)**, McGuire 8912 P-trap, appropriate drain, tailpiece and crumb strainer 1/2 inch McGuire 2158 wheel stop supplies. The Contractor shall provide a template to allow preparation of casework opening.

|       |                       |
|-------|-----------------------|
| Elkay | Model No. LR-2522     |
| Just  | Model No. SL-2225A-GR |

#### 2.10 MOP RECEPTOR

A. Mop Receptor, P-5:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Fiat MSB 2424 or a comparable product by one of the following:

- a. Acorn Engineering Company.
- b. Swan Corporation (The).
- c. Zurn Plumbing Products Group; Light Commercial Operation.

2. Description: Flush-to-wall, floor-mounting, cast-polymer fixture with rim guard.

- a. Shape: Square.
- b. Size: 24 by 24 inches.
- c. Height: 10 inches.
- d. Rim Guard: On all top surfaces.
- e. Color: White.
- f. Faucet: Sink Fiat 830-AA or approved equal. Chrome plated, back mounted, with wall support, vacuum breaker, hose threaded spout and bucket hook
- g. Drain: Grid with NPS 3 outlet.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
  - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
  - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

- L. Install traps on fixture outlets.
  - 1. Exception: Omit trap on fixtures with integral traps.
  - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- M. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.
- N. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

### 3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

### 3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.

### 3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
  2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

### 3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

**END OF SECTION 224000**

## SECTION 230500 – COMMON WORK RESULTS FOR HVAC

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Sleeves.
  - 4. Escutcheons.
  - 5. Equipment installation requirements common to equipment sections.
  - 6. Painting and finishing.
  - 7. Supports and anchorages.
  - 8. Cast-in-Place Concrete.
  - 9. Mechanical Demolition.

#### 1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
  - 1. CPVC: Chlorinated polyvinyl chloride plastic.
  - 2. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 2. NBR: Acrylonitrile-butadiene rubber.

## 1.5 SUBMITTALS

- A. Product Data: For the following if utilized:
  - 1. Transition fittings.
  - 2. Dielectric fittings.
- B. Steel Certifications.

## 1.6 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

## 1.8 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

### 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

- E. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

- B. Insulating Material: Suitable for system fluid, pressure, and temperature.

- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

- 1. Manufacturers:

- a. Eclipse, Inc.
- b. Epcos Sales, Inc.
- c. Hart Industries, International, Inc.
- d. Watts Industries, Inc.; Water Products Div.
- e. Zurn Industries, Inc.; Wilkins Div.

- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

- 1. Manufacturers:

- a. Capitol Manufacturing Co.
- b. Epcos Sales, Inc.
- c. Watts Industries, Inc.; Water Products Div.

- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

- 1. Manufacturers:

- a. Advance Products & Systems, Inc.
- b. Calpico, Inc.
- c. Pipeline Seal and Insulator, Inc.

- 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

- 1. Manufacturers:

- a. Calpico, Inc.
- b. Lochinvar Corp.



G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

- a. Perfection Corp.
- b. Precision Plumbing Products, Inc.
- c. Victaulic Co. of America.

## 2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- D. PVC Pipe: ASTM D 1785, Schedule 40.

## 2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  1. Finish: Rough brass.
- D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

## 2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.

## 2.8 CAST-IN-PLACE CONCRETE

- A. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: Maintain within range permitted by ACI 301 (ACI 301M). Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

## PART 3 - EXECUTION

### 3.1 MECHANICAL DEMOLITION

- A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition & Restoration" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  1. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  2. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  3. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  - 1. New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
    - c. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
- M. Sleeves are not required for core-drilled holes.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
    - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
  - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Verify final equipment locations for roughing-in.
- P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.6 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

### 3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

### 3.8 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

### 3.9 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

**END OF SECTION 230500**

## SECTION 230510 – HVAC ELECTRICAL AND WIRING REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 230500 – COMMON WORK RESULTS FOR HVAC forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 ELECTRICAL EQUIPMENT

- A. General:
  - 1. This Contractor shall furnish all motors, starters, for motors and controls for equipment under his Contract, unless otherwise noted.
  - 2. Electrical Contractor shall furnish & install all disconnects and overload protectors and shall provide all necessary wire, conduit and boxes to properly connect equipment for this Contractor no matter how many disconnects, etc. are included, unless otherwise noted.
  - 3. This Contractor shall provide all necessary conduit and control wiring to pushbuttons, thermostats, pilot lights, interlocks and similar equipment for this Contractors equipment.
  - 4. Flow control switches, thermostats and similar mechanical-electrical devices necessary for proper operation of mechanical systems shall be furnished and installed by this Contractor.
  - 5. Where the starter and/or safety switch is an integral part of the equipment assembly, the assembly shall be furnished with the wiring complete between starter, controller and motor. The Electrical Contractor will make connections to unit terminals.
  - 6. If motor control center is furnished (and installed) by Electrical Contractor for specific motors, the Mechanical Contractor shall not furnish starters for those specific motors, however the Mechanical Contractor shall furnish Electrical Contractor with starter requirements to insure proper operation of those motors.

7. All motors and motor control equipment and wiring shall meet the requirements of the NEC, and shall comply with the requirements of the Public Utility Company furnishing service and with the rules and regulations of all authorities having jurisdiction.
8. Voltage available at the building is 120/208 volts - three phase – four wires.
9. THIS CONTRACTOR SHALL VERIFY VOLTAGE AT SITE BEFORE ORDERING ANY ELECTRICAL EQUIPMENT.
10. The Electrical Contractor shall be responsible for proper rotation of three phase equipment.

## PART 2 - PRODUCTS

### 2.1 CONTROL WIRING

- A. All wiring and conduit shall be according to the latest edition of the NEC. All control wiring shall be installed in EMT, applicable portions of the NEC and of "DIVISION 16 - ELECTRICAL".
- B. Low voltage control wiring in air plenums shall be a UL approved conductor for application as manufactured by Alpha or Beldon.

## PART 3 - EXECUTION

### 3.1 CONTROL WIRING

- A. Workmanship on all phases of control wiring shall be equal to that of the Electrical Contractor and shall be performed by competent workmen.
- B. Horizontal cable runs shall be made level. Vertical cable runs shall be made plumb. Exposed cable runs shall run parallel or perpendicular to walls and ceilings, i.e., no unsightly diagonals or bends.
- C. In building equipment spaces, cables may be run along and strapped to the surface of walls using mechanical fasteners with wire ties.
- D. Horizontal cable runs shall be supported every 12 inches, and vertical cable runs shall be supported every 24 inches. Cables will be run in a workmanlike manner parallel to the floor with all droops removed by pulling taut but without exceeding the tensile strength of the conductors.
- E. Cable runs may not be run along or fastened to: any telephone cable superstructure, including those supported from the ceiling, from the wall, or on top of the telephone equipment frames; any air handling ductwork beyond fifteen feet from the supply or return fan; any fluid or gas piping.
- F. Cables shall be concealed unless permission is otherwise solicited from the Professional and granted in writing.

### 3.2 RESPONSIBILITIES

- A. The following is a list of equipment provided by this Contractor and shows both this Contractor's and the Electrical Contractor's responsibility for the furnishing, installing and connection of control, disconnecting and overload equipment.
- B. The conditions under Electrical Equipment, General (above) also apply to these paragraphs.
- C. Provide to the Electrical Contractor shop drawings, product data, and manufacturer's instructions for equipment furnished under DIVISION 23.
  - 1. Exhaust Fans EF-1,2,3
    - a. 120 volt, 1 phase.
    - b. Thermal overload switch, with pilot light, shall be provided by the Electrical Contractor.
    - c. Where indicated, light switches, or toggle switches with pilot lights, shall control fans. In these cases, thermal overload switches shall be provided and installed by the Electrical Contractor adjacent to the fan.
  - 2. Ductless Split System AHU-1, CU-1
    - a. 208 volt - 1 phase.
    - b. Starters with overload protection shall be furnished and installed by equipment manufacturer.
    - c. The Electrical Contractor shall furnish, install and connect all power wiring to a fused weatherproof disconnect switch.
    - d. All wiring to the respective devices in the unit shall be factory installed by the equipment manufacturer.
    - e. Internally mounted control center with motor starters, 24 VAC control transformers and control circuit fusing shall be provided by equipment manufacturer.
  - 3. Ducted Split System FC-1,2 CU-2
    - a. 208/230 volt - 1 phase.
    - b. Starters with overload protection shall be furnished and installed by equipment manufacturer.
    - c. The Electrical Contractor shall furnish, install and connect all power wiring to a fused weatherproof disconnect switch.
    - d. All wiring to the respective devices in the unit shall be factory installed by the equipment manufacturer.
    - e. Internally mounted control center with motor starters, 24 VAC control transformers and control circuit fusing shall be provided by equipment manufacturer.
  - 4. DX Horizontal Ceiling AC Unit AHU-2,3 CU-3,4
    - a. 208 volt - 3 phase.
    - b. Starters with overload protection shall be furnished and installed by equipment manufacturer.
    - c. The Electrical Contractor shall furnish, install and connect all power wiring to a fused weatherproof disconnect switch.



- d. All wiring to the respective devices in the unit shall be factory installed by the equipment manufacturer.
  - e. Internally mounted control center with motor starters, 24 VAC control transformers and control circuit fusing shall be provided by equipment manufacturer.
5. Energy Recovery Ventilator (Indoor) ERV-1
- a. 120 volt - 1 phase.
  - b. Starters with overload protection shall be furnished and installed by equipment manufacturer.
  - c. The Electrical Contractor shall furnish, install and connect all power wiring to a fused disconnect switch.
  - d. All wiring to the respective devices in the unit shall be factory installed by the equipment manufacturer.
  - e. Internally mounted control center with motor starters, 24 VAC control transformers and control circuit fusing shall be provided by equipment manufacturer.

**END OF SECTION 230510**

## SECTION 230553 – MECHANICAL IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment nameplates.
  - 2. Equipment markers.
  - 3. Pipe labels.
  - 4. Ductwork labels.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

### PART 2 - PRODUCTS

#### 2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
  - 1. Terminology: Match schedules as closely as possible.
  - 2. Data: Equipment Number.
  - 3. Size: 1 x 4 inches for equipment.

## 2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semi rigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.

## 2.3 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- D. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 23 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

### 3.2 EQUIPMENT IDENTIFICATION

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
  - 1. Roof Top Unit, Exhaust Fan, Make-Up Air and Energy Recovery Ventilator equipment.
- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
  - 1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches
  - 2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
  - 3. Locate markers where accessible and visible.

### 3.3 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

### 3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
  - 1. Blue: For supply ducts.
  - 2. Orange: For hot-air supply ducts.
  - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
  - 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

**END OF SECTION 230553**

## **SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. Section Includes:
  - 1. Balancing Air Systems:
    - a. Constant-volume air systems (New and Existing).

#### **1.4 DEFINITIONS**

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

#### **1.5 SUBMITTALS**

- A. Certified TAB reports.

## 1.6 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB or TABB.
  - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB or TABB.
  - 2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB or TABB as a TAB technician.
- B. Certify TAB field data reports and perform the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 – “Air Balancing.”
- F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 – “System Balancing.”

## PART 2 - PRODUCTS\_(Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

- E. Examine ceiling plenums used for supply, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section Metal Ducts and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan curves.
  - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine terminal units; such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine operating safety interlocks and controls on HVAC equipment.
- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
  - 1. Permanent electrical-power wiring is complete.
  - 2. Automatic temperature-control systems are operational.
  - 3. Equipment and duct access doors are securely closed.
  - 4. Balance, smoke, and fire dampers are open.
  - 5. Isolating and balancing valves are open and control valves are operational.
  - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.



7. Windows and doors can be closed so indicated conditions for system operations can be met.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
  1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.

- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

### 3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
  - 2. Measure fan static pressures as follows to determine actual static pressure:
    - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet or through the flexible connection.
    - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
  - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Report the cleanliness status of filters and the time static pressures are measured.
  - 4. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
  - 5. Obtain approval from engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
  - 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
  - 1. Measure airflow of submain and branch ducts.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
  - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
  - 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
  - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
  - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

### 3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
  - 1. Manufacturer's name, model number, and serial number.
  - 2. Motor horsepower rating.
  - 3. Motor rpm.
  - 4. Efficiency rating.
  - 5. Nameplate and measured voltage, each phase.
  - 6. Nameplate and measured amperage, each phase.
  - 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

### 3.7 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
  - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
  - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
  - 3. Check the refrigerant charge.
  - 4. Check the condition of filters.
  - 5. Check the condition of coils.
  - 6. Check the operation of the drain pan and condensate-drain trap.
  - 7. Check bearings and other lubricated parts for proper lubrication.
  - 8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
  
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
  - 1. New filters are installed.
  - 2. Coils are clean and fins combed.
  - 3. Drain pans are clean.
  - 4. Fans are clean.
  - 5. Bearings and other parts are properly lubricated.
  - 6. Deficiencies noted in the preconstruction report are corrected.
  
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
  - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
  - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
  - 3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
  - 4. Balance each air outlet.

### 3.8 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.

### 3.9 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

### 3.10 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
  - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
  - 1. Pump curves.
  - 2. Fan curves.
  - 3. Manufacturers' test data.
  - 4. Field test reports prepared by system and equipment installers.
  - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
  - 1. Title page.
  - 2. Name and address of the TAB contractor.
  - 3. Project name.
  - 4. Project location.
  - 5. Architect's name and address.
  - 6. Engineer's name and address.
  - 7. Contractor's name and address.
  - 8. Report date.
  - 9. Signature of TAB supervisor who certifies the report.
  - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  - 11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.
    - c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
  13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  14. Notes to explain why certain final data in the body of reports vary from indicated values.
  15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.
    - f. Inlet vane settings for variable-air-volume systems.
    - g. Settings for supply-air, static-pressure controller.
    - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
  2. Water and steam flow rates.
  3. Duct, outlet, and inlet sizes.
  4. Pipe and valve sizes and locations.
  5. Terminal units.
  6. Balancing stations.
  7. Position of balancing devices.

**END OF SECTION 230593**

## SECTION 230713 – HVAC DUCT INSULATION

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section includes insulating the following duct services:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, exposed supply and outdoor air.
  - 3. Indoor, concealed return.
  - 4. Indoor, exposed return.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings.
  - 1. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 2. Detail application of field-applied jackets.
- C. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin and wrapped with a factory-applied FSK or ASJ jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; SoftTouch Duct Wrap.
    - b. Johns Manville; Microlite.
    - c. Knauf Insulation; Friendly Feel Duct Wrap.
    - d. Manson Insulation Inc.; Alley Wrap.
    - e. Owens Corning; SOFTR All-Service Duct Wrap.

### 2.2 TAPES

- A. ASJ Tape: White, Paintable, vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 428 AWF ASJ.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    - c. Compac Corporation; 104 and 105.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
  2. Width: 3 inches.
  3. Thickness: 11.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.



B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ABI, Ideal Tape Division; 491 AWF FSK.
- b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
- c. Compac Corporation; 110 and 111.
- d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.

3. Thickness: 6.5 mils.

4. Adhesion: 90 ounces force/inch in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ABI, Ideal Tape Division; 488 AWF.
- b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
- c. Compac Corporation; 120.
- d. Venture Tape; 3520 CW.

2. Width: 3 inches.

3. Thickness: 3.7 mils.

4. Adhesion: 100 ounces force/inch in width.

5. Elongation: 5 percent.

6. Tensile Strength: 34 lbf/inch in width.

## 2.3 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

## 2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

## 2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
  - b. Vimasco Corporation; 749.
  - c. Or Approved Equal.
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
  - b. Eagle Bridges - Marathon Industries; 570.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
  - d. Or Approved Equal.
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

## 2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.

B. ASJ Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.

4. Color: White, Paintable.

## 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  1. ASJ: White, Paintable, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
  2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

## 2.8 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ITW Insulation Systems; Gerrard Strapping and Seals.
    - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.

- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.3 PENETRATIONS

- A. Insulation Installation at roof Penetrations: Install insulation continuously through roof penetrations.
  - 1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor insulation, install insulation applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

### 3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  2. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not over compress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.
    - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

### 3.5 FINISHES

- A. Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Government Design Professional from manufacturer's full range. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

- B. Tests and Inspections:
  - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.7 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation with ASJ or other paintable jacket material:
  - 1. Indoor, exposed supply and outdoor air.
  - 2. Indoor, exposed return.
  - 3. Indoor, exposed exhaust.
- B. Plenums and Ducts Requiring Insulation with FSK jacket material:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor concealed return.
  - 3. Indoor, concealed exhaust.
- C. Items Not Insulated:
  - 1. Factory-insulated flexible ducts.
  - 2. Vibration-control devices.

### 3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.
- B. Supply-Air Duct and Plenum Insulation:
  - 1. Mineral-fiber blanket, R-5 minimum.
  - 2. Mineral-Fiber Board: R-5 minimum.
- C. Outdoor-Air Duct and Plenum Insulation:
  - 1. Mineral-fiber blanket, R-5 minimum.
  - 2. Mineral-Fiber Board: R-5 minimum.
- D. Return-Air Duct and Plenum Insulation:
  - 1. Mineral-fiber blanket, R-5 minimum.
  - 2. Mineral-Fiber Board: R-5 minimum.
- E. Type I, Commercial, Kitchen Hood Exhaust Duct: Fire-rated blanket; thickness as required to achieve 2-hour fire rating.

F. Exhaust-Air Duct and Plenum Insulation:

1. Mineral-fiber blanket, R-5 minimum.
2. Mineral-Fiber Board: R-5 minimum

**END OF SECTION 230713**

## SECTION 233113 – METAL DUCTS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:

1. Rectangular ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

- B. Related Sections:

1. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.



## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submittals: Steel Certificates: For each type of product indicated.
  - 1. Exhaust Duct.
  - 2. Supply / Return
- C. Shop Drawings:
  - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
  - 2. Factory- and shop-fabricated ducts and fittings.
  - 3. Fittings.
  - 4. Reinforcement and spacing.
  - 5. Seam and joint construction.
  - 6. Equipment installation based on equipment being used on Project.
  - 7. Hangers and supports, including methods for duct and building attachment and vibration isolation.
  - 8. Testing, Balancing and Adjusting Reports.
  - 9. Steel Certifications.
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

## PART 2 - PRODUCTS

### 2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and

Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

## 2.2 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G60 or G90.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
  - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.3 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
  - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
  - 2. Tape Width: 3 inches.
  - 3. Sealant: Modified styrene acrylic.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  - 7. Service: Indoor and outdoor.
  - 8. Service Temperature: Minus 40 to plus 200 deg F.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

## 2.4 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
  - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.
- I. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- J. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- K. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- L. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## PART 3 - EXECUTION

### 3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

### 3.2 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
  - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 2. Outdoor, Supply-Air Ducts: Seal Class A.
  - 3. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
  - 4. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
  - 5. Unconditioned Space, Exhaust Ducts: Seal Class C.
  - 6. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
  - 7. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
  - 8. Conditioned Space, Exhaust Ducts: Seal Class B.

### 3.3 DUCT SCHEDULE

- A. Supply Ducts:
  - 1. Ducts Connected to Make-Up Air Units:
    - a. Pressure Class: Positive 2-inch wg.
    - b. Minimum SMACNA Seal Class: A.
    - c. SMACNA Leakage Class for Rectangular: 12.

B. Exhaust Ducts:

1. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.
  - a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
  - b. Concealed: Carbon Steel Sheet.
  - c. Welded seams and joints.
  - d. Pressure Class: Positive or negative 2-inch wg.
  - e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
  - f. SMACNA Leakage Class: 3.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  1. Where practical, install concrete inserts before placing concrete.
  2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 DUCT CLEANING

- A. Clean new duct system before testing, adjusting, and balancing.

### 3.7 START UP

- A. Air Balance: Contractor shall test and adjust fans to Toilet/Shower room exhaust fans for proper rotation and working order. Balance and Adjust outside air handler supply ductwork for required CFM to each supply diffuser and grille. Provide a balance report upon completion.

### 3.8 DUCT SCHEDULE

#### A. Supply Ducts:

##### 1. Ducts Connected to Fan Coil Units, Heat Pumps, and Terminal Units:

- a. Pressure Class: Positive and Negative: 2-inch wg .
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

#### B. Exhaust Ducts:

##### 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

- a. Pressure Class: Negative 2-inch wg .
- b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

##### 2. Ducts Connected to Equipment Not Listed Above:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

#### C. Elbow Configuration:

##### 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

###### a. Velocity 1000 fpm or Lower:

- 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
- 2) Mitered Type RE 4 without vanes.

###### b. Velocity 1000 to 1500 fpm:

- 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
- 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.

- 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
    - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
  3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
    - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
      - 1) Velocity 1000 fpm: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
      - 2) Radius-to Diameter Ratio: 1.5.
    - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
- D. Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
    - a. Rectangular Main to Rectangular Branch: 45-degree entry.
    - b. Rectangular Main to Round Branch: Spin in.
  2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
    - a. Velocity 1000 fpm or Lower: 90-degree tap.

**END OF SECTION 233113**



## SECTION 233300 – AIR DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Manual volume dampers.
  - 2. Control dampers.
  - 3. Fire dampers.
  - 4. Smoke dampers.
  - 5. Flange connectors.
  - 6. Turning vanes.
  - 7. Duct-mounted access doors.
  - 8. Flexible connectors.
  - 9. Flexible ducts.
  - 10. Duct accessory hardware.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
  - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
    - a. Special fittings.
    - b. Manual volume damper installations.

- c. Control damper installations.
  - d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.
  - e. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G60 or G90.
  - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

### 2.2 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Air Balance Inc.; a division of Mestek, Inc.
    - b. American Warming and Ventilating; a division of Mestek, Inc.
    - c. Flexmaster U.S.A., Inc.
    - d. McGill AirFlow LLC.
    - e. METALAIRE, Inc.
    - f. Nailor Industries Inc.
    - g. Pottorff; a division of PCI Industries, Inc.
    - h. Ruskin Company.
    - i. Trox USA Inc.
    - j. Vent Products Company, Inc.
  2. Standard leakage rating, with linkage outside airstream.
  3. Suitable for horizontal or vertical applications.
  4. Frames:
    - a. Hat-shaped, galvanized steel channels, 0.064-inch minimum thickness.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
  5. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized-steel, 0.064 inch thick.
  6. Blade Axles: Galvanized steel.
  7. Bearings:
    - a. Oil-impregnated bronze or Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  8. Tie Bars and Brackets: Galvanized steel.
- B. Standard, Aluminum, Manual Volume Dampers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Air Balance Inc.; a division of Mestek, Inc.
    - b. American Warming and Ventilating; a division of Mestek, Inc.
    - c. Flexmaster U.S.A., Inc.
    - d. McGill AirFlow LLC.
    - e. METALAIRE, Inc.

- f. Nailor Industries Inc.
  - g. Pottorff; a division of PCI Industries, Inc.
  - h. Ruskin Company.
  - i. Trox USA Inc.
  - j. Vent Products Company, Inc.
2. Standard leakage rating, with linkage outside airstream.
  3. Suitable for horizontal or vertical applications.
  4. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
  5. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
    - e. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
  6. Blade Axles: Galvanized steel
  7. Bearings:
    - a. Oil-impregnated bronze or Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  8. Tie Bars and Brackets: Aluminum.
- C. Jackshaft:
1. Size: 1-inch diameter.
  2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
  3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware:
1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
  2. Include center hole to suit damper operating-rod size.
  3. Include elevated platform for insulated duct mounting.

## 2.3 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.

2. Nexus PDQ; Division of Shilco Holdings Inc.
  3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

#### 2.4 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
  2. Duro Dyne Inc.
  3. METALAIRE, Inc.
  4. SEMCO Incorporated.
  5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- E. Vane Construction: Single wall.
- F. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

#### 2.5 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Warming and Ventilating; a division of Mestek, Inc.
  2. Cesco Products; a division of Mestek, Inc.
  3. Ductmate Industries, Inc.

4. Flexmaster U.S.A., Inc.
5. Greenheck Fan Corporation.
6. McGill AirFlow LLC.
7. Nailor Industries Inc.
8. Pottorff; a division of PCI Industries, Inc.
9. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:
  - a. Double wall, rectangular.
  - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
  - c. Vision panel.
  - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
  - e. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
  - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
  - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
  - c. Access Doors up to 24 by 48 Inches (Three hinges and two compression latches.

## 2.6 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
  2. Duro Dyne Inc.
  3. Ventfabrics, Inc.
  4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd.

2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  3. Service Temperature: Minus 40 to plus 200 deg F Minus 40 to plus.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd.
  2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
  3. Service Temperature: Minus 50 to plus 250 deg F.
- G. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
  2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
  7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

## 2.7 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flexmaster U.S.A., Inc.
  2. McGill AirFlow LLC.
  3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
  2. Maximum Air Velocity: 4000 fpm.
  3. Temperature Range: Minus 10 to plus 160 deg F .
  4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
- C. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
  2. Maximum Air Velocity: 4000 fpm.

3. Temperature Range: Minus 20 to plus 175 deg F .
  4. Insulation R-Value: Comply with ASHRAE/IESNA 90.1.
- D. Insulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
1. Pressure Rating: 8-inch wg positive or negative.
  2. Maximum Air Velocity: 5000 fpm.
  3. Temperature Range: Minus 20 to plus 250 deg F .
  4. Insulation R-value: Comply with ASHRAE/IESNA 90.1
- E. Flexible Duct Connectors:
1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action or Nylon strap in sizes 3 through 18 inches , to suit duct size.

## 2.8 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
1. Install steel volume dampers in steel ducts.
  2. Install aluminum volume dampers in aluminum ducts.



- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
  - 1. On both sides of duct coils.
  - 2. At outdoor-air intakes and mixed-air plenums.
  - 3. At drain pans and seals.
  - 4. Downstream from manual volume dampers, control dampers, and equipment.
  - 5. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
  - 6. At each change in direction and at maximum 50-foot spacing.
  - 7. Upstream and downstream from turning vanes.
  - 8. Control devices requiring inspection.
  - 9. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
  - 1. One-Hand or Inspection Access: 8 by 5 inches.
  - 2. Two-Hand Access: 12 by 6 inches.
  - 3. Head and Hand Access: 18 by 10 inches.
- K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- O. Connect diffusers or to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- P. Connect flexible ducts to metal ducts with adhesive or draw bands.
- Q. Install duct test holes where required for testing and balancing purposes.

- R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

### 3.2 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

**END OF SECTION 233300**

## SECTION 233423 –HVAC POWER VENTILATORS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Ceiling-mounted ventilators. (EF-1, EF-2, EF-3)

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Wiring Diagrams: For power, signal, and control wiring.
  - 3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Operation and maintenance data.
- D. Steel Certifications.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

## PART 2 - PRODUCTS

### 2.1 CEILING-MOUNTED VENTILATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. American Coolair Corporation.
  - 2. Ammerman; Millennium Equipment.
  - 3. Breidert Air Products.
  - 4. Broan-NuTone LLC.
  - 5. Broan-NuTone LLC; NuTone Inc.
  - 6. Carnes Company.
  - 7. FloAire.
  - 8. Greenheck Fan Corporation.
  - 9. JencoFan.
  - 10. Loren Cook Company.
  - 11. PennBarry.
  - 12. W.W. Grainger, Inc.; Dayton Products.
  - 13. Or Approved Equal.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Painted aluminum, white louvered grille with flange on intake and thumbscrew attachment to fan housing.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Accessories:
  - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
  - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover.
  - 3. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.

4. Filter: Washable aluminum to fit between fan and grille.
5. Isolation: Rubber-in-shear vibration isolators.
6. Manufacturer's standard roof jack or wall cap, and transition fittings.

## 2.2 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
  1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
  2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
- B. Enclosure Type: Totally enclosed, fan cooled.

## 2.3 SOURCE QUALITY CONTROL

- A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.
- B. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- C. Support suspended units from structure using threaded steel rods and elastomeric hangers having a static deflection of 1 inch.
- D. Install units with clearances for service and maintenance.
- E. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."

### 3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Verify that shipping, blocking, and bracing are removed.
  - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
  - 3. Verify that cleaning and adjusting are complete.
  - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
  - 5. Adjust belt tension.
  - 6. Adjust damper linkages for proper damper operation.
  - 7. Verify lubrication for bearings and other moving parts.
  - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
  - 9. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Prepare test and inspection reports.

**END OF SECTION 233423**

## SECTION 233713 – DIFFUSERS AND GRILLES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Square ceiling diffusers.
  - 2. Fixed face Grilles.
- B. Related Sections:
  - 1. Division 23 Section "Air Duct Accessories" for dampers and volume-control dampers not integral to diffusers, registers, and grilles.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

### PART 2 - PRODUCTS

#### 2.1 CEILING DIFFUSERS

- A. Square Ceiling Diffusers:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- a. Anemostat
  - b. Carnes.
  - c. Hart & Cooley Inc.
  - d. Krueger.
  - e. METALAIRE, Inc.
  - f. Nailor Industries Inc.
  - g. Tuttle & Bailey.
  - h. Or Approved Equal.
- 2. Devices shall be specifically designed for variable-air-volume flows.
  - 3. Material: Aluminum.
  - 4. Finish: Baked enamel, white
  - 5. Face Size: 12 by 12 and 24 by 24 inches (See Drawings).
  - 6. Face Style: Three cone.
  - 7. Mounting: Lay-In, Surface Mounted and Duct-Mounted (See Drawings).
  - 8. Pattern: Fixed

## 2.2 REGISTERS AND GRILLES

### A. Fixed Blade Grille:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Carnes.
  - b. Dayus Register & Grille Inc.
  - c. Anemostat, Inc.
  - d. Hart & Cooley Inc.
  - e. Krueger.
  - f. Nailor Industries Inc.
  - g. Tuttle & Bailey.
  - h. Or Approved Equal.
- 2. Material: Aluminum.
- 3. Finish: Baked enamel, white
- 4. Blade Arrangement: Horizontal, Long, 1/2-inch spacing, 45° deflection.
- 5. Frame: 1-1/4 inches wide.
- 6. Mounting: Countersunk screw

## 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.



- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.2 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

**END OF SECTION 233713**

## SECTION 236200 - REFRIGERATION AND RELATED EQUIPMENT

### Part 1 GENERAL

#### 1.1 STIPULATIONS

- A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

### Part 2 PRODUCTS

#### 2.1 AIR COOLED CONDENSING UNITS (CU-1)

- A. This Contractor shall furnish and install air cooled condensing units as detailed and scheduled in the plans. Capacity ratings shall be based on tests in accordance with ARI Standard 210-66. Condensing units shall consist of casing, compressor, condenser coil, condenser fans and motors and unit controls. Units shall be as manufactured by York Corp. model YXV60B21S, the Trane Company, Dunham-Bush, Carrier Corp., or accepted equal.
- B. Condensing units shall be designed for outdoor application and shall provide complete protection for all components and controls. Casings shall have panels to provide complete protection and access to compressor, controls, condenser fans, motors and drives. The unit shall be shipped in one section completely factory assembled. Field assembly of units and refrigerant piping within the units shall not be permitted.
- C. The compressor shall be welded steel shell, hermetic 3,450 RPM compressor. Internal protection devices include temperature and current sensitive overloads, and pressure relief valve. The compressor shall have internal spring isolation and sound muffling, and mounted on rubber grommets to minimize noise and vibration transmission. Off cycle temperature regulated crankcase heater shall be factory furnished and installed.
- D. The condensing unit operating and safety controls shall include high and low pressure cutout, oil pressure cutout, and compressor winding thermostat. Three leg compressor overload protection shall be provided. Control panel shall include magnetic contactors for compressor and condenser fan motors. Control panels shall be 24 volts.
- E. Condenser section shall consist of a coil of seamless copper tubing mechanically bonded to heavy duty aluminum fins, a liquid accumulator and subcooler circuit, backseating liquid line service access valve, condenser fans and motors.
- F. The condenser coil shall be two-row, wraparound "U" shaped configuration with heavy aluminum fins mechanically bonded to 3/8 inch OD copper tubes. The coil shall be protected on all sides by steel coil guard. The unit shall be factory tested under pressure to assure leakproof construction.
- G. The condenser fan shall be aluminum, aerodynamic design, statically balanced fan draws hot air up and away from unit. Direct-drive weatherproof PSC motor shall be permanently lubricated, with ventilated design for longer life; current and thermal overload protection and external rain shield for increased reliability. The fan/motor support shall be mounted to cabinet top. Heavy wire grille shall protect fan.

- H. The control shall have a factory wired and mounted terminal strip for easy low voltage connection and servicing. Pressure box lugs for high voltage power connection shall be supplied from factory. Indoor fan time delay control shall be furnished to help minimize cyclic cooling losses.
- I. The cabinet shall be heavy-gauge, zinc-coated steel, phosphatized, painted with epoxy resin primer (exterior surface) and finished with acrylic topcoat. Electrical and refrigerant connections shall be located on same side of all units. Highly tooled basepan shall include integral shipping skid and die-formed mounting rails for ease of installation. Drainage holes shall facilitate removal of moisture of coil.

### Part 3 EXECUTION

#### 3.1 GENERAL

- A. Where equipment furnished vary in dimensions, configuration, electrical characteristics, or location, etc., from the layout indicated on the drawings, the contractor shall make all modifications required to accommodate the actual equipment to be provided. Submission of shop drawings shall indicate acceptance of this responsibility. In any case an accurate 1/4" - 1'0" drawings shall be submitted with the shop drawings for approval by the professional prior to installation.
- B. All equipment shall be installed in a workmanlike manner by skilled workmen regularly engaged in this type of work.
- C. Where equipment is relocated to a place other than that shown on the drawings or when equipment other than that specified is used, the Contractor shall pay the entire cost of required revisions to such items as structural steel, concrete, electrical work, piping and ductwork.
- D. It is the full responsibility of this Contractor to ensure that the equipment he is providing fully conforms to this specification before submission to the Professional for review. This Contractor shall incur and shall be fully responsible for any and all costs associated with the equipment provided by a substitute manufacturer. Acceptance of the substitute manufacturer's equipment by the Professional will not relieve this Contractor of this responsibility.
- E. All sensors must be provided by the equipment manufacturer and shall be installed by this Contractor.

**END OF SECTION 236200**

## SECTION 237200 – ENERGY RECOVERY VENTILATORS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Packaged energy recovery units.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Operation and Maintenance Data: For energy recovery ventilator to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ARI Compliance:
  - 1. Capacity ratings for energy recovery ventilator shall comply with ARI 1060, "Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment."
- C. ASHRAE Compliance:
  - 1. Capacity ratings for energy recovery ventilator shall comply with ASHRAE 84, "Method of Testing Air-to-Air Heat Exchangers."
- D. UL Compliance:

1. Packaged heat recovery ventilators shall comply with requirements in UL 1812, "Ducted Heat Recovery Ventilators"; or UL 1815, "Nonducted Heat Recovery Ventilators."
2. Electric coils shall comply with requirements in UL 1995, "Heating and Cooling Equipment."

## 1.5 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Coordinate sizes and locations of equipment supports, and wall penetrations with actual equipment provided.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air-to-air energy recovery equipment that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Packaged Energy Recovery Units: One year.

## PART 2 - PRODUCTS

### 2.1 PACKAGED ENERGY RECOVERY UNITS

- A. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  1. Greenheck Fan Corporation Model Minicore
  2. Des Champs Technologies.
  3. Carrier Corporation.
- B. Housing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, removable panels with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch-thick thermal insulation, knockouts for electrical connections, exterior drain connection, and lifting lugs.
  1. Inlet: Flanged duct connections, with damper for exhaust and supply.
    - a. Exhaust: Gravity backdraft damper.
    - b. Supply: Gravity backdraft damper.
- C. Supply and Exhaust Fans: Backward-inclined, SWSI centrifugal fan with neoprene vibration isolation pads and flexible duct connections.
  1. Motor and Drive: Direct driven.
  2. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

3. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
4. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

D. Extended-Surface, Disposable Panel Filters:

1. Comply with NFPA 90A.
2. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
3. Factory-fabricated, dry, extended-surface type.
4. Thickness: 2 inches.

E. Electrical Coils, Controls, and Accessories: Comply with UL 1995.

1. Casing Assembly: Slip-in type with galvanized-steel frame.
2. Access: Fabricate coil section to allow removal and replacement of coil and to allow in-place access for service.

F. Accessories:

1. Hinged access doors with quarter-turn latches.
2. Horizontal discharge box.
3. Mechanical purge.
4. Filter, wheel and blower maintenance indicators.

## 2.2 CAPACITIES AND CHARACTERISTICS

1. Fan Motor Size: ½ HP Supply and ½ HP Return.
2. Fan Motor Electrical Characteristics:
  - a. Volts: 120V.
  - b. Phase: Single.
  - c. Hertz: 60.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine casing insulation materials and filter media before energy recovery ventilator installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for electrical services to verify actual locations of connections before installation.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install units with clearances for service and maintenance.
- B. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

### 3.3 CONNECTIONS

- A. Comply with requirements for ductwork specified in Division 23 Section "Metal Ducts."
- B. Electrical Connections: Comply with applicable requirements in Division 26 Sections.
  - 1. Install electrical devices furnished with units but not factory mounted.

**END OF SECTION 237200**

## SECTION 237300 HVAC TERMINAL EQUIPMENT

### Part 1 GENERAL

#### 1.1 SUMMARY

- A. The system shall be designed to maintain temperature and relative humidity conditions within the room. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the site.
- B. The system shall be manufactured by Skil-aire, Liebert or approved equal.

#### 1.2 DESIGN REQUIREMENTS

- A. The environmental control system shall be factory assembled model ceiling mounted system. The evaporator section shall be specifically designed for above ceiling installation.
- B. The system shall have a total cooling capacity of 36,600 BTUH and a sensible cooling capacity of 29,300 BTUH based on an entering air temperature of 80°F DB and 67°F WB. The unit shall be supplied with 208 volt, 3 phase, 60 Hz electrical service.

### Part 2 PRODUCTS

#### 2.1 CABINET

- A. The cabinet and access panels shall be fabricated from sturdy 16-gauge galvanized sheet metal. The panels shall be lined with 1/2" 2 lb. density insulation. Removable side doors shall provide ease of installation, service and maintenance. (In most instances, units can be serviced in place, while in operation.) A stainless steel drain pan with dual condensate drain connections shall be provided. Quick adjusting external hanger brackets with vibration isolators shall simplify installation on hanger rods by providing easy leveling, smooth operation, reduced noise and component wear.

#### 2.2 AIR DISTRIBUTION

- A. The blower shall be double-inlet, dynamically balanced blower with multiple forward curved blades, self-aligning sleeve bearings, and lifetime lubrication. The blower motor shall be permanent-split capacitor, high efficiency type. Air delivery shall be 1200 CFM. System shall be suitable for plenum or ducted air distribution.

#### 2.3 FILTERS

- A. The filters shall be rated not less than 20% efficiency based on ASHRAE Dust Weight Arrestance Test. They shall be removable without shutting down the system.

#### 2.4 ELECTRICAL CIRCUITS

- A. The control panel shall be pre-wired to include all contactors, fuses, relays, control transformers and capacitors necessary for complete operation. Terminal blocks shall be provided for power and control connections. Units shall be supplied with on/off control.

#### 2.5 REMOTE WALL MOUNTED DIGITAL THERMOSTAT



- A. A remote wall mounted single stage heat / cool non-programmable thermostat with digital display shall be factory provided for field installation. The thermostat shall include FAN AUTO-ON and COOL-OFF-HEAT selector switches.

## 2.6 EVAPORATOR COILS

- A. The evaporator coil shall be seamless drawn rifled copper tube, mechanically bonded to tempered aluminum laced fins with galvanized coil end plates. The coil shall have 2.5 sq. ft. face area, 4 rows deep. The coil shall be factory pressure tested. The refrigeration system shall be sealed prior to shipment. The angle placement in cabinet permits maximum coil sizes and the most efficient airflow. An externally equalized thermostatic expansion valve shall control refrigerant flow. The coil shall be provided with a stainless steel drain pan covering the entire coil area.

## 2.7 COMPRESSORS

- A. The compressor shall be a full hermetic type mounted on vibration isolators and located in a separate compartment out of the evaporator air stream to facilitate servicing while equipment is operating. The compressor shall be complete with reversible positive oil pump, charging and service ports, internal spring isolation, and discharge gas vibration eliminator.

## 2.8 REFRIGERATION CIRCUIT

- A. The refrigeration circuit shall be pre-piped with type "L" refrigerant copper tubing. The refrigeration system shall include but not be limited to: expansion valve with external equalizer and rapid bleed-through capacity. Features shall include filter dryer, sight glass, pressure fittings and high pressure/low pressure safety cutouts.

## 2.9 OUTDOOR, REMOTE PROPELLER FAN, AIR COOLED CONDENSING UNIT

- A. The remote air cooled condensing unit shall be a direct drive, propeller fan type arranged for vertical air discharge. The condensing unit shall be sized for full heat of rejection at 95°F ambient and be capable of operation to 0°F. The condenser coil constructed of copper tube and aluminum fins. The coil shall be factory tested, and refrigeration system sealed prior to shipment. The condenser motor shall have permanently lubricated bearings and inherent internal overload protection.

## 2.10 AIR COOLED CONDENSER - LOW AMBIENT CONTROL

- A. 0°F AMBIENT - FAN CYCLING
- B. Condenser fan cycling controls shall be factory provided for field installation to allow for low ambient condenser operation to 0°F.

## 2.11 CONTROL OPTIONS

- A. 7-Day Programmable Wall Mounted digital Heat / Cool Thermostat
- B. A remote wall mounted deluxe 7-day programmable heat pump ready thermostat with digital display shall be factory provided for field installation. The thermostat shall include FAN AUTO-ON, COOL-OFF-HEAT-EM (emergency heat), SET and PROG/MAN selector switches.

## 2.12 Microprocessor Temperature Humidity Controller with Alarms

- A. The system shall be provided with a Temperature and Humidity controller with Alarms. Centered in the remote wall mounted controller shall be a graphic LCD display with characters to show the operating mode, time, set points and actual readings. The temperature and humidity sensors shall be internal to the remote display.
- B. The controller shall be capable of three different set points: normal, temporary and night per day, 7 days per week.
- C. The controller shall include the following visual and audible alarm indications (if applicable):
  - High and Low Temperature
  - High and Low Humidity
  - Dirty Filter
  - Sensor Failure
  - Common Alarm Failure

The controller shall include the following system operations (if applicable):

- Fan - continuous or on demand
- Auto-restart upon power loss
- Remote stop/start connection
- Short cycle protection
- Cold start time delay
- Heat pump operation with aux. heat

## 2.13 ELECTRIC REHEAT

- A. The electric reheat shall include factory mounted nichrome open wire elements, contactors and limit controls. The electric element shall be UL approved. The electric heat shall have a capacity of 17,065 BTU/H and a KW rating of 5.0 KW.

## 2.14 STEAM GENERATING HUMIDIFIER

- A. The humidification system shall be an electrode canister type, complete with fill valve, drain valve, adjustable humidity output, and automatic flush cycle. Humidification shall be in the coil bypass to provide maximum humidification efficiency. The humidifier shall be producing 5 lbs/hr.

## 2.15 HOT GAS BYPASS

- A. A hot gas bypass system shall be factory installed to provide capacity modulation.

## 2.16 MAIN POWER NON-FUSED DISCONNECT

- A. A main power non-fused disconnect shall be factory provided for field installation.

#### 2.17 FIRESTAT

- A. The firestat shall immediately shut down the environmental control system when activated. The firestat shall be mounted with sensing element in the return air duct, and wired by installing contractor to unit control panel.

#### 2.18 SMOKE DETECTOR

- A. The smoke detector shall immediately shut down the environmental control system when activated. The smoke detector shall be mounted in the return air duct by the installing contractor and wired to the unit control panel.

#### 2.19 REFRIGERANT LINE-SETS

- A. The condensing unit shall be factory tested, charged with refrigerant, sealed and be capable of being connected to the evaporator section directly when the units are close coupled or using pre-charged refrigerant lines sets when the condensing unit is mounted remote from the evaporator.

### Part 3 EXECUTION

#### 3.1 GENERAL

- A. Contractor shall install all equipment in accordance with manufacturer's written instructions, all applicable codes, and recognized industry practices.
- B. After all equipment is installed, it shall be tested to demonstrate proper operation of performance and compliance with the specifications. Equipment not operating correctly shall be field corrected or replaced.

#### 3.2 AIR HANDLING UNITS

- A. Install equipment where shown, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes. Coordinate with other work, including ductwork, floor construction, roof decking, and piping, as necessary to interface installation of equipment with other work.
- B. Contractor to coordinate the installation of units on spring vibration mounts that comply with manufacturers indicated installation method. External vibration mounts to be eliminated when the unit manufacturer provides unit internal vibration isolation.
- C. Contractor is responsible for proper mounting height of all units including vibration isolation to accommodate the installation of the condensate drain trap and drain line as indicated on the plans.
- D. Upon completion of installation of equipment, start-up and operate equipment to demonstrate capability and compliance with requirements. Where possible, field correct malfunctioning units, then retest to demonstrate compliance.

**END OF SECTION 237300**

## SECTION 237310 - HVAC TERMINAL EQUIPMENT

### Part 1 GENERAL

#### 1.1 STIPULATIONS

- A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

### Part 2 PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - 1. York Co. Model YP9C120D20MP13C
  - 2. Trane; a business of American Standard Companies
  - 3. Reznor/Thomas & Betts Corporation.
  - 4. Or approved equal.
- B. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.8/CSA 2.6.
- C. Fuel Type: Design burner for natural gas having characteristics same as those of gas available at Project site.
- D. Type of Venting: Separated combustion, power vented.
  - 1. Concentric, Terminal Vent Assembly: Power-vent outlet with roof caps. Include adapter assembly for connection to outlet pipes, and flashing for roof penetration.
  - 2. Indoor External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
  - 3. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.
  - 4. Suspension Attachments: Reinforce suspension attachments at connection to gas-fired duct heaters.
  - 5. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.
  - 6. Heat Exchanger: Stainless steel.
  - 7. Burner Material: Stainless steel.
  - 8. Retain first paragraph below for power-vented model.

9. Power Venter: Integral, motorized centrifugal fan interlocked with gas valve.
10. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
  - a. Gas Control Valve: Modulating.
  - b. Ignition: Electronically controlled electric spark with flame sensor.
  - c. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
  - d. First option in first subparagraph below is for gravity-vented units; second option is for units with a power venter.
  - e. Vent Flow Verification: Differential pressure switch to verify open vent.
  - f. Control transformer.
  - g. High Limit: Thermal switch or fuse to stop burner.
  - h. Capacities and Characteristics:
    - (1). See Drawing for Duct Furnace Schedule for units Capacities and Characteristics.

## 2.2 TIME CLOCK

- A. The Contractor shall furnish and install an electromechanical type 7-day time clock, settable for occupied and unoccupied time periods on a daily basis, and capable of providing signals to the make-up air unit. Features of the time clock shall include ability to omit any delay or days from the program, manual override of time settings, 16-hour continuous duty during power outages and a NEMA type metal enclosure. Time clock as manufactured by Intermatic, Paragon or approved equal.

## Part 3 EXECUTION

### 1. INSTALLATION

- a. Install and connect gas-fired duct heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.
- b. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
  - (1). Spring hangers are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment.
  - (2). Restrain the unit to resist code-required horizontal acceleration.

### 2. CONNECTIONS

- a. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- b. Install piping adjacent to gas-fired duct heaters to allow service and maintenance.
- c. Gas Piping: Comply with Division 22 Section Facility Natural Gas Piping. Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.
- d. Duct Connections: Comply with Division 22 Section Metal Ducts.
- e. Electrical Connections: Comply with applicable requirements in Division 26 Sections.

### 3. FIELD QUALITY CONTROL

- a. Perform tests and inspections and prepare test reports.
  - (1). Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- b. Tests and Inspections:
  - (1). Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - (2). Verify bearing lubrication.
  - (3). Verify proper motor rotation.
  - (4). Test Reports: Prepare a written report to record the following:
    - (a). Test procedures used.
    - (b). Test results that comply with requirements.
    - (c). Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- c. Remove and replace malfunctioning units and retest as specified above.

### 4. ADJUSTING

- a. Adjust initial temperature set points.
- b. Adjust burner and other unit components for optimum heating performance and efficiency.

### 5. DEMONSTRATION

- a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas-fired duct heaters.

**END OF SECTION 237310**

## SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

### 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 split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Filters: One set for each air-handling unit.
  - 2. Gaskets: One set for each access door.

## 1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
  - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
  - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

## 1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period:
    - a. For Compressor: Five years from date of Substantial Completion.
    - b. For Parts: One year from date of Substantial Completion.
    - c. For Labor: One year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:



1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. Lennox International Inc.
3. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
4. Mitsubishi Electric Sales Canada Inc.
5. Mitsubishi Heavy Industries America, Inc.
6. SANYO North America Corporation; SANYO Fisher Company.
7. Trane; a business of American Standard companies.
8. YORK; a Johnson Controls company.

## 2.2 INDOOR UNITS (5 TONS (18 kW) OR LESS)

### A. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:
  - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements.
  - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
  - c. Enclosure Type: Totally enclosed, fan cooled.
  - d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
  - e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
  - f. Mount unit-mounted disconnect switches on interior of unit.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Condensate Drain Pans:
  - a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
    - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
    - 2) Depth: A minimum of 1 inch (25 mm) deep.
  - b. Single-wall, galvanized-steel sheet.
  - c. Double-wall, galvanized-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
  - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
    - 1) Minimum Connection Size: NPS 1 (DN 25).

- e. Pan-Top Surface Coating: Asphaltic waterproofing compound.
7. Air Filtration Section:
- a. General Requirements for Air Filtration Section:
    - 1) Comply with NFPA 90A.
    - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
    - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
  - b. Disposable Panel Filters:
    - 1) Factory-fabricated, viscous-coated, flat-panel type.
    - 2) Thickness: 1 inch (25 mm).
    - 3) Arrestance according to ASHRAE 52.1: 80.
    - 4) Merv according to ASHRAE 52.2: 5.
    - 5) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
    - 6) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

## 2.3 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

### A. Air-Cooled, Compressor-Condenser Components:

- 1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
  - a. Compressor Type: Scroll.
  - b. Modulating compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
  - c. Refrigerant Charge: R-410A.
  - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
- 3. Fan: Aluminum-propeller type, directly connected to motor.
- 4. Motor: Permanently lubricated, with integral thermal-overload protection.
- 5. Mounting Base: Polyethylene.

## 2.4 ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan. Thermostat shall display both temperature and humidity.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- D. Drain Hose: For condensate.

## 2.5 CAPACITIES AND CHARACTERISTICS

- A. Cooling Capacity:
  - 1. As shown on plans.
- B. Indoor Unit:
  - 1. Fan Motor Electrical Characteristics:
    - a. Volts: 208, fed from outdoor unit.
    - b. Phase: Single.
    - c. Hertz: 60.
  - 2. Airflow: 523 cfm.
- C. Outdoor Unit:
  - 1. Type: Air cooled.
  - 2. Electrical Characteristics:
    - a. Volts: 208, feed-thru type.
    - b. Phase: Single.
    - c. Hertz: 60.
    - d. Minimum Circuit Ampacity: 20A.
    - e. Maximum Overcurrent Protection: 30A.
    - f. Fan Motor Full-Load Amperes: 0.5.
    - g. Compressor Full-Load Amperes: 7.0.
    - h. Compressor Locked-Rotor Amperes: 17.5.
  - 3. Sound-Pressure Level: 51 dBa.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install units level and plumb.

- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Equipment Mounting:
  - 1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
  - 2. Install ground-mounted, compressor-condenser components on polyethylene mounting base.
  - 3. Provide manufacturer's standard vibration isolation devices.
- D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

### 3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

**END OF SECTION 238126**

## **SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. Section Includes:
  - 1. Electrical equipment coordination and installation.
  - 2. Sleeves for raceways and cables.
  - 3. Sleeve seals.
  - 4. Grout.
  - 5. Common electrical installation requirements.

#### **1.4 DEFINITIONS**

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

#### **1.5 SUBMITTALS**

- A. Product Data: For sleeve seals.

#### **1.6 COORDINATION**

- A. Coordinate arrangement, mounting, and support of electrical equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate sleeve selection and application with selection and application of firestopping.

## PART 2 - PRODUCTS

### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
  2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  3. Pressure Plates: Carbon steel. Include two for each sealing element.
  4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

### 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- C. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- D. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

**END OF SECTION 260500**



## **SECTION 260510 - ELECTRICAL EQUIPMENT WIRING**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 SECTION INCLUDES**

- A. Mechanical Equipment wiring, and General Equipment wiring.

### **PART 2 - PRODUCTS**

#### **2.1 PRODUCTS**

- A. Products are specified within Divisions 26, 27, and 28 Sections.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. The General, HVAC and Plumbing Contractors shall furnish all motors, starters, pushbuttons for local and remote control, controllers, pressure switches, aquastats or similar items together with all appurtenances, accessories and control wiring required to operate the equipment furnished under their respective sections of the contract, which is necessary to perform the operating functions as specified, shown on the drawings or as otherwise required.
- B. The General, HVAC and Plumbing Contractors shall set and mount all motors, starters and controls. This Contractor shall furnish and install all safety switches at the equipment and make all power connections to the safety switches, starters and the motors. All control wiring necessary for the required performance and operation of the equipment shall be installed and connected under each respective and associated contract. Where the starter and/or safety switch is an integral part of the equipment assembly, the assembly shall be furnished with the wiring being complete between the starter, controller and motor and this Contractor shall make the power connections only at the unit.

- C. If procurement requirements necessitate a change in the electrical characteristics of any motor or equipment being furnished under the General, HVAC or Plumbing Contract, the respective Contractor shall first obtain approval of such changes from the Department. The same Contractor shall also be responsible for all necessary arrangement and shall pay all costs, if any, for all required changes to this contract.

### 3.2 GENERAL REQUIREMENTS

- A. This Contractor shall furnish, install and connect all power wiring to all equipment and all associated controls and appurtenances provided under this section of the contract. In addition, this Contractor shall furnish, install and connect all power wiring to all equipment, associated controls and appurtenances provided under other sections of this contract, unless otherwise specified herein or indicated on the drawings. All necessary and required control wiring for the aforementioned equipment and systems shall be furnished, installed and connected by the respective Contractors providing the equipment, unless otherwise specified herein or indicated on the drawings.

### 3.3 WIRING FOR HEATING, VENTILATING AND AIR CONDITIONING

- A. All equipment for the heating, ventilating and air conditioning systems shall be furnished and installed under the HVAC Contract, unless otherwise indicated.
- B. This Contractor shall be responsible for furnishing all labor and materials required for the installation and connection of all electrical power wiring to and for the HVAC equipment, unless otherwise indicated.
- C. In general, all starters and special control equipment required for the heating, ventilating and air conditioning equipment such as the unit heaters, air handling units, etc., will be furnished and installed under the temperature control section of the HVAC Contract, unless otherwise indicated.

### 3.4 TEMPERATURE CONTROL WIRING

- A. All interconnecting control wiring associated with the temperature control system(s) for heating and air conditioning system(s) shall be furnished, installed and connected under the HVAC Contract.
- B. This Contractor shall provide a source of power and make final power connections for all temperature control system equipment (air handling units, etc.) and at each apparatus control panel location. Temperature Control Panels shall be furnished and installed under the HVAC Contract.

### 3.5 ELECTRICAL WORK FOR ROOF VENTILATORS AND/OR EXHAUST FANS

- A. For single-phase units, a motor starting disconnecting type snap switch shall be furnished as an integral part of the roof ventilator or exhaust fan. However, this Contractor shall furnish a

remote control thermal overload switch with pilot light. Switch shall be installed within the room to be ventilated or exhausted, as indicated on the drawings but generally adjacent to unit.

- B. For 3-phase units, this Contractor shall furnish and install remote control switches, together with pilot lights, within the room to be ventilated or exhausted at location as indicated on the drawings. In addition, the Contractor shall furnish and install a disconnect switch (in proper NEMA rated enclosure) at motor location.

### 3.6 WIRING FOR PLUMBING EQUIPMENT

- A. All equipment for the plumbing system shall be furnished and installed under the Plumbing Contract, unless otherwise indicated.
- B. This Contractor shall be responsible for furnishing all labor and materials required for the installation and connection of all electrical power wiring to and for the Plumbing equipment, unless otherwise indicated.
- C. In general, all starters and special control equipment required for electrically operated equipment furnished under the Plumbing Contract, such as the pumps and electric water heaters will be furnished and installed by the Plumbing Contractor.

### 3.7 ELECTRICAL EQUIPMENT BY OTHERS

- A. All electrical equipment furnished and installed under contracts other than this contract shall be furnished with full complement of control equipment, control wiring, conduit and all other items necessary for satisfactory operation.
- B. Remote motor starters for equipment furnished under contracts other than this contract shall be furnished and installed by the respective Contractor providing the equipment.
- C. This Contractor shall furnish and install fused disconnect switches, to include properly rated and type of fuses, for all 3-phase equipment unless otherwise indicated.
- D. This Contractor shall furnish and install thermal overload switches for each single phase motor except where units are furnished with built-in thermal protection, in which case this Contractor shall furnish and install a single pole switch, with or without pilot light as indicated on the drawings or directed by the Department.
- E. This Contractor shall complete all power wiring through the disconnect switch and/or thermal cutouts and local control stations to the equipment as required.
- F. This Contractor shall complete all electrical connections, through the disconnect switch, starter and motor terminals of all 3-phase equipment. This Contractor shall be responsible for final connections.
- G. This Contractor shall be responsible for proper direction of rotation of 3-phase motors.
- H. This Contractor shall provide disconnect switches for all 3-phase equipment. Combination motor starter/disconnect switches shall be furnished and installed under the contracts providing

the equipment. This Contractor shall provide disconnect switches at motor when motors are located away from combination starter/disconnect switches.

### 3.8 LOCATIONS

- A. This Contractor shall apply for detailed and specific information regarding the location of all equipment as the final location may differ from that indicated on the drawings. Outlets, equipment or wiring improperly placed because of this Contractor's failure to obtain this information shall be relocated and reinstalled without additional expense to the Department.
- B. The design shall be subject to such revisions as may be necessary to overcome building obstructions. No changes shall be made in location of outlets or equipment without written consent of the Department.
- C. This Contractor is cautioned that all outlet information must be checked and verified before installation; and all stub-ups into equipment must be as indicated and detailed on the respective shop drawings.
- D. Unless otherwise detailed on the drawings, rough-in of proper size and capacity of mechanical equipment indicated on the drawings as "Future" or "N.I.C." shall be provided and installed in such a manner and location that future final connections can be made with a minimum of work and without cutting or patching permanent walls, partitions, ceiling or floors.
- E. Engineering drawings are, of necessity, schematics for special equipment as exact roughing-in and requirements may vary with different manufacturers. Each trade shall connect its respective services to all special equipment indicated on the drawings at no additional cost to the Department.

**END OF SECTION 260510**

## SECTION 260513 - MEDIUM-VOLTAGE CABLES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes cables and related splices, terminations, and accessories for medium-voltage electrical distribution systems.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of cable indicated. Include splices and terminations for cables and cable accessories.
- B. Material Certificates: For each cable and accessory type, signed by manufacturers.
- C. Source quality-control test reports.
- D. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Installer: Engage a cable splicer, trained and certified by splice material manufacturer, to install, splice, and terminate medium-voltage cable.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- C. Source Limitations: Obtain cables and accessories through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- E. Comply with IEEE C2 and NFPA 70.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
  - 1. Cables:
    - a. American Insulated Wire Corp.; a Leviton Company.
    - b. Pirelli Cables & Systems NA.
    - c. Rome Cable Corporation.
    - d. Southwire Company.
  - 2. Cable Splicing and Terminating Products and Accessories:
    - a. Raychem Corp.; Telephone Energy and Industrial Division; Tyco International Ltd.
    - b. Thomas & Betts Corporation.
    - c. 3M; Electrical Products Division.

### 2.2 CABLES

- A. Cable Type: MV105.
- B. Comply with UL 1072, AEIC CS 8.
- C. Conductor: Copper.
- D. Conductor Stranding: Compact round, concentric lay, Class B.
- E. Conductor Insulation: Ethylene-propylene rubber.
  - 1. Voltage Rating: 15 kV.
  - 2. Insulation Thickness: 133 percent insulation level.
- F. Shielding: Copper tape, helically applied over semiconducting insulation shield.
- G. Shielding and Jacket: Corrugated copper drain wires embedded in extruded, chlorinated, polyethylene jacket.
- H. Cable Jacket: Sunlight-resistant PVC.

### 2.3 SPLICE KITS

- A. Connectors and Splice Kits: Comply with IEEE 404; type as recommended by cable or splicing kit manufacturer for the application.
- B. Splicing Products: As recommended, in writing, by splicing kit manufacturer for specific sizes, ratings, and configurations of cable conductors. Include all components required for complete splice, with detailed instructions.

1. Premolded, cold-shrink-rubber, in-line splicing kit.

## 2.4 SOLID TERMINATIONS

- A. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class is equivalent to that of cable. Include shield ground strap for shielded cable terminations.
  1. Class 1 Terminations: Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone rubber, insulator modules; shield ground strap; and compression-type connector.

## 2.5 SEPARABLE INSULATED CONNECTORS

- A. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.
- B. Load-Break Cable Terminators: Elbow-type units with 200-A load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
- C. Dead-Front Terminal Junctions: Modular bracket-mounted groups of dead-front stationary terminals that mate and match with above cable terminators. Two-, three-, or four-terminal units as indicated, with fully rated, insulated, watertight conductor connection between terminals and complete with grounding lug, manufacturer's standard accessory stands, stainless-steel mounting brackets, and attaching hardware.
  1. Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.
  2. Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.
  3. Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders, and carrying case.
  4. Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.
- D. Test-Point Fault Indicators: Applicable current-trip ratings and arranged for installation in test points of load-break separable connectors, and complete with self-resetting indicators capable of being installed with shotgun hot stick and tested with test tool.

## 2.6 ARC-PROOFING MATERIALS

- A. Tape for First Course on Metal Objects: 10-mil- (250-micrometer-) thick, corrosion-protective, moisture-resistant, PVC pipe-wrapping tape.
- B. Arc-Proofing Tape: Fireproof tape, flexible, conformable, intumescent to 0.3 inch (8 mm) thick, compatible with cable jacket.
- C. Glass-Cloth Tape: Pressure-sensitive adhesive type, 1/2 inch (13 mm) wide.

## 2.7 SOURCE QUALITY CONTROL

- A. Test and inspect cables according to ICEA S-97-682 before shipping.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install cables according to IEEE 576.
- B. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
  - 1. Where necessary, use manufacturer-approved pulling compound or lubricant that will not deteriorate conductor or insulation.
  - 2. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.
- C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- D. Support cables according to Division 26 Section "Common Work Results for Electrical."
- E. Install terminations at ends of conductors and seal multiconductor cable ends with standard kits.
- F. Install separable insulated-connector components as follows:
  - 1. Protective Cap: At each terminal junction, with one on each terminal to which no feeder is indicated to be connected.
  - 2. Portable Feed-Through Accessory: Three.
  - 3. Standoff Insulator: Three.
- G. Arc Proofing: Unless otherwise indicated, arc proof medium-voltage cable at locations not protected by conduit, cable tray, direct burial, or termination materials. In addition to arc-proofing tape manufacturer's written instructions, apply arc proofing as follows:
  - 1. Clean cable sheath.
  - 2. Wrap metallic cable components with 10-mil (250-micrometer) pipe-wrapping tape.
  - 3. Smooth surface contours with electrical insulation putty.
  - 4. Apply arc-proofing tape in one half-lapped layer with coated side toward cable.
  - 5. Band arc-proofing tape with 1-inch- (25-mm-) wide bands of half-lapped, adhesive, glass-cloth tape 2 inches (50 mm) o.c.
- H. Seal around cables passing through fire-rated elements.
- I. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.
- J. Identify cables according to Division 26 Section "Identification for Electrical Systems."

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. After installing and before electrical circuitry has been energized, test for compliance with requirements. This shall include Hi-Pot testing.



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

**END OF SECTION 260513**

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Building wires rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Sections include the following:
  - 1. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

#### 1.4 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.6 QUALITY ASSURANCE

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

## 1.7 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

## PART 2 - PRODUCTS

### PART 3 - CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
  - 1. Alcan Products Corporation; Alcan Cable Division.
  - 2. American Insulated Wire Corp.; a Leviton Company.
  - 3. General Cable Corporation.
  - 4. Senator Wire & Cable Company.
  - 5. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

### 3.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Hubbell Power Systems, Inc.
  - 3. O-Z/Gedney; EGS Electrical Group LLC.
  - 4. 3M; Electrical Products Division.
  - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## PART 4 - EXECUTION

### 4.1 CONDUCTOR MATERIAL APPLICATIONS

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

### 4.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

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

- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- J. Class 2 Control Circuits: Type THHN-THWN, in raceway.

#### 4.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls and ceilings unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

#### 4.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

#### 4.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

#### 4.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Retain first paragraph and subparagraphs below to describe tests and inspections to be performed by either of the entities in two paragraphs above.
- C. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
    - a. Panel board Feeders.
    - b. Branch-circuit conductors
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

**END OF SECTION 260519**

## **SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. This Section includes methods and materials for grounding systems and equipment.

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:
  - 1. Test wells.
  - 2. Ground rods.
- C. Field quality-control test reports.

#### **1.5 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### **PART 2 - PRODUCTS**

#### **2.1 CONDUCTORS**

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches (6 by 50 mm) in cross section, unless otherwise indicated; with insulators. Minimum 12" long, predrilled and/or punched.

## 2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 5/8 inch by 8 feet.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Underground Grounding Conductors: Install bare copper conductor, No. 4/0 AWG minimum.
  - 1. Bury at least 30 inches below grade.
  - 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
  - 3. Tracer (independent of trench tape): #12 THHN CU buried 12" below finished rough grade along trench for tracing capabilities.
- B. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.
3. Cal Lab ground bars: Provide ground conductors in EMT and shall leave wall via 4"x4" flush mounted box with 90 degree cable fitting. Conceal ground conductor in as much as possible. Closely coordinate all blocking requirements in the walls with the G.C. prior to drywall installation.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

### 3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Pad-Mounted Transformers: Install four ground rods (one at each corner) and ground ring around the vault. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes.

### 3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor (or as otherwise directed) in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus with standoff insulators.
  2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- D. Specialized gas piping: ground all gas piping as per NEC and manufacturer's recommendations.

### 3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.



1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
  2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor (or as otherwise directed).
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole and shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
  3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart. Provide 4/0 AWG copper from in-slab rebar to each column as per NEC.

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.

- a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
  - b. Perform tests by fall-of-potential method according to IEEE 81.
3. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
  2. Pad-Mounted Equipment: 5 ohms.
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.
- D. Provide a complete, detailed grounding report with all measured ground resistances.

**END OF SECTION 260526**

## **SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

#### **1.4 DEFINITIONS**

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

#### **1.5 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Steel slotted support systems.

#### **1.6 QUALITY ASSURANCE**

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

#### **1.7 COORDINATION**

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

## PART 2 - PRODUCTS

### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. Thomas & Betts Corporation.
    - e. Unistrut; Tyco International, Ltd.
  - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 3. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
      - 2) Hilti Inc.
      - 3) MKT Fastening, LLC.
    - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
    - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
    - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
    - 5. Hanger Rods: Threaded steel.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To New Concrete: Bolt to concrete inserts.
  - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 3. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 4. To Light Steel: Sheet metal screws.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.3 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION 260529**

## **SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

#### **1.4 DEFINITIONS**

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RNC: Rigid nonmetallic conduit.

#### **1.5 SUBMITTALS**

- A. Product Data: For raceways, surface raceways, wire-ways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

#### **1.6 QUALITY ASSURANCE**

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

- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 3. O-Z Gedney; a unit of General Signal.
  - 4. Wheatland Tube Company.
- B. EMT: ANSI C80.3.
- C. FMC: Zinc-coated steel.
- D. LFMC: Flexible steel conduit with PVC jacket.
- E. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: compression type.

### 2.2 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Lamson & Sessions; Carlon Electrical Products.
  - 3. RACO; a Hubbell Company.
  - 4. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
  - 1. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
  - 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 3. Underground Conduit (rising): Shall have long sweep RGS elbows and continue RGS to terminations.
  - 4. Service Entrance: Shall be RGS where exposed.



- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed, Not Subject to Severe Physical Damage: EMT.
  - 2. Branch circuits concealed in walls and above ceilings: EMT
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

### 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls and above ceilings, unless otherwise indicated.
- H. No conduit shall be run in floor slab except for service entrance conduit and communications entrance conduit, unless noted otherwise.
- I. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Change from ENT to IMC before rising above the floor.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover

plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where conduit pass from an unclassified space to a classified space.
3. Where otherwise required by NFPA 70 (NEC 2005).

N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
  - a. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

O. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter. Performed by General Contractor.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving." Performed by Electrical Contractor.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose.
  - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.4 FIRESTOPPING

- A. Apply fire-stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.5 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION 260533**

## **SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. Section Includes:
  - 1. Identification for raceways.
  - 2. Identification for conductors.
  - 3. Underground-line warning tape.
  - 4. Equipment identification labels.
  - 5. Miscellaneous identification products.

#### **1.4 SUBMITTALS**

- A. Product Data: For each electrical identification product indicated.

#### **1.5 QUALITY ASSURANCE**

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

#### **1.6 COORDINATION**

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

### 2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

### 2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
  - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
  - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
  - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
  - 3. Inscriptions for Orange-Colored Tapes: COMMUNICATIONS CABLE.
- C. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

## 2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

## 2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- F. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

## 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  1. Normal Emergency.
  2. Standby.
  3. Telecom.

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
    - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
    - b. Colors for 208/120-V Circuits:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
    - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
  - 1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- E. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  - 1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
  - 2. Equipment to Be Labeled:
    - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
    - b. Enclosures and electrical cabinets.
    - c. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    - d. Enclosed switches.
    - e. Enclosed controllers.
    - f. Receptacles (circuit number)

g. Switches (circuit number)

**END OF SECTION 260553**



## SECTION 260573 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. This Section includes computer-based, fault-current, overcurrent protective device coordination, and ARC Flash studies. Protective devices shall be set based on results of the protective device coordination study.
  - 1. Series-rated devices are not permitted.
  - 2. The Electrical Contractor shall be responsible for performing all recommendations, adjust settings, adjust type and style of protective devices as required in the Overcurrent Protective Device Coordination Study and the Fault Current Study at no additional cost to the owner.

#### 1.3 SUBMITTALS

- A. Qualification Data: For coordination-study specialist.
- B. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals shall be in digital form.
  - 1. Coordination-study input data, including completed computer program input data sheets.
  - 2. Study and Equipment Evaluation Reports.
  - 3. Coordination-Study Report.

#### 1.4 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.
- B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
  - 1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.
- C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

- D. Comply with IEEE 399 for general study procedures.

## PART 2 - PRODUCTS

### 2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:
  - 1. CGI CYME.
  - 2. EDSA Micro Corporation.
  - 3. ESA Inc.
  - 4. Operation Technology, Inc.
  - 5. SKM Systems Analysis, Inc. (preferred)

### 2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. All electrical distribution devices, standby generator, automatic transfer switches, and branch breakers shall be coordinated.
  - 1. Proceed with coordination study only after relevant equipment submittals have been assembled.
  - 2. Submit coordination study with all coordination of protective devices already accomplished with the various other submittals prior to submitting.

### 3.2 POWER SYSTEM DATA

- A. Gather and tabulate the following input data to support coordination study:
  - 1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
  - 2. Impedance of utility service entrance.

3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
  - a. Circuit-breaker and fuse-current ratings and types.
  - b. Relays and associated power and current transformer ratings and ratios.
  - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
  - d. Generator kilovolt amperes, size, voltage, and source impedance.
  - e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
  - f. Motor horsepower and code letter designation according to NEMA MG 1.
  
4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
  - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
  - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
  - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
  - d. Generator thermal-damage curve.
  - e. Ratings, types, and settings of utility company's overcurrent protective devices.
  - f. Special overcurrent protective device settings or types stipulated by utility company.
  - g. Time-current-characteristic curves of devices indicated to be coordinated.
  - h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
  - i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
  - j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

### 3.3 FAULT-CURRENT STUDY

- A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:
  1. Distribution panelboard.
  2. Branch circuit panelboard.
  
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
  
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
  
- D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.
  1. Transformers:

- a. ANSI C57.12.10.
  - b. ANSI C57.12.22.
  - c. ANSI C57.12.40.
  - d. IEEE C57.12.00.
  - e. IEEE C57.96.
- 2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
  - 3. Low-Voltage Fuses: IEEE C37.46.
- E. Study Report:
- 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.
  - 2. Show interrupting (5-cycle) and time-delayed currents (6 cycles and above) on medium-voltage breakers as needed to set relays and assess the sensitivity of overcurrent relays.
- F. Equipment Evaluation Report:
- 1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
  - 2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
  - 3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

### 3.4 COORDINATION STUDY

- A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.
- 1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
  - 2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
  - 3. Calculate the maximum and minimum ground-fault currents.
- B. Comply with IEEE 241 and IEEE 242 recommendations for fault currents and time intervals.
- C. Transformer Primary Overcurrent Protective Devices:
- 1. Device shall not operate in response to the following:
    - a. Inrush current when first energized.
    - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
    - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
  - 2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.
- D. Motors served by voltages more than 600 V shall be protected according to IEEE 620.

- E. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.
- F. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:
  - 1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
    - a. Device tag.
    - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
    - c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
    - d. Fuse-current rating and type.
    - e. Ground-fault relay-pickup and time-delay settings.
  - 2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
    - a. Device tag.
    - b. Voltage and current ratio for curves.
    - c. Three-phase and single-phase damage points for each transformer.
    - d. No damage, melting, and clearing curves for fuses.
    - e. Cable damage curves.
    - f. Transformer inrush points.
    - g. Maximum fault-current cutoff point.
- G. Completed data sheets for setting of overcurrent protective devices.

### 3.5 ARC FLASH STUDY

- A. Provide a comprehensive ARC Flash study for all major equipment. Provide suitable Arc Flash labels meeting the requirements of the NEC.

**END OF SECTION 260573**

## SECTION 260923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following lighting control devices:
  - 1. Time switches.
  - 2. Outdoor photoelectric switches.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

### PART 2 - PRODUCTS

#### 2.1 TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Intermatic, Inc.
  2. Leviton Mfg. Company Inc.
  3. Paragon Electric Co.; Invensys Climate Controls.
  4. Square D; Schneider Electric.
  5. TORK.
- B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
1. Contact Configuration: SPST.
  2. Contact Rating: 20-A ballast load, 277-V ac.
  3. Programs: 2 channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week.
  4. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
  5. Astronomic Time: All channels.
  6. Battery Backup: For schedules and time clock.

## 2.2 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Area Lighting Research, Inc.; Tyco Electronics.
  2. Grasslin Controls Corporation; a GE Industrial Systems Company.
  3. Intermatic, Inc.
  4. Lithonia Lighting; Acuity Lighting Group, Inc.
  5. Novitas, Inc.
  6. Paragon Electric Co.; Invensys Climate Controls.
  7. Square D; Schneider Electric.
  8. TORK.
  9. Touch-Plate, Inc.
  10. Watt Stopper (The).
- B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
  2. Time Delay: 15-second minimum, to prevent false operation.
  3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
  4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
- C. Description: Solid state, with SPST dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773.
1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
  2. Time Delay: 30-second minimum, to prevent false operation.
  3. Lightning Arrester: Air-gap type.
  4. Mounting: Twist lock complying with IEEE C136.10, with base.

## PART 3 - EXECUTION

### 3.1 WIRING INSTALLATION

- A. Wiring Method: Minimum conduit size shall be 3/4 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

### 3.2 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
  - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

**END OF SECTION 260923**



## SECTION 261200 - MEDIUM-VOLTAGE TRANSFORMERS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following types of transformers with medium-voltage primaries:
  - 1. Pad-mounted, liquid-filled transformers.

#### 1.4 DEFINITIONS

- A. NETA ATS: Acceptance Testing Specification.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, location of each field connection, and performance for each type and size of transformer indicated.
- B. Shop Drawings: Diagram power wiring.
- C. Qualification Data: For testing agency.
- D. Source quality-control test reports.
- E. Field quality-control test reports.
- F. Follow-up service reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For transformer and accessories to include in emergency, operation, and maintenance manuals.

## 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with IEEE C2.
- D. Comply with ANSI C57.12.10, ANSI C57.12.28, IEEE C57.12.70, and IEEE C57.12.80.
- E. Comply with NFPA 70.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store transformers protected from weather and so condensation will not form on or in units. Provide temporary heating according to manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or an approved equal:
  - 1. Cutler-Hammer.
  - 2. GE Electrical Distribution & Control.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; Schneider Electric.

### 2.2 PAD-MOUNTED, LIQUID-FILLED TRANSFORMERS

- A. Description: ANSI C57.12.13, IEEE C57.12.00, pad-mounted, 2-winding transformers. Stainless-steel tank base and cabinet.
- B. Insulating Liquid: Mineral oil, complying with ASTM D 3487, Type II, and tested according to ASTM D 117.
- C. Insulation Temperature Rise: 65 deg C when operated at rated kVA output in a 40 deg C ambient temperature. Transformer shall be rated to operate at rated kilovolt ampere in an average ambient temperature of 30 deg C over 24 hours with a maximum ambient temperature of 40 deg C without loss of service life expectancy.
- D. Basic Impulse Level: 95 kV.

- E. Full-Capacity Voltage Taps: Four 2.5 percent taps, 2 above and 2 below rated high voltage; with externally operable tap changer for de-energized use and with position indicator and padlock hasp.
- F. High-Voltage Switch: 200A, make-and-latch rating of 10-kA RMS, symmetrical, arranged for loop feed with 3-phase, 4-position, gang-operated, load-break switch that is oil immersed in transformer tank with hook-stick operating handle in primary compartment.
- G. Primary Fuses: 150-kV BIL fuse assembly with fuses complying with IEEE C37.47.
  - 1. Bay-O-Net liquid-immersed current-limiting fuses that are externally replaceable without opening transformer tank.
- H. Surge Arresters: Distribution class, one for each primary phase; complying with IEEE C62.11 and NEMA LA 1; support from tank wall within high-voltage compartment. Transformers shall have three arresters for loop-feed circuits.
- I. High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts, complying with IEEE 386 and including the following:
  - 1. Bushing-Well Inserts: One for each high-voltage bushing well.
  - 2. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.
  - 3. Parking Stands: One for each high-voltage bushing well, located so as not to interfere with maintenance.
  - 4. Portable Insulated Bushings: Arranged for parking insulated, high-voltage, load-break cable terminators; one for each primary feeder conductor terminating at transformer.
- J. Accessories:
  - 1. Drain Valve: 1 inch (25 mm), with sampling device.
  - 2. Dial-type thermometer.
  - 3. Liquid-level gage.
  - 4. Pressure-vacuum gage.
  - 5. Pressure Relief Device: Self-sealing with an indicator.
  - 6. Mounting provisions for low-voltage current transformers.
  - 7. Mounting provisions for low-voltage potential transformers.
  - 8. Busway terminal connection at low-voltage compartment.
  - 9. Alarm contacts for gages and thermometer listed above.

### 2.3 IDENTIFICATION DEVICES

- A. Nameplates: The unit shall come complete with a stamped manufacturer's identification plate riveted to the outside of the secondary side door which is identical to the one on the interior of unit. Labels will not be acceptable.

### 2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Perform design and routine tests according to standards specified for components. Conduct transformer tests according to ANSI C57.12.50.
- B. Factory Tests: Perform the following factory-certified tests on each transformer:
  - 1. Resistance measurements of all windings on rated-voltage connection and on tap extreme connections.

2. Ratios on rated-voltage connection and on tap extreme connections.
3. Polarity and phase relation on rated-voltage connection.
4. No-load loss at rated voltage on rated-voltage connection.
5. Excitation current at rated voltage on rated-voltage connection.
6. Impedance and load loss at rated current on rated-voltage connection and on tap extreme connections.
7. Applied potential.
8. Induced potential.
9. Temperature Test: If transformer is supplied with auxiliary cooling equipment to provide more than one rating, test at lowest kilovolt-ampere Class OA or Class AA rating and highest kilovolt-ampere Class OA/FA or Class AA/FA rating.
  - a. Temperature test is not required if record of temperature test on an essentially duplicate unit is available.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for medium-voltage transformers.
- B. Examine roughing-in of conduits and grounding systems to verify the following:
  1. Wiring entries comply with layout requirements.
  2. Entries are within conduit-entry tolerances specified by manufacturer and no feeders will have to cross section barriers to reach load or line lugs.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and that requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install transformers on pre-fabricated concrete vault.
  1. Anchor transformers to vault according to manufacturer's written instructions, seismic codes at Project, and requirements in Section 260529 "Hangers and Supports for Electrical Systems."
- B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

### 3.3 IDENTIFICATION

- A. Identify field-installed wiring and components and provide warning signs as specified in Section 260553 "Identification for Electrical Systems."

### 3.4 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing transformers but before primary is energized, verify that grounding system at substation is tested at specified value or less.
  - 2. After installing transformers and after electrical circuitry has been energized, test for compliance with requirements.
  - 3. Perform visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Test Reports: Prepare written reports to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective actions taken to achieve compliance with requirements.

END OF SECTION 261200

## SECTION 262416 - PANELBOARDS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Distribution panel boards.
  - 2. Lighting and appliance branch-circuit panel boards.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
  - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations:
  - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
    - b. Altitude: Not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
  - 1. Ambient temperatures within limits specified.
  - 2. Altitude not exceeding 6600 feet (2000 m).

#### 1.8 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

#### 1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Surface-mounted and flush-mounted cabinets.
  - 1. Rated for environmental conditions at installed location.
    - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
  - 3. Finishes:
    - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    - b. Back Boxes: Galvanized steel.
  - 4. Directory Card: Inside panelboard door, mounted in transparent card holder.
- B. Incoming Mains Location: Top and bottom.
- C. Phase, Neutral, and Ground Buses:
  - 1. Material: Tin-plated aluminum.
  - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
  - 1. Material: Tin-plated aluminum.
  - 2. Main and Neutral Lugs: Mechanical type.
  - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
  - 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
- E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

### 2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square-D



- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- C. Main Overcurrent Protective Devices: Circuit breaker, unless noted otherwise on panelboard schedule, electronic trip, fully adjustable. All settings shall be coordinated with the short circuit/coordination study prior to shop drawing submittal. Submit panelboard and short circuit/coordination study at the same time.
- D. Branch Overcurrent Protective Devices:
  - 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
  - 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

### 2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square-D
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

- D. Install overcurrent protective devices and controllers not already factory installed.
  - 1. Set field-adjustable, circuit-breaker trip ranges.
- E. Install filler plates in unused spaces.
- F. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- H. Comply with NECA 1.

### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.4 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

**END OF SECTION 262416**

## SECTION 262713 - ELECTRICITY METERING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section includes equipment for electricity metering by utility company and electricity metering requested by Owner.

#### 1.4 DEFINITIONS

- A. KY Pulse: Term used by the metering industry to describe a method of measuring consumption of electricity that is based on a relay opening and closing in response to the rotation of the disk in the meter.
- B. PC: Personal computer.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For electricity-metering equipment.
  - 1. Dimensioned plans and sections or elevation layouts.
  - 2. Wiring Diagrams: For power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.
- C. Operation and Maintenance Data. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Application and operating software documentation.
  - 2. Software licenses.
  - 3. Software service agreement.

4. Hard copies of manufacturer's operating specifications, design user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy Submittal.

## 1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

## 1.8 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
  1. Comply with requirements of utilities providing electrical power services.
  2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

## 1.9 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
  1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade his computer equipment if necessary.
  2. All licenses shall be at no additional cost to the owner and shall be open ended and unrestricted use.
  3. Any and all passwords must be coordinated with DMVA prior to establishing such.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT FOR ELECTRICITY METERING REQUESTED BY OWNER

- A. Manufacturers: Provide one of the following:
  1. Square D Power Logic Model 5560 (no substitutions).
- B. General Requirements for Owner's Meters:
  1. Comply with UL 1244.
  2. Meters used for data collection shall have an accuracy of 0.2 percent of reading, complying with requirements in ANSI C12.20.

3. Enclosure: NEMA 250, Type 3R minimum., manufacturer's recommended enclosure with clear panel for readings without opening doors. Provide with hasp for padlocking or sealing.
  4. Identification: Comply with requirements in Division 26 Section "Identification for Electrical Systems."
  5. Memory Backup: Self-contained to maintain memory throughout power outages of 72 hours, minimum.
  6. Sensors: Current-sensing type, with current or voltage output, selected for optimum range and accuracy for meters indicated for this application.
    - a. Type: Split core.
  7. Current-Transformer Cabinet: Listed or recommended by metering equipment manufacturer for use with sensors indicated.
  8. Building Automation System (BAS) Interface: One digital KY pulse to a user-definable increment of energy measurement. Match signal to BAS input and arrange to convey the instantaneous, integrated, demand level measured by meter to provide data for processing and possible programmed demand control action by destination system.
  9. The system must report data to the Johnson Metasys head end at FTIG, Bldg 11-64. Provide all software and hardware for proper data transmission. Coordinate points and data prior to shop drawing submittal.
- C. Kilowatt-hour/Demand Meter: Electronic three-phase meters, measuring electricity use and demand. Demand shall be integrated over a 15-minute interval.
1. Voltage and Phase Configuration: Meter shall be designed for use on circuits with voltage rating and phase configuration indicated for its application.
  2. Display: LCD with characters not less than 0.25 inch (6 mm) high, indicating accumulative kilowatt-hours, current time and date, current demand, and historic peak demand, and time and date of historic peak demand. Retain accumulated kilowatt-hour and historic peak demand in a nonvolatile memory, until reset.
- D. Software: Preloaded by manufacturer. Loaded by means of cable into meter and is a product of meter manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters as per this specification. Provide any and all software, programming, and troubleshooting necessary for proper operation. Install raceways and equipment according to utility company's written requirements. Provide conduits for metering leads and extend grounding connections as required by utility company.

### 3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
  1. Equipment Identification Labels: See "Identification for Electrical Systems".

**END OF SECTION 262713**

## SECTION 262726 – WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Snap switches.
  - 3. Cord and plug sets.

#### 1.4 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

## 1.7 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and Plug Sets: Match equipment requirements and intended classification.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).
  - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

### 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 5351 (single), 5352 (duplex).
    - b. Hubbell; HBL5351 (single), CR5352 (duplex).
    - c. Leviton; 5891 (single), 5352 (duplex).
    - d. Pass & Seymour; 5381 (single), 5352 (duplex).

### 2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; GF20.
    - b. Pass & Seymour; 2084.

### 2.4 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
  - 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.



2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.5 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
    - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
    - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
    - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

## 2.6 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: Brushed stainless steel.
  3. Material for Unfinished Spaces: Galvanized steel.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, thermoplastic with lockable cover, rated weather-proof while in use.

## 2.7 FINISHES

- A. Color: Gray.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
  1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
  - a. Cut back and pigtail, or replace all damaged conductors.
  - b. Straighten conductors that remain and remove corrosion and foreign matter.
  - c. Pigtailling existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. All wall boxes shall be 4"x4" square with appropriate covers for type of installation (drywall, surface, etc.) This shall include receptacles, switches, and the like. Double duplex shall be multigang as necessary for proper installation.

### 3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles and switches (to include wall box occ sensors, etc.): Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

**END OF SECTION 262726**

## SECTION 262813 - FUSES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Cartridge fuses rated 600-V ac and less for use in enclosed switches and enclosed controllers.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
  - 1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
    - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
    - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
  - 2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
  - 3. Current-limitation curves for fuses with current-limiting characteristics.
  - 4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse
  - 5. Coordination charts and tables and related data.
  - 6. Fuse sizes for elevator feeders and elevator disconnect switches.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

## 1.6 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C) , apply manufacturer's ambient temperature adjustment factors to fuse ratings.

## 1.7 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels. Coordinate with coordination study recommended settings.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Bussmann, Inc.
  - 2. Edison Fuse, Inc.
  - 3. Ferraz Shawmut, Inc.
  - 4. Littelfuse, Inc.

### 2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 FUSE APPLICATIONS

- A. Cartridge Fuses:
  - 1. Motor Branch Circuits: Class RK5, time delay.

### 3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.

### 3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

**END OF SECTION 262813**

## SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Fusible and non-fusible switches.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - 4. Include evidence of NRTL listing for series rating of installed devices.
  - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
  - 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
  - 2. Altitude: Not exceeding 6600 feet (2010 m).

## 1.7 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

## PART 2 - PRODUCTS

### 2.1 FUSIBLE AND NON-FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements :
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses as required, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Lugs: Mechanical type, suitable for number, size, and conductor material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Install fuses in fusible devices as required.
- C. Comply with NECA 1.

### 3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

### 3.4 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

**END OF SECTION 262816**



## SECTION 265100 - INTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 – General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Interior lighting fixtures, lamps, and ballasts.
  - 2. Emergency lighting units.
  - 3. Exit signs.
  - 4. Lighting fixture supports.
- B. Related Sections include the following:
  - 1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
  - 2. Division 26 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

#### 1.4 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. LER: Luminaire efficacy rating.
- D. Luminaire: Complete lighting fixture, including ballast housing if provided.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.

2. Emergency lighting units including battery and charger.
  3. Ballast.
  4. Energy-efficiency data.
  5. Life, output, and energy-efficiency data for lamps.
  6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
    - a. For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by the manufacturer.
    - b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
- B. Warranties: Special warranties specified in this Section.

## 1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

## 1.7 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-detection system, and partition assemblies.

## 1.8 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Emergency LED Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.
- B. Special Warranty for Electronic Drivers: Manufacturer's standard form in which driver manufacturer agrees to repair or replace drivers that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Electronic Drivers: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

1. Basis-of-Design Product: The design for each lighting fixture is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product.

### 2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. LED Fixtures: Comply with UL 1598. Where LED is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- E. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
  1. White Surfaces: 85 percent.
  2. Specular Surfaces: 83 percent.
  3. Diffusing Specular Surfaces: 75 percent.
  4. Laminated Silver Metallized Film: 90 percent.
- F. Plastic Diffusers, Covers, and Globes:
  1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
    - b. UV stabilized.
  2. Glass: Annealed crystal glass, unless otherwise indicated.

### 2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS (if applicable)

- A. Electronic Ballasts: Comply with ANSI C82.11; programmed-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
  1. Sound Rating: A.
  2. Total Harmonic Distortion Rating: Less than 10 percent.
  3. Transient Voltage Protection: IEEE C62.41, Category A or better.
  4. Operating Frequency: 20 kHz or higher.
  5. Lamp Current Crest Factor: 1.7 or less.
  6. BF: 0.85 or higher.

7. Power Factor: 0.98 or higher.
8. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C 82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic or electromagnetic type rated for 0 deg F starting and operating temperature with indicated lamp types.
2. Temperatures Minus 20 Deg F and Higher: Electromagnetic type designed for use with indicated lamp types.

## 2.4 EMERGENCY LED POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate 1 driver and array continuously at an output of 1400 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture driver.
2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
5. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

## 2.5 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.

## 2.6 FLUORESCENT LAMPS (if applicable)

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- B. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 82 (minimum), color temperature 3500 K, and average rated life 20,000 hours, unless otherwise indicated.
- C. T8 rapid-start low-mercury lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 82 (minimum), color temperature 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.

- D. Compact Fluorescent Lamps: 4-Pin, low mercury, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at 3 hours operation per start, and where required, suitable for use with dimming ballasts, unless otherwise indicated.
  - 1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
  - 2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
  - 3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
  - 4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
  - 5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
  - 6. 55 W: T4, triple tube, rated 4300 initial lumens (minimum).

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Suspended Lighting Fixture Support:
  - 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
  - 2. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- C. Adjust aimable lighting fixtures to provide required light intensities.
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

**END OF SECTION 265100**

## SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Communications equipment coordination and installation.
  - 2. Sleeves for pathways and cables.
  - 3. Sleeve seals.
  - 4. Grout.
  - 5. Common communications installation requirements.

#### 1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For sleeve seals.
- B. Submit as required in section 01300.

#### 1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.
  - 4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

## PART 2 - PRODUCTS

### 2.1 SLEEVES FOR PATHWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  - 1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
    - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
    - e. Or approved equal.
  - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
  - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
  - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

### 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."



- K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

**END OF SECTION 270500**

## SECTION 271300 - COMMUNICATIONS BACKBONE CABLING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Pathways.
  - 2. UTP cable.
  - 3. Single Mode, SM1, optical fiber cabling.
  - 4. Cable connecting hardware, patch panels, and cross-connects.
  - 5. Cabling identification products.

#### 1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. LAN: Local area network.
- F. RCDD: Registered Communications Distribution Designer.

#### 1.4 BACKBONE CABLING DESCRIPTION

- A. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

## 1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
  - 2. Cabling administration drawings and printouts.
  - 3. Wiring diagrams to show typical wiring schematics including the following:
    - a. Cross-connects.
    - b. Patch panels.
    - c. Patch cords.
  - 4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
  - 5. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
    - a. Vertical and horizontal offsets and transitions.
    - b. Clearances for access above and to side of cable trays.
    - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
    - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Maintenance Data: For splices and connectors to include in maintenance manuals.
- F. Software and Firmware Operational Documentation:
  - 1. Software operating and upgrade manuals.
  - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.
- G. Submit as required in section 01300.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
  - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
  - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

- B. Testing Agency Qualifications: An NRTL.
  - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 50 or less.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-B.
- F. Grounding: Comply with ANSI-J-STD-607-A.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
  - 2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
  - 3. Test each pair of UTP cable for open and short circuits.

## 1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## 1.10 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

## 1.11 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
  - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-B.
- B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
  - 2. Lacing bars, spools, J-hooks, and D-rings.
  - 3. Straps and other devices.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
  - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep. Use 4"x4" boxes (same for receptacles and switches) with appropriate cover to interface with data outlet covers.

### 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels. Line entire IT room.

### 2.3 OPTICAL FIBER CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Corning Cable Systems.
  - 2. Mohawk; a division of Belden CDT.
  - 3. Superior Essex Inc.
  - 4. 3M.
  - 5. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: Single Mode, SM1, fiber, nonconductive, tight buffer, optical fiber cable. Number of strands as indicated on the drawings.
  - 1. Comply with ICEA S-83-596 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.3 for performance specifications.
  - 3. Comply with TIA/EIA-492AAAA-B for detailed specifications.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
    - a. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
  - 5. Conductive cable shall be not be used.
  - 6. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
  - 7. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

- C. Jacket:

1. Jacket Color: Black for Single Mode, SM1 cable.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

## 2.4 OPTICAL FIBER CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. ADC.
  2. American Technology Systems Industries, Inc.
  3. Corning Cable Systems.
  4. Hubbell Premise Wiring.
  5. Optical Connectivity Solutions Division; Emerson Network Power.
- B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
  1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- C. Patch Cords: Factory-made, dual-fiber cables in 60-inch (1525-mm) lengths. Provide quantity for total fiber termination.
- D. Cable Connecting Hardware:
  1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
  2. Quick-connect, simplex and duplex, Type SC connectors. Insertion loss not more than 0.75 dB.
  3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

## 2.5 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

## 2.6 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

## 2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.

- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

### 3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces. Conceal raceway and cables except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
  - 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

### 3.3 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A.
- B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.
- C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- E. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- F. Pathway Installation in Communications Equipment Rooms:
  - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  - 2. Install cable trays to route cables if conduits cannot be located in these positions.
  - 3. Secure conduits to backboard when entering room from overhead.
  - 4. Extend conduits 3 inches (76 mm) above finished floor.

5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

### 3.4 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:



1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 4-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG (see plans) grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

### 3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
  - 1. Administration Class: 2.
  - 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration including optional identification requirements of this standard.
- D. Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable and asset management software.
- E. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- G. Cable and Wire Identification:
  - 1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
  - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
  - 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
    - b. Label each unit and field within distribution racks and frames.
  - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606-A, for the following:
  - 1. Cables use flexible vinyl or polyester that flexes as cables are bent.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
4. Optical Fiber Cable Tests:
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
  - b. Link End-to-End Attenuation Tests:
    - 1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
    - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

**END OF SECTION 271300**

## SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. The specification Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL forms a part of this section and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SUMMARY

- A. Section Includes:
  - 1. Pathways.
  - 2. UTP cabling.
  - 3. Coaxial cable.
  - 4. Multiuser telecommunications outlet assemblies.
  - 5. Cable connecting hardware, patch panels, and cross-connects.
  - 6. Telecommunications outlet/connectors.
  - 7. Cabling system identification products.

#### 1.4 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- D. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- E. EMI: Electromagnetic interference.
- F. IDC: Insulation displacement connector.
- G. LAN: Local area network.
- H. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

- I. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- J. RCDD: Registered Communications Distribution Designer.
- K. Trough or Ventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.
- L. UTP: Unshielded twisted pair.

#### 1.5 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
  - 1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
  - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
  - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
  - 4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment. The maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) in the horizontal cross-connect.

#### 1.6 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.
- B. Note: All Cat6 cable shall be terminated as if for data. This will allow a "plug and play" configuration for telephone and/or data connections based on how it is patched in the IT room. All telephone cables shall be terminated (with lightning protection) in cross block and ultimately terminated in a patch panel.

#### 1.7 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. For coaxial cable, include the following installation data for each type used:
    - a. Nominal OD.
    - b. Minimum bending radius.
    - c. Maximum pulling tension.
- B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
  2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
  3. Cabling administration drawings and printouts.
  4. Wiring diagrams to show typical wiring schematics, including the following:
    - a. Cross-connects.
    - b. Patch panels.
    - c. Patch cords.
  5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
  6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
    - a. Vertical and horizontal offsets and transitions.
    - b. Clearances for access above and to side of cable trays.
    - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
    - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
- C. Field quality-control reports.
- D. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
  2. Program Software Backup: On magnetic media or compact disk, complete with data files.
  3. Device address list.
  4. Printout of software application and graphic screens.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings Cabling Administration Drawings, and field testing program development by an RCDD.
  2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- E. Grounding: Comply with ANSI-J-STD-607-A.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test each pair of UTP cable for open and short circuits.

## 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## 1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-A.
- B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
  - 2. Lacing bars, spools, J-hooks, and D-rings.
  - 3. Straps and other devices.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
  - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep. Use 4"x4" box with appropriate box covers/adapters suitable for purpose and data outlet mounting.

### 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

### 2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden CDT Inc.; Electronics Division.
  2. Superior Essex Inc.
  3. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: 100-ohm, 4-pair UTP, formed into 25-pair, binder groups covered with a green thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
  2. Comply with TIA/EIA-568-B.1 for performance specifications.
  3. Comply with TIA/EIA-568-B.2, Category 6e.
  4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.

## 2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hubbell Premise Wiring.
  2. Leviton Voice & Data Division.
  3. Panduit Corp.
  4. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 6e. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
1. Number of Terminals per Field: One for each conductor in assigned cables.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
1. Number of Jacks per Field: One for each four-pair UTP cable indicated.
- F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- G. Patch Cords: Factory-made, four-pair cables in 9-foot lengths; terminated with eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6e performance. Patch cords shall have latch guards to protect against snagging.
  2. Patch cords shall have color-coded boots for circuit identification.
  3. Number of patch cords to match number of ports on patch panel(s).



- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpha Wire Company.
  - 2. Belden CDT Inc.; Electronics Division.
  - 3. CommScope, Inc.
- B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.
- C. RG59/U (Plenum Rated): NFPA 70, Type CMP.
  - 1. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
  - 2. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
  - 3. Copolymer jacket.
- D. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
  - 1. CATV Cable: Type CATV or CATVR.
  - 2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
  - 3. CATV Riser Rated: Type CATVR, complying with UL 1666.
  - 4. CATV Limited Rating: Type CATVX.

## 2.6 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Aim Electronics; a brand of Emerson Electric Co.
  - 2. Leviton Voice & Data Division.
  - 3. Siemon Co. (The).
- B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

## 2.7 CONSOLIDATION POINTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Chatsworth Products, Inc.
  - 2. Hubbell Premise Wiring.
  - 3. Panduit Corp.
- B. Description: Consolidation points shall comply with requirements for cable connecting hardware.
  - 1. Number of Terminals per Field: One for each conductor in assigned cables.
  - 2. Number of Connectors per Field:
    - a. One for each four-pair UTP cable indicated.
    - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
  - 3. Mounting: Wall or Furniture.
  - 4. NRTL listed as complying with UL 50 and UL 1863.

5. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

## 2.8 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Chatsworth Products, Inc.
  2. Hubbell Premise Wiring.
  3. Panduit Corp.
- B. Description: MUTOAs shall meet the requirements for cable connecting hardware.
  1. Number of Terminals per Field: One for each conductor in assigned cables.
  2. Number of Connectors per Field:
    - a. One for each four-pair UTP cable indicated.
    - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
  3. Mounting: Recessed in ceiling, Wall, Furniture.
  4. NRTL listed as complying with UL 50 and UL 1863.
  5. Label shall include maximum length of work area cords, based on TIA/EIA-568-B.1.
  6. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

## 2.9 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
- B. Workstation Outlets: Four-port-connector assemblies mounted in single faceplate. (2) Data, (2) spare.
  1. Plastic Faceplate: High-impact plastic. Coordinate color with Division 26 Section "Wiring Devices."
  2. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
    - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
  3. Legend: Machine printed, in the field, using adhesive-tape label.
  4. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

## 2.10 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

## 2.11 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## 2.12 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

### 3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters, except in accessible ceiling spaces. Conceal raceway and cables except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
  - 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

### 3.3 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.
- C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

- D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- E. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- F. Pathway Installation in Communications Equipment Rooms:
  - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  - 2. Install cable trays to route cables if conduits cannot be located in these positions.
  - 3. Secure conduits to backboard when entering room from overhead.
  - 4. Extend conduits 3 inches (76 mm) above finished floor.
  - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

### 3.4 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
  - 1. Comply with TIA/EIA-568-B.1.
  - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  - 3. Install 110-style IDC termination hardware unless otherwise indicated.
  - 4. MUTOA shall not be used as a cross-connect point.
  - 5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
    - a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
    - b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.
  - 6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  - 7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - 8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
  - 9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
  - 10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  - 11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
  - 12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.

13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
  2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
- D. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
  3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- E. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
  2. Install cabling after the flooring system has been installed in raised floor areas.
  3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.
- F. Outdoor Coaxial Cable Installation:
1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
  2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).
- G. Group connecting hardware for cables into separate logical fields.
- H. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
  2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
  3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
  4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.

- b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

### 3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
  - 1. Administration Class: 2.
  - 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration, including optional identification requirements of this standard.
- D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation

terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet ((4.5) m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
  - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
  - b. Label each unit and field within distribution racks and frames.
5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

### 3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. UTP Performance Tests:
  - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
    - 1) Wire map.
    - 2) Length (physical vs. electrical, and length requirements).
    - 3) Insertion loss.
    - 4) Near-end crosstalk (NEXT) loss.
    - 5) Power sum near-end crosstalk (PSNEXT) loss.
    - 6) Equal-level far-end crosstalk (ELFEXT).
    - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
    - 8) Return loss.
    - 9) Propagation delay.
    - 10) Delay skew.
6. Coaxial Cable Tests: Conduct tests according to Division 27 Section "Master Antenna Television System."
7. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
  - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
  - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
- C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- D. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

**END OF SECTION 271500**



## SECTION 311000 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Stripping and stockpiling topsoil.
  - 2. Removing above- and below-grade site improvements.
  - 3. Temporary erosion and sedimentation control measures.
- B. Related Sections include the following:
  - 1. Division 31 Section "EARTH MOVING" for soil materials, excavating, backfilling, and site grading.
  - 2. Division 32 Section "TURF & GRASSES" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

#### 1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### 1.4 MATERIAL OWNERSHIP

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

#### 1.5 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without coordination with the Department and authorities having jurisdiction. Coordinate any adjusted traffic alterations with the Department at least 3 days prior to the completion of the work.

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Utility Locator Service: Contact Bureau of Facilities & Engineering – Maintenance Division (BFE-MD) (717-861-2166) for Utility Clearance Requests. Request for Utility Clearance should be made no less than 10 days prior to the start of work.
  - C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS N/A

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the drawings.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  1. Coordinate with BFE-MD to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  1. Notify the Department not less than three days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without the Department's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

### 3.4 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Limit height of topsoil stockpiles to 8' (feet).
  - 2. Do not stockpile topsoil within tree protection zones.
  - 3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

### 3.5 SITE IMPROVEMENTS

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

### 3.6 DISPOSAL

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

**END OF SECTION 311000**

## SECTION 312000 – EARTH MOVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Preparing sub-grades for walks, pavements, lawns and grasses.
- B. Related Sections include the following:
  - 1. Division 2 Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.

#### 1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the sub-base course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated sub-grade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above sub-grade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
  - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
  - 3. Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.

- H. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf ; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- I. Sub-base Course: Course placed between the sub-grade and base course for hot-mix asphalt pavement, or course placed between the sub-grade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

#### 1.4 SUBMITTALS

- A. Make submissions in accordance with ‘SCHEDULE OF MATERIAL SUBMITTALS’, attached at end of the Specifications.
- B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.
- C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

#### 1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: The contractor will hire an independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, compaction testing and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548. All materials under this Section shall be factory certified, first run material, seconds will not be permitted.
- B. Non-Compliant Materials - Any material found not to be in compliance with the requirements of this Section, through testing and/or other means, whether installed individually and/or as a part of a system or not, shall be immediately removed from the job site and replaced with compliant materials at no additional cost to the Contract.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.
  - 3. Compaction Density Test Reports according to ASTM D 2922 – Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

- D. Aggregate Material Tests: Conduct aggregate material quality tests in accordance with the following:
1. PDT Section 703.1, Fine Aggregate
  2. PDT Section 703.2, Coarse Aggregate
  3. PDT Section 703.3 Select Granular Material (2RC)

## 1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify Department not less than three days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without Department's written permission.
  3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

## PART 2 - PRODUCTS

### DISCLAIMER:

- 2.1 Items specified by specific name of a manufacturer are only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items **must** be used in order to be compatible with existing systems.

## 2.2 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding Project site and surrounding area.
- B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep sub-grades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

### 3.3 EXPLOSIVES

- A. Explosives: Explosives may not be used for any part of this project.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to sub-grade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Classified Excavation: Excavate to sub-grade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Department. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.
  1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
    - a. Intermittent ram hammering; or ripping of material not classified as rock excavation is earth excavation.
    - b. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

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



### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: As indicated on contract drawings or as recommended by the manufacturer.
- C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

### 3.8 SUBGRADE INSPECTION

- A. Notify Department when excavations have reached required sub-grade.
- B. If the contractor encounters unforeseen sub-grade conditions that are considered unsatisfactory for construction or that do not meet compaction requirements, they will notify the department prior to any further excavation or site construction. If the Department determines that unforeseen unsatisfactory sub-grade is present, they will determine the additional work to be completed and submit a change order request through the contracting officer.
- C. Proof-roll sub-grade below the pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated sub-grades.
  - 1. Completely proof-roll sub-grade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph .
  - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons .
  - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Department, without additional compensation.

### 3.9 UNAUTHORIZED EXCAVATION

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

### 3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.11 UTILITY TRENCH BACKFILL

- A. Place backfill on sub-grades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- D. Place and compact final backfill of satisfactory soil to final sub-grade elevation.
- E. Install warning tape directly above utilities, 12 inches (300 mm) above top of pipe, except 6 inches (150 mm) below sub-grade under pavements and slabs.
- F. Utility Trenches that are located at or near finished pavement or structures will be tested for compaction, according to ASTM D 2922. Backfill will not exceed 6" lifts at these locations.

### 3.12 BACKFILL

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

### 3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  1. Under walks and pavements, use satisfactory soil material.
- C. Place soil fill on sub-grades free of mud, frost, snow, or ice.

### 3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 12 inches of existing sub-grade and each layer of backfill or fill soil material at 95 percent.
  2. Under walkways, scarify and re-compact top 6 inches below sub-grade and compact each layer of backfill or fill soil material at 92 percent.
  3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below sub-grade and compact each layer of backfill or fill soil material at 85 percent.
  4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent. Utility trenches within a pavement area shall be compacted according to #1 above.

### 3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Grading inside Building Lines: Finish sub-grade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.
- C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub-grades to required elevations within the following tolerances:
  1. Lawn or Unpaved Areas: Plus or minus 1/2 inch.
  2. Walks: Plus or minus 1/2 inch.
  3. Pavements: Plus or minus 1/4 inch.

### 3.17 SUBBASE AND BASE COURSES

- A. Place sub-base and base course on sub-grades free of mud, frost, snow, or ice.
- B. On prepared sub-grade, place sub-base and base course under pavements and walks as follows:
  1. Install separation geotextile on prepared sub-grade according to manufacturer's written instructions, overlapping sides and ends.
  2. Place base course material over sub-base course under hot-mix asphalt pavement.
  3. Shape sub-base and base course to required crown elevations and cross-slope grades.
  4. Place sub-base and base course 6 inches or less in compacted thickness in a single layer.

5. Place sub-base and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
6. Compact sub-base and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

### 3.18 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test sub-grades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by the Department.
- D. Testing agency will test compaction of soils in place according to ASTM D 2922 as applicable. Tests will be performed at the following locations and frequencies:
  1. Paved and Building Slab Areas: At sub-grade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
  2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
  3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.
- E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.
- F. The contractor will provide the Department with copies of all test reports prior to final backfill and certification of calibration of nuclear density gauge.

### 3.19 PROTECTION

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

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Department's property.
  - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Department's property.
  - 2. The Department will retain all satisfactory soils originated from Ft. Indiantown Gap.

**END OF SECTION 312000**

## **SECTION 312319 - DEWATERING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes construction dewatering.
- B. Related Sections include the following:
  - 1. Division 2 Section "Earthwork" for excavating, backfilling, site grading and for site utilities.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Dewatering Performance: furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
  - 1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, so that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
  - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 3. Accomplish dewatering without damaging existing buildings adjacent to excavation.
  - 4. Remove dewatering system if no longer needed.

#### **1.4 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

#### **1.5 PROJECT CONDITIONS**

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Department and then only after arranging to provide temporary utility services according to requirements indicated.

### **PART 2 - PRODUCTS (Not Used)**

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
  - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
  - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

### 3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 1. Maintain piezometric water level a minimum of 24 inches (600 mm) below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
  - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

### **END OF SECTION 312319**

## SECTION 323113 CHAIN-LINK FENCES AND GATES

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

- A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions

#### 1.3 SUMMARY

- A. Section Includes:

- 1. Chain-Link Fences.
- 2. Cantilever Gates.
- 3. Swing operators.
- 4. Cast-in-Place Concrete Post Footings.

- B. Related Sections:

- 1. Division 31 Section "Earth Moving" for site excavation, fill, and backfill where chain-link fences and gates are located.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Chain-link fence and gate framework shall match the existing military equipment parking area fencing and withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to:

- 1. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:
  - a. Wind Loads: 80 mph.
  - b. Exposure Category: B.
  - c. Fence Height: 7 feet.
  - d. Max. Post Spacing: 10 feet.
  - e. Material Group: IA, ASTM F 1043, Schedule 40 steel pipe.

#### 1.5 SUBMITTALS



- A. Make submissions in accordance with ‘SCHEDULE OF MATERIAL SUBMITTALS’ attached at end of the Specifications.
- B. No deviations, substitutions or changes of materials, to be incorporated into this project shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.
- C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.
- D. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
  - 1. Fence and gate posts, rails, and fittings.
  - 2. Chain-link fabric, reinforcements, and attachments.
  - 3. Gates and hardware.
  - 4. Accessories: Barbed wire.
  - 5. Cast-in-place concrete post footings.
- E. Shop Drawings: Include plans, elevations, sections, details, operational clearances, and attachments to other work. Show locations of fences, gates, posts, rails, tension wires, and operational clearances, details of extended posts, post anchorage, bracing, extension arms, gate swing, or other operational hardware and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components.
- F. Product Certificates: For each type of chain-link fence and gate from manufacturer.
- G. Product Test Reports: For framing strength according to ASTM F 1043.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on the Contract Drawings in relation to existing structures. Verify dimensions by field measurements.

## PART 2 - PRODUCTS

### DISCLAIMER:

- 2.1 Items specified by specific name of a manufacturer are only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient

supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items must be used in order to be compatible with existing systems.

## 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:
  - 1. Fabric Height: Seven (7) feet Wire Fabric: with mill finished, and 9 gauge wire.
    - a. Aluminum-Coated Fabric: ASTM A 491, Type I, 0.35 oz./sq. ft. (107 g/sq. m)]
  - 2. Mesh Size: 2 inches.
  - 3. Selvage: Twisted at both selvages.

## 2.3 FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:
  - 1. Fence Height: 84 inches.
  - 2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.
    - a. Line Post: 3 inches outside diameter (O.D.).
    - b. End, Corner and Pull Post: 3 inches outside diameter (O.D.).
  - 3. Horizontal Framework Members: Top rails complying with ASTM F 1043.
    - a. Top Rail: 1.625 inches in diameter.
  - 4. Brace Rails: Comply with ASTM F 1043.
  - 5. Metallic Coating for Steel Framing:
    - a. Type C, Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. coating.

## 2.4 TENSION WIRE

- A. General: Provide horizontal tension wire along bottom of fence fabric.
- B. Type I, aluminum coated (aluminized): 0.192-inch diameter tension wire, mill finished, complying with ASTM B 211, Alloy 6061-T94 with 50,000-psi minimum tensile strength.

## 2.5 HORIZONTAL-SLIDE GATES

- A. General: Comply with ASTM F 1184 for gate posts and single sliding gate types.

1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies.
  - a. Gate Frame Width and Height: More than 48 inches wide by 96 inches height.
- B. Pipe and Tubing:
  1. Zinc-Coated Steel: Protective coating and finish to match fence framing
  2. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel .
  3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate framed as required to attach barbed wire assemblies.
- E. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
- F. Hardware:
  1. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
  2. Lock: Manufacturer's standard.
  3. Hangers, roller assemblies, and stops fabricated from Grade 319 aluminum-alloy casting with stainless-steel fasteners.

## 2.6 SWING GATES

- A. General: Comply with ASTM F 900 for gate posts and single swing gate types.
  1. Gate Leaf Width: (2) 10 foot leafs.
  2. Gate Fabric Height: 2 inches less than adjacent fence height.
- B. Pipe and Tubing:
  1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
  2. Gate Posts: Round tubular steel.
  3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches to attach barbed wire assemblies.
- E. Hardware:
  1. Hinges: 360-degree inward and outward swing.
  2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

3. Closer: Manufacturer's standard.

## 2.7 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post Caps: Provide for each post.
  1. Provide line post caps with loop to receive a top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  1. Top Rail Sleeves: Aluminum Alloy 6063 not less than 6 inches long.
  2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Aluminum Alloy 6063.
- F. Tension Bars: Aluminum, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Mill-finished aluminum rod and turnbuckle or other means of adjustment.
- H. Barbed Wire Arms: Aluminum with clips, slots, or other means for attaching strands of barbed wire and means for attaching to posts for each post unless otherwise indicated, and as follows:
  1. Provide line posts with arms that accommodate top rail or tension wire.
  2. Provide corner arms at fence corner posts, unless extended posts are indicated.
  3. Type I, single slanted arm.
- I. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
    - a. Aluminum: ASTM B 211; Alloy 1350-H19; 0.148-inch diameter, mill-finished wire.
- J. Finish:
  1. Aluminum: Mill finish.

## 2.8 BARBED WIRE

- A. Steel Barbed Wire: Comply with ASTM A 121, for two-strand barbed wire, 0.099-inch diameter line wire with 0.080-inch diameter, four-point round barbs spaced not more than 5 inches o.c.

- 1. Aluminum Coating: Type A.

## 2.9 CAST-IN-PLACE CONCRETE POST FOOTINGS

- A. Class A concrete conforming to PennDOT Pub. 408 and placed as indicated on the Contract Drawings.

## 2.9 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

## 2.10 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
  - 1. Material above Finished Grade: Copper.
  - 2. Material on or below Finished Grade: Copper.
  - 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.
  - 4. Connectors for Below-Grade Use: Exothermic welded type.
  - 5. Grounding Rods: Copper-clad steel, 3/4 by 120 inches .

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with the Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by the Department.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

### 3.4 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- D. Line Posts: Space line posts uniformly at 10 feet o.c.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
1. Locate horizontal braces at mid-height of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along the bottom of fence fabric. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate and Bottom Rails: Install and secure to posts with fittings.
- I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Wire should be wrapped 360 degrees around line post or brace, securing fabric to post, with twisted connection placed on the secure side of the fence. Bend ends of wire to minimize hazard to individuals and clothing.
  1. Maximum Spacing: Tie fabric to line posts at 15 inches o.c. and to braces at 24 inches o.c.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.
- M. Barbed Wire: Install barbed wire uniformly spaced angled toward security side of fence. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

### 3.5 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

### 3.6 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
  1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
    - a. Gates and Other Fence Openings: Ground fence on each side of opening.
      - 1) Bond metal gates to gate posts.

- 2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
  - C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
  - D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:
    1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
    2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
  - E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
  - F. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
    1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
    2. Make connections with clean, bare metal at points of contact.
    3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
    4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
    5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
  - G. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

### 3.7 FIELD QUALITY CONTROL

- A. Grounding-Resistance Testing: The contractor will hire a qualified testing agency to perform tests and inspections.
  1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance no fewer than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.



2. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify Architect promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
3. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.

### 3.8 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION

## **SECTION 329200 – TURFS and GRASSES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Seeding.
- B. Related Sections include the following:
  - 1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
  - 2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

#### **1.3 DEFINITIONS**

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

#### **1.4 SUBMITTALS**

- A. Make submissions in accordance with ‘SCHEDULE OF MATERIAL SUBMITTALS’, attached at end of the Specifications.
- B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.
- C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
  - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
  - 1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

#### 1.7 SCHEDULING

- A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

#### 1.8 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
  - 1. Seeded Lawns: 60 days from date of Substantial Completion.
    - a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
  - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches (100 mm).
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  - 2. Water lawn at a minimum rate of 1 inch (25 mm) per week.

- D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
  - 1. Mow grass 2 to 3 inches (38 to 50 mm) high.
- E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
  - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to lawn area.

PART 2 - PRODUCTS

DISCLAIMER:

- 2.1 Items specified by specific name of a manufacturer is to only provide a standard for characteristics, type, quality, performance, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items **must** be used in order to be compatible with existing systems.
- 2.2 Manufacturer's
  - A. Seedway, Inc.
  - B. Or Approved Equal
- 2.3 SEED
  - A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
    - 1. Seed Species: PENNDOT 408, Section 804 – Formula L
- 2.4 TOPSOIL
  - A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.
    - 1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
      - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.
- 2.5 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
  - 1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a minimum 75 percent passing through No. 60 (0.25-mm) sieve.

## 2.6 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
  - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

## 2.7 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

## 2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Matting: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
  - 1. Recommended Manufacturer's – Curlex or approved equal.
- B. Erosion Filter Sock: Provide an erosion control sock with 5 mil HDPE, photodegradable, 3/8" mesh openings. Tensile strength - 12" sock = 969 lbs., 18" sock = 1339 lbs. The functional longevity period should be 6-12 months. Filter sock shall be installed by an approved contractor experienced in the layout and placement of filter sock systems. Once all soil has been stabilized and construction activity has been completed, the filter media may be dispersed and incorporated into the soil as an amendment or left upon the surface to aid in permanent seeding or landscaping.
  - 1. Recommended Manufacturer's – Filtrex or approved equal.

## 2.9 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities: See Site drawings for Mix Design.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### 3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply fertilizer directly to subgrade before loosening.
  - 2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - b. Mix lime with dry soil before mixing fertilizer.
  - 3. Spread planting soil mix to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
    - a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

### 3.4 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  - 1. Do not use wet seed or seed that is moldy or otherwise damaged.

- B. Sow seed at the rate of 3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m).
- C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 4:1 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with slopes not exceeding 6:1 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

### 3.5 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

### 3.6 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.

## **END OF SECTION 329200**

## SECTION 334100 - STORM UTILITY DRAINAGE PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
  - 1. Pipe and fittings.
  - 2. Cleanouts.
  - 3. Catch basins.
  - 4. Stormwater inlets.
  - 5. Pipe outlets.
  - 6. Trench Drain

#### 1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene-monomer rubber.
- C. FRP: Fiberglass-reinforced plastic.
- D. LLDPE: Linear low-density, polyethylene plastic.
- E. PE: Polyethylene plastic.
- F. PP: Polypropylene plastic.
- G. PVC: Polyvinyl chloride plastic.
- H. RTRF: Glass-fiber-reinforced, thermosetting-resin fitting.
- I. RTRP: Glass-fiber-reinforced, thermosetting-resin pipe.
- J. TPE: Thermoplastic elastomer.
- K. RCP: Reinforced Concrete Pipe

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa). Pipe joints shall be at least silt-tight, unless otherwise indicated.



#### 1.4 SUBMITTALS

- A. Make submissions in accordance with 'SCHEDULE OF MATERIAL SUBMITTALS', attached at end of the Specifications.
- B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.
- C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and storm-water inlets according to manufacturer's written rigging instructions.

#### 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than 3 days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

#### PART 2 - PRODUCTS

#### PART 3 - DISCLAIMER:

PART 4 - Items specified by specific name of a manufacturer are only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items must be used in order to be compatible with existing systems.

#### 4.1 PE PIPE AND FITTINGS

- A. Corrugated PE Pipe and Fittings NPS 12 to NPS 60 (DN 300 to DN 1500): AASHTO M 294M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

#### 4.2 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M).
  - 1. **Tongue-and-groove ends and sealant joints with ASTM C 990 (ASTM C 990M), bitumen or butyl-rubber sealant.**
  - 2. Class V, **Wall B.**

#### 4.3 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R (ACI 350M/350RM), and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
  - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: [1] [2] percent through manhole.
  - 2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: [4] [8] percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

#### 4.4 CATCH BASINS

- A. Standard Precast Concrete Catch Basins PENNDOT TYPE "M":
  - 1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 2. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.

3. Riser Sections: 4-inch (102-mm) minimum thickness, 48-inch (1200-mm) diameter, and lengths to provide depth indicated.
  4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  5. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
  6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
  7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.
  8. Steps: Individual FRP steps; FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches (1500 mm).
  9. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for PENNDOT H-20, structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches (610 by 610 mm) minimum unless otherwise indicated.
  2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with small square or short-slotted drainage openings.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

#### 4.5 STORMWATER INLETS

- A. Gutter Inlets PENNDOT TYPE "M": Made with horizontal gutter opening, per PENNDOT specifications. Include heavy-duty frames and grates.
- B. Combination Inlets: Made with vertical curb and horizontal gutter openings, per PENNDOT specifications. Include heavy-duty frames and grates.
- C. Frames and Grates: Heavy duty, per PENNDOT specifications, H-20.
- D. All Storm-water Inlets, frames and grates will be constructed and installed per PENNDOT Specification 408 (April 2011 Edition) and PENNDOT Standards for Roadway Construction (June 2010 Edition).

#### 4.6 PIPE OUTLETS

- A. Flared End Sections: Match size and type of storm pipe per site plan drawings.
- B. Head Walls: PENNDOT Type "D-W" Cast-in-place reinforced concrete, with apron and tapered sides.
- C. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
  1. Average Size: NSSGA No. R-3, screen opening 2 inches (51 mm).
  2. Average Size: NSSGA No. R-4, screen opening 3 inches (76 mm).

3. Average Size: NSSGA No. R-5, screen opening 5 inches (127 mm).

#### 4.7 TRENCH DRAIN

##### A. Pre-formed Polyester Polymer Concrete Trench Drain:

1. Compressive Strength: 14,000 PSI
2. Flexural Strength: 4,000 PSI
3. Water Absorption: 0.07%
4. Channel: Neutral

- 4.8 Grate: Slotted Ductile Iron, Load Class "F", PENNDOT H-20 (4,182 PSI)

### PART 5 - EXECUTION

#### 5.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

#### 5.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Install gravity-flow, non-pressure drainage piping according to the following:
1. Install piping pitched down in direction of flow.
  2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  3. Install piping with 1' minimum cover.
  4. Install PE corrugated sewer piping according to ASTM D 2321.
  5. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  6. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

#### 5.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping according to the following:

1. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
2. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
3. Join dissimilar pipe materials with non-pressure-type flexible couplings.
4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.

#### 5.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
  1. Use Heavy-Duty, top-loading classification cleanouts in all compacted gravel areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep. Set with tops 1 inch (25 mm) above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

#### 5.5 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

#### 5.6 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of fractured stone, as indicated.
- C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- D. Construct energy dissipaters at outlets, as indicated.

#### 5.7 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

#### 5.8 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
  1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
  2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
  3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large

enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
  - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

## 5.9 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

## 5.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.
1. Submit separate reports for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- B. Leaks and loss in test pressure constitute defects that must be repaired.
- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

**END OF SECTION 334100**

# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS' AFFAIRS

ANNVILLE, PENNSYLVANIA

TOM WOLF, GOVERNOR

MG ANTHONY CARRELLI, ADJUTANT GENERAL

**DMVA PROJECT NO. 42080032**

**NEW CSMS-EAST**

**CALIBRATION LABORATORY**

FORT INDIANTOWN GAP, LEBANON COUNTY, PENNSYLVANIA

DESIGN PROFESSIONALS  
DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
BLDG. 0-10, FORT INDIANTOWN GAP  
ANNVILLE, LEBANON COUNTY, PENNSYLVANIA

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- G.1.2 PROJECT INFORMATION

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- C.1.0 EXISTING SITE PLAN
  - C.2.0 PROPOSED SITE PLAN
  - C.2.1 CIVIL DETAILS
  - C.3.0 EROSION & SEDIMENTATION CONTROL PLAN
  - C.3.1 EROSION & SEDIMENTATION NOTES & DETAILS

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- A.1.2 DIMENSIONED FLOOR PLAN
- A.1.3 REFLECTED CEILING PLAN
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- HVAC DWGS.
- H.1.0 HVAC FLOOR PLANS
  - H.2.0 HVAC SCHEDULES

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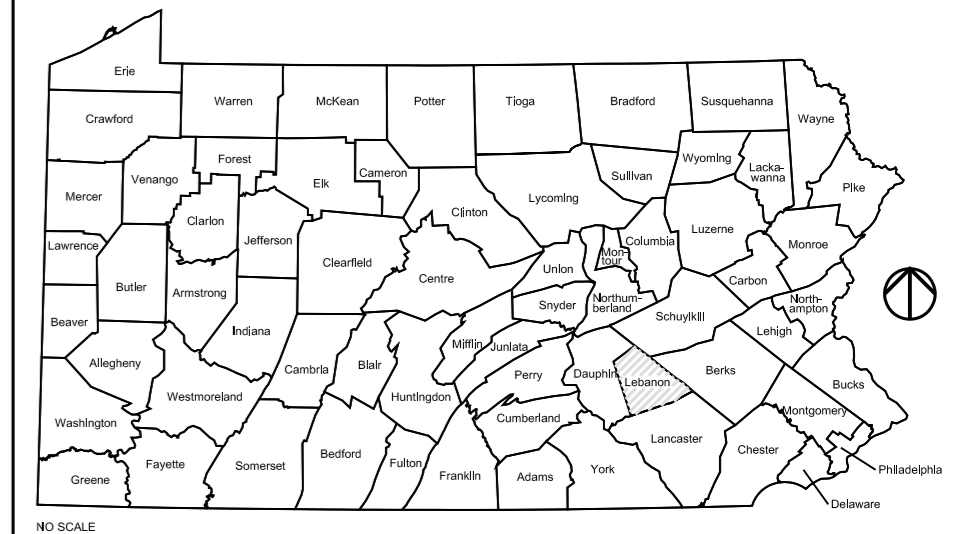
- PLUMBING DWGS.
- P.1.0 PLUMBING FLOOR PLAN
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- ELECTRICAL DWGS.
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### CODE APPROVALS

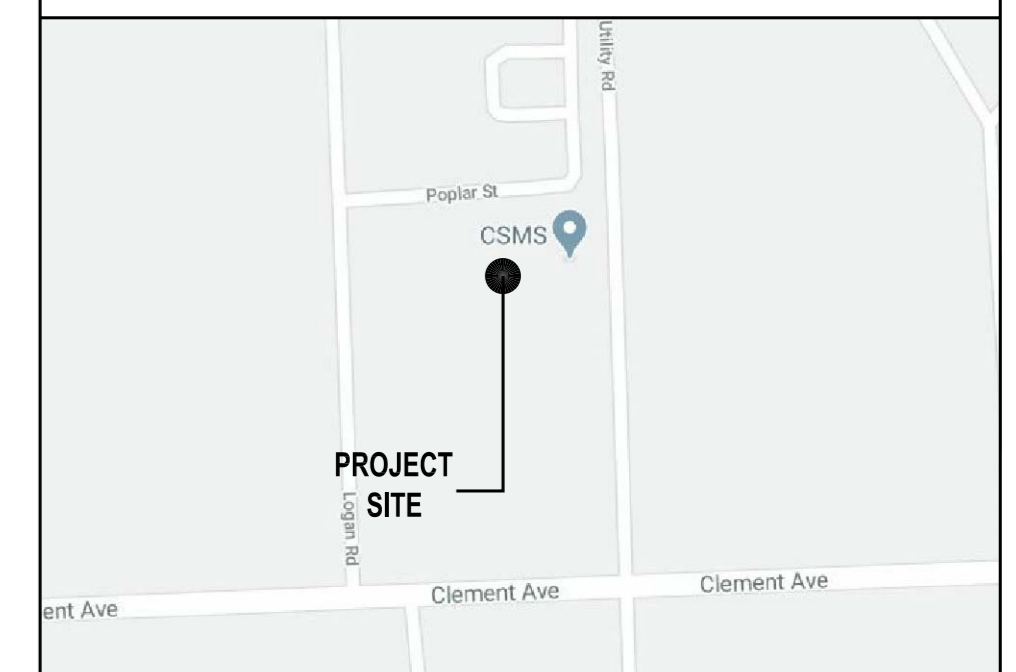
### PROJECT LOCATION MAP



### VICINITY MAP



### CAMPUS / KEY PLAN



Drawings Listed In Index:

BEA Electronic Approval \_\_\_\_\_ DATE \_\_\_\_\_

Professional's Signature \_\_\_\_\_ Date \_\_\_\_\_ Professional's Signature \_\_\_\_\_ Date \_\_\_\_\_

COMMONWEALTH OF PENNSYLVANIA  
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ANNVILLE, PENNSYLVANIA

DMVA PROJECT NO. 42080032

**NEW CSMS-EAST  
CALIBRATION LAB**  
AREA 10, FORT INDIANTOWN GAP  
LEBANON COUNTY, PENNSYLVANIA

### COVER SHEET

|                           |                     |                             |
|---------------------------|---------------------|-----------------------------|
| DRAWN BY<br>J. NYE        | DATE<br>6 APR. 2020 | DRAWING NO.<br><b>G.1.0</b> |
| CHECKED BY<br>R. FISHBURN | SCALE<br>AS NOTED   |                             |



**BUILDING CODE AND STANDARDS ANALYSIS**

**GENERAL INFORMATION:**

**OCCUPANCY GROUP:** "B" BUSINESS

**TYPE OF CONSTRUCTION:** TYPE III B

**ALLOWABLE HEIGHT AND BUILDING AREA:**  
 ALLOWABLE HEIGHT: 4 STORIES  
 ACTUAL HEIGHT: 1 STORY  
 ALLOWABLE AREA: 19,000 SQ. FT. PER FLOOR  
 ACTUAL AREA: 6,000 SQ. FT.

**FIRE RESISTANCE RATING REQUIRED FOR:** TYPE III B  
 STRUCTURAL FRAME: 0 - HOUR  
 BEARING WALLS EXTERIOR: 2 - HOUR  
 BEARING WALLS INTERIOR: 0 - HOUR  
 NON-BEARING WALLS EXTERIOR: 0 - HOUR  
 NON-BEARING WALLS INTERIOR: 0 - HOUR  
 FLOOR CONSTRUCTION: 0 - HOUR  
 ROOF CONSTRUCTION: 0 - HOUR

**MAXIMUM FLOOR ALLOWANCE PER OCCUPANT:** 100 SQ. FT. PER OCCUPANT

**ALLOWABLE (MAXIMUM) OCCUPANTS:** 60 PERSONS  
**FULL-TIME OCCUPANTS:** 22 PERSONS

**EGRESS INFORMATION:**

**IBC 1005.1 EGRESS WIDTH PER OCCUPANT:** WITHOUT SPRINKLER = 0.2/PERSON

**BUILDING OCCUPANCY:** 60 PERSONS @ 0.2 = 12.0 INCHES

**ACTUAL EGRESS WIDTHS:**  
 MAIN ENTRANCE: DOOR 001: 34 INCHES = 170 PERSONS  
 STORAGE ROOM: DOOR 002: 34 INCHES = 170 PERSONS  
 CALIBRATION LAB: DOOR 003: 34 INCHES = 170 PERSONS

**IBC 1014.3 COMMON PATH:** NOT APPLICABLE

**IBC 1016.1 EXIT ACCESS TRAVEL DISTANCE:** WITHOUT SPRINKLER = 200 FT

**IBC 1017.1 CORRIDOR FIRE RESISTANCE RATING:** NOT APPLICABLE

**IBC 1017.2 CORRIDOR WIDTHS:** 44 INCHES MINIMUM

**IBC 1017.3 DEAD END CORRIDORS:** NOT TO EXCEED 25 FT

**IBC 1019.1 NUMBER OF EXITS:** 1-500 OCCUPANTS = 2 EXITS MINIMUM

**BASIC DESIGN LOADS:**

**WIND LOADS (IBC):**  
 EXPOSURE: C  
 3 SECOND GUST: 90 MPH  
 FASTEST MILE WIND SPEED: 75 MPH

**SNOW LOADS (IBC):**  
 EXPOSURE: C  
 DESIGN LOAD: 30 LBS/SQ. FT.  
 EXPOSURE FACTOR: 0.9

**SEISMIC LOADS (IBC):** CATEGORY B

**THERMAL INSULATION VALUES:**  
 ZONE: 4  
 CEILING/ROOF: R38  
 WALL: R19  
 FLOOR: R19

**FROST PROTECTION:**  
 AVERAGE DEPTH: 15 IN.  
 DESIGN DEPTH: 36 IN.

**CODE AND STANDARD COMPLIANCE**

- GENERAL BUILDING CODE:**
- A. INTERNATIONAL BUILDING CODE (2015)
  - B. USGBC - LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN (LEED)
  - C. DEPARTMENT OF DEFENSE, UNIFIED FACILITIES CRITERIA (UFC 04-010-01): ANTI-TERRORISM STANDARDS FOR BUILDINGS
- STRUCTURAL:**
- A. ACI 318 - AMERICAN CONCRETE INSTITUTE: BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
- MECHANICAL:**
- A. INTERNATIONAL MECHANICAL CODE (2015)
  - B. INTERNATIONAL PLUMBING CODE (2015)
  - C. INTERNATIONAL FUEL GAS CODE (2015)
  - D. ASHRAE 90.1 - AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
- ELECTRICAL CODE:**
- A. NATIONAL ELECTRICAL CODE (2015)
  - B. INTERNATIONAL ENERGY CONSERVATION CODE (2015)
- FIRE AND SAFETY:**
- A. INTERNATIONAL FIRE CODE (2009)
  - B. NFPA 101, LIFE SAFETY CODE (2009)
  - C. OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
- TESTING AND MATERIALS:**
- A. ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS
  - B. UL - UNDERWRITER LABORATORIES

**GENERAL NOTES**

1. CONTRACTOR SHALL VERIFY FIELD CONDITIONS AND DIMENSIONS AND REPORT DISCREPANCIES TO GOVERNMENT DESIGN PROFESSIONAL PRIOR TO COMMENCEMENT OF WORK.
2. EXTERIOR DIMENSIONS SHOWN ON DRAWINGS ARE FINISHED FACE TO FINISHED FACE, UNLESS DEPICTED OTHERWISE.
3. INTERIOR DIMENSIONS SHOWN ON DRAWINGS ARE CENTER OF WALL TO CENTER OF WALL, UNLESS DEPICTED OTHERWISE.
4. DETAILS ARE TYPICAL AND SHOW COMMON PRACTICE. CONTRACTOR SHALL INCORPORATE THESE DETAILS INTO THE PROJECT AT APPROPRIATE LOCATIONS WHERE CONDITIONS ARE SIMILAR AND WHETHER SPECIFICALLY INDICATED OR NOT.
5. DRAWINGS DEPICT COMMON PRACTICES AND ARE DIAGRAMMATIC. CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ALL NECESSARY COMPONENTS NEEDED FOR A COMPLETE AND FUNCTIONAL FACILITY.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR FOLLOWING ALL APPLICABLE CODE REGULATIONS. ASPECTS NOT DETAILED WITHIN THE DESIGN DOCUMENTS SHALL BE INCORPORATED AS NECESSARY TO MEET ALL GOVERNMENT CODE REQUIREMENTS.
7. EQUIPMENT AND MATERIALS DESIGNATED AS "NO SUBSTITUTIONS" ARE FORT INDIANTOWN GAP STANDARDS AND SHALL BE PROVIDED AS DETAILED ON DRAWINGS AND OUTLINED WITHIN PROJECT SPECIFICATIONS.
8. GENERAL ("PRIME") CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF WORK WITH THAT OF ALL OTHER TRADES.

**DRAWING INTERPRETATION**

DETAILS INDICATED ON THE DRAWINGS, BOTH TYPICAL (TYP.) AND SPECIFIC, SHALL APPLY TO ALL SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. THE APPLICABILITY OF THE DETAIL TO ITS LOCATION ON THE PLANS CAN BE DETERMINED BY THE TITLE OF THE DETAIL. SUCH DETAILS SHALL APPLY WHETHER OR NOT THEY ARE KEYPED AT EACH LOCATION. DECISIONS REGARDING THE APPLICABILITY OF DETAILS SHOWN SHALL BE DETERMINED BY THE GOVERNMENT DESIGN PROFESSIONAL AND/OR THE GOVERNMENT CONSTRUCTION MANAGEMENT SPECIALIST.

**SOIL ANALYSIS**

| MAP SYMBOL AND SOIL NAME      | RESTRICTIVE LAYER    |                   |           |                        | SUBSIDENCE |       | POTENTIAL FOR FROST ACTION | RISK OF CORROSION |          |
|-------------------------------|----------------------|-------------------|-----------|------------------------|------------|-------|----------------------------|-------------------|----------|
|                               | KIND                 | DEPTH TO TOP (IN) | THICKNESS | HARDNESS               | INITIAL    | TOTAL |                            | UNCOATED STEEL    | CONCRETE |
| UkgD URBAN LAND BERKS COMPLEX | 10-20 LITHIC BEDROCK | 10-100            | NA        | VERY STRONGLY CEMENTED | 0          | 0     | HIGH                       | MOD               | MOD      |

**ARCHITECTURAL**

|  |                                       |   |
|--|---------------------------------------|---|
| ABV ABOVE                                    | EPDM ETHYLENE-PROPYLENE-DIENE-MONOMER | PNL PANEL                               |
| ADA AMERICANS w/ DISABILITIES ACT            | FAB FABRICATE                         | PNT PAINT                               |
| ACST ACOUSTIC                                | FBD FIBERBOARD                        | PORC PORCELAIN                          |
| ADDL ADDITIONAL                              | FF FINISHED FLOOR                     | PR PAIR                                 |
| ADJ ADJACENT                                 | FIN FINISH                            | PREFAB PREFABRICATED                    |
| A & E ARCHITECTURAL & ENGINEERING            | FL FLASHING                           | PROJ PROJECT                            |
| AFF ABOVE FINISHED FLOOR                     | FLEX FLEXIBLE                         | PT POINT                                |
| AL ALUMINUM                                  | FLG FLANGE                            | PTD PAINTED                             |
| ALT ALTERNATE                                | FLR FLOOR                             | PTN PARTITION                           |
| ARCH ARCHITECTURAL                           | FLRG FLOORING                         | QTF QUARRY TILE FLOOR                   |
| ASB ASBESTOS                                 | FRP FIBERGLASS-REINFORCED PLASTIC     | R RADIUS                                |
| ASPHRS ASPHALT ROOF SHINGLES                 | FT FOOT                               | RS RISER                                |
| ASSOC ASSOCIATION                            | FTG FOOTING                           | REFRG REFRIGERATOR                      |
| ASST ASSISTANT                               | FURN FURNITURE                        | REINF REINFORCED                        |
| ASSY ASSEMBLY                                | GAR GARAGE                            | REQD REQUIRED                           |
| AVG AVERAGE                                  | GL GLASS                              | REV REVISION                            |
| AWI ALTERNATE WORK ITEM                      | GRD GROUND                            | RFG ROOFING                             |
| B BOTTOM                                     | GWB GYPSUM WALLBOARD                  | RH RIGHT HAND                           |
| BALC BALCONY                                 | GYP GYPSUM                            | RM ROOM                                 |
| BD BOARD                                     | H HIGH                                | S SOUTH                                 |
| BETW BETWEEN                                 | HDWE HARDWARE                         | SAPC SUSPENDED ACOUSTICAL PANEL CEILING |
| BLDG BUILDING                                | HM HOLLOW METAL                       | SCHD SCHEDULE                           |
| BP BASE PLATE                                | HMD HOLLOW METAL DOOR                 | SDG SIDING                              |
| BS BOTH SIDE                                 | HORIZ HORIZONTAL                      | SEC SECTION                             |
| BSMT BASEMENT                                | HT HEIGHT                             | SMS SEAMLESS                            |
| CAB CABINET                                  | ID INSIDE DIAMETER                    | SF SQUARE FOOT                          |
| CAP CAPACITY                                 | IE THAT IS                            | SHT SHEET                               |
| CARP CARPET                                  | IN INCHES                             | SIM SIMILAR                             |
| CDR COILING DOOR                             | INSUL INSULATION                      | SKY SKYLIGHT                            |
| CER CERAMIC TILE                             | INTR INTERIOR                         | SLDR SLIDING DOOR                       |
| CL CENTER LINE                               | JST JOIST                             | SMLS SEAMLESS                           |
| CLG CEILING                                  | LAB LABORATORY                        | SPEC SPECIFICATION                      |
| CLO CLOSET                                   | LAM LAMINATE                          | SPKR SPEAKER                            |
| CNCL CONCEALED                               | LF LINEAR FOOT                        | SQ SQUARE                               |
| CO COMPANY                                   | LG LENGTH                             | SS STAINLESS STEEL                      |
| COMP COMPOSITION                             | LH LEFT HAND                          | STD STANDARD                            |
| CONSTR CONSTRUCTION                          | LIB LIBRARY                           | STOR STORAGE                            |
| CONTR CONTRACTOR                             | LN LINEAR                             | STWY STAIRWAY                           |
| CRV CURVED                                   | LT LIGHT                              | SUPT SUPERINTENDENT                     |
| CSK COUNTERSINK                              | MAINT MAINTENANCE                     | SUPR SUPERVISOR                         |
| CID COATED                                   | MATL MATERIAL                         | SURF SURFACE                            |
| CTR CENTER                                   | MAX MAXIMUM                           | SUSP SUSPENDED/SUSPENSION               |
| CU.YD. CUBIC YARD                            | MEMB MEMBRANE                         | SYS SYSTEM                              |
| DBL DOUBLE                                   | MEZZ MEZZANINE                        | T TREAD                                 |
| DEG DEGREE                                   | MFR MANUFACTURER                      | T & B TOP & BOTTOM                      |
| DEPT DEPARTMENT                              | MGR MANAGER                           | T & G TONGUE & GROOVE                   |
| DET DETAIL                                   | MIN MINIMUM                           | TAN TANGENT                             |
| DGL DIAGONAL                                 | MISC MISCELLANEOUS                    | TEMP TEMPORARY                          |
| DIA DIAMETER                                 | MET METAL                             | TER TERRAZZO                            |
| DM DIMENSION                                 | ML METAL LATH                         | THRU THROUGH                            |
| DIV DIVISION                                 | MOLD MOLDING                          | TRTD TREATED                            |
| DMPF DAMP PROOFING                           | MWP METAL LATH & PLASTER              | TYP TYPICAL                             |
| DN DOWN                                      | MNT MOUNTING                          | UNO UNLESS NOTED OTHERWISE              |
| DP DEMOUNTABLE PARTITION                     | NA NOT APPLICABLE                     | VAT VINYL ASBESTOS TILE                 |
| DR DOOR                                      | NC NOT IN CONTRACT                    | VCT VINYL COMPOSITE TILE                |
| DS DOWN SPOUT                                | NO NUMBER                             | VERT VERTICAL                           |
| DW DISHWASHER                                | NRC NOISE REDUCTION                   | W WEST                                  |
| DWG DRAWING                                  | NTS NOT TO SCALE                      | W/ WITH                                 |
| EA EACH                                      | OA OVERALL                            | W/O WITHOUT                             |
| E & S EXTERIOR INSULATION & FINISHING SYSTEM | OC ON CENTER                          | WBD WALLBOARD                           |
| EIS EROSION & SEDIMENTATION                  | OD OUTSIDE DIAMETER                   | WD WOOD                                 |
| EIS ENVIRONMENTAL IMPACT STUDY               | OFF OFFICE                            | WDR WOOD DOOR                           |
| ELEV ELEVATOR                                | OH OPPOSITE HAND                      | WTRPFR WATERPROOFING                    |
| ENTR ENTRANCE                                | OHDR OVERHEAD DOOR                    | WYF WELDED WIRE FABRIC                  |
| EQ EQUIP                                     | OPNG OPENING                          | YD YARDS                                |
| EQIP EQUIPMENT                               | OPP OPPOSITE                          |   |
| EXIST EXISTING                               | OPRF OPERATED                         |   |
| EXP EXPANSION                                | PLAS PLASTER                          |   |
| EXT EXTERIOR                                 | PLYWD PLYWOOD                         |   |

**CIVIL**

|  |                              |
|--|------------------------------|
| ASPH ASPHALT                                 | AVEN AVENUE                  |
| B.G. BELOW GRADE                             | BM BENCHMARK                 |
| BLU BOILER                                   | B.O. BOTTOM OF               |
| BLU BRITISH THERMAL UNIT                     | CLR CLEAR                    |
| BLU BRITISH THERMAL UNIT PER HOUR            | D DEPTH                      |
| CFM CUBIC FEET PER MINUTE                    | ELEV ELEVATION               |
| CUH CUBIC FEET PER HOUR                      | FFE FINISHED FLOOR ELEVATION |
| EA EXHAUST AIR                               | GR GRADE                     |
| EBB ELECTRIC BASEBOARD                       | GRD GROUND                   |
| EEF ENERGY EFFICIENCY RATING                 | GVL GRAVEL                   |
| EXH EXHAUST                                  | HPT HIGH POINT               |
| F FAHRENHEIT                                 | LPT LOW POINT                |
| FA FRESH AIR                                 | MH MANHOLE                   |
| FD FIRE DAMPER                               | OE OVERHEAD ELECTRIC         |
| G GAS  | OT OVERHEAD TELEPHONE        |
| HP HORSE POWER                               | P/L PROPERTY LINE            |
| HTR HEATER                                   | RD ROAD                      |
| HVAC HEATING, VENTILATION & AIR CONDITIONING | SS SANITARY SEWER            |
| LAT LEAVING AIR TEMPERATURE                  | SW STORM WATER               |
| MBH THOUSAND BTU'S PER HOUR                  | TBR TO BE REMOVED            |
| MOD MOTOR OPERATED DAMPER                    | T.O. TOP OF                  |
| OA OUTSIDE AIR                               | UE UNDERGROUND ELECTRIC      |
| P PROPANE                                    | UP UNDERGROUND TELEPHONE     |
| RA RETURN AIR                                | UT UNDERGROUND TELEPHONE     |
| RR RETURN REGISTER                           | WTR WATER                    |
| RTU ROOF TOP UNIT                            |                              |
| SA SUPPLY AIR                                |                              |
| SR SUPPLY REGISTER                           |                              |
| T-STAT THERMOSTAT                            |                              |
| TEMP TEMPERATURE                             |                              |
| U.C. UNDERCUT                                |                              |
| WALL HEATER                                  |                              |
| VAV VARIABLE AIR VOLUME                      |                              |

**HVAC**

|                                      |  |
|--------------------------------------|--|
| AC AIR CONDITIONING                  | AHU AIR HANDLING UNIT                        |
| A.T.C. AUTOMATIC TEMPERATURE CONTROL | B.L.R. BOILER                                |
| FA-PS FIRE ALARM PULL STATION        | B.T.U. BRITISH THERMAL UNIT                  |
| FA-HS FIRE ALARM HORN/STROBE         | CLR CLEAR                                    |
| FDC FIRE DEPARTMENT CONNECTION       | CFM CUBIC FEET PER MINUTE                    |
| FDR FIRE DOOR                        | CUH CUBIC FEET PER HOUR                      |
| FE FIRE EXTINGUISHER                 | EA EXHAUST AIR                               |
| FEC FIRE EXTINGUISHER & CABINET      | EBB ELECTRIC BASEBOARD                       |
| FH FIRE HYDRANT                      | EEF ENERGY EFFICIENCY RATING                 |
| FSH FIRE SUPPRESSION HOOD            | EXH EXHAUST                                  |
| SD SMOKE DETECTOR                    | F FAHRENHEIT                                 |
| SPR SPRINKLER                        | FA FRESH AIR                                 |
|                                      | FD FIRE DAMPER                               |
|                                      | G GAS  |
|                                      | HP HORSE POWER                               |
|                                      | HTR HEATER                                   |
|                                      | HVAC HEATING, VENTILATION & AIR CONDITIONING |
|                                      | LAT LEAVING AIR TEMPERATURE                  |
|                                      | MBH THOUSAND BTU'S PER HOUR                  |
|                                      | MOD MOTOR OPERATED DAMPER                    |
|                                      | OA OUTSIDE AIR                               |
|                                      | P PROPANE                                    |
|                                      | RA RETURN AIR                                |
|                                      | RR RETURN REGISTER                           |
|                                      | RTU ROOF TOP UNIT                            |
|                                      | SA SUPPLY AIR                                |
|                                      | SR SUPPLY REGISTER                           |
|                                      | T-STAT THERMOSTAT                            |
|                                      | TEMP TEMPERATURE                             |
|                                      | U.C. UNDERCUT                                |
|                                      | WALL HEATER                                  |
|                                      | VAV VARIABLE AIR VOLUME                      |

**FIRE PROTECTION**

|                                      |
|--------------------------------------|
| Co2 CARBON DIOXIDE                   |
| FA FIRE ALARM                        |
| A.T.C. AUTOMATIC TEMPERATURE CONTROL |
| FA-PS FIRE ALARM PULL STATION        |
| FA-HS FIRE ALARM HORN/STROBE         |
| FDC FIRE DEPARTMENT CONNECTION       |
| FDR FIRE DOOR                        |
| FE FIRE EXTINGUISHER                 |
| FEC FIRE EXTINGUISHER & CABINET      |
| FH FIRE HYDRANT                      |
| FSH FIRE SUPPRESSION HOOD            |
| SD SMOKE DETECTOR                    |
| SPR SPRINKLER                        |

**STRUCTURAL**

|                                     |
|-------------------------------------|
| B BEAM                              |
| BRDG BRIDGING                       |
| BRC BEARING                         |
| CJ CONTROL JOINT                    |
| CMU CONCRETE MASONRY INSULATED UNIT |
| CMU CONCRETE MASONRY UNIT           |
| DL DEAD LOAD                        |
| FDN FOUNDATION                      |
| GA GAUGE                            |
| GALV GALVANIZED                     |
| LL LEVEL LOAD                       |
| LWC LIGHTWEIGHT CONCRETE            |
| MAS MASONRY                         |
| MO MASONRY OPENING                  |
| PL PLATE                            |
| PSF POUNDS PER SQUARE FOOT          |
| PSI POUNDS PER SQUARE INCH          |
| STL STEEL                           |
| STRUCT STRUCTURAL                   |
| SJ SAW JOINT                        |

**GOVERNMENT/MILITARY**

|   |
|---|
| COVT GOVERNMENT                                     |
| MILT MILITARY                                       |
| EC ELECTRICAL CONTRACTOR                            |
| GC GENERAL CONTRACTOR                               |
| EHV ELECTRIC WATER COOLER                           |
| EMW ELECTRIC WATER HEATER                           |
| MC MECHANICAL CONTRACTOR                            |
| PC PLUMBING CONTRACTOR                              |
| COR CONTRACTING OFFICE REPRESENTATIVE               |
| GOVT GOVERNMENT INSPECTOR                           |
| BFE BUREAU OF FACILITIES & ENGINEERING              |
| BFE-ENG ENGINEERING DIVISION (BLDG. 0-10)           |
| BFE-EW ENVIRONMENTAL DIVISION (BLDG. 0-11)          |
| BFE-MAINT MAINTENANCE DIVISION (BLDG. 11-64)        |
| FTIC FORT INDIANTOWN GAP                            |
| PFO PURCHASING & CONTRACTING (BLDG. 0-47)           |
| TSC TRAINING SITE COMMAND (BLDG. T-0-1)             |
| TSFE TRAINING SITE FACILITY ENGINEERS (BLDG. 11-12) |
| FPD FORCE PROTECTION DISTANCE                       |
| POC POINT OF CONTACT                                |

**LEGEND**

|  |                             |
|--|-----------------------------|
|  | FULL HEIGHT/INSULATED WALLS |
|  | INSULATED WALLS             |
|  | LANDSCAPING FABRIC          |
|  | CONCRETE MASONRY UNITS      |
|  | CONCRETE                    |
|  | GYP. BOARD                  |
|  | EARTH                       |
|  | GRAVEL                      |
|  | BATT INSULATION             |
|  | GLASS                       |
|  | CMU - ELEVATION             |

**SYMBOLS**

**SECTION REFERENCE**

SECTION NUMBER

SHEET WHERE SECTION IS DRAWN

**DETAIL REFERENCE**

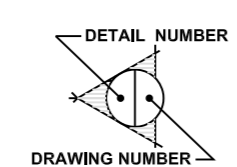
DETAIL NUMBER

SHEET WHERE DETAIL IS DRAWN

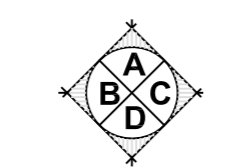
**ELEVATION REFERENCE**

SHEET WHERE ELEVATION IS DRAWN

**DETAIL KEY**



**WALL REFERENCE**



**OPENING TYPE SYMBOLS**

WINDOW TYPE SYMBOL

DOOR TYPE SYMBOL

LOCATION: AREA 10 - FORT INDIANTOWN GAP ANNVILLE, PA 17003

PROJECT: NEW CSMS - EAST CALIBRATION LAB

DESIGNED BY: J. NYE  
 DRAWN BY: J. NYE  
 REVIEWED BY: R. FISHERN

DATE: 6 APR. 2020  
 PROJECT NO.: 42080032  
 SCALE: AS NOTED

REVISIONS:

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
|     |      |             |
|     |      |             |

DRAWING NO. G.1.2

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. DIMENSIONS SHALL BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.





**SITE / CIVIL LEGEND**

| EXISTING                              | PROPOSED                              |                             |
|---------------------------------------|---------------------------------------|-----------------------------|
| 450                                   | 450                                   | CONTOUR LINE                |
| SS — SS                               | SS — SS                               | SANITARY SEWER              |
| — —                                   | — —                                   | WATER LINE                  |
| — —                                   | — —                                   | ELECTRIC - UNDERGROUND      |
| — —                                   | — —                                   | ELECTRIC - OVERHEAD         |
| — —                                   | — —                                   | FENCELINE                   |
| — —                                   | — —                                   | COMMUNICATION - UNDERGROUND |
| — GAS — GAS                           | — GAS — GAS                           | PROPANE                     |
| — —                                   | — —                                   | STORM SEWER                 |
| — —                                   | — —                                   | TREE LINE                   |
| — —                                   | — —                                   | SILT FENCE                  |
| — —                                   | — —                                   | EROSION FILTER SOCK         |
| — —                                   | — —                                   | LIMIT OF DISTURBANCE        |
| CL MH<br>RIM = 443.70<br>INV = 436.85 | CL MH<br>RIM = 443.70<br>INV = 436.85 | WATER VALVE                 |
| 447.75                                | 447.75                                | GAS VALVE                   |
| 447.75                                | 447.75                                | MANHOLE                     |
| BENCHMARK                             | BENCHMARK                             | SPOT ELEVATION              |
| BENCHMARK                             | BENCHMARK                             | BENCHMARK ELEVATION         |
| — —                                   | — —                                   | FLOW ARROW                  |
| — —                                   | — —                                   | TEMPORARY ROCK FILTER       |
| — —                                   | — —                                   | UTILITY POLE                |
| — —                                   | — —                                   | FIRE HAYDRANT               |
| — —                                   | — —                                   | CONCRETE HATCH              |

**GENERAL NOTES**

1. THE CONTRACTOR IS REQUIRED TO SUBMIT A REQUEST FOR A DIGGING PERMIT, THROUGH THE BUREAU OF RESERVATION MAINTENANCE (BRM), BUILDING 11-64, 10 DAYS PRIOR TO CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL UTILITY LOCATIONS PRIOR TO THE START OF WORK AND INCLUDE THESE MARKING LOCATIONS ON THE AS-BUILT DRAWINGS. THE CONTRACTOR WILL COORDINATE WITH THE BRM (BLDG. 11-64) IN THE VERIFICATION OF THE EXISTING UTILITIES.
2. THE CONTRACTOR WILL PROVIDE 3 DAY NOTICE PRIOR TO ALL UTILITY CONNECTIONS. THE CONTRACTOR WILL NOTIFY BRM UPON COMPLETION OF THE CONNECTIONS, BUT PRIOR TO BACKFILLING. THE CONTRACTOR WILL NOT BACKFILL ANY UTILITY CONNECTIONS UNTIL BRM INSPECTS AND APPROVES THE WORK.
3. SURVEY AND REFERENCE DATUM WAS ACQUIRED FROM A "RETTEW AND ASSOCIATES" DRAWING, FOR THE DEPARTMENT OF MILITARY AND VETERANS AFFAIRS, TITLED "SURVEY BOUNDARY PLAN", DATED 30 SEPTEMBER 2000.

**EXISTING SITE PLAN**

SCALE: 1" = 20'  
SCALE IN FEET



PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING G-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

PROFESSIONAL SEAL

LOCATION:  
AREA 10  
FT. INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

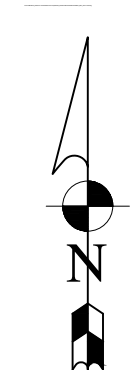
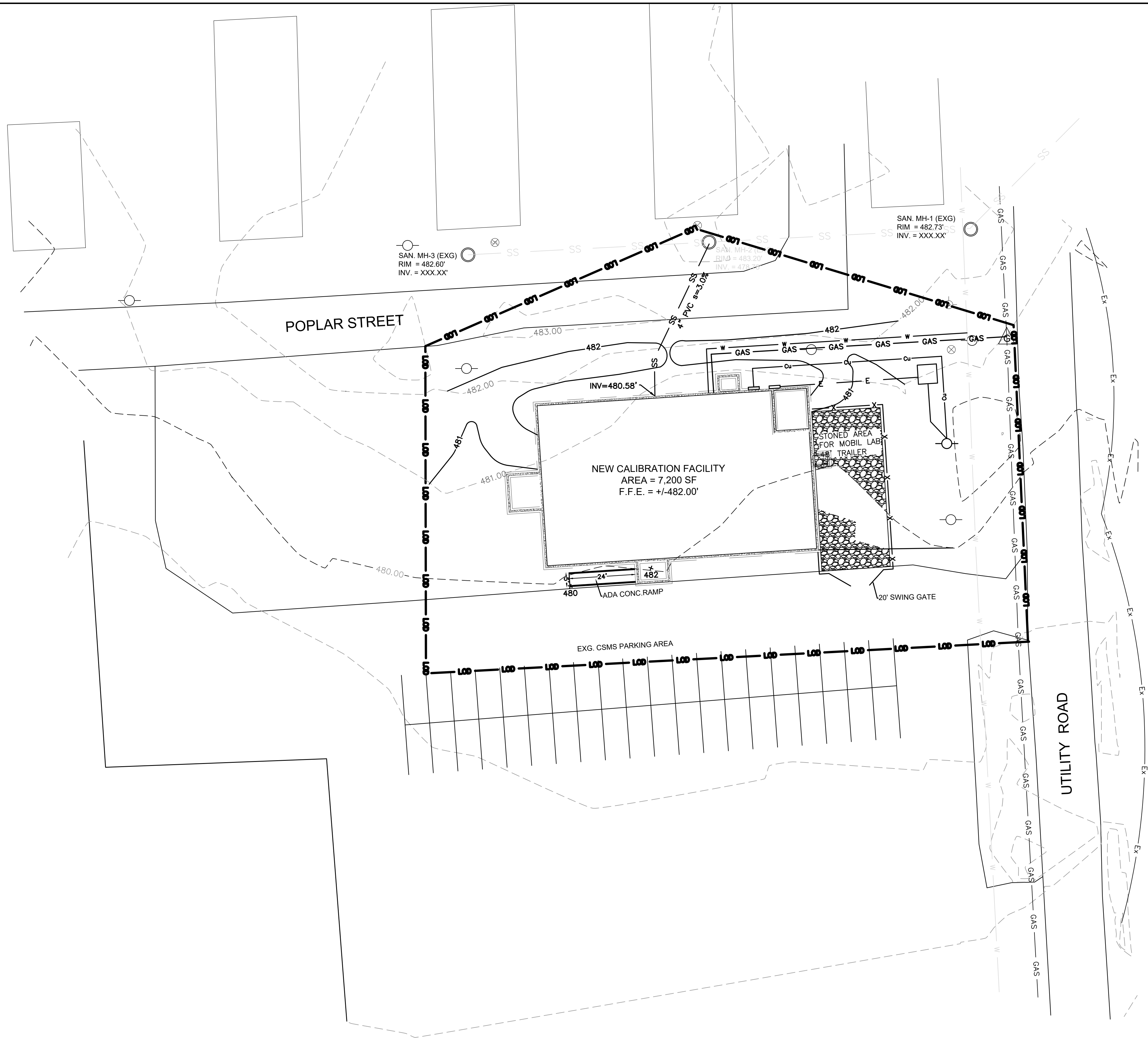
| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
|           |     |      |             |

|             |             |             |          |
|-------------|-------------|-------------|----------|
| DESIGNED BY | K. LLOYD    | DATE        | 4-8-20   |
| DRAWN BY    | K. LLOYD    | PROJECT NO. | 42080032 |
| REVIEWED BY | R. DAUTRICH | SCALE       | AS NOTED |

DRAWING:  
EXISTING  
SITE PLAN

DRAWING NO.  
**C.1.0**

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.



**SITE / CIVIL LEGEND**

| EXISTING | PROPOSED |                             |
|----------|----------|-----------------------------|
| 450      | 450      | CONTOUR LINE                |
| SS       | SS       | SANITARY SEWER              |
| W        | W        | WATER LINE                  |
| E        | E        | ELECTRIC - UNDERGROUND      |
| E        | E        | ELECTRIC - OVERHEAD         |
| ---      | ---      | FENCELINE                   |
| ---      | ---      | COMMUNICATION - UNDERGROUND |
| GAS      | GAS      | PROPANE                     |
| ---      | ---      | STORM SEWER                 |
| ---      | ---      | TREE LINE                   |
| ---      | ---      | SILT FENCE                  |
| ---      | ---      | EROSION FILTER SOCK         |
| ---      | ---      | LIMIT OF DISTURBANCE        |
| △        | △        | WATER VALVE                 |
| ○        | ○        | MANHOLE                     |
| 447.75   | 447.75   | SPOT ELEVATION              |
| △        | △        | BENCHMARK ELEVATION         |
| →        | →        | FLOW ARROW                  |
| ○        | ○        | TEMPORARY ROCK FILTER       |
| ○        | ○        | UTILITY POLE                |
| +        | +        | FIRE HYDRANT                |
| □        | □        | CONCRETE HATCH              |

**GENERAL NOTES**

1. THE CONTRACTOR IS REQUIRED TO SUBMIT A REQUEST FOR A DIGGING PERMIT, THROUGH THE BUREAU OF RESERVATION MAINTENANCE (BRM), BUILDING 11-64, 10 DAYS PRIOR TO CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL UTILITY LOCATIONS PRIOR TO THE START OF WORK AND INCLUDE THESE MARKING LOCATIONS ON THE AS-BUILT DRAWINGS. THE CONTRACTOR WILL COORDINATE WITH THE BRM (BLDG. 11-64) IN THE VERIFICATION OF THE EXISTING UTILITIES.
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**PROPOSED SITE PLAN**  
 SCALE: 1" = 20'  
 SCALE IN FEET 20' 10' 0' 20' 40'

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING G-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

PROFESSIONAL SEAL

LOCATION: AREA 10  
 FT. INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT: NEW CSMS  
 CALIBRATION LAB

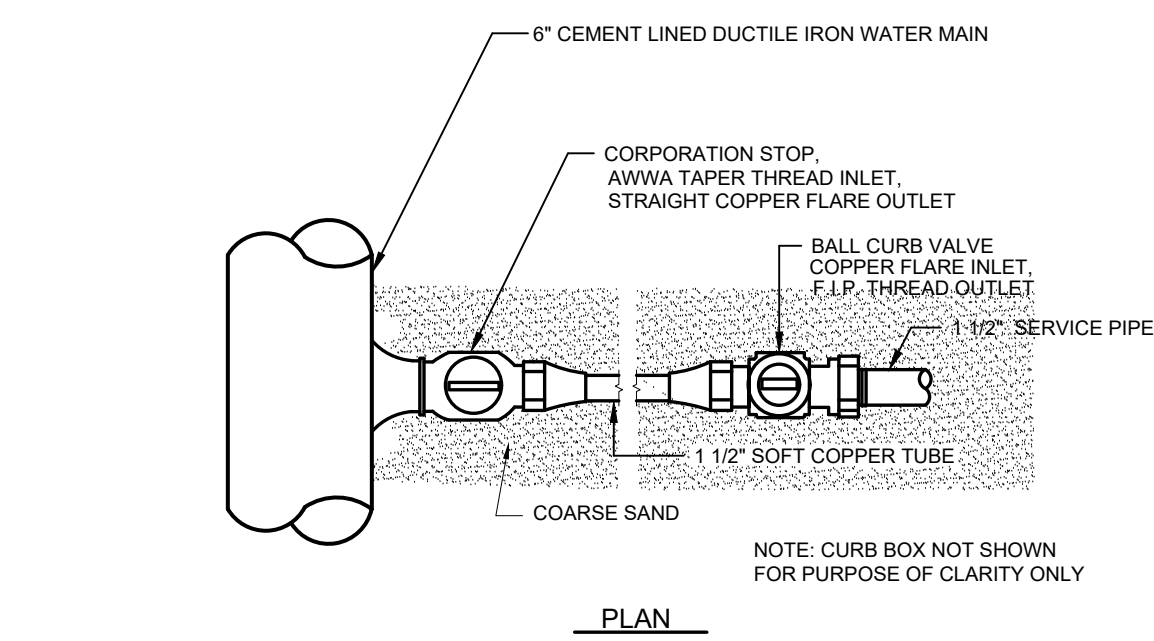
| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
|           |     |      |             |

|             |             |             |          |
|-------------|-------------|-------------|----------|
| DESIGNED BY | K. LLOYD    | DATE        | 4-8-20   |
| DRAWN BY    | K. LLOYD    | PROJECT NO. | 42080032 |
| REVIEWED BY | R. DAUTRICH | SCALE       | AS NOTED |

DRAWING: PROPOSED  
 SITE PLAN

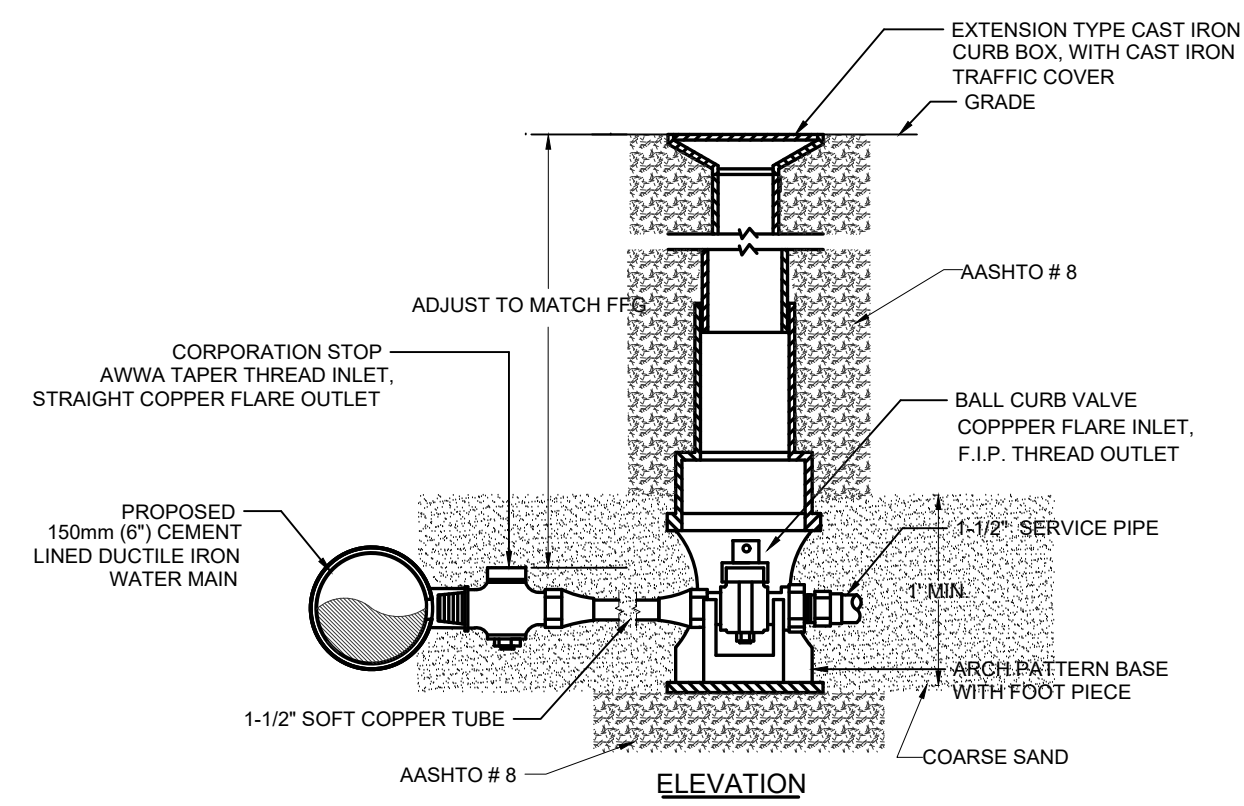
DRAWING NO. C.2.0

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THE DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.



NOTE: CURB BOX NOT SHOWN FOR PURPOSE OF CLARITY ONLY

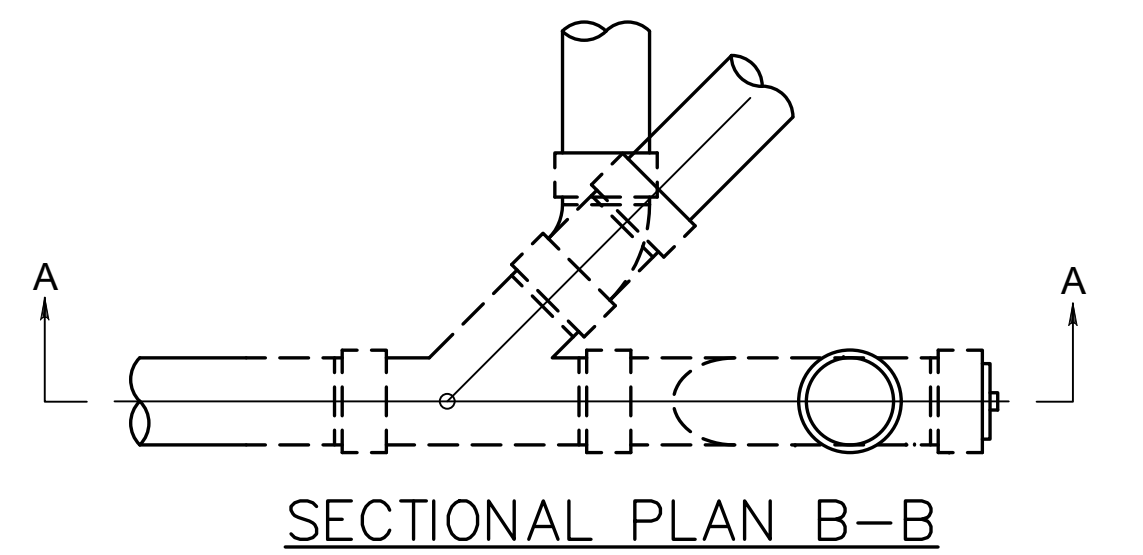
PLAN



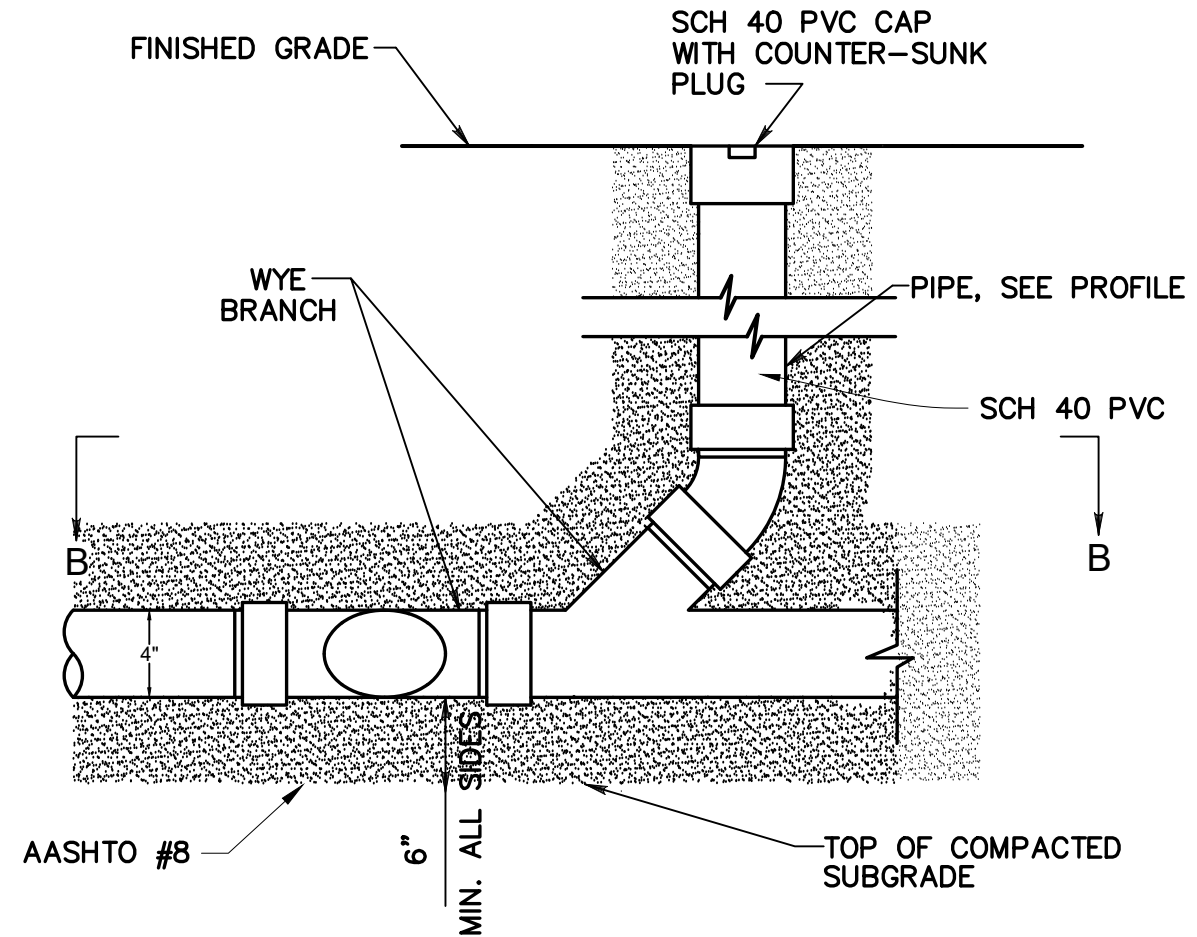
ELEVATION

**1 WATER LATERAL DETAIL**

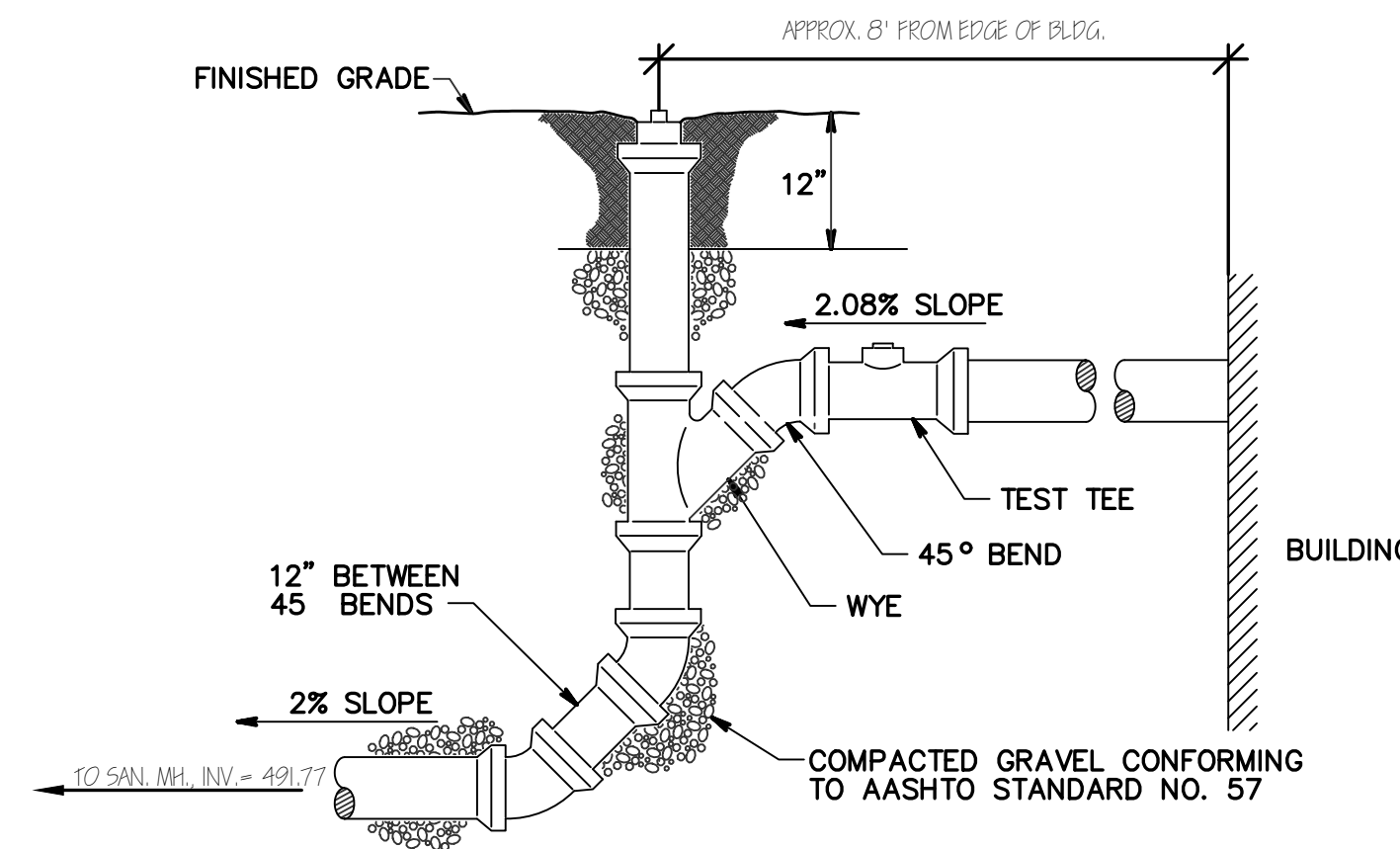
C.2.1 NOT TO SCALE



SECTIONAL PLAN B-B

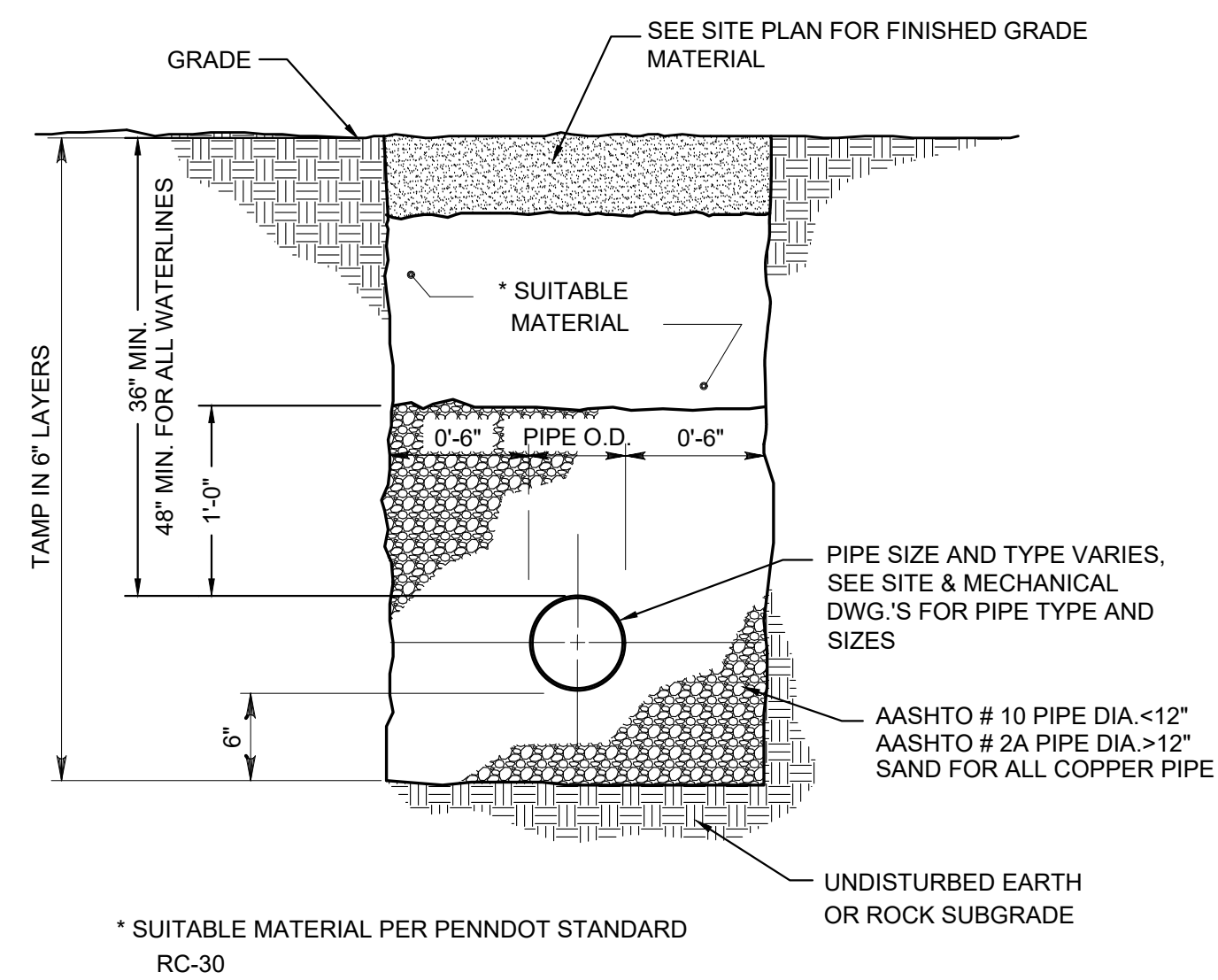


SECTION A-A



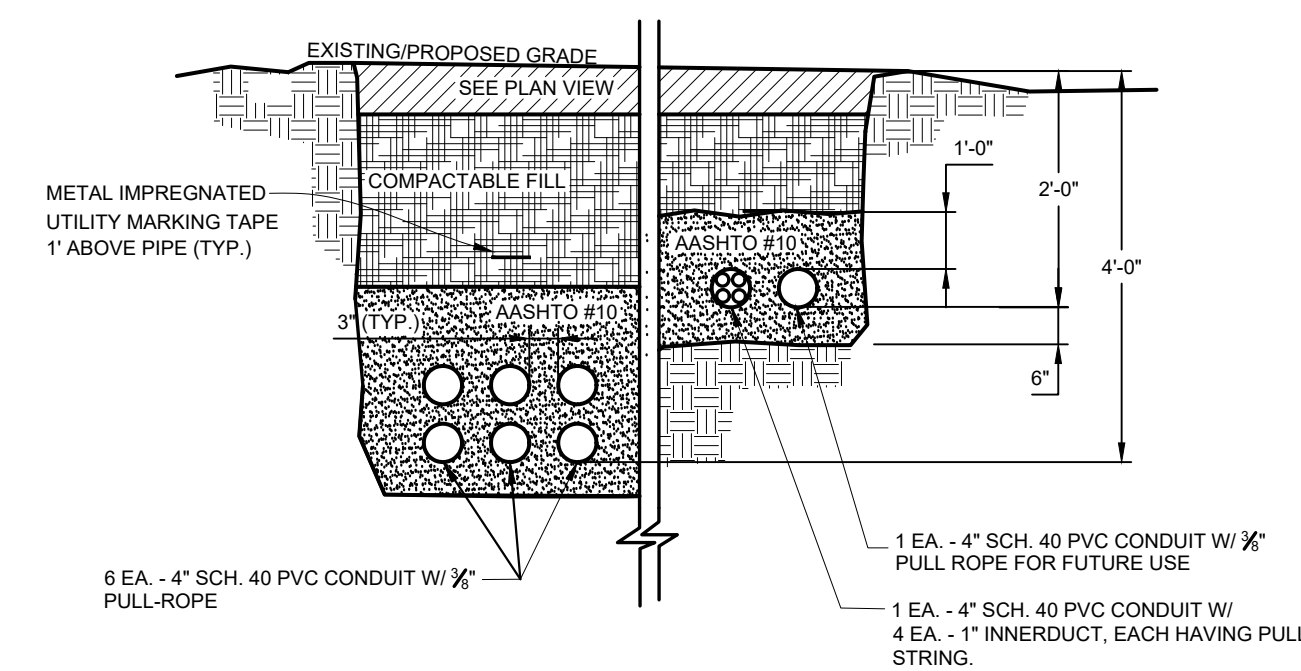
**2 SEWER LATERAL DETAILS**

- C.2.1 NOT TO SCALE
- NOTES
1. PLUMBER SHALL CUT THE VERTICAL RISER AT THE REQUIRED ELEVATION TO SERVICE THE FIRST FLOOR AND INSTALL A WYE, A 45 DEGREE FITTING, AND TEST TEE. THE VERTICAL RISER SHALL THEN BE EXTENDED TO SURFACE GRADE AND PLUGGED TO SERVE AS A CLEANOUT.
  2. THE LATERAL RISER PIPE AND FITTINGS SHALL BE OF THE SAME MATERIAL AS THE MAIN SEWER TO THE POINT WHERE THE PLUMBER CUTS THE VERTICAL RISER. PVC PIPE AND FITTINGS MAY THEN BE USED FOR THE HOUSE LATERAL.



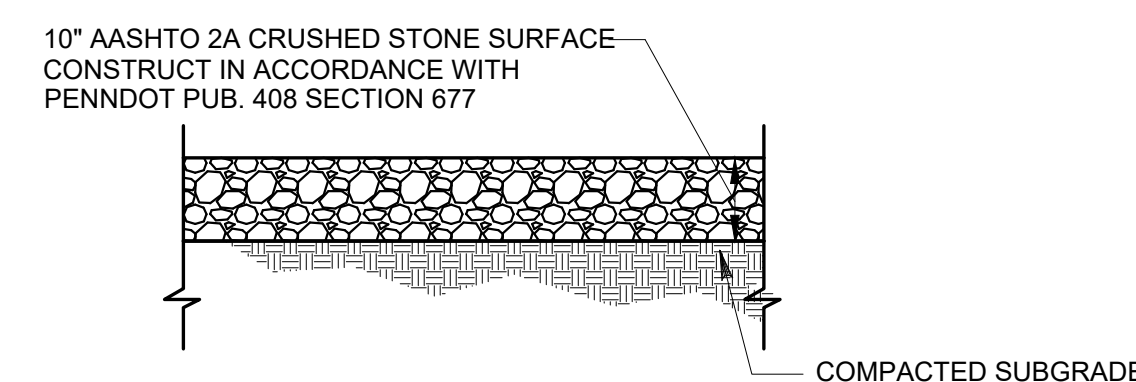
**3 TYPICAL UTILITY TRENCH DETAIL**

C.2.1 NOT TO SCALE



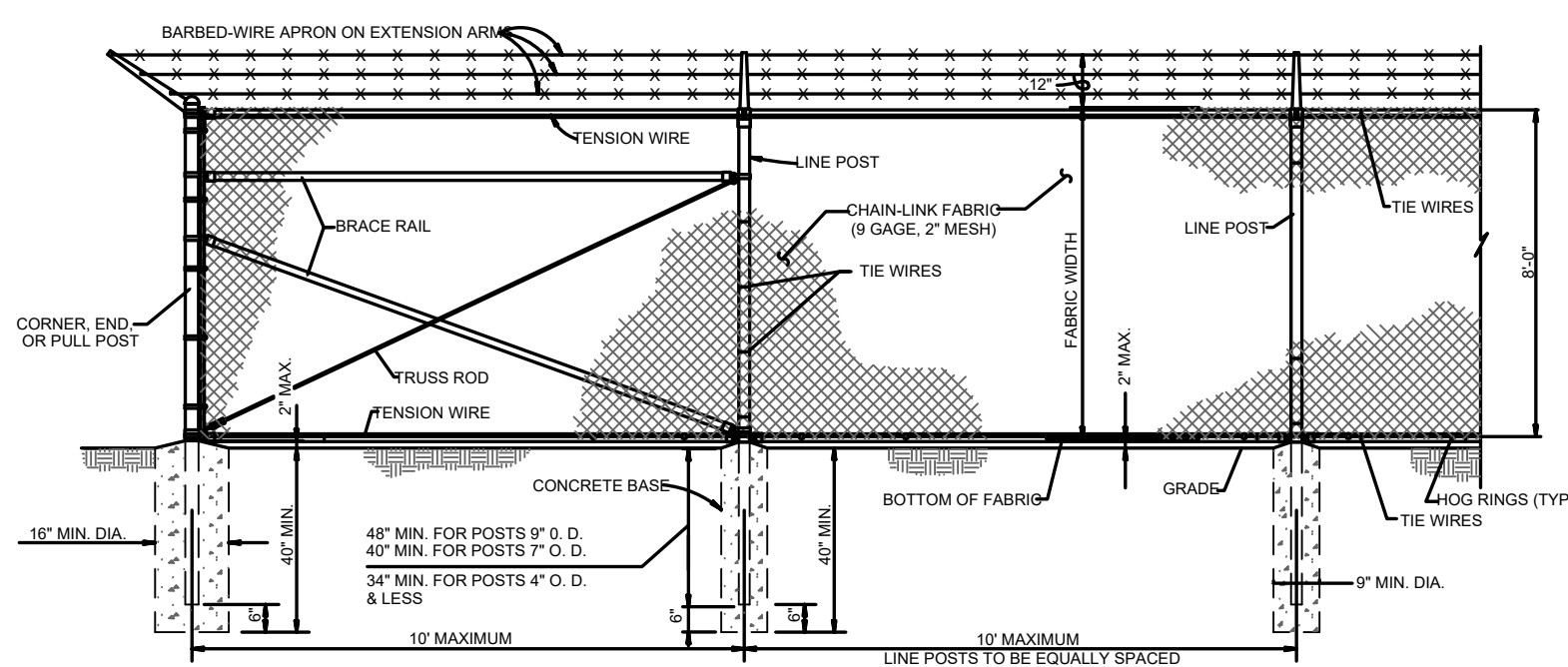
**4 CONDUIT DETAILS**

C.2.1 NOT TO SCALE



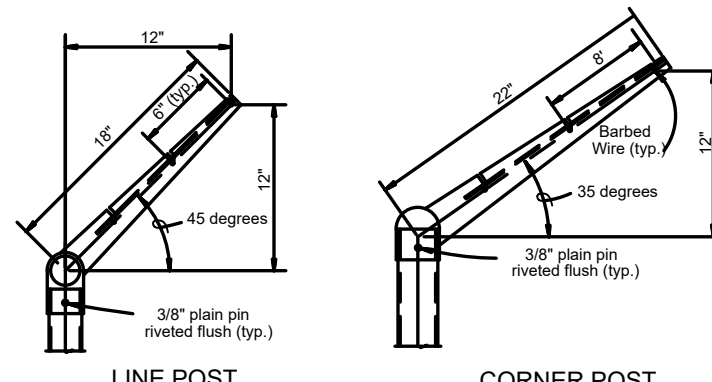
**5 GRAVEL PAD DETAIL**

C.2.1 NOT TO SCALE



**CHAIN-LINK FENCE DETAIL**

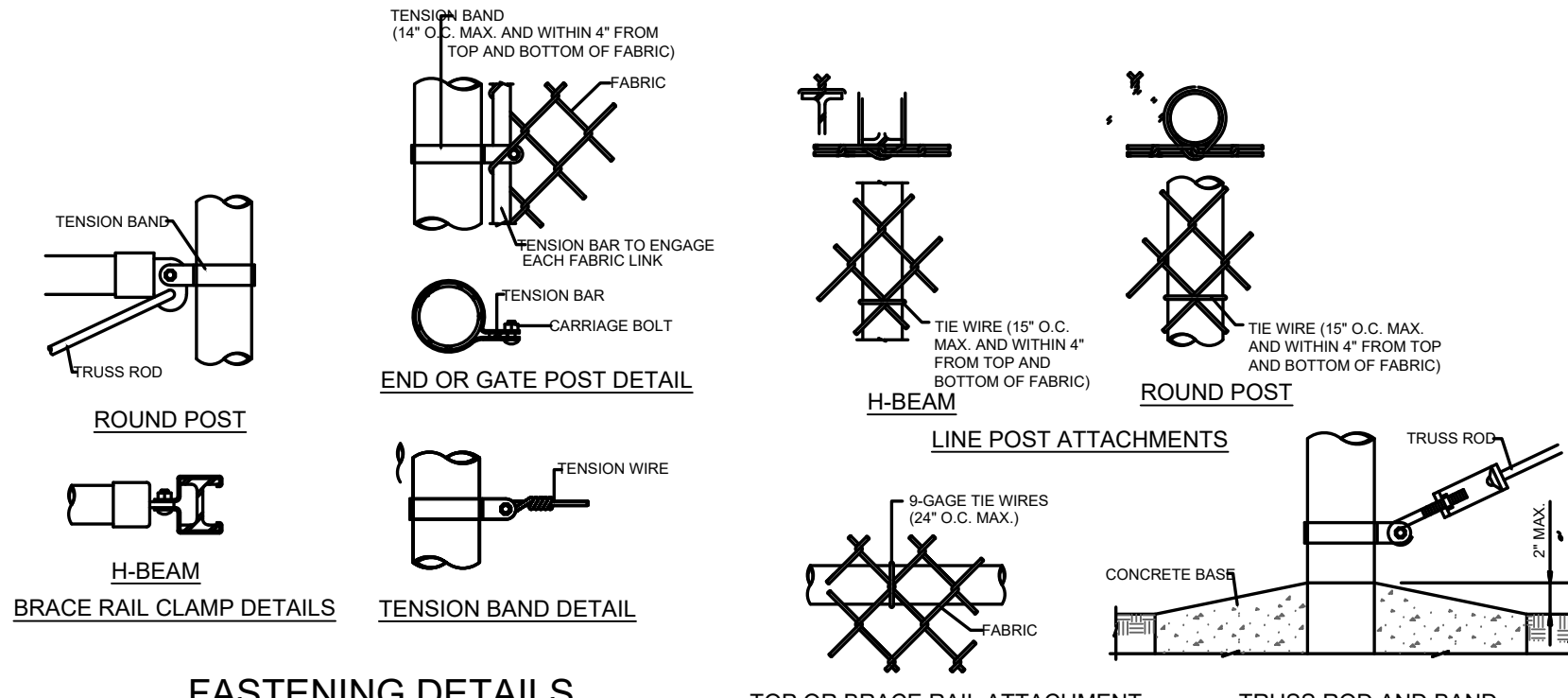
SCALE: N.T.S.



**EXTENSION ARM (SINGLE BRACKET) DETAILS**

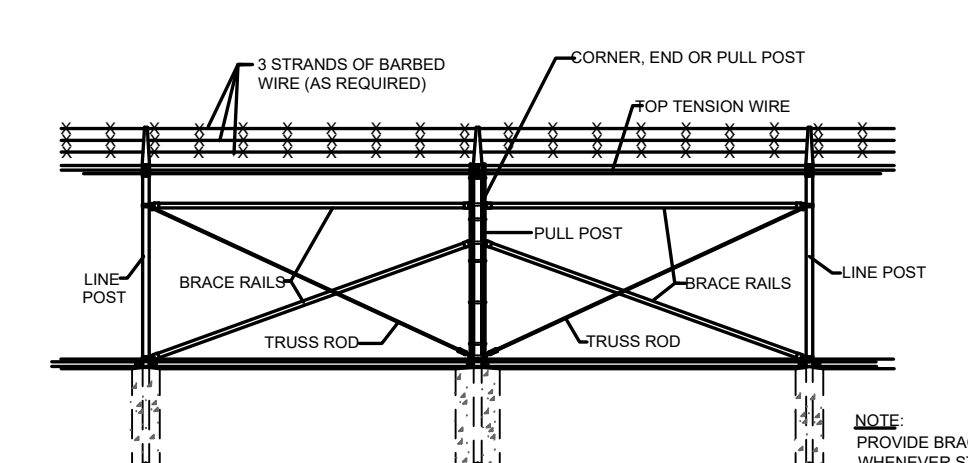
N.T.S.

| USE AND SECTION           | MINIMUM OUTSIDE DIMENSIONS (TYPICAL) |
|---------------------------|--------------------------------------|
| Corner, End & Pull Posts  | 3" O.D.                              |
| Line Posts                | 3" O.D.                              |
| Top, Bottom & Brace Rails | 1.5-1.8" O.D.                        |



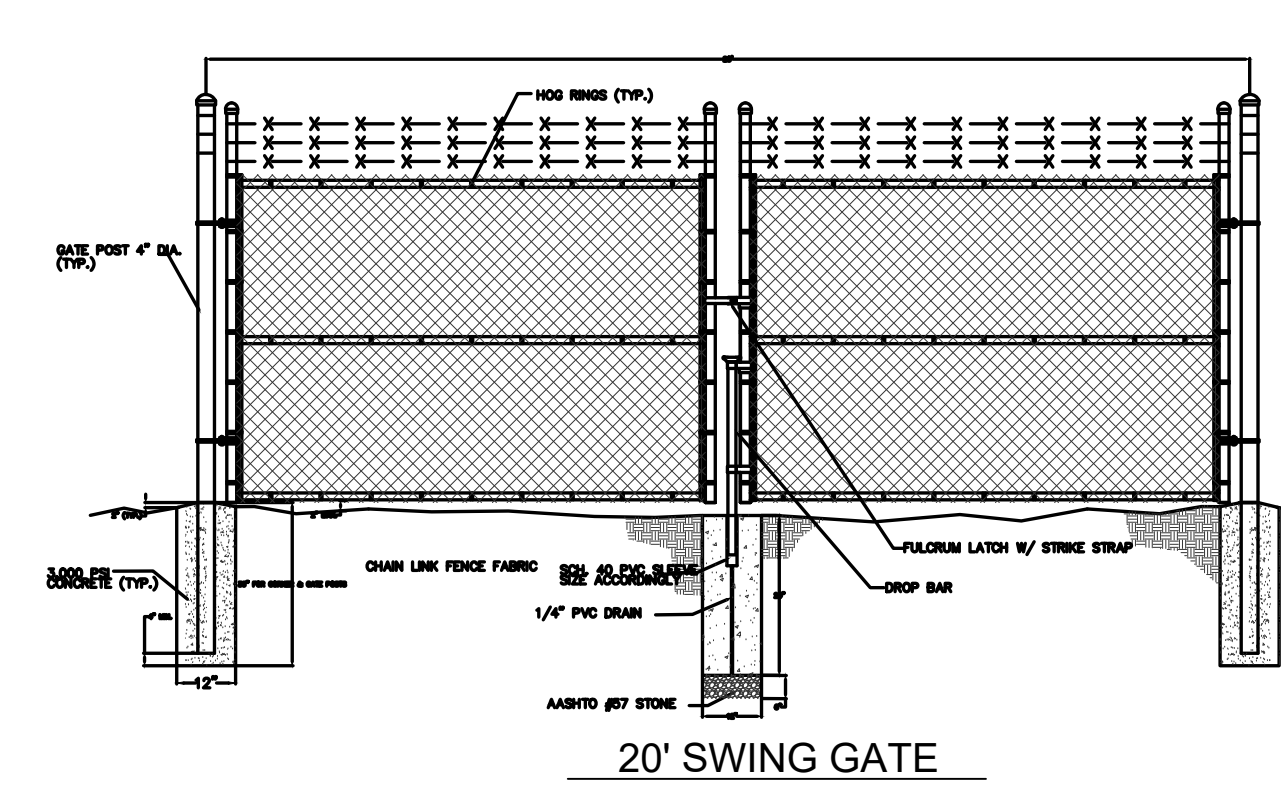
**FASTENING DETAILS**

SCALE: N.T.S.



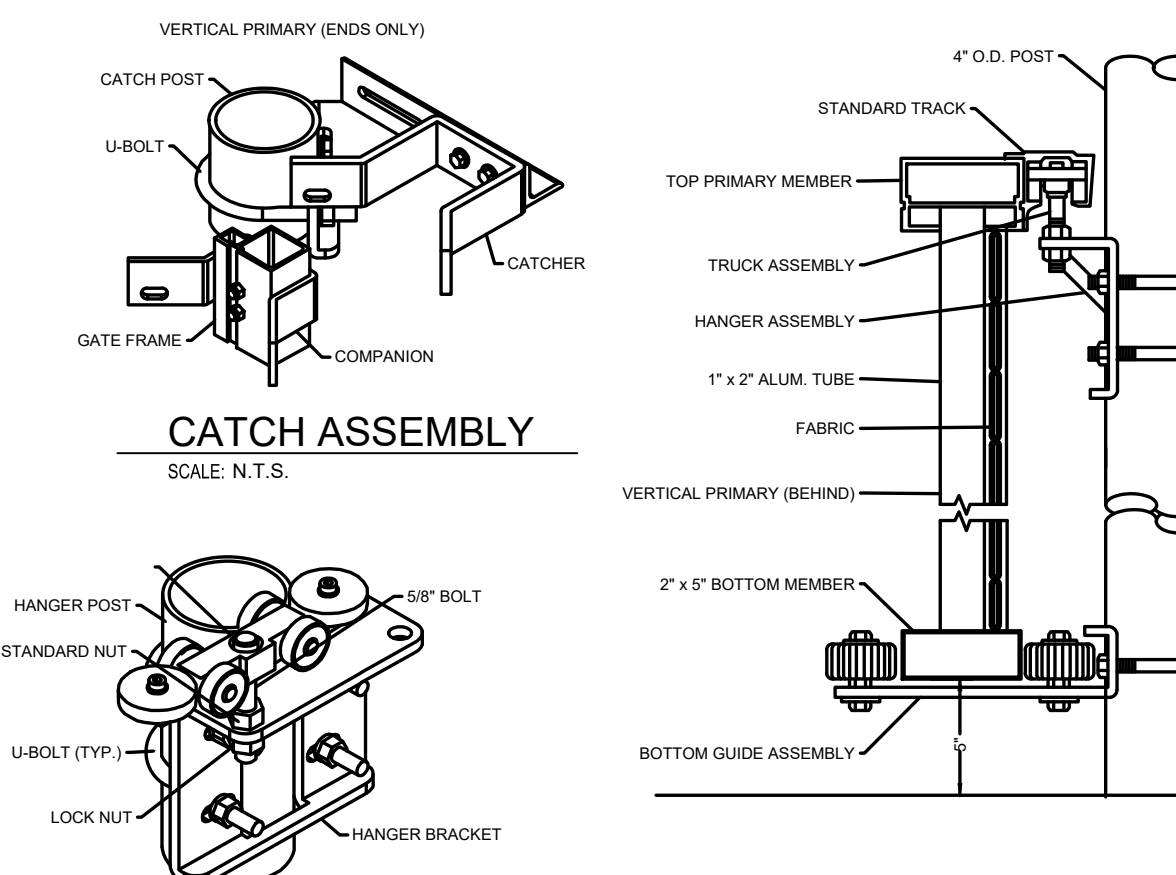
**BRACE PANEL DETAIL**

SCALE: N.T.S.



**20' SWING GATE**

SCALE: N.T.S.

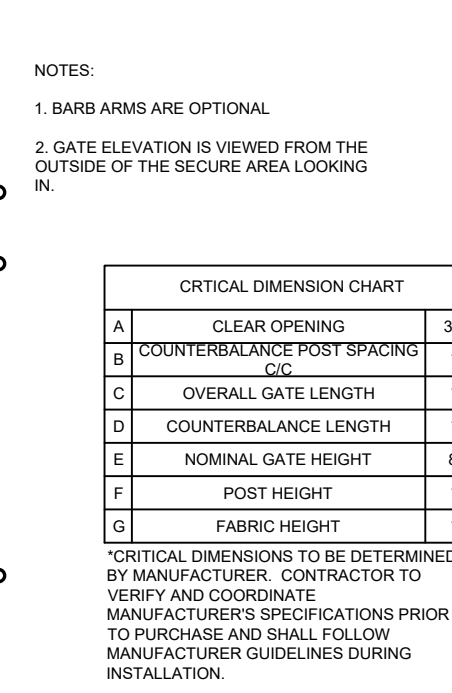


**CATCH ASSEMBLY**

SCALE: N.T.S.

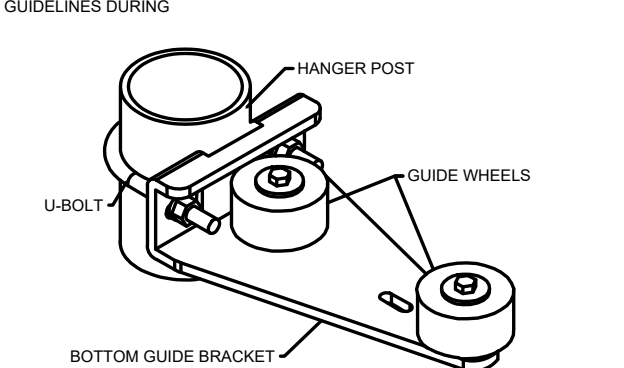
**GATE HANGER ASSEMBLY**

SCALE: N.T.S.



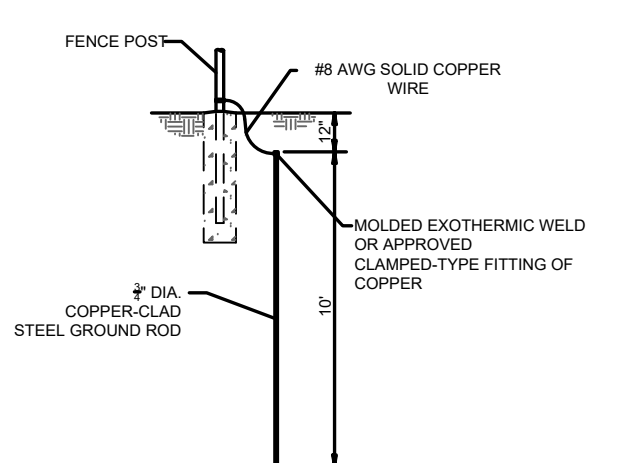
**ASSEMBLY SECTION**

SCALE: N.T.S.



**BOTTOM GUIDE ASSEMBLY**

SCALE: N.T.S.



**GROUNDING DETAIL**

SCALE: N.T.S.

**6 GRAVEL PAD DETAIL**

C.2.1 NOT TO SCALE

PROFESSIONAL SEAL

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING G-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION: AREA 10 FT. INDIANTOWN GAP ANNVILLE, PA 17003

PROJECT: NEW CSMS CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
|           |     |      |             |

DESIGNED BY: K. LLOYD  
 DATE: 4-8-20  
 DRAWN BY: K. LLOYD  
 PROJECT NO.: 42080032  
 REVIEWED BY: R. DAUTRICH  
 SCALE: AS NOTED

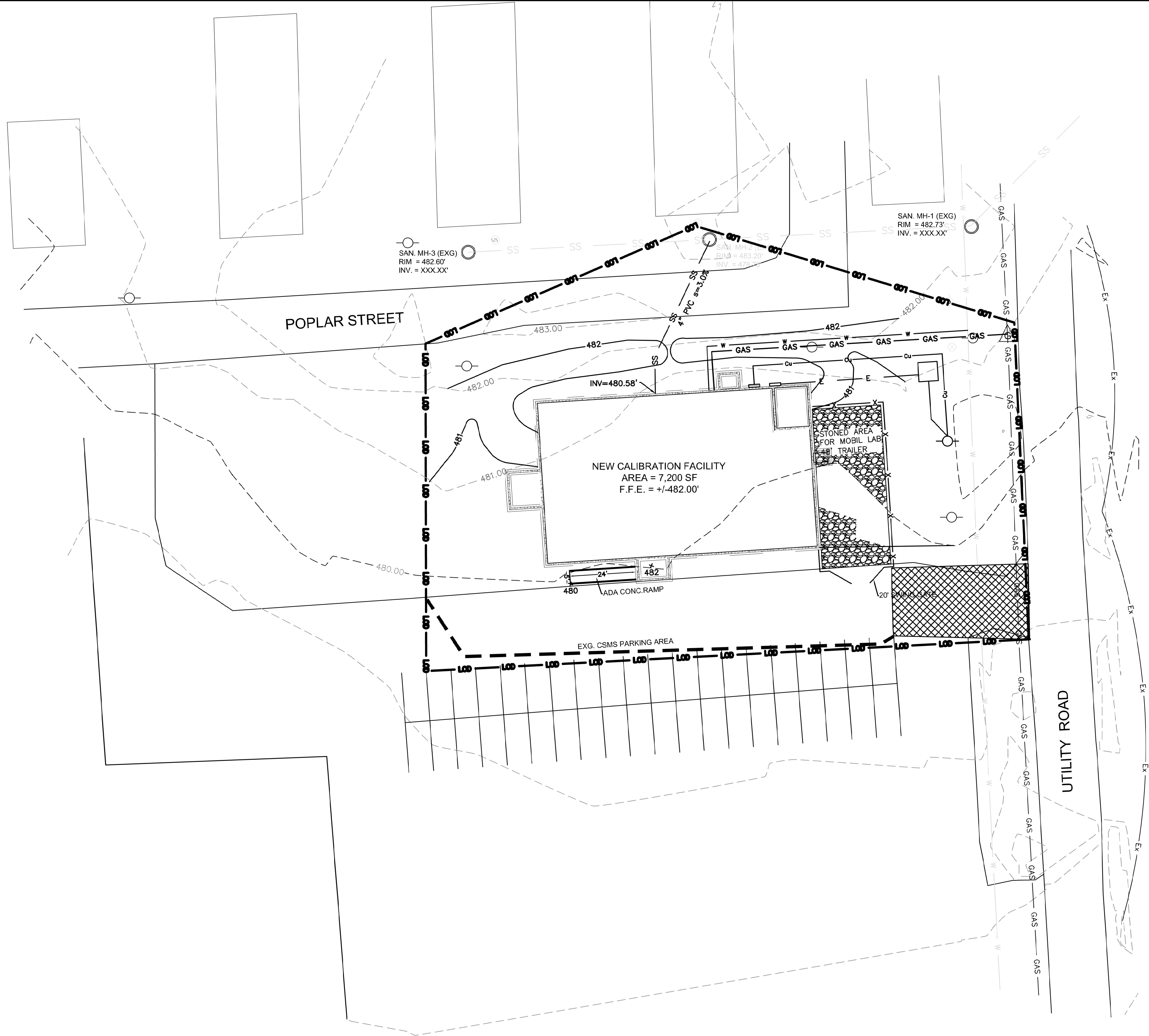
DRAWING: CIVIL DETAILS  
 DRAWING NO. C.2.1

ALL DIMENSIONS AND FIXTURES CONFORMANCE SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS OR DISTANCES.



**CONCEPT SITE PLAN**

SCALE: 1" = 20'  
SCALE IN FEET



**E&S LEGEND**

|            |                               |
|------------|-------------------------------|
|            | 12" COMPOST FILTER SOCK       |
|            | ROCK CONSTRUCTION ENTRANCE    |
|            | LIMIT OF DISTURBANCE BOUNDARY |
| - L.O.D. - |                               |

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
BUILDING G-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

PROFESSIONAL SEAL

LOCATION:  
AREA 10  
FT. INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

| DESIGNED BY | DATE        | REVISIONS | NO. | DATE | DESCRIPTION |
|-------------|-------------|-----------|-----|------|-------------|
| K. LLOYD    | 4-8-20      |           |     |      |             |
| DRAWN BY    | PROJECT NO. |           |     |      |             |
| K. LLOYD    | 42080032    |           |     |      |             |
| REVIEWED BY | SCALE       |           |     |      |             |
| R. DAUTRICH | AS NOTED    |           |     |      |             |

ALL DIMENSIONS AND POSITIONS SHOWN SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.

DRAWING:  
EROSION AND SEDIMENTATION  
CONTROL PLAN

DRAWING NO.  
**C.3.0**

**3.0 CONSTRUCTION SEQUENCE**

**GENERAL NOTES**

- At least 10 days before starting any earth disturbance activities, the contractor shall invite all Guardsmen and maintenance personnel involved in those activities, the landowner, all appropriate municipal officials, the erosion and sedimentation control plan preparer, and a representative of the Lebanon Conservation District at 717-277-5275 to schedule an on-site pre-construction meeting. Also, at least 3 days before starting any earth disturbance activities, the contractor shall notify the Pennsylvania One Call System Inc. at 1-800-242-1776 for buried utilities location.
- Before implementing any revisions to the approved erosion and sediment control plan or revisions to other plans which may affect the effectiveness of the approved E&S control plan, the contractor receive written approval of the revisions from the Lebanon Conservation District.
- The contractor shall remove from the site, recycle or dispose of all waste materials (tree stumps, brush etc.) in accordance with the Department's Solid Waste Management Regulations at 25 PA Code 260.1 et seq., 271.1 e. seq. and 287.1 et seq.
- Before disposing of soil or receiving borrow for the site, the contractor must assure that each spoil or borrow area has an erosion and sediment control plan approved by the Lebanon Conservation District, and which is being implemented and maintained according to Chapter 102 regulations. The contractor shall also notify the Lebanon Conservation District in writing of all receiving spoil and borrow areas when they have been identified.
- Only limited disturbance will be permitted to provide access to construct construction BMPs.
- Erosion and sedimentation controls must be constructed, stabilized, and functional before site disturbance within the tributary areas of those controls.

**ROCK CONSTRUCTION ENTRANCE**

- Rock construction entrance thickness will be constantly maintained to the specified dimensions by adding rock. A stockpile of rock material will be maintained on the site for this purpose. At the end of each construction day, all sediment deposited on public roadways will be removed and returned to the construction site.

**COMPOST FILTER SOCK**

- Compost sock should be placed parallel to contours with both ends of the sock extended upslope at a 45 degree angle to the rest of the sock to prevent end-arounds.
- Socks placed on earthen slopes should be anchored with stakes driven through the center of the sock or immediately down slope of the sock as per detail.
- Any section of compost sock, which has been undermined or topped, must be immediately replaced.

**CONSTRUCTION SEQUENCE NOTES**

- All earth disturbance activities shall proceed in accordance with the following sequence. Each stage shall be completed in compliance with Chapter 102 regulations before any following stage is initiated. Clearing and grubbing shall be limited only to those areas described in each stage.
- Flag the limit of disturbance.
- Install rock construction entrance.
- Install compost filter sock as per plan.
- Mobilize construction equipment.
- Clear and grub the site within the limits of disturbance.
- Strip topsoil and stockpile and stabilize.
- Excavate for new building parking lot.
- Construct stone driveway and install utilities.
- After site is stabilized, remove temporary BMP's and stabilize.

**GROUND COVER**

**Temporary Seeding**  
All grass areas disturbed by the work of this Project shall be seeded as follows:

Temporary seeding shall be done in areas where active work will not be performed for twenty days (20). Temporary seeding shall be done immediately after work ceases.

Apply agricultural lime and fertilizer as follows for temporary seeding:  
Agricultural Lime -- 50 pounds per 1,000 square feet  
Fertilizer -- 12 pounds per 1,000 square feet

Fertilizer shall be a commercial type 10-20-20.  
Temporary seed mixture Annual Ryegrass -- 1 pound per 1,000 square feet.

All temporary seeding shall be mulched. Temporary seeding shall be watered as required to develop cover.  
Mulch shall be straw, shall be clean and free from noxious weeds, and shall be applied at the rate of 140 pounds per 1,000 square feet.

**Permanent Seeding**

Permanent seeding shall take place in all disturbed areas as follows:  
**Fertilization:** The following shall be spread and worked into the topsoil to a depth of 3 to 4 inches.

Agricultural Lime - 275 pounds per 1,000 square feet  
Fertilizer - 25 pounds per 1,000 square feet  
The fertilizer shall be a commercial type 10-20-20.

**Note:** If agricultural lime and fertilizer have been applied previously to the ground where the permanent seed is to be applied, the lime and fertilizer rates shall be reduced by the amount by what has been applied previously.

**Permanent Seed Mixture:** The following seed mixtures shall be applied as follows:

- Stockpiles must be stabilized immediately.
- Hay or straw mulch must be applied at rates of at least 3.0 tons per acre.

**FTIG ITAM Mix (requires proper legume inoculants)**

- 10% Annual Ryegrass
- 25% Perennial Ryegrass
- 20% Medium Ryegrass
- 10% White Ladino Clover
- 10% White Dutch Clover
- 10% Vernal Alfalfa
- 10% Norcen Birdsfoot Trefoil
- 5% Crimson

**PENNDOT Formula L Low Grow Mix**

- 35% Creeping Red Fescue
- 27.5% Defiant Hard Fescue
- 27.5% Stonehenge Fescue
- 10% Annual Ryegrass

**FTIG Legume Mix plant with Low Grow at rate 10#/acre, requires inoculant)**

- 20% White Ladino Clover
- 10% Medium Red Clover
- 10% Mammoth Red Clover
- 10% White Dutch Clover
- 10% Alsike Clover
- 20% Vernal Alfalfa
- 10% Norcen Birdsfoot Trefoil
- 10% Crimson Clover

\*All mixtures given above are for PLS - Pure Live Seed 100%. To calculate PLS, the percentage of pure seed is multiplied by the percentage of germination, and the product is divided by 100. (85% pure seed x 72% germination) divided by 100 = 61% PLS. To determine how much seed to plant, divide the percentage into 100. Example: 100 divided by 61 = 1.63. Thus, every pound of seed mixture called for should then be 1.63 lbs.  
**Mulch:** Apply mulch to all permanently seeded areas.

Materials: Straw, air-dried and free from undesirable seeds and course materials. Application: 140 pounds per 1,000 square feet.

**5 - 1**

**MAINTENANCE PROGRAM**

**Emergency Erosion Protection**

If erosion does occur, the contractor shall repair and reseed those areas or use other stabilization methods as required. The contractor shall use jute, wood fiber, or other tie down filter netting on top of the new seed as required, regardless of the slope of the land.

Mulched areas shall be checked weekly and immediately after severe storms for damage, until the mulching is no longer necessary for protection against erosion. Damaged portions of the mulch or tie down materials shall be repaired as soon as discovered.

**Periodic Inspection Program**

The contractor will regularly inspect the Project's erosion and sedimentation controls during the entire active construction stages. The inspections will be performed weekly or after all runoff events and the inspections shall be documented and records of repairs keep on site. The contractor will be responsible for the installation, operation, maintenance, and removal of all erosion and sedimentation controls. All preventative and remedial maintenance work, including clean out repair, replacement, regrading, reseeding, mulching, and renetting must be performed immediately. Sediment that has been trapped by the silt sock will be re-anchored, repaired, or replaced as necessary. All other controls will be inspected on the same schedule. If erosion and sediment control BMPs fail to perform as expected, replacement BMPs, or modification of those installed will be required.

**5 - 2**

**Removal of Controls and Continuing Maintenance**

All required temporary erosion and sedimentation controls shall remain in place and be maintained until the area they protect has been stabilized.

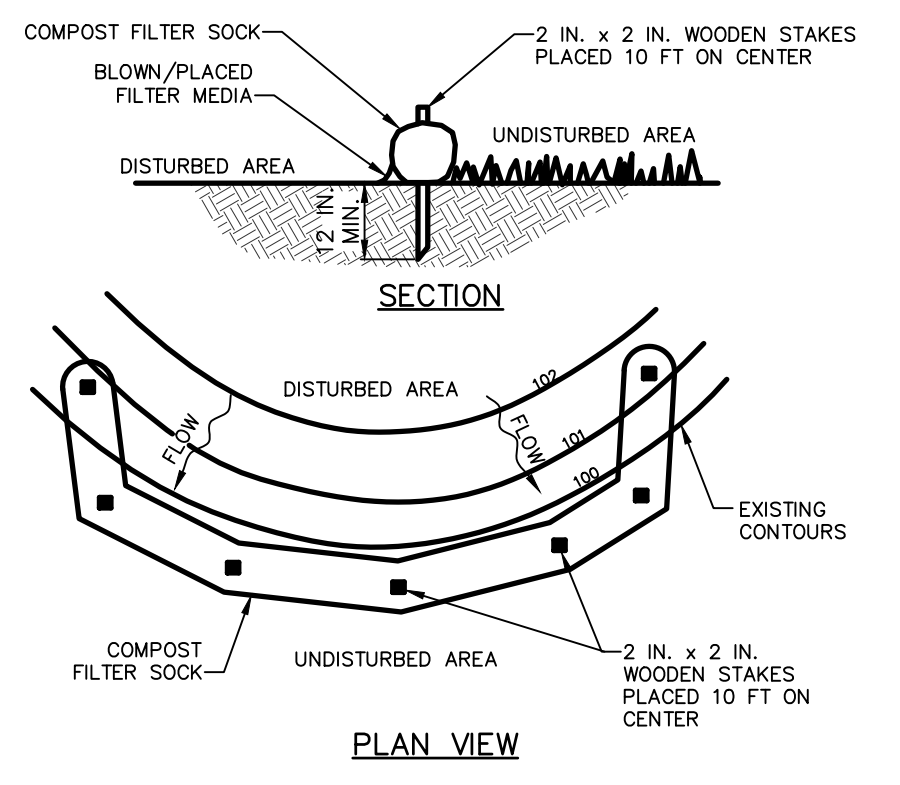
An area shall be considered to have achieved final stabilization when it has a minimum uniform 70% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding or other movements.

Revegetation shall occur immediately after completion of the final grading. Should conditions prohibit permanent revegetation efforts, the area will be temporarily stabilized through the use of quick-growing grasses, nylon erosion control mats or similar measures. The Gap maintenance personnel shall be responsible for the permanent stabilization of all areas exposed or disturbed during the Project.

The contractor shall maintain all temporary erosion and sedimentation control facilities in good condition until establishment of ground cover over tributary areas. This will include cleaning and, if required, repair of any filter fabric fence which may become torn, and seeding of eroded areas, as necessary.

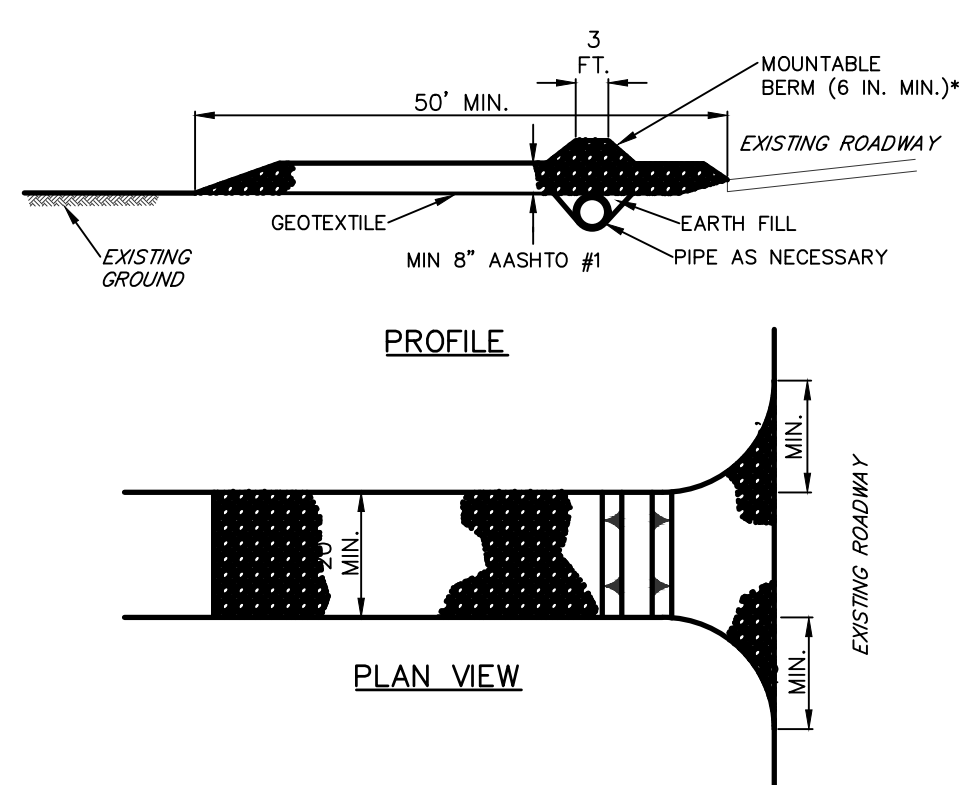
Permanent erosion control measures will not require maintenance other than lawn mowing and on a quarterly bases cleaning out any debris collected in the infiltration berm.

Permanent erosion and sedimentation control measures will become the responsibility of the Guardsmen and maintenance personnel upon completion of all aspects of the Project.



**NOTES:**  
SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 OF THE PA DEP EROSION CONTROL MANUAL. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE PA DEP EROSION CONTROL MANUAL.  
COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.  
TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.  
ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.  
COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.  
BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTOGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.  
UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

**1 12" COMPOST FILTER SOCK DETAIL**  
C.3.1 NOT TO SCALE



**NOTES:**  
REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.  
RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.  
MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.  
MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

**2 CONSTRUCTION ENTRANCE**  
C.3.1 NOT TO SCALE

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING G-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

PROFESSIONAL SEAL

LOCATION:  
AREA 10  
FT. INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
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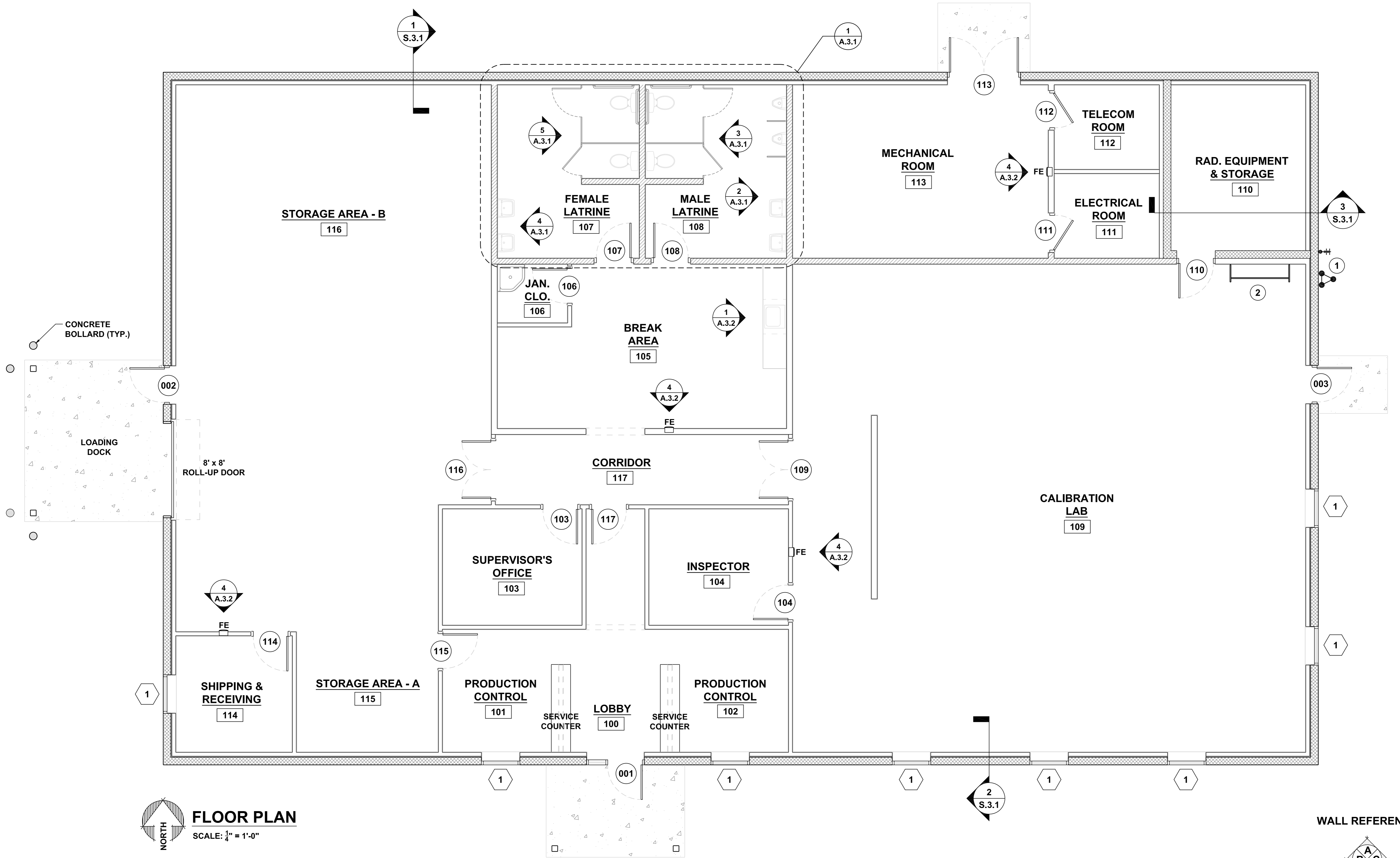
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|-------------|-------------|-------------|----------|
| DESIGNED BY | K. LLOYD    | DATE        | 4-8-20   |
| DRAWN BY    | K. LLOYD    | PROJECT NO. | 42080032 |
| REVIEWED BY | R. DAUTRICH | SCALE       | AS NOTED |

DRAWING:  
EROSION AND SEDIMENTATION CONTROL NOTES & DETAILS

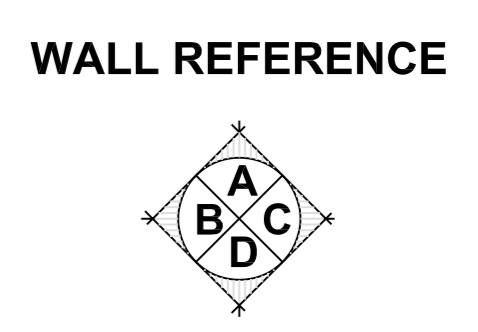
DRAWING NO.  
**C.3.1**

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.

- ① GOVERNMENT FURNISHED ANTENNA MAST AND GABLE ANTENNA TO BE INSTALLED BY GENERAL CONTRACTOR. PROVIDE ALL REQUIRED MOUNTING BRACKETS AND STRAPS TO SECURE EQUIPMENT FIRMLY TO BUILDING.
- ② GOVERNMENT FURNISHED SCALE (WEIGHT) CALIBRATION BAR. GENERAL CONTRACTOR TO INSTALL PER GOVERNMENT REPRESENTATIVE INSTRUCTIONS. CONTRACTOR SHALL PROVIDE ALL NECESSARY BLOCKING, ANCHOR BOLTS, ETC.



**FLOOR PLAN**  
 SCALE: 1/4" = 1'-0"



PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUREAU OF DESIGN AND PROJECT MANAGEMENT  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING C-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
 AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

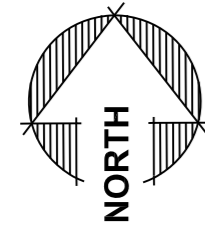
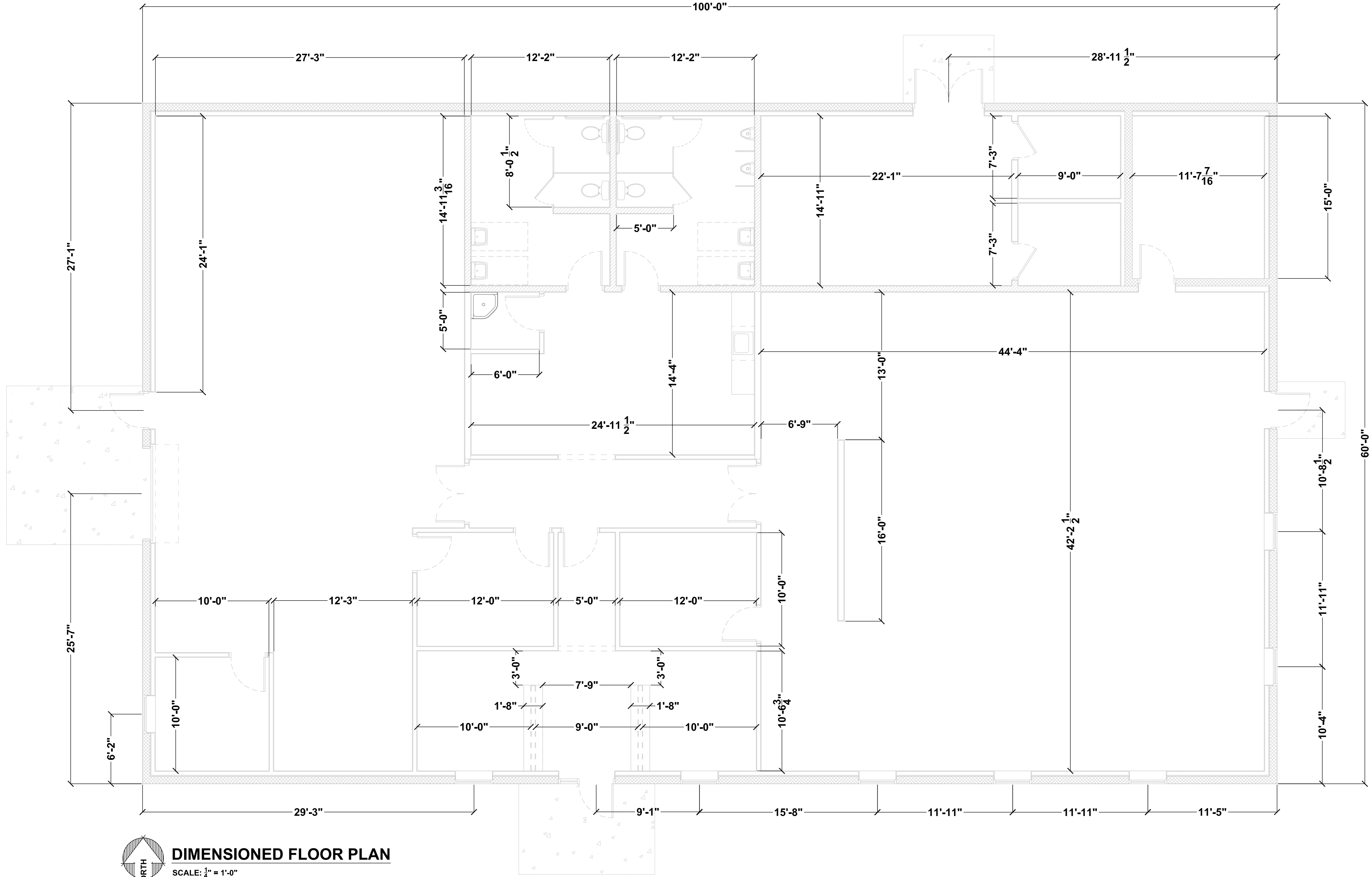
PROJECT:  
 NEW CSMS - EAST  
 CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. ALL DIMENSIONS SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.

| DESIGNED BY | DATE        | PROJECT NO. | SCALE | AS NOTED |
|-------------|-------------|-------------|-------|----------|
| J. NYE      | 6 APR. 2020 | 42080032    |       |          |
| DRAWN BY    |             |             |       |          |
| REVIEWED BY |             |             |       |          |
| R. FISBURN  |             |             |       |          |

DRAWING:  
 FLOOR PLAN  
 DRAWING NO.  
**A.1.1**



**DIMENSIONED FLOOR PLAN**

SCALE: 1/4" = 1'-0"

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUREAU OF DESIGN AND PROJECT MANAGEMENT  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING C-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
 AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT:  
 NEW CSMS - EAST  
 CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
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|-------------|------------|-------------|-------------|
| DESIGNED BY | J. NYE     | DATE        | 6 APR, 2020 |
| DRAWN BY    | J. NYE     | PROJECT NO. | 42080032    |
| REVIEWED BY | R. FISBURN | SCALE       | AS NOTED    |

DRAWING:  
 DIMENSIONED FLOOR PLAN

DRAWING NO.  
**A.1.2**

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CLIENT. DIMENSIONS AND DISTANCES SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.




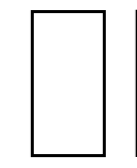
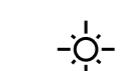




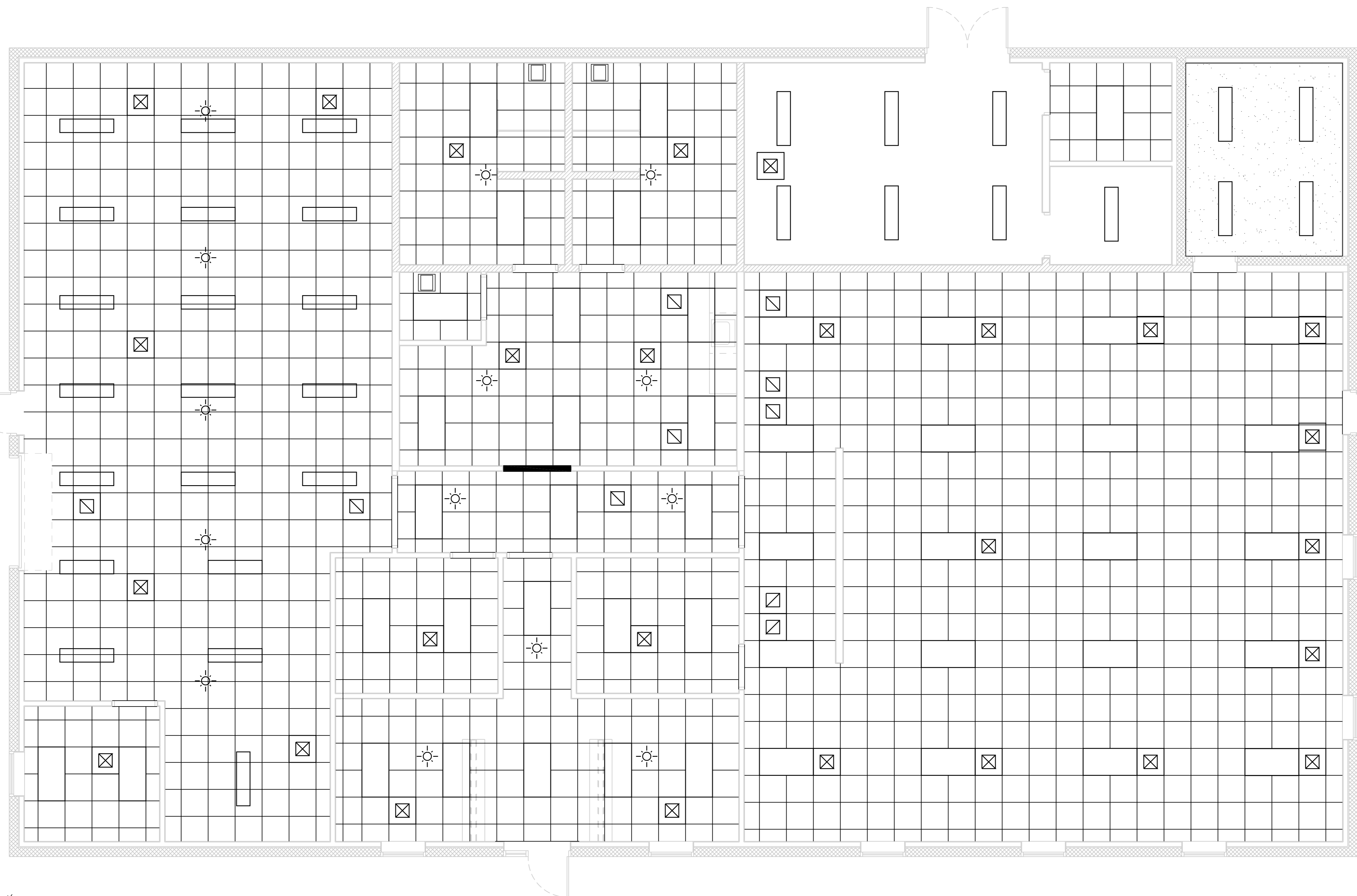
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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. ALL DIMENSIONS SHALL BE TO FACE UNLESS NOTED OTHERWISE. SCALE TO OBTAIN DIMENSIONS AND DISTANCES.

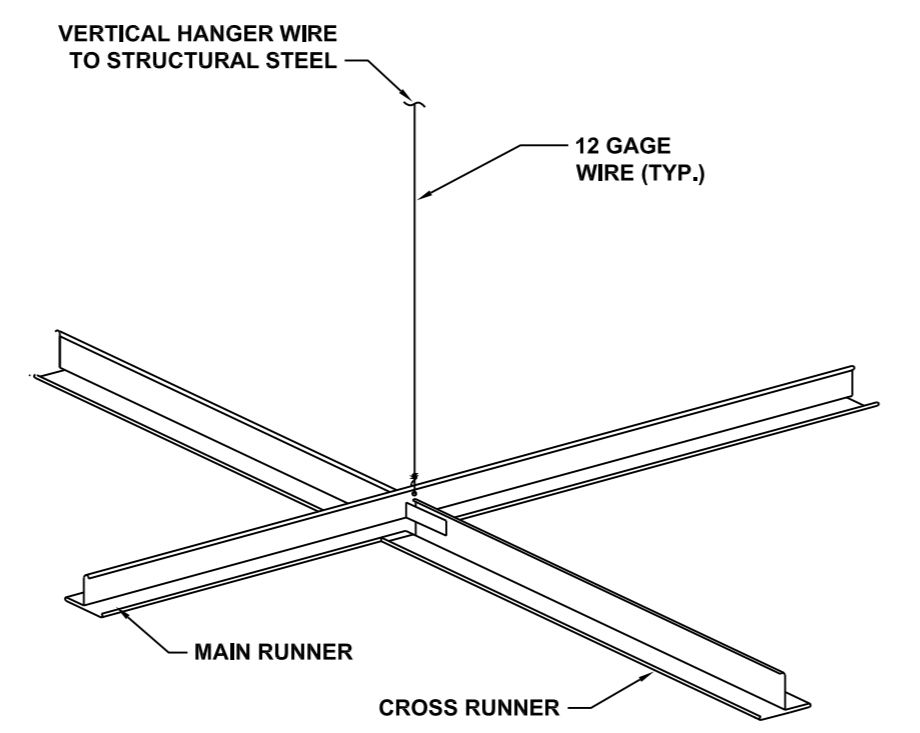
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| J. NYE <td>6 APR, 2020 <td> </td> <td> </td> </td> | 6 APR, 2020 <td> </td> <td> </td> |          |          |
| DRAWN BY   | PROJECT NO.                       | SCALE    | AS NOTED |
| J. NYE   | 42080032                          |          |          |
| REVIEWED BY  | SCALE                             | AS NOTED |          |
| R. FISBURN   |                                   |          |          |

**LEGEND**

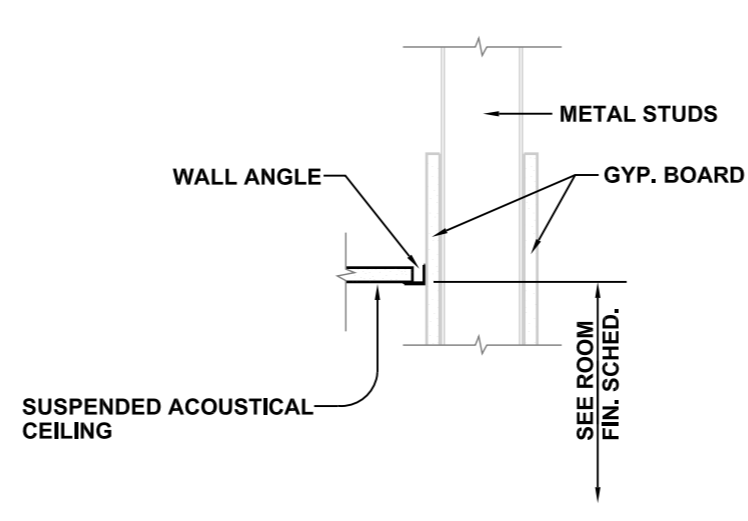
-  GYPSUM BOARD
-  CEILING GRID/TILE
-  BULKHEAD
-  LIGHT FIXTURES
-  OCCUPANCY SENSORS
-  HVAC - SUPPLY DIFFUSER
-  HVAC - RETURN REGISTER



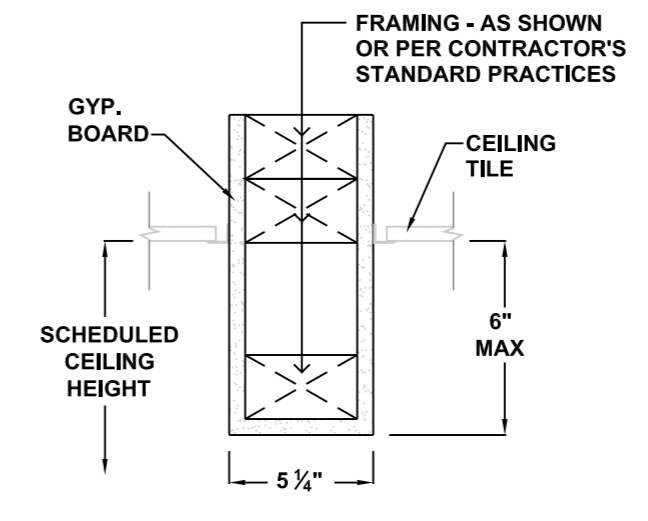
**REFLECTED CEILING PLAN**  
 SCALE: 1/4" = 1'-0"



**SUSP. CEILING SUPPORT**  
 SCALE: N.T.S.      1  
 A11.3

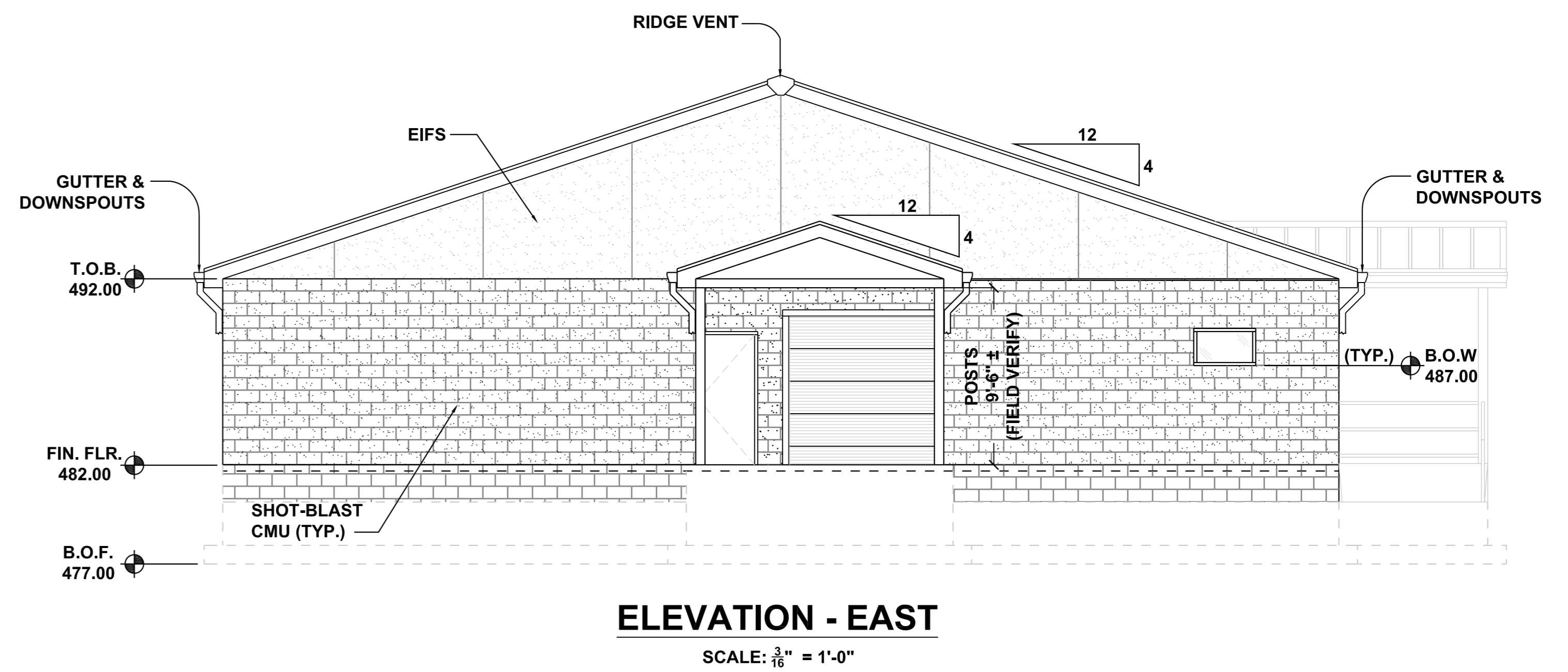
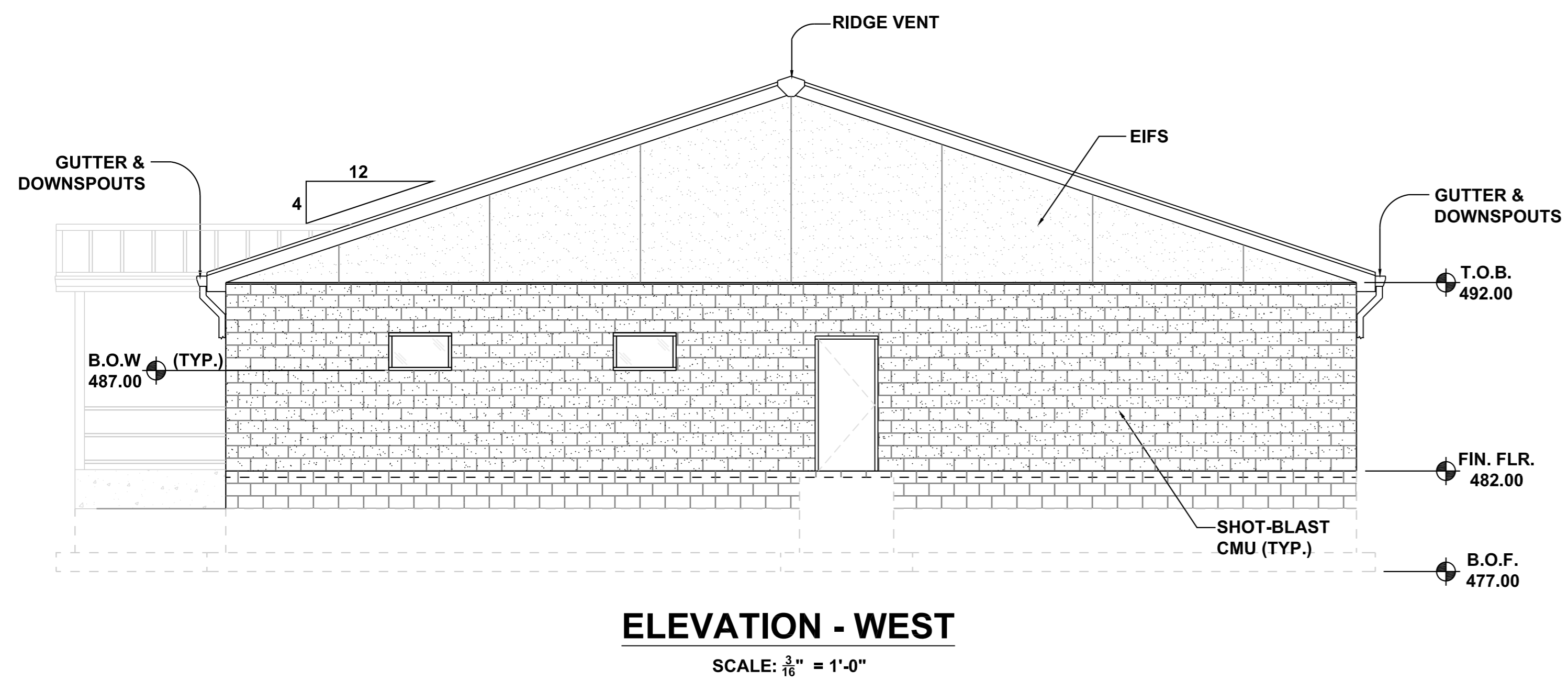
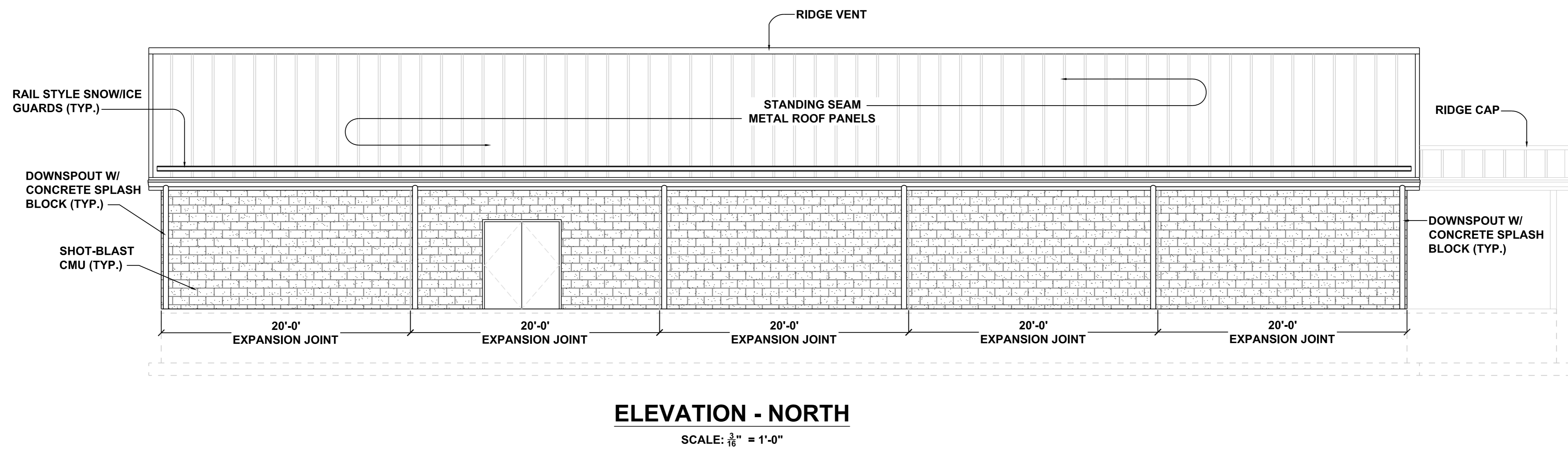
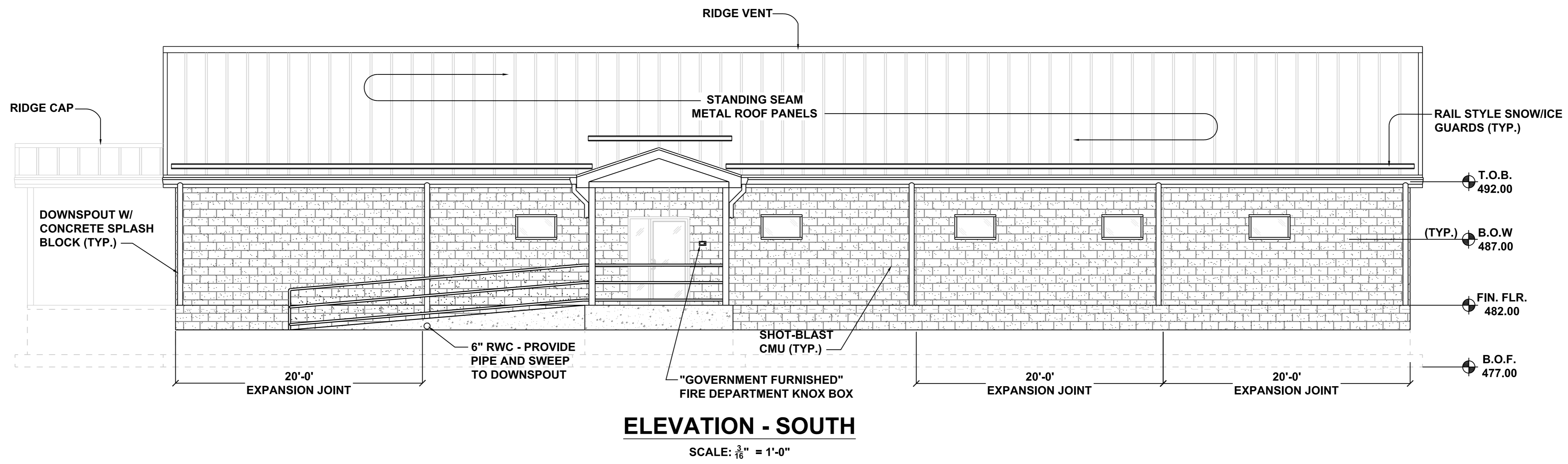


**LAY-IN CEILING DETAIL**  
 SCALE: N.T.S.      2  
 A11.3



**BULK HEAD DETAIL**  
 SCALE: N.T.S.      3  
 A11.3





PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING C-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS - EAST  
CALIBRATION LAB

| NO. | DATE | REVISIONS | DESCRIPTION |
|-----|------|-----------|-------------|
|     |      |           |             |
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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CLIENT. ALL DIMENSIONS SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.

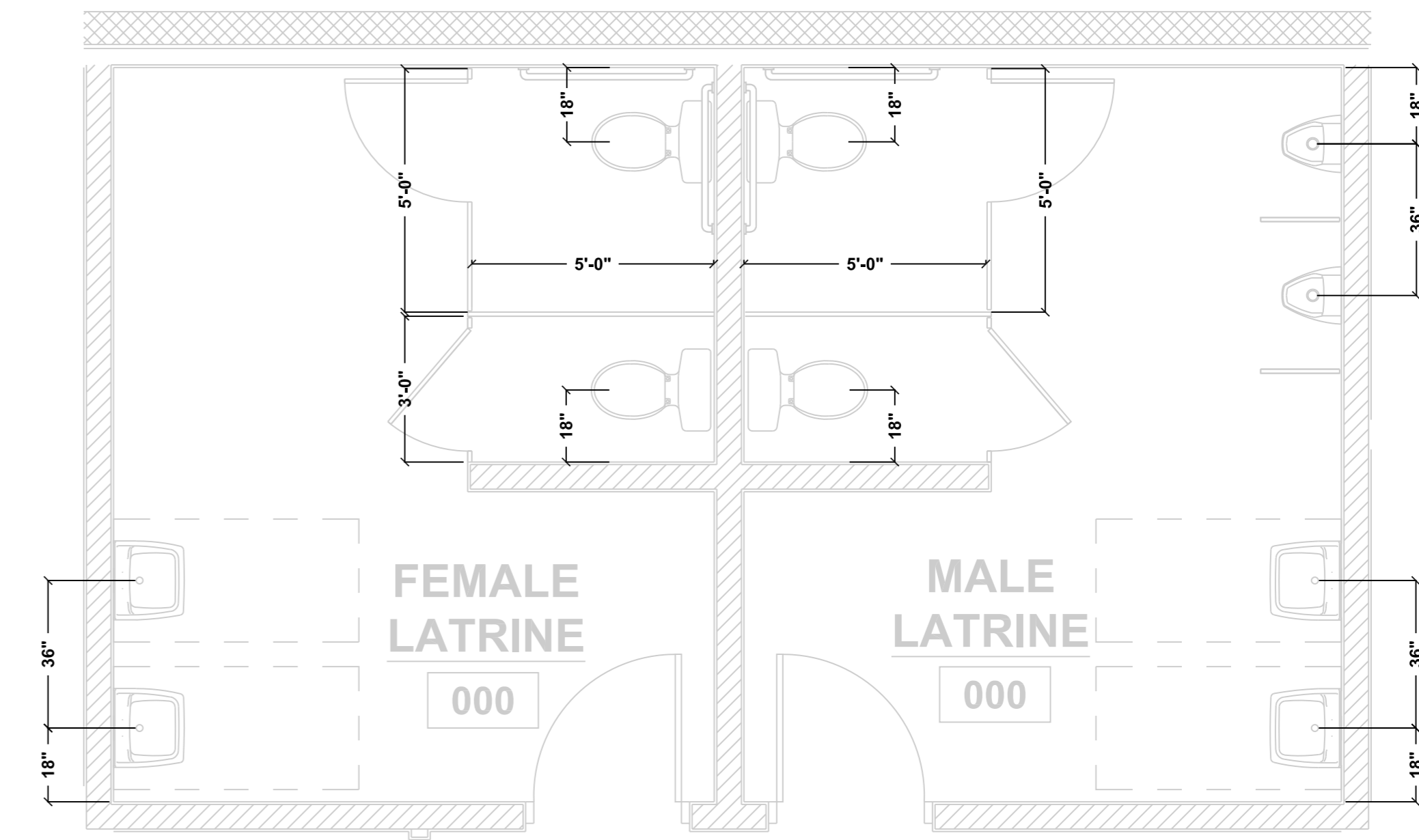
| DESIGNED BY | DATE        | PROJECT NO. | SCALE | AS NOTED |
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| J. NYE      | 6 APR. 2020 | 420800032   |       |          |
| DRAWN BY    |             |             |       |          |
| J. NYE      |             |             |       |          |
| REVIEWED BY |             |             |       |          |
| R. FISHER   |             |             |       |          |

DRAWING:  
EXTERIOR ELEVATIONS

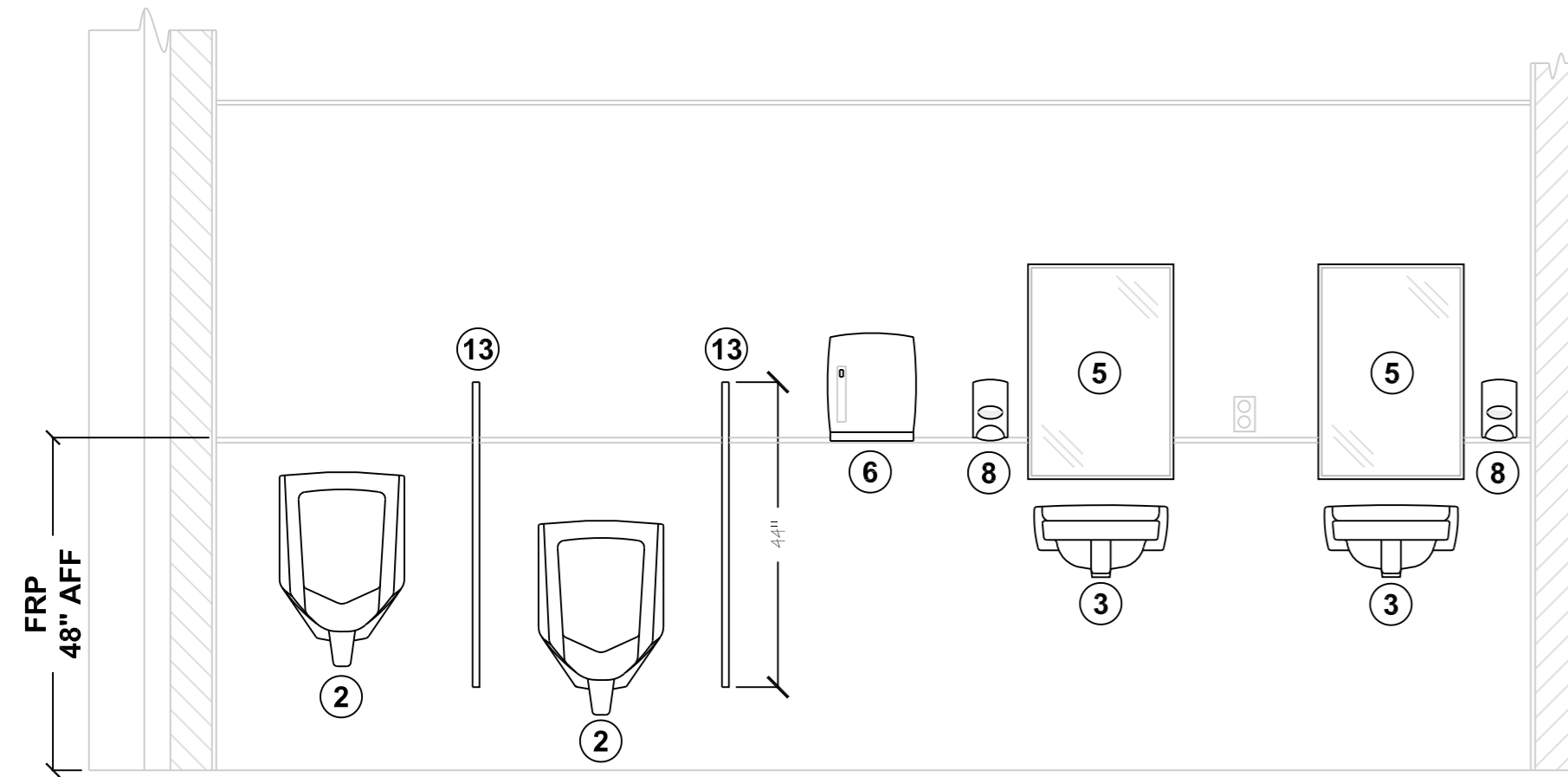
DRAWING NO.

A.2.1

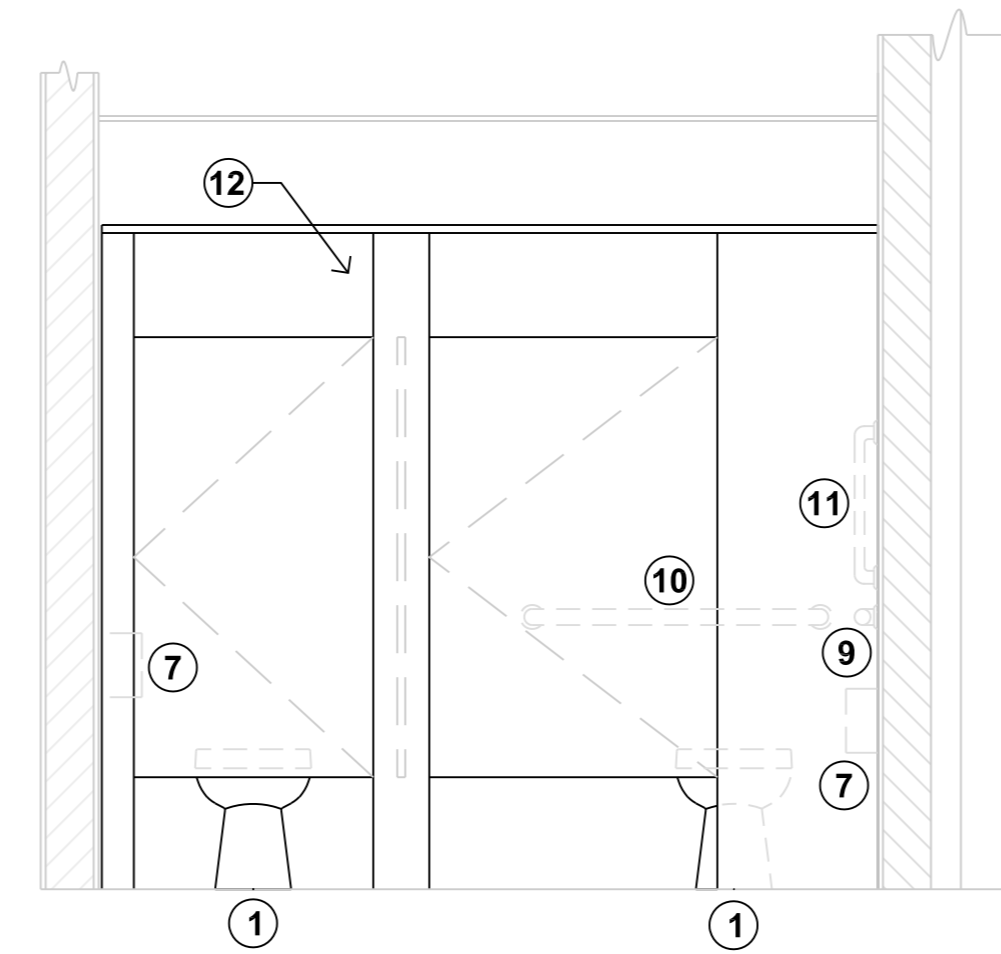
| TOILET ROOM ACCESSORIES |                        |                       |         |                           |                    |              |                               |     |
|-------------------------|------------------------|-----------------------|---------|---------------------------|--------------------|--------------|-------------------------------|-----|
| NO.                     | DESCRIPTION            | MOUNTING HEIGHT (AFF) |         | NOTE                      | DESIGN BASIS       |              | REMARKS                       | NO. |
|                         |                        | STANDARD              | ADA     |                           | MANUFACTURER       | MODEL NO.    |                               |     |
| 1                       | WATER CLOSET           | 14 1/2"               | 17 1/2" | TOP OF BOWL               | KOHLER             | PLMBG SPECS  |                               | 1   |
| 2                       | URINAL                 |                       | 17"     | TOP OF SPUD               | KOHLER             | PLMBG SPECS  |                               | 2   |
| 3                       | SINK                   | -                     | 34"     | COUNTER MOUNTED           | KOHLER             | PLMBG SPECS  |                               | 3   |
| 4                       | ADA INSULATION KIT     | -                     | -       | COVER SUPPLIES & DRAIN    | -                  | PLMBG SPECS  |                               | 4   |
| 5                       | MIRROR                 | 42"                   | 40"     | BOTTOM OF FRAME           | AMERICAN SPCIALTS. | 0600         | CENTER MIRROR ON SINK         | 5   |
| 6                       | PAPER TOWEL DISPENSER  | 44"                   | 44"     | BOTTOM OF DISPENSER       | KIMBERLY - CLARK   | 09736        |                               | 6   |
| 7                       | TOILET PAPER DISPENSER | 24"                   | 19"     | BOTTOM OF DISPENSER       | KIMBERLY - CLARK   | 0961200      |                               | 7   |
| 8                       | SOAP DISPENSER         | 48"                   | 40"     | BOTTOM OF DISPENSER       | KIMBERLY - CLARK   | 91180        |                               | 8   |
| 9                       | 42" GRAB BAR           | -                     | 34"     | CENTER OF BAR             | AMERICAN SPCIALTS. | 3100 SERIES  | INSTALL 12" FROM FIXTURE WALL | 9   |
| 10                      | 36" GRAB BAR           | -                     | 34"     | CENTER OF BAR             | AMERICAN SPCIALTS. | 3100 SERIES  |                               | 10  |
| 11                      | 18" VERTICAL GRAB BAR  | -                     | 39"     | CENTER OF BOTTOM BRACKET  | AMERICAN SPCIALTS. | 3100 SERIES  | INSTALL 39" FROM FIXTURE WALL | 11  |
| 12                      | TOILET PARTITION       | -                     | -       | FLOOR MOUNTED W/ OH RAILS | COLUMBIA PARTIONS. | 15000 SERIES |                               | 12  |



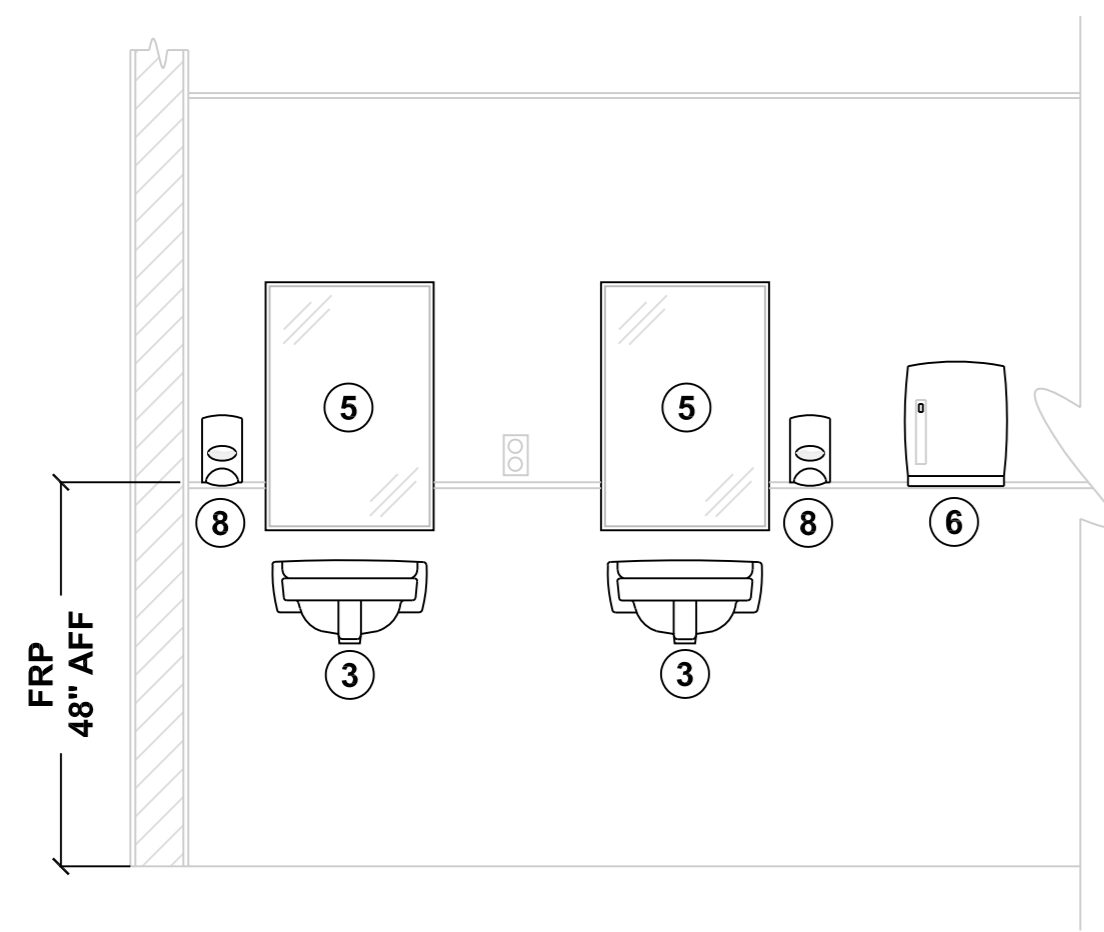
ENLARGED TLT./SHWR ROOM PLAN 1  
A13.1  
SCALE: 3/8" = 1'-0"



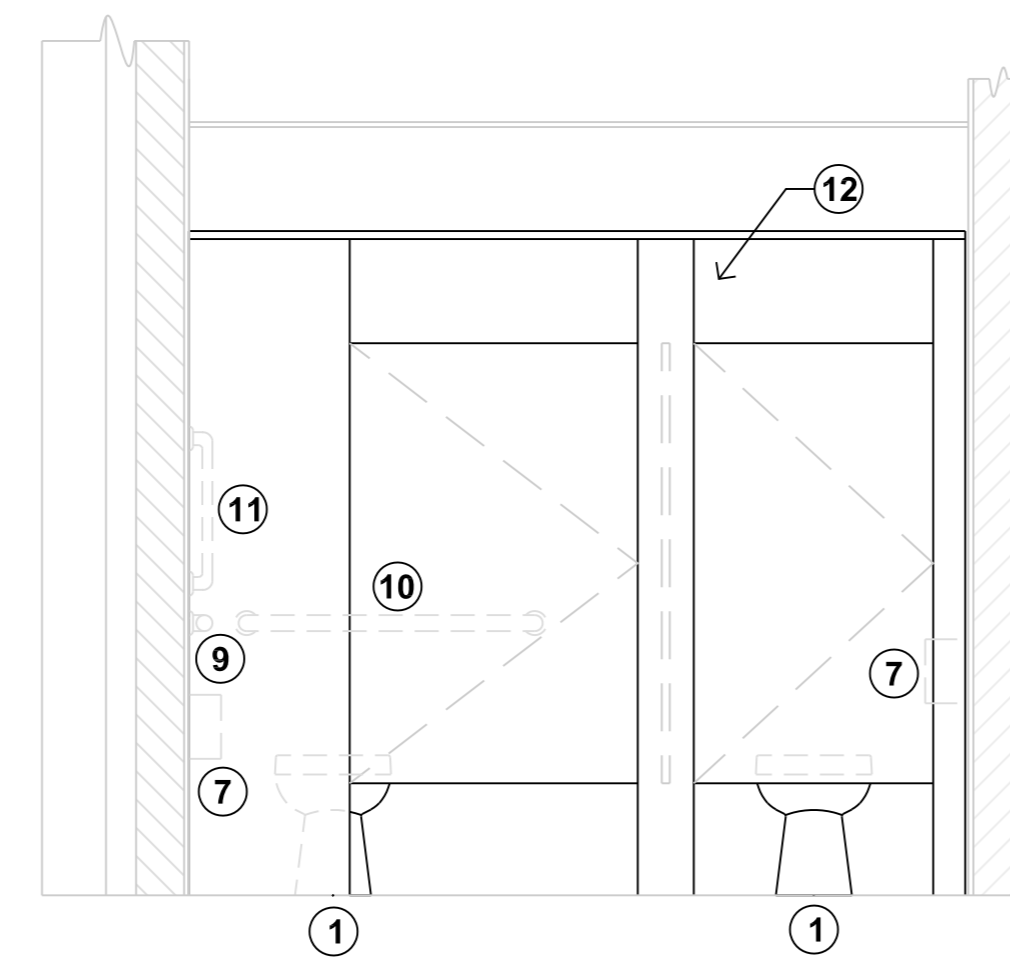
MALE TOILET ROOM - ELEVATION 1 2  
A13.1  
SCALE: 1/2" = 1'-0"



MALE TOILET ROOM - ELEVATION 2 3  
A13.1  
SCALE: 1/2" = 1'-0"



FEMALE TOILET ROOM - ELEVATION 1 4  
A13.1  
SCALE: 1/2" = 1'-0"



FEMALE TOILET ROOM - ELEVATION 2 5  
A13.1  
SCALE: 1/2" = 1'-0"

PENNSYLVANIA DEPARTMENT OF MILITARY  
AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
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BUILDING C-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS - EAST  
CALIBRATION LAB

| DESIGNED BY | DATE        | NO. | REVISIONS | DESCRIPTION |
|-------------|-------------|-----|-----------|-------------|
| J. NYE      | 6 APR, 2020 |     |           |             |
| DRAWN BY    | PROJECT NO. |     |           |             |
| J. NYE      | 42080032    |     |           |             |
| REVIEWED BY | SCALE       |     |           |             |
| R. FISHBURN | AS NOTED    |     |           |             |

ALL DIMENSIONS AND FINISHING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CLIENT. DIMENSIONS SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.

DRAWING NO.  
LARGE SCALE TOILET ROOM  
PLANS AND DETAILS

A.3.1

| RM. NO. | ROOM NAME           | SQUARE FOOTAGE | FLOOR | WALLS    |          |          |          | CEILING  |        | REMARKS   | RM. NO. |
|---------|---------------------|----------------|-------|----------|----------|----------|----------|----------|--------|---|---------|
|         |                     |                |       | WALL 'A' | WALL 'B' | WALL 'C' | WALL 'D' | MATERIAL | HGT.   |   |         |
| 100     | LOBBY               | 95             | 1     | -        | 6        | 6        | 1        | 1        | 8'-0"  |   | 100     |
| 101     | PRODUCT. CONTROL    | 106            | 1     | 5        | 5        | 6        | 1        | 1        | 8'-0"  |   | 101     |
| 102     | PRODUCT. CONTROL    | 106            | 1     | 5        | 5        | 6        | 1        | 1        | 8'-0"  |   | 102     |
| 103     | SUPERVISOR OFC.     | 120            | 3     | 5        | 5        | 5        | 5        | 1        | 8'-0"  |   | 103     |
| 104     | INSPECTOR OFC.      | 120            | 3     | 5        | 5        | 5        | 5        | 1        | 8'-0"  |   | 104     |
| 105     | BREAK AREA          | 322            | 1     | 4        | 4        | 4        | 4        | 1        | 8'-0"  |   | 105     |
| 106     | JANITOR CLOSET      | 30             | 1     | 4        | 5        | 5        | 5        | 1        | 8'-0"  |   | 106     |
| 107     | FEMALE LATRINE      | 182            | 1     | 1        | 4        | 4        | 4        | 1        | 8'-0"  |   | 107     |
| 108     | MALE LATRINE        | 182            | 1     | 1        | 4        | 4        | 4        | 1        | 8'-0"  |   | 108     |
| 109     | CALIBRATION LAB     | 1871           | 2     | 4        | 4/5      | 1        | 1        | 1        | 8'-0"  |   | 109     |
| 110     | RAD. EQUIP. & STOR. | 166            | 2     | 1        | 3        | 1        | 3        | X        | 10'-0" |   | 110     |
| 111     | ELECTRICAL ROOM     | 65             | 4     | 5        | 4        | 3        | 4        | 1        | 8'-0"  |   | 111     |
| 112     | TELECOM ROOM        | 65             | 4     | 1        | 4        | 3        | 5        | -        | -      | ALL WALLS TO BE 5/8" FIRE RATED PLYWOOD IN LIEU OF GYP. BOARD | 112     |
| 113     | MECHANICAL ROOM     | 329            | 4     | 1        | 4        | 4        | 4        | -        | -      |   | 113     |
| 114     | SHIP/RECV'G OFC.    | 100            | 1     | 5        | 1        | 5        | 1        | 1        | 8'-0"  |   | 114     |
| 115     | STORAGE - A         | 128            | 4     | -        | 5        | 5        | 1        | 1        | 10'-0" |   | 115     |
| 116     | STORAGE - B         | 1237           | 4     | 1        | 1        | 4        | -        | 1        | 10'-0" |   | 116     |
| 117     | CORRIDOR            | 152            | 1     | 5        | 5        | 5        | 5        | 1        | 8'-0"  |   | 117     |

**CEILING FINISHES:**

- ACOUSTIC CEILING SYSTEM - 24"x24" GRID WITH 24"x24" LAY-IN, LIGHT TEXTURED ACOUSTIC TILES.
- 5/8" GYP., FINISHED, PRIMED AND PAINTED
- 5/8" GYP. BOARD w/ MOISTURE PROTECTION

NOTE 1: REFER TO PROJECT SPECIFICATIONS FOR CEILING GRID INFORMATION. GRID, TILE AND PAINTED GYP. COLORS TO BE SELECTED BY GOVERNMENT PERSONNEL.

NOTE 2: REFER TO DRAWING A.1.3 FOR CEILING GRID LAYOUT.

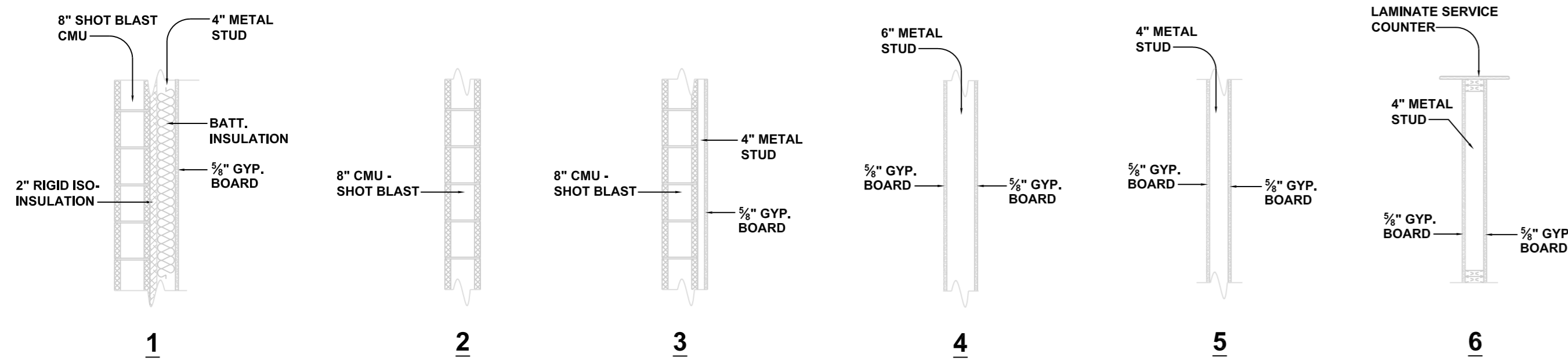
NOTE 3: CONTRACTOR TO PROVIDE ALL NECESSARY FRAMING MEMBERS (16" O.C.), SUPPORT BRACKETS AND FASTENERS FOR GYP. BOARD CEILING SYSTEMS.

**FLOOR FINISHES:**

- 12"x12" VINYL COMPOSITE TILE. (COLOR AND STYLE TO BE SELECTED BY GOVERNMENT PROFESSIONAL).
- 12"x12" ANTI-STATIC VINYL COMPOSITE FLOOR (COLOR AND STYLE TO BE SELECTED BY GOVERNMENT PROFESSIONAL)
- CARPET TILE - 24" x 24" (COLOR AND STYLE TO BE SELECTED BY GOVERNMENT DESIGN PROFESSIONAL)
- CONCRETE - PAINTED.

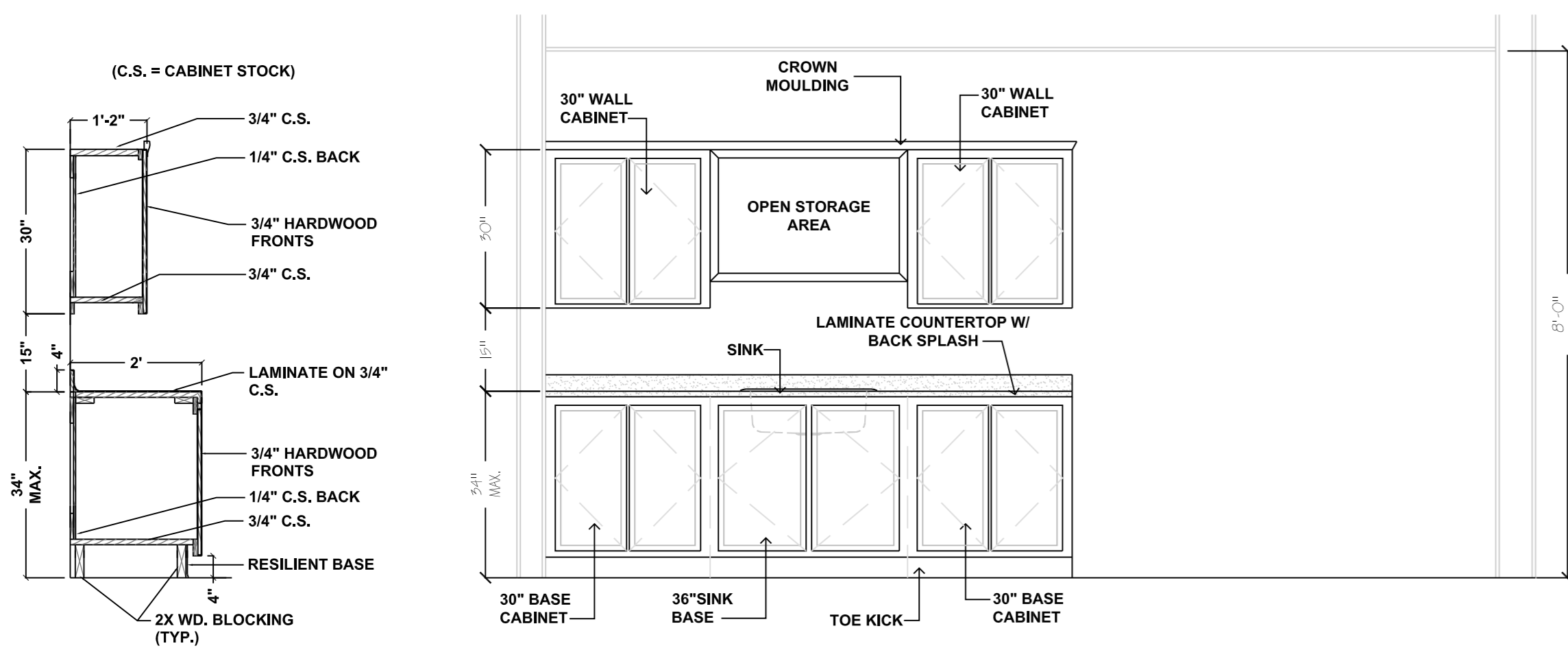
NOTE: ALL FLOORS TO RECEIVE VINYL WALL BASE UNLESS NOTED OTHERWISE. REFER TO SPECIFICATIONS FOR INFORMATION ON WALL BASE.

**WALL TYPES**



**WALL NOTES:**

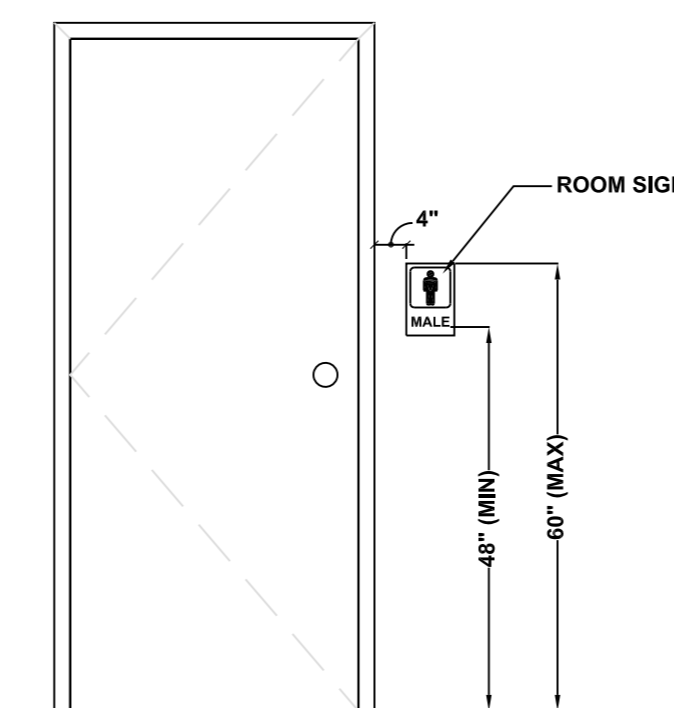
- GYP. BOARD INSTALLED IN TOILETS ROOMS AND JANITOR CLOSET SHALL BE MOISTURE/MILDEW RESISTANT GREEN BOARD.
- TOILET ROOMS TO RECEIVE FRP (FIBERGLASS REINFORCED PANELS). PANELS ARE TO BE INSTALLED TO A MAXIMUM HEIGHT OF 48" AFF. SEE SHEET A.3.1 FOR FUTHER DETAILS.
- ALL STUD WALLS ARE TO BE RAN FULL HEIGHT TO UNDERSIDE OF TRUSSES, UNLESS OTHERWISE NOTED.
- GYP. BOARD SHALL BE INSTALLED TO A MINIMUM OF 6 INCHES ABOVE FINISHED CEILING HEIGHT, UNLESS OTHERWISE NOTED.
- INSULATE WALLS AS INDICATED ON PLAN A.1.1 UTILIZING 4" OR 6" BATT. INSULATION.



NOTE:  
1. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO ORDERING CABINERY. DIMENSIONS TO BE ADJUSTED AS NEEDED TO ACCOMMODATE FIELD CONDITIONS.

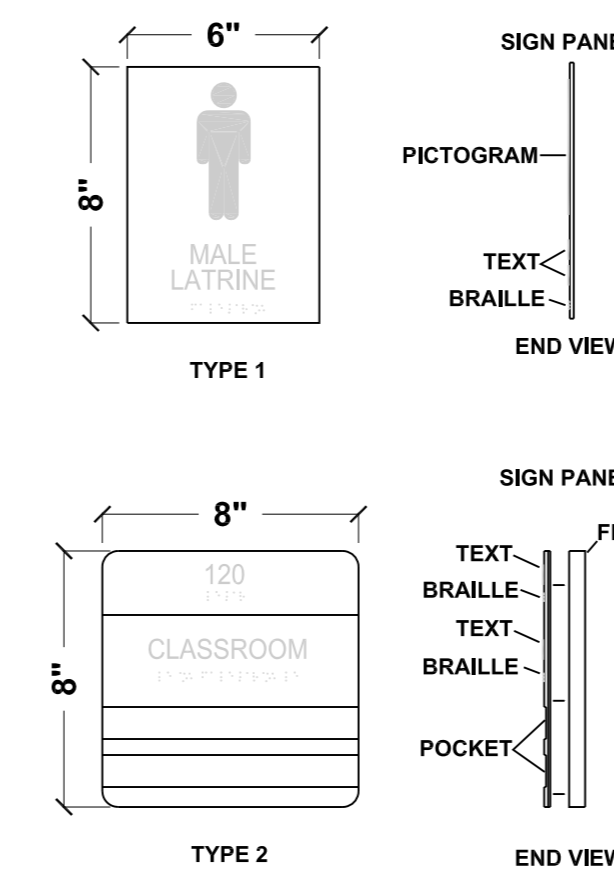
**BREAK ROOM ELEVATION**  
SCALE: 1/2" = 1'-0"

1  
A 13.2



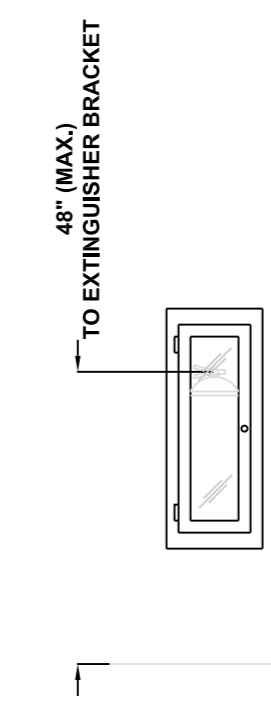
**DOOR SIGNAGE**  
SCALE: N.T.S

2  
A 13.2



**SIGNAGE DETAILS**  
SCALE: N.T.S

3  
A 13.2



**EXTINGUISHER CABINET**  
SCALE: N.T.S

4  
A 13.2

REVISIONS

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
|     |      |             |
|     |      |             |
|     |      |             |

DESIGNED BY: J. NYE  
DRAWN BY: J. NYE  
REVIEWED BY: R. FISHBURN

DATE: 6 APR. 2020  
PROJECT NO.: 42080032  
SCALE: AS NOTED

REVISIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. ALL DIMENSIONS AND DISTANCES SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS - EAST  
CALIBRATION LAB

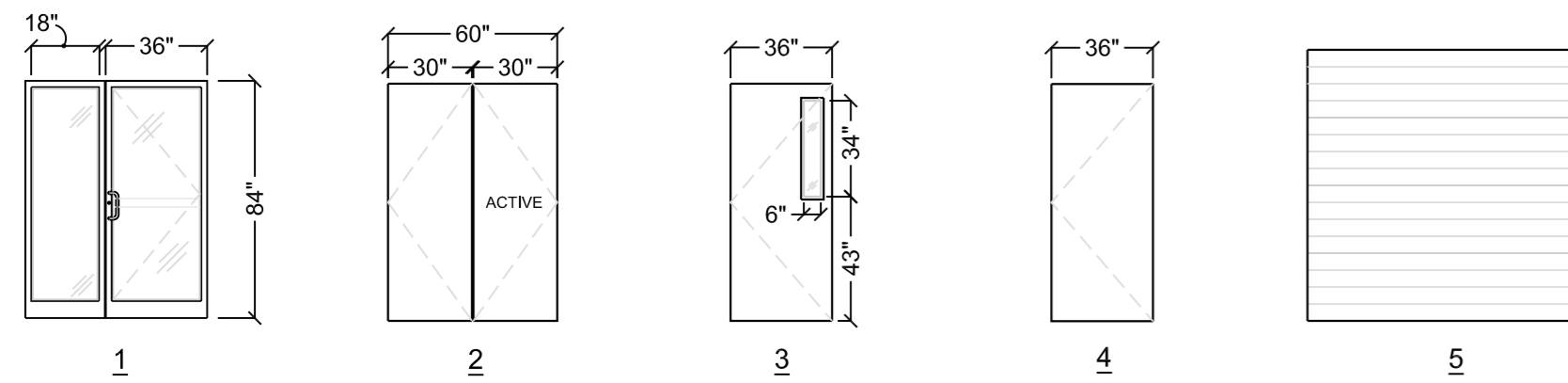
DRAWING:  
ROOM FINISH SCHEDULES  
AND INTERIOR DETAILS

DRAWING NO.  
**A.3.2**

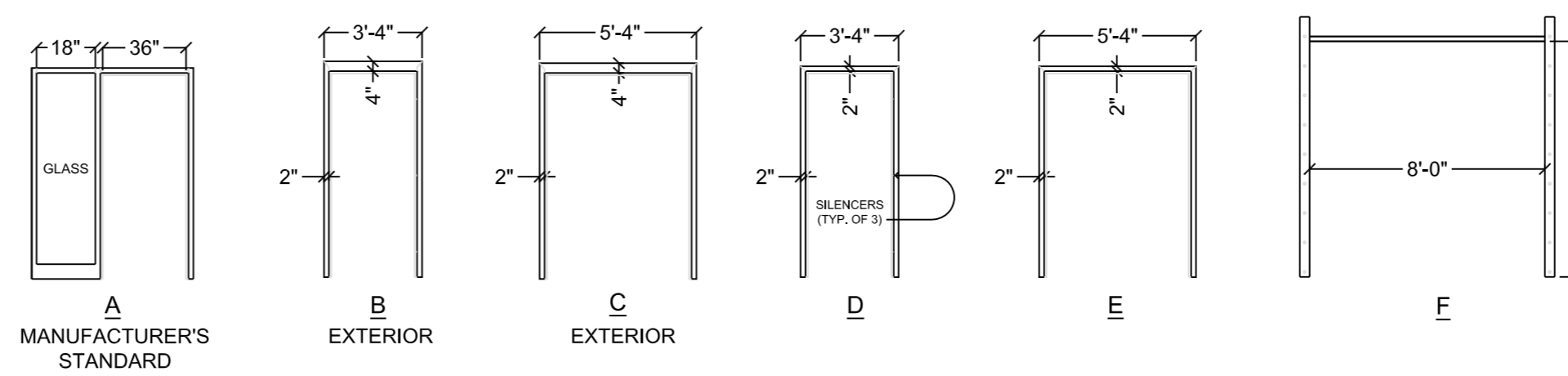
PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING C-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

| DOOR AND FRAME SCHEDULE |       |       |        |             |          |        |       |             |         |          |        |         |           |       |  |     |
|-------------------------|-------|-------|--------|-------------|----------|--------|-------|-------------|---------|----------|--------|---------|-----------|-------|--|-----|
| DOOR NO.                | DOOR  |       |        |             |          | FRAME  |       |             |         | HARDWARE |        | REMARKS | DOOR NO.  |       |  |     |
|                         | SIZE  | MAT'L | TYPE   | FIRE RATING | GLASS    | LOUVER | MAT'L | FRAME DETL. | SET NO. | KEY SIDE | KEYING |         |           |       |  |     |
| W                       | H     | T     |        |             | DoD TYPE | W      | H     |             |         |          |        |         |           |       |  |     |
| 001                     | 3'-0" | 7'-0" | 1 3/4" | ALUM        | 1        | NA     | FULL  | B           |         | ALUM     | A      | 1       | EXT/INT   | BFE-M | DOORS TO BE INSULATED  | 001 |
| 002                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     |       |             |         | STEEL    | B      | 2       | EXT       | BFE-M | DOORS TO BE INSULATED  | 002 |
| 003                     | 8'-0" | 8'-0" | -      | ALUM        | 5        | NA     |       |             |         | STEEL    | F      | 4       | EXT       | BFE-M |  | 003 |
| 004                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | B      | 2       | EXT       | BFE-M | DOORS TO BE INSULATED  | 004 |
| 005                     | 5'-0" | 7'-0" | 1 3/4" | STEEL       | 2        | NA     |       |             |         | STEEL    | C      | 3       | EXT       | BFE-M | DOORS TO BE INSULATED/RIGHT DOOR (ACTIVE)/LEFT DOOR (INACTIVE) | 005 |
| 103                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     | 6x30  |             |         | STEEL    | D      | 5       | CDR. 117  | BFE-M |  | 103 |
| 104                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     | 6x30  |             |         | STEEL    | D      | 5       | LAB 109   | BFE-M |  | 104 |
| 106                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 6       |           | BFE-M |  | 106 |
| 107                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 7       |           | BFE-M |  | 107 |
| 108                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 7       |           | BFE-M |  | 108 |
| 109                     | 5'-0" | 7'-0" | 1 3/4" | STEEL       | 2        | NA     | 6x30  |             |         | STEEL    | E      | 2       | CDR. 117  | BFE-M | RIGHT DOOR (ACTIVE) LEFT DOOR (INACTIVE)                       | 109 |
| 110                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 5       | LAB 109   | BFE-M |  | 110 |
| 111                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 6       |           | BFE-M |  | 111 |
| 112                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 4        | NA     |       |             |         | STEEL    | D      | 6       |           | BFE-M |  | 112 |
| 114                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     | 6x30  |             |         | STEEL    | D      | 5       | STOR. 116 | BFE-M |  | 114 |
| 115                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     | 6x30  |             |         | STEEL    | D      | 5       | P.C. 101  | BFE-M |  | 115 |
| 116                     | 5'-0" | 7'-0" | 1 3/4" | STEEL       | 2        | NA     | 6x30  |             |         | STEEL    | E      | 2       | STOR. 116 | BFE-M | RIGHT DOOR (ACTIVE) LEFT DOOR (INACTIVE)                       | 116 |
| 117                     | 3'-0" | 7'-0" | 1 3/4" | STEEL       | 3        | NA     | 6x30  |             |         | STEEL    | D      | 2       | LBY. 100  | BFE-M |  | 117 |

DOOR TYPES



FRAME TYPES



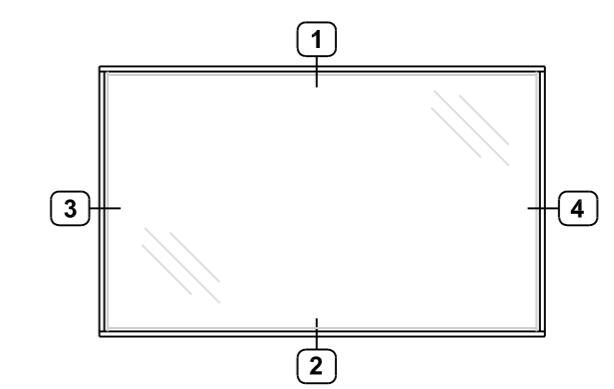
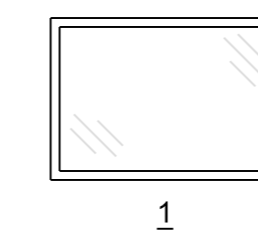
DOOR HARDWARE SCHEDULE

- SET 1**  
HINGES: PER MANUFACTURER'S STANDARD  
OPENING DEVICE: PULL HANDLES  
LOCKING DEVICE: MORTISE LOCK, DEADBOLT W/ INTERIOR/EXTERIOR KEYING  
EXIT: TOUCH BAR  
CLOSER: TOP SURFACE MOUNTED ON DOOR W/ 120° PARALLEL ARM
- SET 2**  
HINGES: HEAVY DUTY, 5 KNUCKLE, FULL MORTISE  
OPENING DEVICE: LEVER W/ KEYED CORE  
LOCKING DEVICE: MORTISE LOCK, DEADBOLT W/ ONE SIDED LOCK ONLY  
EXIT: TOUCH BAR  
CLOSER: TOP SURFACE MOUNTED ON DOOR W/ 120° PARALLEL ARM
- SET 3**  
HINGES: HEAVY DUTY, 5 KNUCKLE, FULL MORTISE  
OPENING DEVICE: KNOB W/ KEYED CORE  
LOCKING DEVICE: CYLINDRICAL LOCK W/ EXTERIOR LOCK ONLY  
EXIT: KNOB  
CLOSER: TOP SURFACE MOUNTED ON DOOR W/ 120° PARALLEL ARM
- SET 4**  
ROLL-UP DOOR HARDWARE:  
TRACK, OPERATION DEVICE, HARDWARE, TO INCLUDE LOCKING DEVICE TO BE PROVIDED BY DOOR MANUFACTURER AND PER MANUFACTURER'S STANDARD BASED ON DOOR SIZE AND INSTALLATION PARAMETERS.
- SET 5**  
HINGES: 5 KNUCKLE, FULL MORTISE  
OPENING DEVICE: LEVER W/ KEYED CORE  
LOCKING DEVICE: CYLINDRICAL LOCK W/ INSIDE PUSH BUTTON ACTIVATION  
EXIT: LEVER  
CLOSER: NONE
- SET 6**  
HINGES: 5 KNUCKLE, FULL MORTISE  
OPENING DEVICE: LEVER  
LOCKING DEVICE: NONE  
EXIT: LEVER  
CLOSER: NONE
- SET 7**  
HINGES: 5 KNUCKLE, FULL MORTISE  
OPENING DEVICE: PUSH PLATE  
LOCKING DEVICE: NONE  
EXIT: PULL HANDLE  
CLOSER: TOP SURFACE MOUNTED ON DOOR W/ 120° PARALLEL ARM

WINDOW SCHEDULE

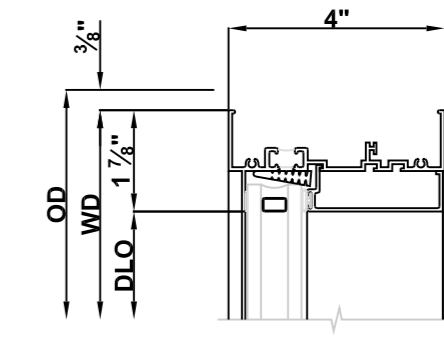
| NO. | TYPE | SIZE      | INSTALL HEIGHT | FRAME MATERIAL | SECURITY GLAZING | DoD ATFP TYPE |                                   |
|-----|------|-----------|----------------|----------------|------------------|---------------|-----------------------------------|
| 1   | 1    | 36" x 24" | 64" AFF        | ALUMINUM       | YES              | B             | REFER TO SPECS. FOR FURTHER INFO. |

WINDOW TYPES

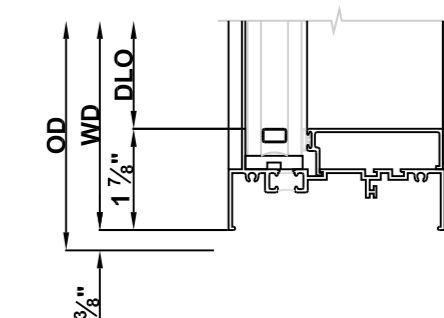


FIXED WINDOW

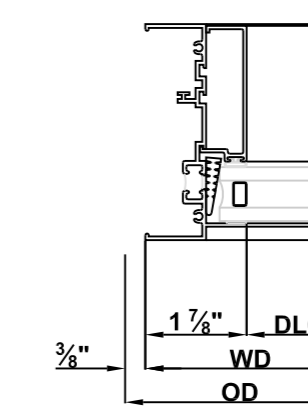
1 FIXED HEAD



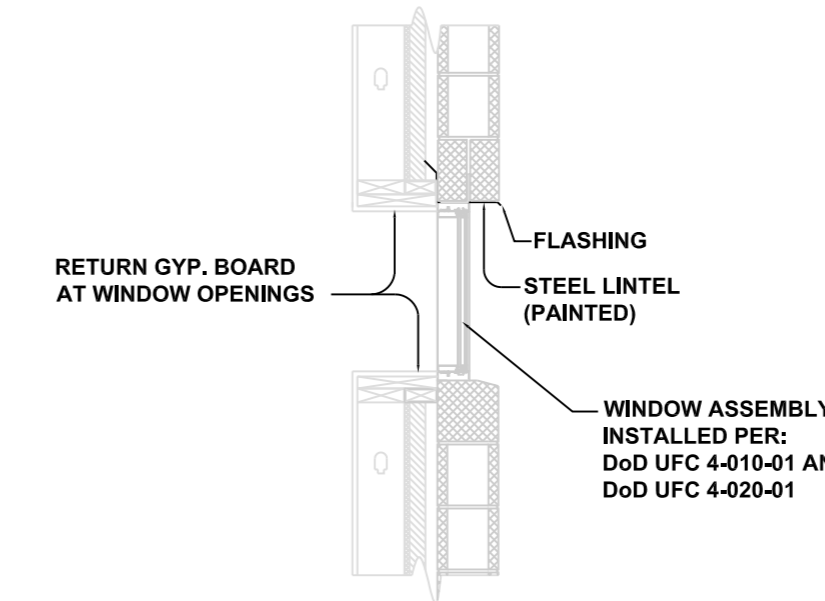
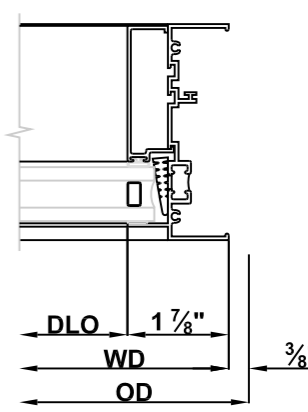
2 FIXED SILL



3 FIXED JAMB



4 FIXED JAMB



WINDOW INSTALL - TYP SCALE: 1/2" = 1'-0" A 13.3

WINDOW DETAILS - TYP SCALE: N.T.S. A 13.3

**SPECIAL NOTE:**  
ALL EXTERIOR DOOR AND WINDOW FRAMING, GLAZING AND INSTALLATION METHODS MUST MEET AND/OR EXCEED ALL REQUIREMENTS AS OUTLINED WITHIN THE DEPARTMENT OF DEFENSE: UNIFIED FACILITIES CODE, UFC-04-010 AND UFC-04-020-01. CONTRACTOR ALONG WITH THE DOOR/WINDOW MANUFACTURER SHALL BE RESPONSIBLE FOR INSURING THAT ALL INSTALLED DOORS AND WINDOWS COMPLY WITH THE REFERENCED STANDARD TO THE FULLEST EXTENT.

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING C-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION: AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

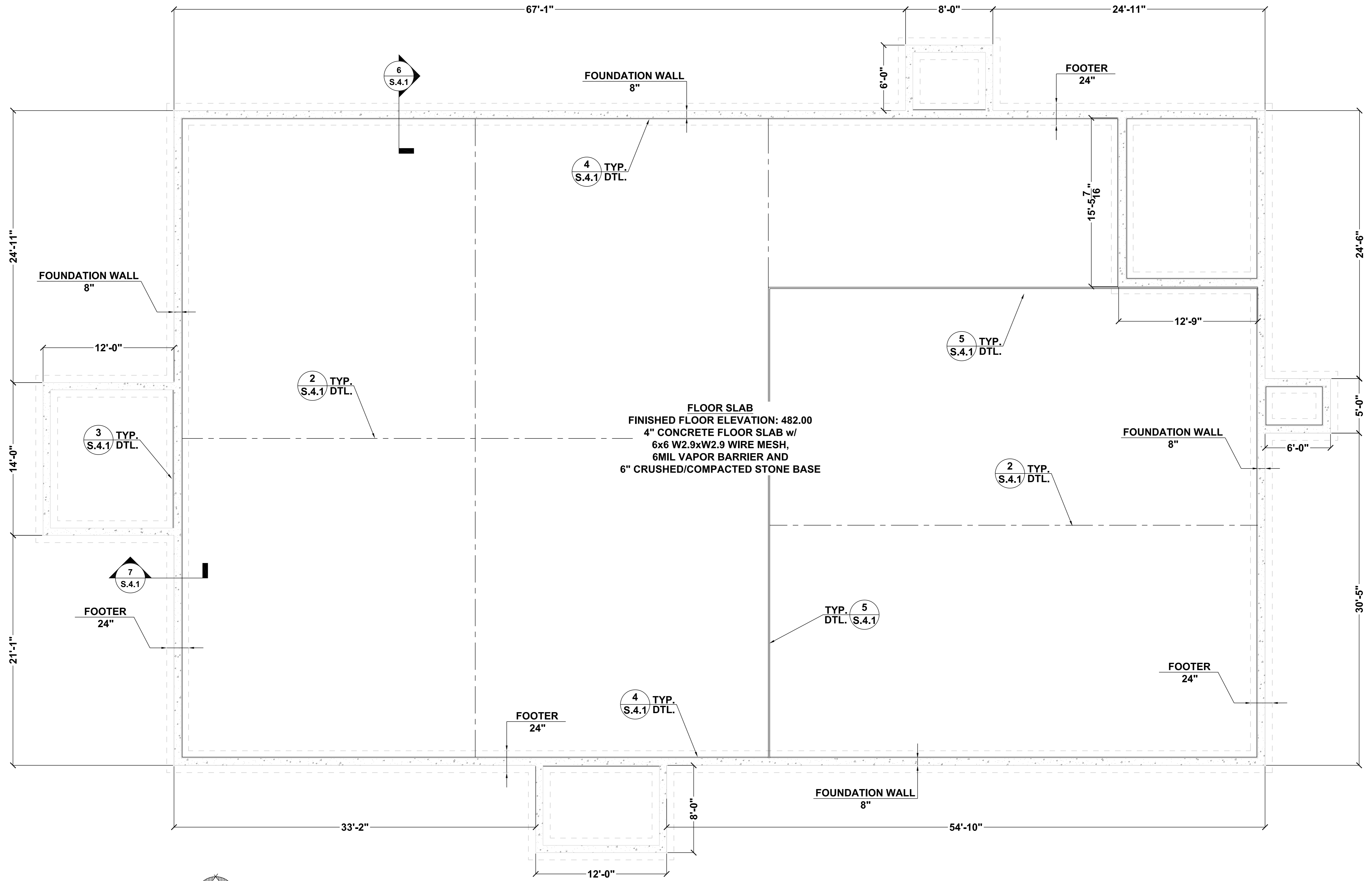
PROJECT: NEW CSMS - EAST CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
|           |     |      |             |
|           |     |      |             |
|           |     |      |             |

DESIGNED BY: J. NYE  
DRAWN BY: J. NYE  
PROJECT NO.: 42080032  
REVIEWED BY: R. FISHER  
SCALE: AS NOTED

DRAWING: DOOR AND WINDOW SCHEDULES AND DETAILS  
DRAWING NO. A.3.3

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. ALL DIMENSIONS AND DISTANCES SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.



**FOUNDATION PLAN**  
 SCALE: 1/4" = 1'-0"

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUREAU OF DESIGN AND PROJECT MANAGEMENT  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING C-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
 AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT:  
 NEW CSMS - EAST  
 CALIBRATION LAB

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
|     |      |             |
|     |      |             |

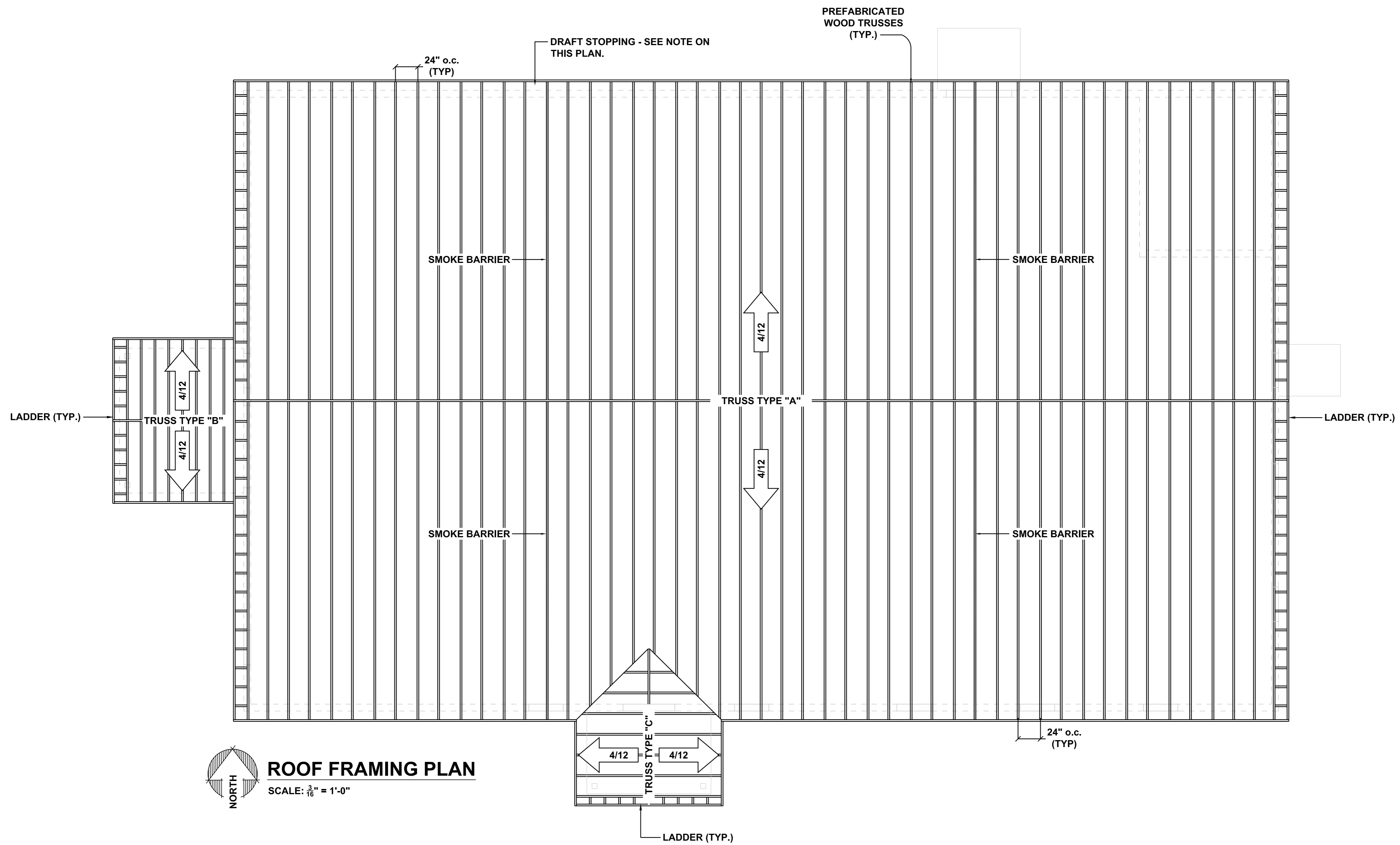
|             |            |             |             |
|-------------|------------|-------------|-------------|
| DESIGNED BY | J. NYE     | DATE        | 6 APR. 2020 |
| DRAWN BY    | J. NYE     | PROJECT NO. | 42080032    |
| REVIEWED BY | R. FISBURN | SCALE       | AS NOTED    |

DRAWING:  
 FOUNDATION PLAN  
 AND DIMENSIONS

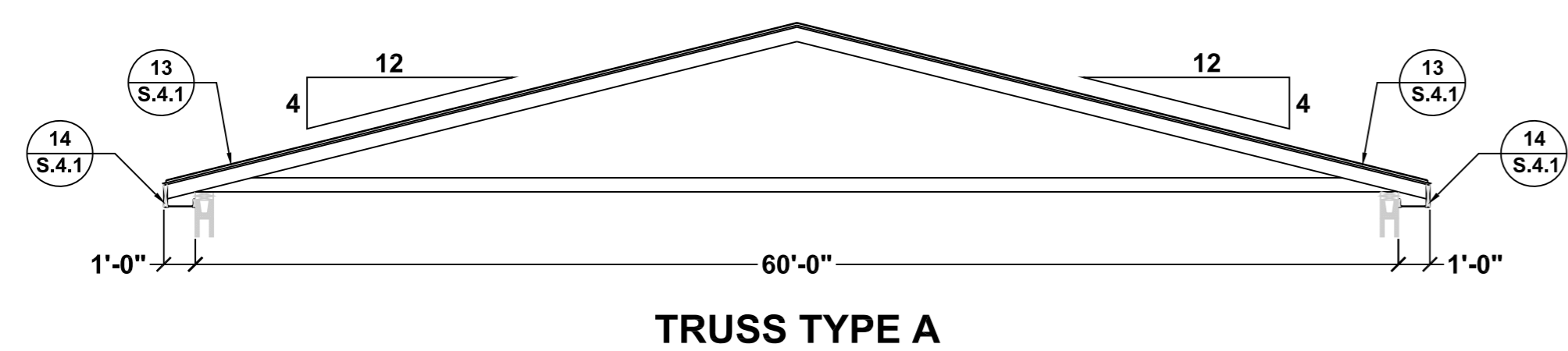
DRAWING NO.  
**S.1.1**

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE USER. DIMENSIONS AND DISTANCES SHALL BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.

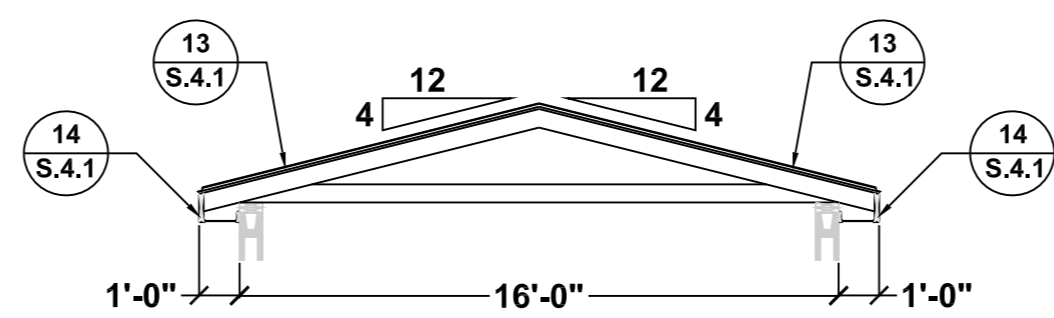




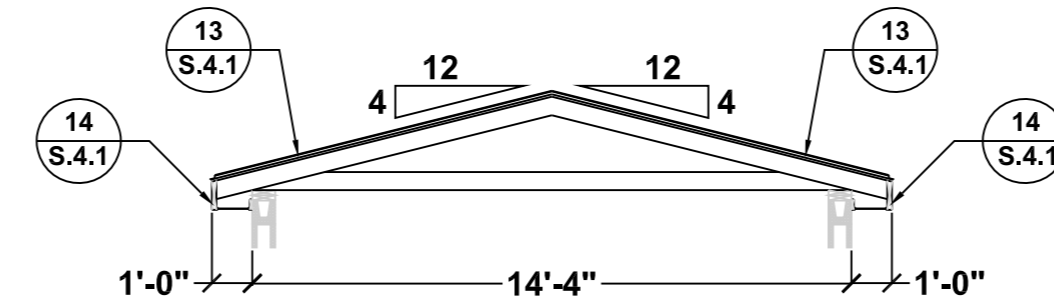
**ROOF FRAMING PLAN**  
 SCALE:  $\frac{3}{16}'' = 1'-0''$



**TRUSS TYPE A**



**TRUSS TYPE B**

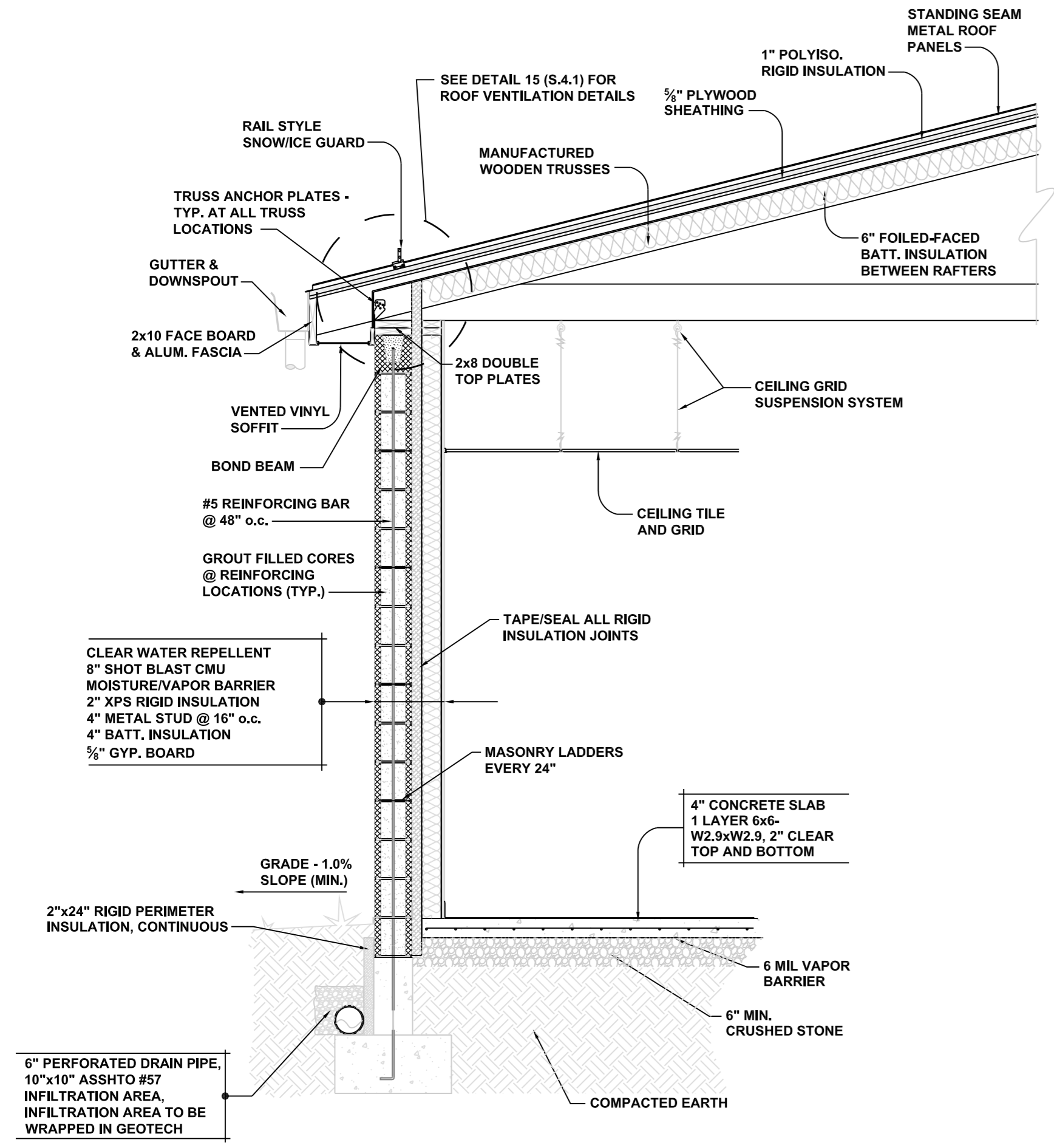


**TRUSS TYPE C**

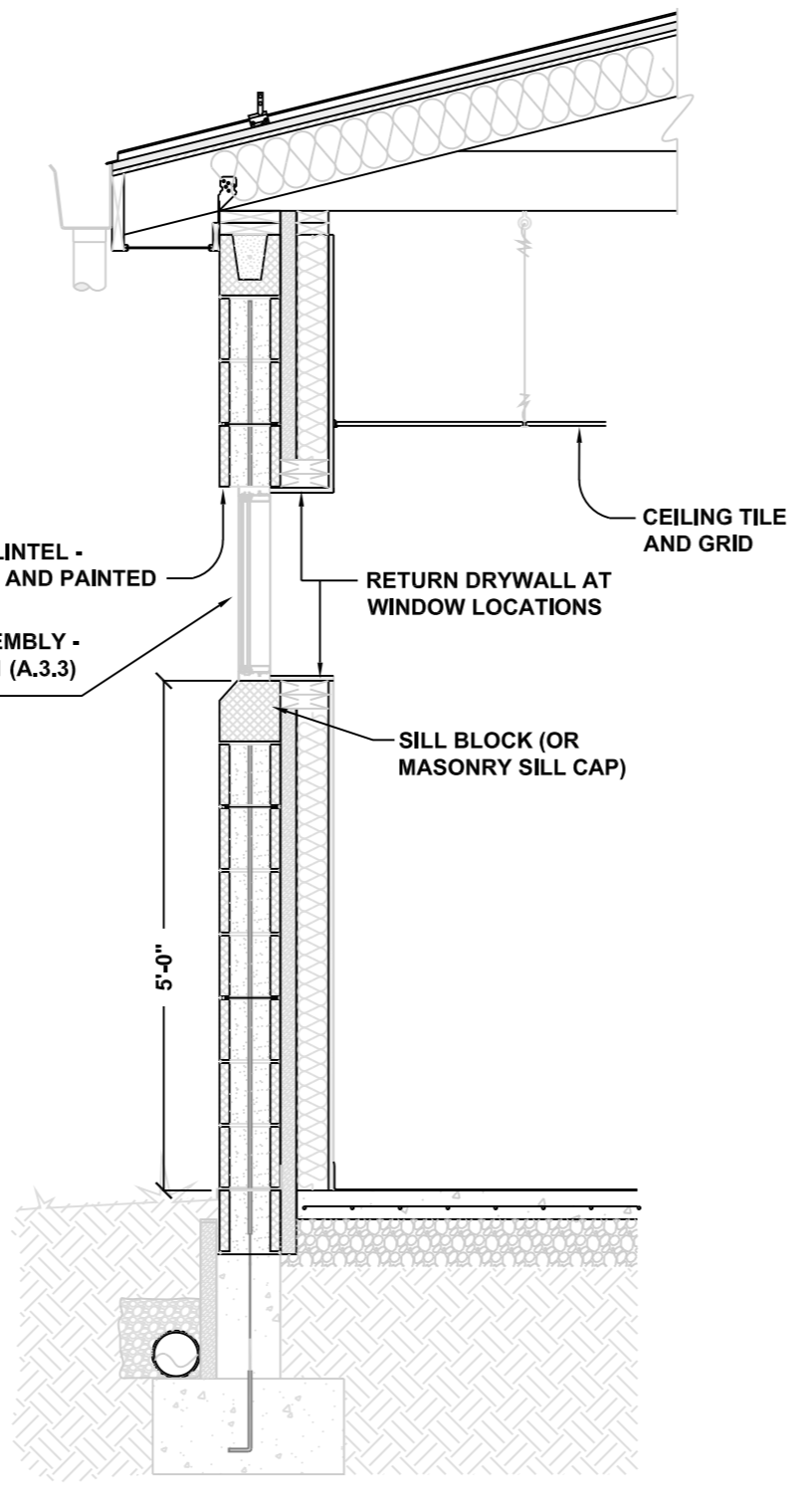
**ROOF FRAMING NOTE:**  
 THE ROOF FRAMING LAYOUT DEPICTS COMMON CONSTRUCTION PRACTICE AND IS SHOWN TO OUTLINE DESIGN INTENT. TRUSS MANUFACTURER SHALL BE RESPONSIBLE TO PERFORM ALL NECESSARY DESIGN CALCULATIONS AND TO SIZE TRUSSES AS NECESSARY. CONTRACTOR SHALL PLACE AND ANCHOR ALL TRUSSES PER THE MANUFACTURER'S ENGINEERED PLANS, WRITTEN RECOMMENDATIONS AND IN ACCORDANCE WITH ALL APPLICABLE FEDERAL AND STATE BUILDING CODES.

**DRAFT STOPPING:**  
 ENCLOSE ONE ENTIRE SIDE OF ONE TRUSS WITH  $\frac{1}{4}''$  PLYWOOD. PLYWOOD SHALL EXTEND BELOW BOTTOM CHORD OF TRUSS TO THE TOP OF THE CEILING GRID. DRAFT STOPPING SHALL BE INSTALLED IN THE GENERAL LOCATIONS DEPICTED ON PLAN.

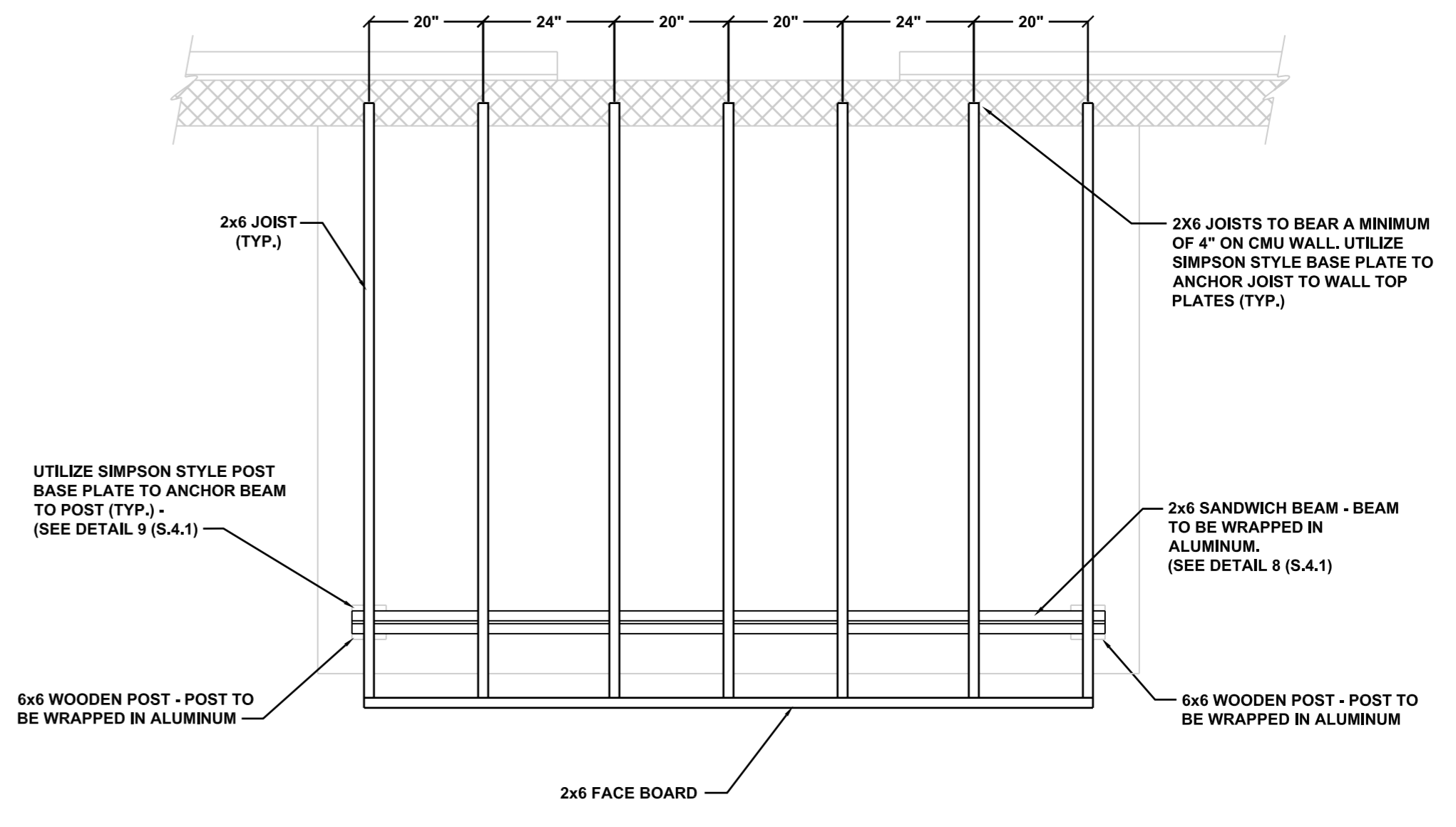
| PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS<br>BUREAU OF DESIGN AND PROJECT MANAGEMENT<br>DIV. OF ENGINEERING & ARCHITECTURE<br>BUILDING C-10, FORT INDIANTOWN GAP<br>ANNVILLE, PENNSYLVANIA 17003 | LOCATION:<br>AREA 10<br>FORT INDIANTOWN GAP<br>ANNVILLE, PA 17003 | PROJECT:<br>NEW CSMS - EAST<br>CALIBRATION LAB | REVISIONS<br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">NO.</th> <th style="width: 10%;">DATE</th> <th style="width: 80%;">DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | NO. | DATE | DESCRIPTION |  |  |  |  |  |  |  |  |  |
|---|---|--|---|-----|------|-------------|--|--|--|--|--|--|--|--|--|
| NO.   | DATE  | DESCRIPTION                                    |   |     |      |             |  |  |  |  |  |  |  |  |  |
|   |   |  |   |     |      |             |  |  |  |  |  |  |  |  |  |
|   |   |  |   |     |      |             |  |  |  |  |  |  |  |  |  |
|   |   |  |   |     |      |             |  |  |  |  |  |  |  |  |  |
| DESIGNED BY<br>J. NYE   | DATE<br>6 APR. 2020   | PROJECT NO.<br>420800032                       | ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. DIMENSIONS SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND DISTANCES.  |     |      |             |  |  |  |  |  |  |  |  |  |
| DRAWN BY<br>J. NYE  | SCALE<br>AS NOTED   | REVIEWED BY<br>R. FISHBURN                     | DRAWING:<br>ROOF FRAMING<br>AND DETAILS<br>DRAWING NO.<br><b>S.2.1</b>  |     |      |             |  |  |  |  |  |  |  |  |  |



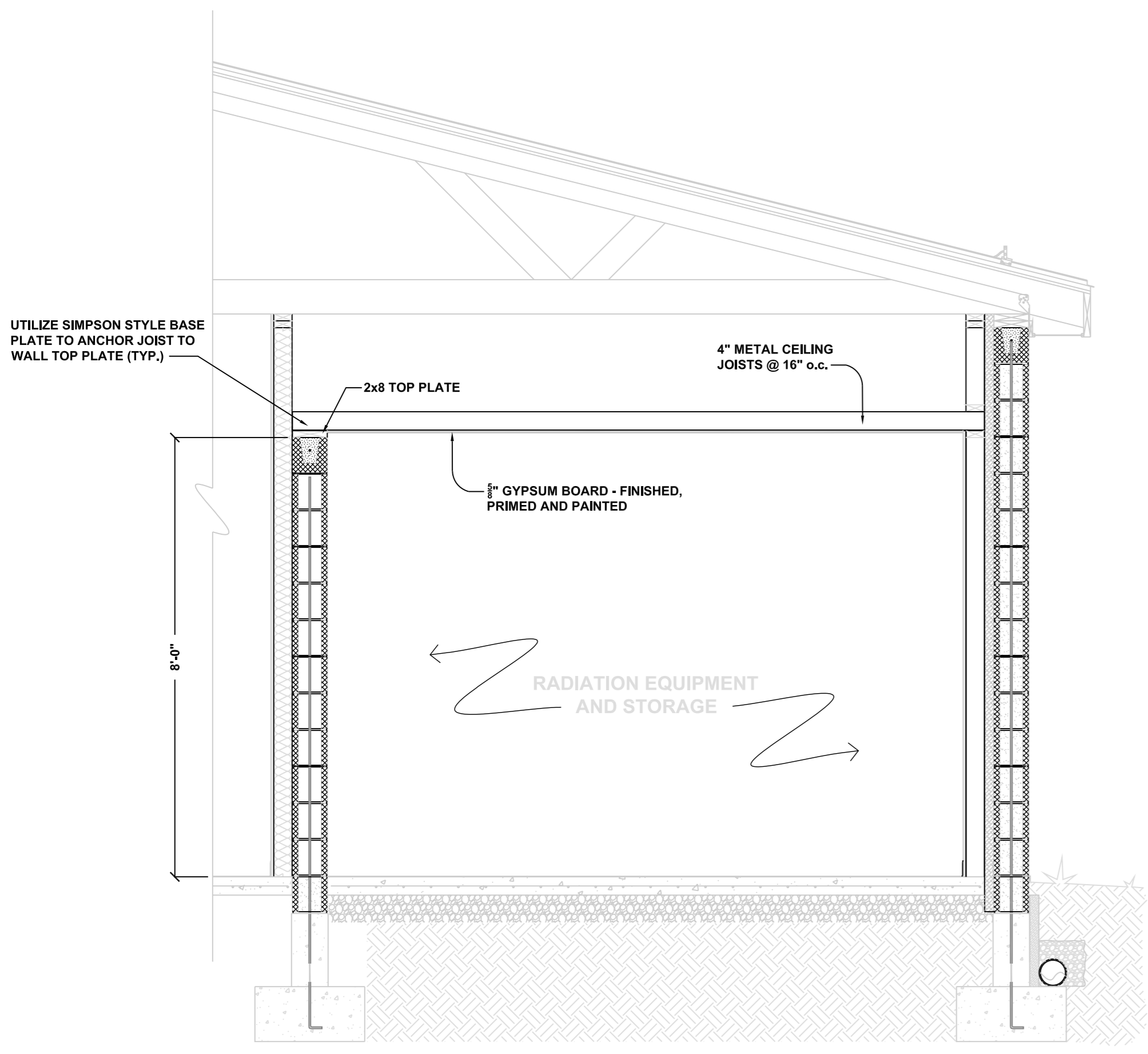
**SECTION - TYP. EXTERIOR WALL**  
SCALE: 1/2" = 1'-0"  
S | 3.1



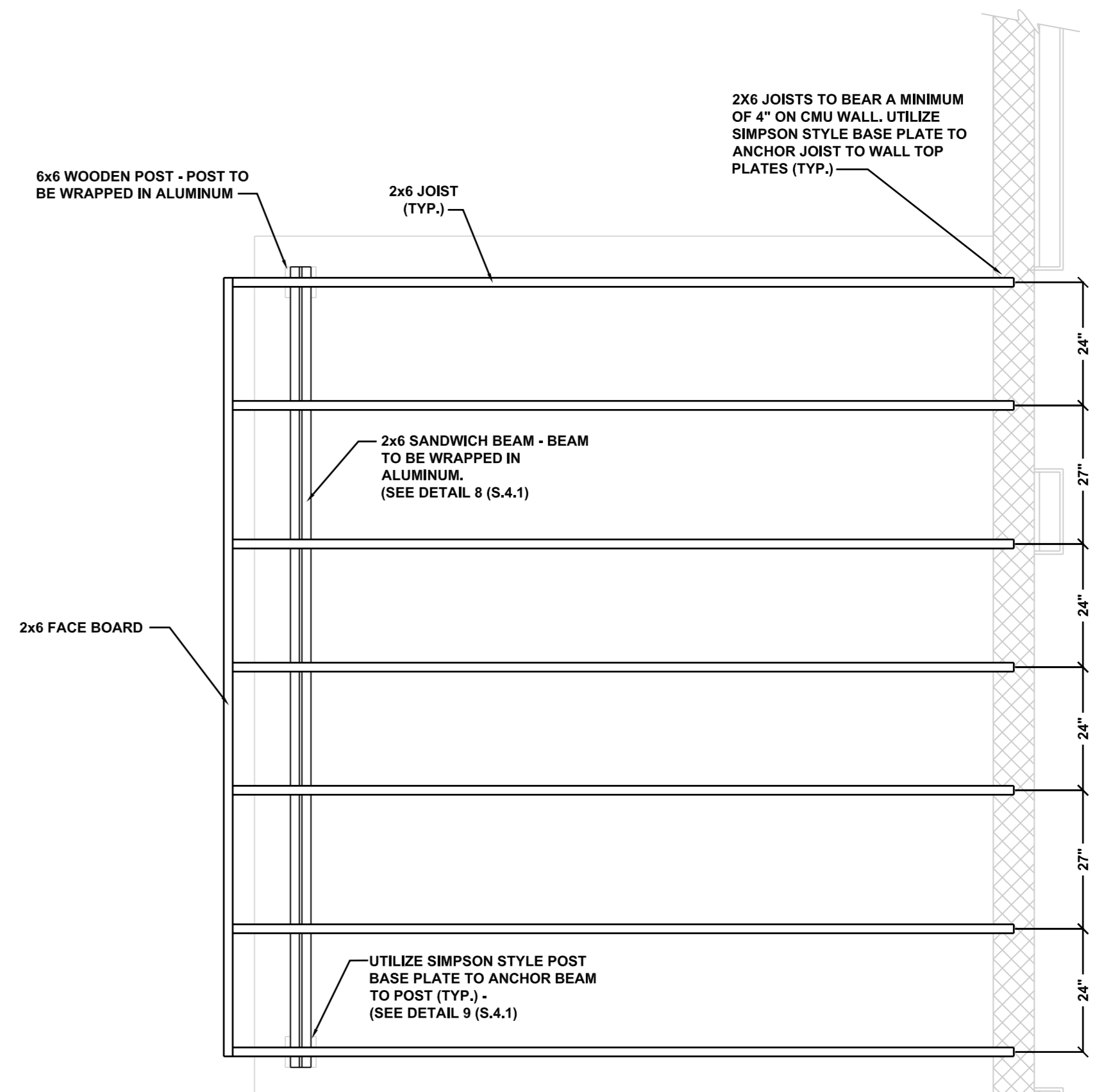
**SECTION - EXTERIOR WINDOWS (TYP.)**  
SCALE: 1/2" = 1'-0"  
S | 3.1



**DETAIL - MAIN ENTRANCE ROOF FRAMING**  
SCALE: 1/2" = 1'-0"  
S | 3.1



**SECTION - RAD. EQUIPMENT ROOM**  
SCALE: 1/2" = 1'-0"  
S | 3.1



**DETAIL - LOADING DOCK ROOF FRAMING**  
SCALE: 1/2" = 1'-0"  
S | 3.1

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUREAU OF DESIGN AND PROJECT MANAGEMENT  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING C-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS - EAST  
CALIBRATION LAB

| DESIGNED BY | DATE        | NO. | DESCRIPTION |
|-------------|-------------|-----|-------------|
| J. NYE      | 6 APR. 2020 |     |             |
| J. NYE      | 4/20/20032  |     |             |
| R. FISHER   |             |     |             |

DRAWING NO. S.3.1

WALL SECTIONS AND DETAILS

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR. ALL DIMENSIONS SHALL BE TO FACE UNLESS NOTED OTHERWISE.





| HEAT PUMP CONDENSING UNIT SCHEDULE (ARI CAPACITIES) |                 |             |                  |          |                  |      |                            |        |          | DUCTLESS A/C FAN COIL UNIT SCHEDULE (ARI CAPACITIES) |        |                 |              |            |                       |              |        |                       |                        |         |                            |          |
|---|-----------------|-------------|------------------|----------|------------------|------|----------------------------|--------|----------|--|--------|-----------------|--------------|------------|-----------------------|--------------|--------|-----------------------|------------------------|---------|----------------------------|----------|
| SYMBOL  | BASIS OF DESIGN |             | COOLING CAPACITY |          | HEATING CAPACITY |      | ELECTRICAL CHARACTERISTICS |        |          | REMARKS  | SYMBOL | BASIS OF DESIGN |              | SUPPLY FAN | COOLING CAPACITY DATA |              |        | HEATING CAPACITY DATA |                        |         | ELECTRICAL CHARACTERISTICS |          |
|   | MFG.            | MODEL NO.   | TOTAL MBH        | S.E.E.R. | TOTAL MBH        | HSPF | POWER SUPPLY M.C.A.        | M.O.P. | VOLTAGE  |  |        | TOTAL C.F.M.    | TOTAL M.B.H. | E.A.T.     |                       | TOTAL M.B.H. | E.A.T. |                       | POWER SUPPLY FUSE AMPS | VOLTAGE |                            |          |
| CU-2  | YORK            | DHM24CMB21S | 26.0             | 22       | 29.0             | 8.2  | 20                         | 30     | 208/60/1 | ① ②  | FC-1,2 | YORK            | DHP12NWB21S  | 453        | 13.0                  | 80           | 67     | 12.0                  | 70                     | 60      | N/A                        | 208/60/1 |

REMARKS

- ① UNIT SHALL BE PROVIDED WITH THE FOLLOWING ACCESSORIES: TIME DELAY RELAY, LOW AMBIENT CONTROLLER, WINTER START CONTROL, EVAPORATOR DEFROST CONTROL KIT, HIGH/LOW PRESSURE CUT-OUT SWITCH.
- ② NOTE: MAX LINESET LENGTH SHALL BE UNDER 66'. PROVIDE REMOTE CONTROLLED THERMOSTATS. PROVIDE LINESET COVER KITS.

| SPLIT SYSTEM AIR HANDLER SCHEDULE |         |              |                 |         |                          |               |              |      |                            | SPLIT SYSTEM CONDENSING UNIT SCHEDULE |              |        |              |                 |         |          |     |  |  |
|-----------------------------------|---------|--------------|-----------------|---------|--------------------------|---------------|--------------|------|----------------------------|---------------------------------------|--------------|--------|--------------|-----------------|---------|----------|-----|--|--|
| SYMBOL                            | SERVES  | TOTAL C.F.M. | ELECTRICAL DATA |         | NATURAL GAS FURNACE DATA |               |              |      | COOLING CAPACITY - 80°/67° |                                       | COOLING DATA |        |              | ELECTRICAL DATA |         | REMARKS  |     |  |  |
|                                   |         |              | M.C.A.          | VOLTAGE | INPUT M.B.H.             | OUTPUT AFUE % | TEMP RISE °F | ROWS | TOTAL MBH                  | SENSIBLE MBH                          | NOM. TONS    | E.E.R. | COND. E.A.T. | C.U. M.C.A.     | VOLTAGE |          |     |  |  |
| AHU-1 CU-1                        | STORAGE | 1,950        | 17              | 120/1   | 120                      | 116           | 98           | 75   | -                          | 52.5                                  | 37.6         | 5.0    | 12.5         | 95              | 33.9    | 208/1/60 | ① ② |  |  |

REMARKS

- ① BASIS OF DESIGN: YORK MODEL #YP9C120D20MP13C / #YXV60B21S OR APPROVED EQUAL WITH SIDE RETURN FILTER BOX AND SPARE FILTERS. MOUNT AIR HANDLER ON A 4" HIGH CONCRETE MAINTENANCE PAD. PROVIDE SUPPORTS AND VIBRATION ISOLATION AS REQUIRED.
- ② FURNISH AND INSTALL UNIT WITH THE FOLLOWING ACCESSORIES:
  - A. CONDENSATE DRAIN WITH 2" DEEP TRAP AND NEUTRALIZATION KIT.
  - B. PROVIDE WITH LOW AMBIENT KIT.

| DX HORIZONTAL CEILING AIR COOLED AC UNIT |         |              |        |             |              |    |    |          |     |                   |                       |                     |      |                        |                     |                 |      |           |               |       |
|--|---------|--------------|--------|-------------|--------------|----|----|----------|-----|-------------------|-----------------------|---------------------|------|------------------------|---------------------|-----------------|------|-----------|---------------|-------|
| SYMBOL                                   | SERVES  | TOTAL C.F.M. | FAN HP | COMPRESSORS | COOLING      |    |    | HEATING  |     | ELECTRICAL DATA   |                       |                     |      |                        |                     | BASIS OF DESIGN |      | REMARKS   |               |       |
|  |         |              |        |             | TOTAL M.B.H. | DB | WB | CAP BTUH | KW  | INDOOR DX V/PH/HZ | AIR HANDLING UNIT MCA | CONDENSING UNIT MFS | FLA  | OUTDOOR REMOTE V/PH/HZ | CONDENSING UNIT MCA | MFS             | FLA  |           | MANUFACTURER  | MODEL |
| AHU-2,3 CU-3,4                           | CAL LAB | 1,200        | 0.5    | (1) 3HP     | 36.6         | 80 | 67 | 17,065   | 5.0 | 208/3/60          | 38.5                  | 40                  | 30.8 | 208/3/60               | 14.2                | 20              | 11.6 | SKIL-AIRE | MAC-036-H3/FU | ① ② ③ |

REMARKS

- ① PROVIDE WITH TEMPERATURE HUMIDITY CONTROLLER WITH ALARMS.
- ② PROVIDE WITH 5 YEAR COMPRESSOR WARRANTY.
- ③ PROVIDE WITH STEAM GENERATING HUMIDIFIER 5 LBS/HR.

| EXHAUST FAN SCHEDULE |         |                 |           |      |        |        |        |                 |      |         |         |         |
|----------------------|---------|-----------------|-----------|------|--------|--------|--------|-----------------|------|---------|---------|---------|
| SYMBOL               | SERVING | BASIS OF DESIGN |           | TYPE | C.F.M. | E.S.P. | R.P.M. | ELECTRICAL DATA |      |         |         | REMARKS |
|                      |         | MFG.            | MODEL NO. |      |        |        |        | FAN MOTOR       |      | VOLTAGE |         |         |
| EF-1                 | JANITOR | GREENHECK       | SP-A50    | CC   | 70     | 0.1    | 838    | 0.33            | 4.3  | 15      | 115V-1Ø | ①       |
| EF-2                 | WOMEN   | GREENHECK       | SP-A190   | CC   | 150    | 0.1    | 1400   | 0.45            | 54.2 | 15      | 115V-1Ø | ①       |
| EF-3                 | MEN     | GREENHECK       | SP-A290   | CC   | 300    | 0.1    | 1050   | 0.72            | 80.7 | 15      | 115V-1Ø | ①       |

REMARKS

- ① PROVIDE WITH INTERNAL BACKDRAFT DAMPER, PLUG-TYPE DISCONNECT, HANGING ISOLATORS AND ALUMINUM GRILLE. TYPE CC = CEILING CENTRIFUGAL

| ENERGY RECOVERY VENTILATOR SCHEDULE |                 |                 |                       |           |        |        |      |          |                       |             |                       |               |         |             |        |        |
|-------------------------------------|-----------------|-----------------|-----------------------|-----------|--------|--------|------|----------|-----------------------|-------------|-----------------------|---------------|---------|-------------|--------|--------|
| SYMBOL                              | BASIS OF DESIGN |                 | ENERGY RECOVERY WHEEL |           |        |        |      |          | ELECTRICAL DATA       |             |                       | WEIGHT (LBS.) | REMARKS |             |        |        |
|                                     | MFG.            | MODEL NO.       | SERVING               | O.A./E.A. | C.F.M. | E.S.P. | RPM  | FAN H.P. | SUMMER D.B./W.B. (°F) | L.A.T. (°F) | WINTER D.B./W.B. (°F) |               |         | L.A.T. (°F) | M.C.A. | M.O.P. |
| ERV-1                               | GREENHECK       | MINIVENT-750-VG | BLDG.                 | O.A.      | 600    | 0.5    | 1661 | 1/2      |                       | 80/68       | 0                     | 21.8          | 30      | 115/60/1    | 245    | ①      |

REMARKS

- ① UNIT SHALL BE PROVIDED WITH FACTORY MOUNTED HANGING BRACKETS AND SHALL BE SUSPENDED FROM ROOF STRUCTURE AS PER MANUFACTURER'S RECOMMENDATIONS AND UTILIZING VIBRATION ISOLATORS.

BUILDING MANAGEMENT SYSTEM

- GENERAL
  - A. THE GENERAL PROJECT SCOPE TO PROVIDE CONTROLS AND INSTRUMENTATION FOR THE HVAC SYSTEMS
    - 1. ALL SYSTEMS ARE TO BE AN EXTENSION OF THE EXISTING FTIG BMS NETWORK.
    - 2. BUILDING LEVEL CONTROLLER TO BE A WEB BASED SYSTEM UTILIZING BACNET COMMUNICATIONS AT ALL LEVELS. SYSTEM LEVEL CONTROLS TO BE DISTRIBUTED DDC UTILIZING BACNET COMMUNICATION
    - 3. PROVIDE WEB BASED GRAPHICAL DISPLAYS OF ALL PRIMARY AND SECONDARY EQUIPMENT AS WELL AS BUILDING FLOOR PLANS SHOWING EQUIPMENT LOCATIONS AND SPACE CONDITION INFORMATION. GRAPHICAL DISPLAYS SHALL BE INTEGRATED INTO THE EXISTING BASE-WIDE SYSTEM UTILIZING NAMING CONVENTIONS, LOGICAL DISPLAY ORDER AND CONTENT CONSISTENT WITH EXISTING SYSTEMS.
  - 2. PART 2 - PRODUCTS
    - A. GENERAL DESCRIPTION
      - 1. ACCEPTABLE BMS MANUFACTURERS
        - 1) JOHNSON CONTROLS, METASYS EXTENDED ARCHITECTURE
        - 2) NO SUBSTITUTIONS
      - B. ACCEPTABLE INSTALLERS
        - 3) JOHNSON CONTROLS, FACTORY BRANCH OFFICE
          - a. CONTACT SCOTT A SCHMITTEL 717-856-7609
          - 4) NO SUBSTITUTIONS
      - 3. PART 4 SEQUENCE OF OPERATION
        - A. GENERAL DESCRIPTION
          - 1) METASYS MAESNE CLASS
          - 2) CONNECTED TO BMS
  - AHU-1
    - A. PROVIDE PROGRAMMABLE NETWORKABLE THERMOSTAT, CONTROL UNIT HEATING AND COOLING IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE, OCCUPANCY SCHEDULE BY BMS
    - B. CONNECT TO BMS
    - C. PROVIDE INTERLOCK TO OUTDOOR UNIT
  - AHU-2 AND AHU-3
    - A. UNITS TO BE PROVIDED WITH MANUFACTURER PROVIDED CONTROLS, INTEGRATE TO BMS FOR MONITORING AND ALARM, PROVIDE SECONDARY TEMPERATURE AND HUMIDITY SENSOR CONNECTED TO BMS, LOCAL UNIT CONTROL TO OPERATE UNIT HEATING AND COOLING IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY, OCCUPANCY SCHEDULE BY BMS
    - B. CONNECT TO BMS
    - C. PROVIDE INTERLOCK TO OUTDOOR UNIT
  - ERV
    - A. PROVIDE CO2 SENSORS, (2) ADJACENT TO AHU-1 AND AHU-2 THERMOSTATS, CONNECT TO BMS. THE BMS SHALL CYCLE THE ERV ON IF EITHER CO2 SENSOR DETECTS A CO2 LEVEL GREATER THAN 450PPM (ADJ)
  - TELCOM AND RAD EQUIPMENT STORAGE
    - A. FC UNITS TO BE PROVIDED WITH MANUFACTURER PROVIDED CONTROLS AND WILL BE STAND ALONE, PROVIDE SECONDARY TEMPERATURE SENSOR CONNECTED TO BMS. LOCAL UNIT CONTROL TO OPERATE UNIT HEATING AND COOLING IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE
    - B. PROVIDE INTERLOCK TO OUTDOOR UNIT.
  - ENERGY METERING
    - A. PROVIDE GAS (AL-800), WATER (RCDL120) AND ELECTRIC METER, CONNECTED TO THE BMS. ELECTRIC METER FURNISHED AND INSTALLED BY THE 4 CONTRACTOR. GAS AND WATER METER FURNISHED UNDER THE 2 CONTRACT AND INSTALLED UNDER THE 3 CONTRACT.

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING 0-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
 AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT:  
 NEW CSMS  
 CALIBRATION LAB

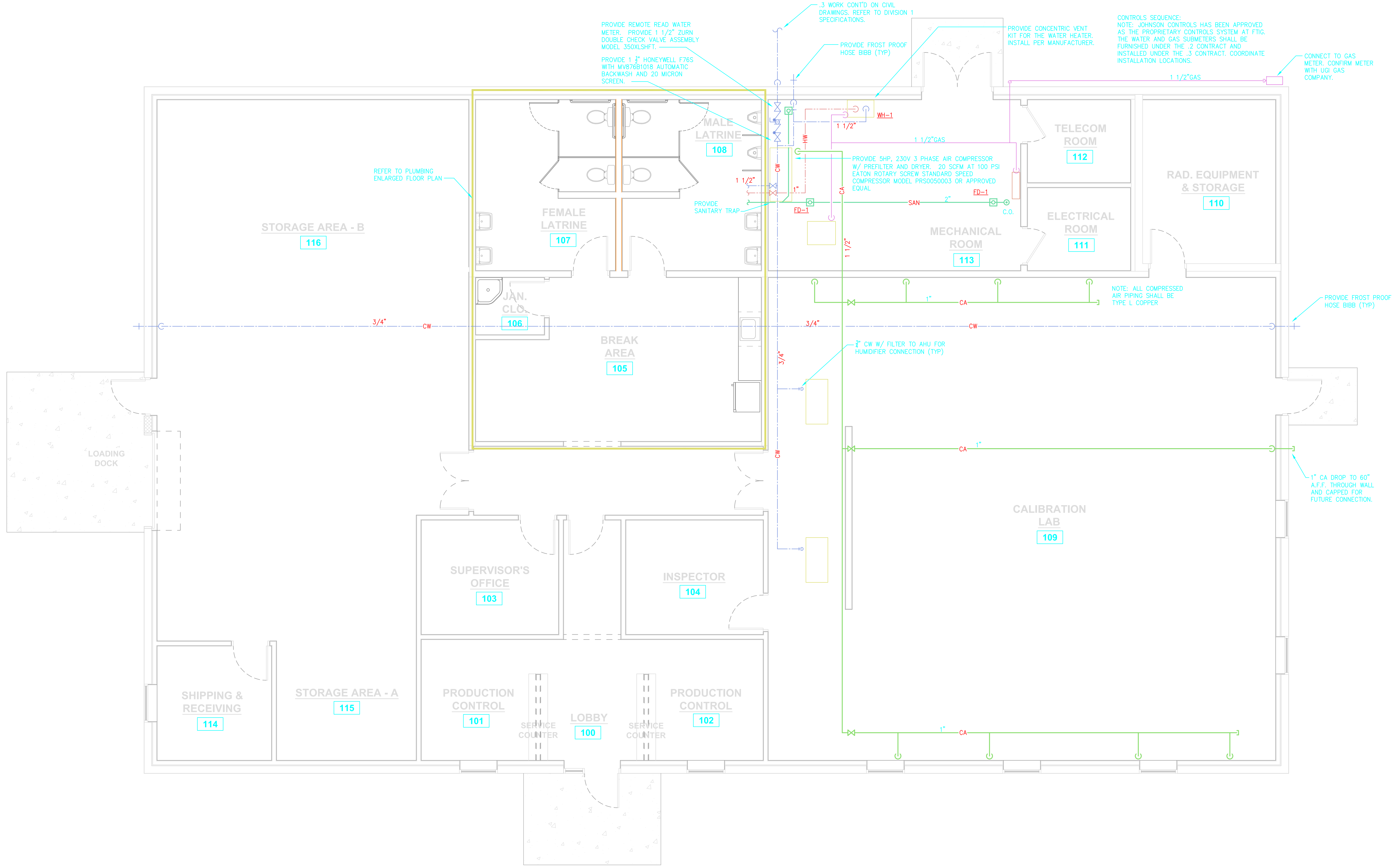
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|     |      |             | BY        | DATE |
|     |      |             |           |      |
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|             |             |             |              |
|-------------|-------------|-------------|--------------|
| DESIGNED BY | C. KITA     | DATE        | 6 APRIL 2020 |
| DRAWN BY    | C. KITA     | PROJECT NO. | PN           |
| REVIEWED BY | R. FISHBURN | SCALE       | AS NOTED     |

DRAWING:  
 HVAC SCHEDULES

DRAWING NO.  
 H.2.0

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DETAILS.



**PLUMBING FLOOR PLAN**  
SCALE: 1/4" = 1'-0"

PROVIDE REMOTE READ WATER METER. PROVIDE 1 1/2" ZURN DOUBLE CHECK VALVE ASSEMBLY MODEL 350XLSHFT.  
PROVIDE 1 1/2" HONEYWELL F76S WITH MV876B1018 AUTOMATIC BACKWASH AND 20 MICRON SCREEN.

3 WORK CONTD ON CIVIL DRAWINGS. REFER TO DIVISION 1 SPECIFICATIONS.

PROVIDE FROST PROOF HOSE BIBB (TYP)

PROVIDE CONCENTRIC VENT KIT FOR THE WATER HEATER. INSTALL PER MANUFACTURER.

CONTROLS SEQUENCE:  
NOTE: JOHNSON CONTROLS HAS BEEN APPROVED AS THE PROPRIETARY CONTROLS SYSTEM AT FTIG. THE WATER AND GAS SUBMETERS SHALL BE FURNISHED UNDER THE .2 CONTRACT AND INSTALLED UNDER THE .3 CONTRACT. COORDINATE INSTALLATION LOCATIONS.

CONNECT TO GAS METER. CONFIRM METER WITH UGI GAS COMPANY.

REFER TO PLUMBING ENLARGED FLOOR PLAN

NOTE: ALL COMPRESSED AIR PIPING SHALL BE TYPE L COPPER

PROVIDE FROST PROOF HOSE BIBB (TYP)

3/4" CW W/ FILTER TO AHU FOR HUMIDIFIER CONNECTION (TYP)

1" CA DROP TO 60" A.F.F. THROUGH WALL AND CAPPED FOR FUTURE CONNECTION.

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
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BUILDING 0-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
|           |     |      |             |
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ALL DIMENSIONS AND FINISHING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.

| DESIGNED BY | DATE         | PROJECT NO. | SCALE    |
|-------------|--------------|-------------|----------|
| C. KITA     | 6 APRIL 2020 |             | AS NOTED |

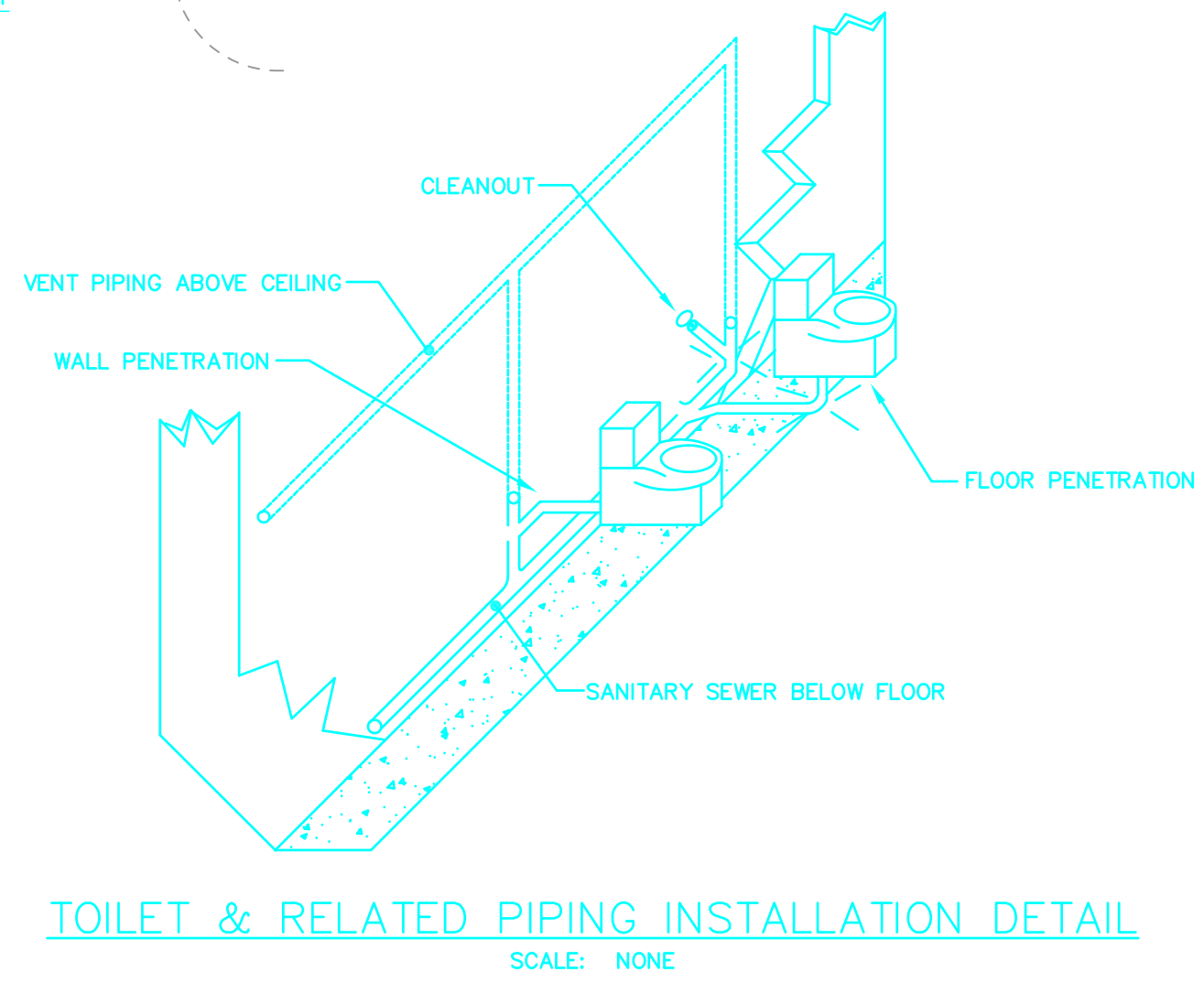
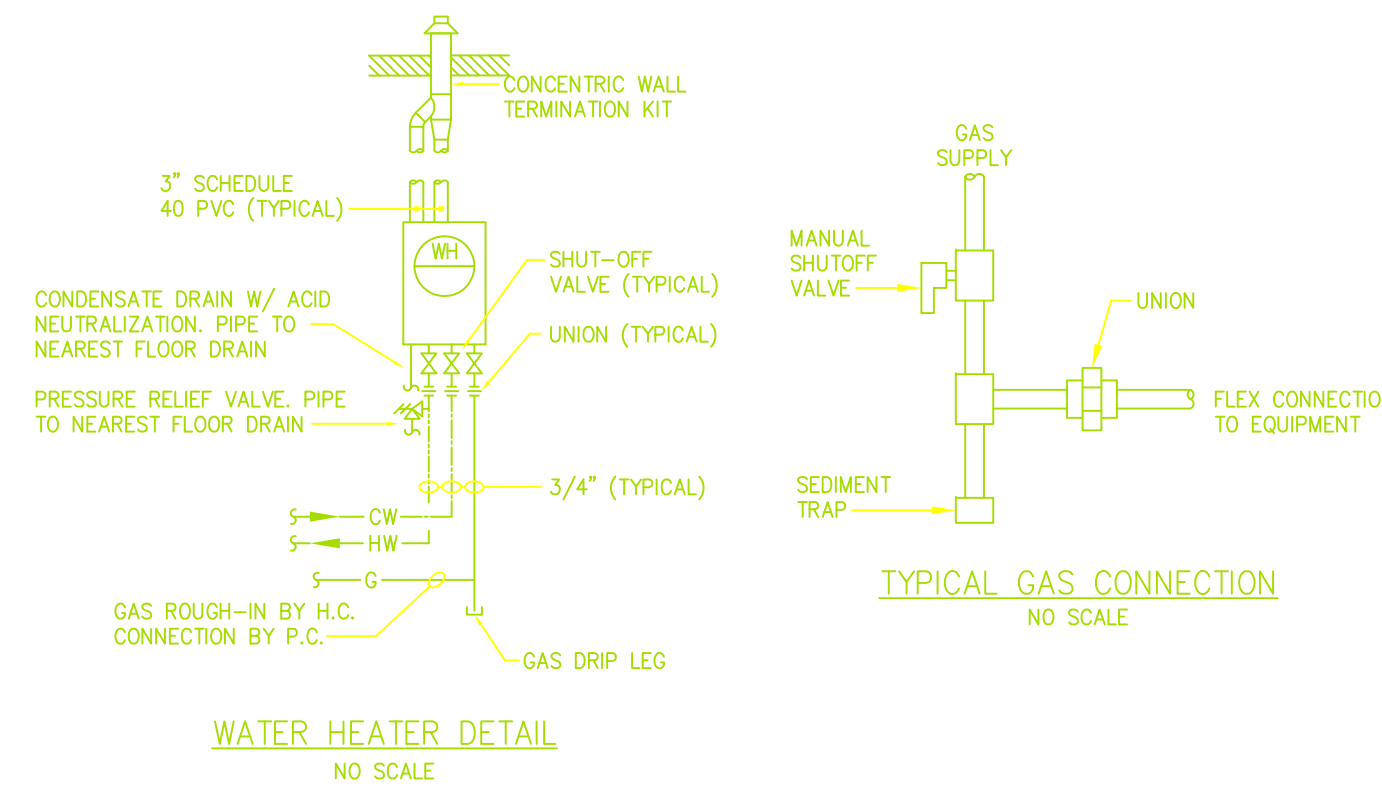
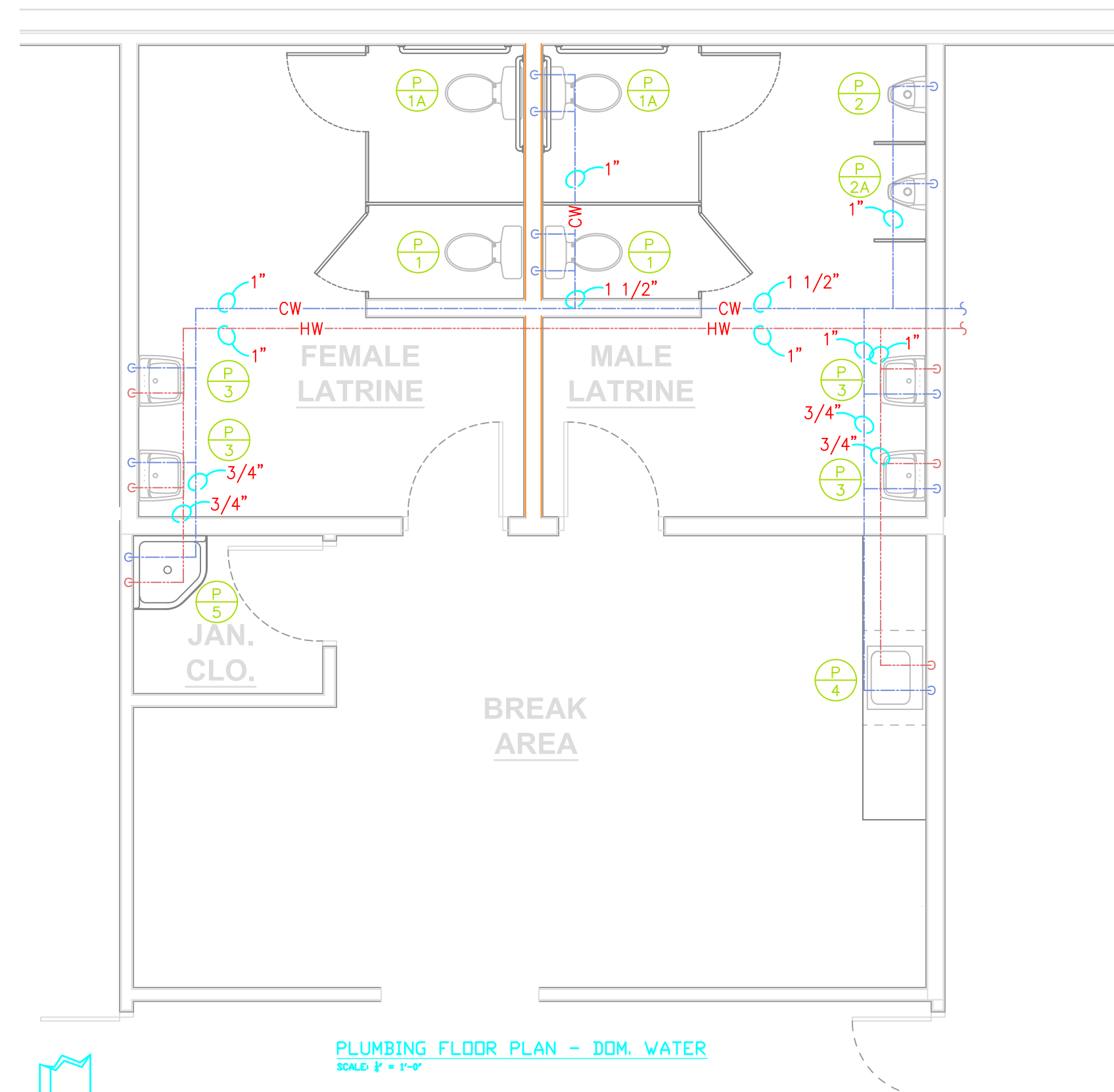
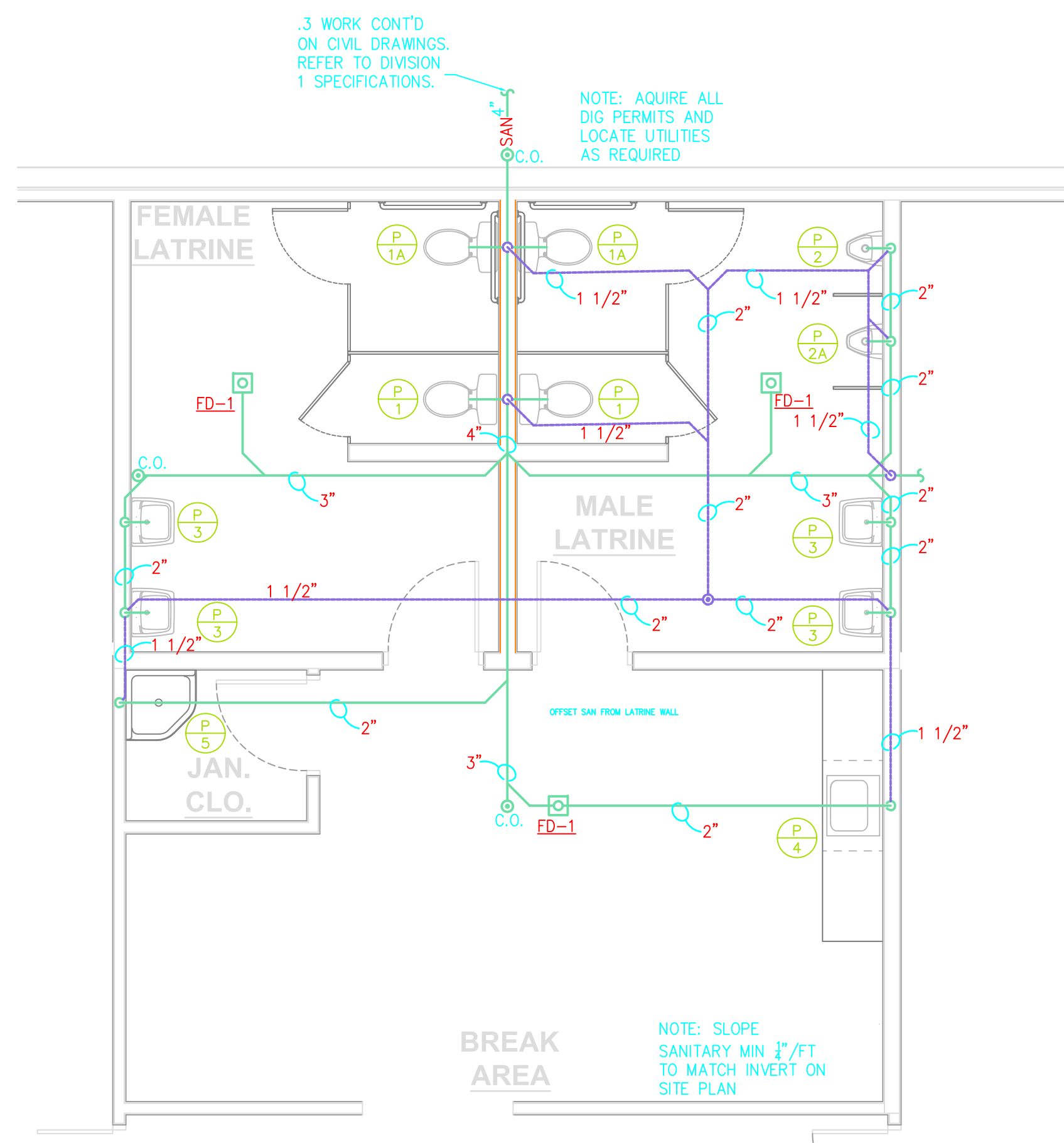
| DRAWN BY | PN |
|----------|----|
| C. KITA  |    |

| REVIEWED BY | SCALE    |
|-------------|----------|
| R. FISHBURN | AS NOTED |

DRAWING:  
PLUMBING FLOOR PLAN

DRAWING NO.  
P.1.0





| SYMBOL | FIXTURE DESCRIPTION       | C.W. | H.W. | SAN    | VENT   | MOUNTING | RIM HEIGHT | REMARKS |
|--------|---------------------------|------|------|--------|--------|----------|------------|---------|
| P-1    | WATER CLOSET - TANK       | 3/4" | -    | 4"     | -      | FLOOR    | 14"        | ①       |
| P-1A   | WATER CLOSET - ADA - TANK | 3/4" | -    | 4"     | -      | FLOOR    | 17" (ADA)  | ①       |
| P-2    | URINAL                    | 3/4" | -    | 2"     | 1-1/2" | WALL     | SEE ARCH   | ①       |
| P-2A   | URINAL - ADA              | 3/4" | -    | 2"     | 1-1/2" | WALL     | SEE ARCH   | ①       |
| P-3    | LAVATORY                  | 1/2" | 1/2" | 1-1/2" | 1-1/4" | WALL     | SEE ARCH   | ①       |
| P-4    | KITCHEN SINK              | 1/2" | 1/2" | 1-1/2" | 1-1/4" | COUNTER  | SEE ARCH   | ①       |
| P-5    | MOP RECEPTOR              | 3/4" | 3/4" | 3"     | -      | FLOOR    | 10"        | ①       |
| HB     | HOSE BIBB                 | 3/4" | -    | -      | -      | WALL     | 24"        | ①       |
| FPHB   | FREEZE-PROOF HOSE BIBB    | 3/4" | -    | -      | -      | WALL     | 24"        | ①       |
| FD-1   | FLOOR DRAIN               | -    | -    | 2"     | -      | FLOOR    | -          | ①       |

REMARKS  
① SEE SPECIFICATIONS FOR "BASIS OF DESIGN" FIXTURE MODELS, TRIM AND ACCESSORIES.

**SYMBOL LEGEND**

|  |                       |  |                          |
|--|-----------------------|--|--------------------------|
|  | (CW) COLD WATER       |  | PIPE RISE                |
|  | (HW) HOT WATER        |  | PIPE DROP (ELBOW)        |
|  | (V) VENT              |  | PIPE DROP (TEE)          |
|  | (SAN) SANITARY        |  | SHUT-OFF VALVE           |
|  | BACKFLOW PREVENTER    |  | PIPE BREAK               |
|  | WATER HAMMER ARRESTOR |  | FLOOR DRAIN              |
|  | FLOOR CLEAN OUT       |  | FROST PROOF WALL HYDRANT |
|  | WALL CLEAN OUT        |  |                          |

| SYMBOL | BASIS OF DESIGN |        | MAXIMUM INPUT (MBH) | GPM @ 70' RISE | GPM @ 50' RISE | MAXIMUM GPM. | WATER CONN. | GAS CONN. | THERMAL EFF. (%) | ELECTRICAL |      | REMARKS |
|--------|-----------------|--------|---------------------|----------------|----------------|--------------|-------------|-----------|------------------|------------|------|---------|
|        | MANUFACTURER    | MODEL  |                     |                |                |              |             |           |                  | VOLTS      | AMPS |         |
| WH-1   | RINNAI          | RUR98i | 199.0               | 4.8            | 6.7            | 9.8          | 3/4"        | 3/4"      | 95               | 120        | 2    | ①       |

REMARKS  
① PROVIDE AND INSTALL WITH SERVICE VALVES AND CONCENTRIC WALL TERMINATION KIT.

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
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DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING G-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

| NO. | DATE | DESCRIPTION | REVISIONS |      |
|-----|------|-------------|-----------|------|
|     |      |             | BY        | DATE |
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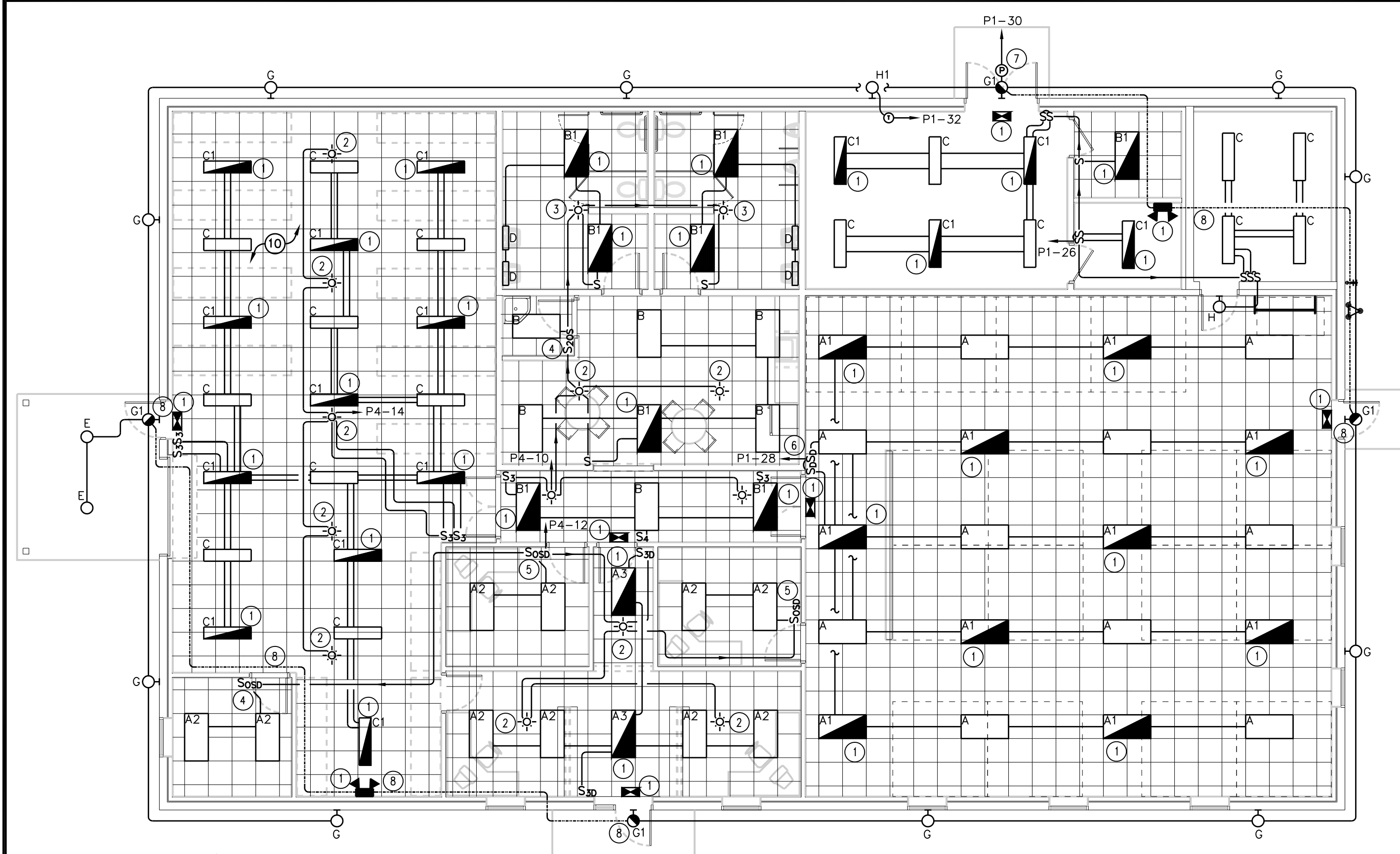
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|-------------|-------------|-------------|--------------|
| DESIGNED BY | C. KITA     | DATE        | 6 APRIL 2020 |
| DRAWN BY    | C. KITA     | PROJECT NO. | PN           |
| REVIEWED BY | R. FISHBURN | SCALE       | AS NOTED     |

DRAWING:  
ENLARGED PLUMBING PLAN

DRAWING NO.  
P.1.1

ALL DIMENSIONS AND FIXTURES CONFORMANCE SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DETAILS.





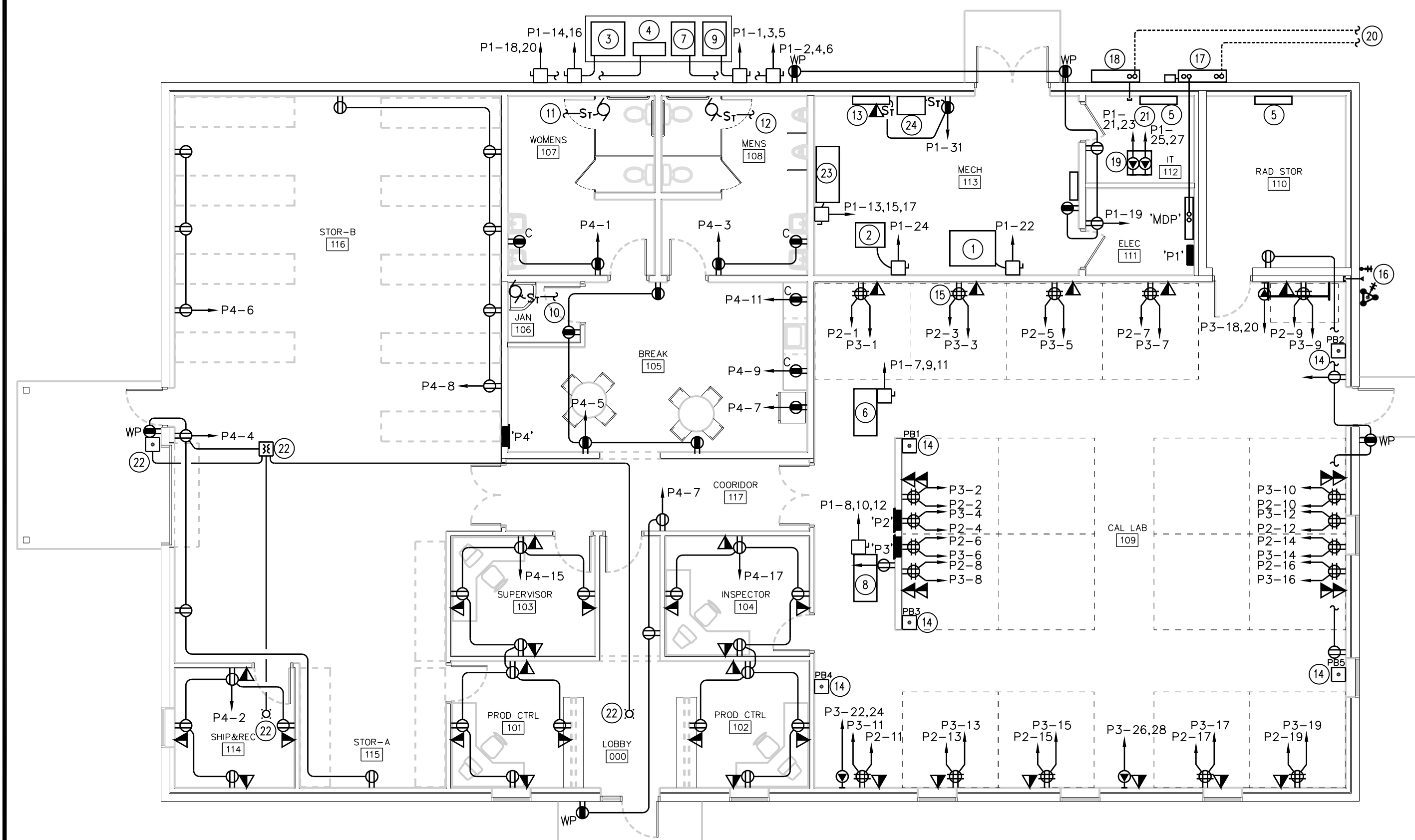
**LIGHTING PLAN**  
SCALE: 1/8" = 1'-0"

**LIGHTING PLAN NOTES:**

1. EXTEND AND CONNECT EMERGENCY BATTERY FOR EMERGENCY LIGHTING UNITS, EXITS AND EMERGENCY FLUORESCENT LIGHTING TO UNSWITCHED HOT LEG OF LIGHTING CIRCUIT IN THE AREA IN WHICH IT SERVES.
2. LINE VOLTAGE CEILING MOUNTED OCCUPANCY SENSOR, 2 POLE, SENSORSWITCH #CMR-PDT-9-2P-P OR APPROVED EQUAL. WIRE IN PARALLEL SUCH THAT IF ANY SENSOR IS ACTIVATED, THE LIGHTS TURN ON AND MANUAL SWITCHING IS ON THE LOAD SIDE OF THE SENSOR.
3. LINE VOLTAGE CEILING MOUNTED OCCUPANCY SENSOR, 2 POLE, SENSORSWITCH #CMR-PDT-9-2P-P OR APPROVED EQUAL.
4. LINE VOLTAGE WALL BOX OCCUPANCY SENSOR, 2 POLE, SENSORSWITCH #WSD-PDT-2P-GY OR APPROVED EQUAL.
5. LINE VOLTAGE WALL BOX OCCUPANCY SENSOR, 2 POLE, SENSORSWITCH #WSD-PDT-2P-GY OR APPROVED EQUAL.
6. WALL BOX DIMMER, HUBBELL #PSD710-UNV-WV WITH #PSDKIT-LL-GY COLOR CHANGE KIT. WIRE AS PER MANUFACTURERS INSTRUCTIONS.
7. WIRE EXTERIOR LIGHTS VIA 2 CHANNEL ASTRONOMIC DIGITAL TIMELOCK. WIRE LIGHTING FOR PHOTOCELL ON/TIMELOCK OFF OPERATION.
8. CONNECT 12V DC WIRING AS SHOWN. BATTERY UNIT MUST BE ON UNSWITCHED HOT LEG OF EXTERIOR LIGHTING CIRCUIT.
9. FREEZE PROTECTION WARNING LIGHT, WIRE VIA REVERSE ACTING STAT.
10. UTILIZE BOTH POLES OF OCCUPANCY SENSORS TO LIMIT LOADING ON EACH POLE IN RECEIVING AREA.

| I.D.                    | DESCRIPTION              | MANUFACTURER    |           |           | CAT. NO.                                    | LAMPS         | MTG.     | WATT  | REMARKS  |
|-------------------------|--------------------------|-----------------|-----------|-----------|---|---------------|----------|-------|----------|
|                         |                          | BASIS OF DESIGN | ALTERNATE | ALTERNATE |   |               |          |       |          |
| A                       | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LEPC24-40HLG-LL-EDU                         | 5800 L LED    | RECESSED | 47W   |          |
| A1                      | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LEPC24-40HLG-LL-EDU-ELL14                   | 5800 L LED    | RECESSED | 47W   | NOTE 1   |
| A2                      | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LEPC24-40LWG-LL-EDU                         | 4350 L LED    | RECESSED | 34W   |          |
| A3                      | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LEPC24-40MLG-LL-EDU-ELL14                   | 4350 L LED    | RECESSED | 34W   | NOTE 1   |
| B                       | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LJT24-40MW-FSA12125-EU                      | 3940 L LED    | RECESSED | 31W   |          |
| B1                      | 2'x4' LED                | COLUMBIA        | LITHONIA  | COOPER    | LJT24-40MW-FSA12125-EU-ELL14                | 3940 L LED    | RECESSED | 31W   | NOTE 1   |
| C                       | 4' ENCLOSED LED          | COLUMBIA        | LITHONIA  | COOPER    | LXEM4-40ML-RFA-ESDU/XEHC                    | 4550 L LED    | SURFACE  | 39W   |          |
| C1                      | 4' ENCLOSED LED          | COLUMBIA        | LITHONIA  | COOPER    | LXEM4-40ML-RFA-ESDU/XEHC                    | 4550 L LED    | SURFACE  | 39W   | NOTE 1   |
| D                       | 2' WALLMOUNT LED         | COLUMBIA        | LITHONIA  | COOPER    | CWM2-40LWSM-FRWA-EU                         | 2430 L LED    | SURFACE  | 21W   |          |
| D1                      | 2' WALLMOUNT LED         | COLUMBIA        | LITHONIA  | COOPER    | CWM2-40LWSM-FRWA-EU-ELL14                   | 2430 L LED    | SURFACE  | 21W   | NOTE 1,7 |
| E                       | CANOPY LIGHT             | BEACON          | LITHONIA  | COOPER    | SRT1-35-4K8-50W-UNV-DB-WG-SCP-BF/SCP REMOTE | 4550 L LED    | SURFACE  | 35W   |          |
| F                       | SURFACE MOUNT LED, WL    | FAIL-SAFE       | LITHONIA  | COOPER    | TRR11-LD4-25W-40-CL-WH-UNV-EDC1-CSTG        | 2333 L LED    | SURFACE  | 25W   | NOTE 7   |
| F1                      | SURFACE MOUNT LED, WL    | FAIL-SAFE       | LITHONIA  | COOPER    | TRR11-LD4-15W-40-CL-WH-UNV-EDC1-EL5W/CSTG   | 1500 L LED    | SURFACE  | 15W   | NOTE 1,7 |
| G                       | LED WALL BRACKET         | DUAL LITE       | LITHONIA  | COOPER    | PGF1-Z                                      | (1) LED ARRAY | SURFACE  | 17.7W |          |
| G1                      | LED NORM/EM WALL BRACKET | DUAL LITE       | LITHONIA  | COOPER    | PGN-Z                                       | (4) LEDs      | SURFACE  | 17W   | NOTE 2,3 |
| H                       | STROBE LIGHT             | LARSON ELECTR   | LITHONIA  | COOPER    | SLEDB-110V-RED                              | (1) LED ARRAY | SURFACE  | 265W  | NOTE 6   |
| H1                      | STROBE LIGHT             | LARSON ELECTR   | LITHONIA  | COOPER    | SLEDB-110V-RED                              | (1) LED ARRAY | SURFACE  | 265W  | NOTE 6   |
| LED EXIT                | LED EXIT                 | DUAL LITE       | SURELITES | LITHONIA  | LXURWEI                                     | LED-3.0W      | SURFACE  | 2.6W  | NOTE 1   |
| EMERGENCY LIGHTING UNIT | EMERGENCY LIGHTING UNIT  | LITHONIA        | SURELITES | DUALITE   | CVCE50N-12V-I-0                             | -----         | SURFACE  | 13W   | NOTE 4,5 |

NOTE:  
 1. PROVIDE EMERGENCY BATTERY PACK. WIRE TO HOT LEG OF LOCAL LIGHTING CIRCUIT IN THE AREA IN WHICH IT SERVES. THE AREA MUST BE ON THE SAME CIRCUIT.  
 2. PROVIDE 12V DC FROM EMERGENCY LIGHTING UNIT AND 120V AC VIA BUILDING MOUNTED PHOTOCELL VIA SEPARATE CONDUIT AND WIRING SYSTEMS.  
 3. UNIT EQUIPPED WITH DUAL DRIVERS AND QUAD LED ARRAYS MEETING LIFE SAFETY STANDARDS.  
 4. WIRE TO HOT LEG OF LOCAL LIGHTING CIRCUIT IN THE AREA IN WHICH IT SERVES. THE AREA SERVED MUST BE ON THE SAME CIRCUIT, NO HEADS, 50W CAPACITY  
 5. WHEN APPLICABLE, MOUNT ABOVE CEILING.  
 6. DIRECT MOUNT TO WALL. WIRE VIA A FLUSH MOUNTED JUNCTION BOX ADJACENT TO BEACON. DIRECT WIRE VIA BOX AND 90' CABLE FITTING TO INT. CONTROL AS SHOWN.  
 7. NOT USED THIS PROJECT



**POWER PLAN**  
SCALE: 1/8" = 1'-0"

**POWER PLAN NOTES:**

1. ERV-1 BY H.C., 120V-1ø, 19.6 FLA, PROVIDE 30A-2P FDS, FUSE AT 30A.
2. AHU-1 BY H.C., 120V-1ø, 16.0 FLA, PROVIDE 30A-2P FDS, FUSE AT 25A.
3. CU-1 BY H.C., 208V-1ø, 30 FLA, PROVIDE 60A-2P WP FDS, FUSE AT 40A.
4. CU-2 BY H.C., 208V-1ø, 15.0 FLA, PROVIDE 30A-2P FDS, FUSE AT 30A.
5. FC-1 & FC-2 BY H.C., FED VIA CU-2 VIA LINESET CONTROL CABLE.
6. AHU-2 BY H.C., 208V-3ø, 30.8 FLA, PROVIDE 60A-3P FDS, FUSE AT 40A.
7. CU-3 BY H.C., 208V-3ø, 11.6 FLA, PROVIDE 30A-3P WP FDS, FUSE AT 20A.
8. AHU-3 BY H.C., 208V-3ø, 30.8 FLA, PROVIDE 60A-3P FDS, FUSE AT 40A.
9. CU-4 BY H.C., 208V-3ø, 11.6 FLA, PROVIDE 30A-3P WP FDS, FUSE AT 20A.
10. EF-1 BY H.C., 120V-1ø, .33FLA, PROVIDE THERMALLY PROTECTED SNAP SWITCH AS DISCONNECTING MEANS. EXTEND AND CONNECT TO LIGHTS AS REQUIRED.
11. EF-2 BY H.C., 120V-1ø, .45FLA, PROVIDE THERMALLY PROTECTED SNAP SWITCH AS DISCONNECTING MEANS. EXTEND AND CONNECT TO LIGHTS AS REQUIRED.
12. EF-3 BY H.C., 120V-1ø, .72FLA, PROVIDE THERMALLY PROTECTED SNAP SWITCH AS DISCONNECTING MEANS. EXTEND AND CONNECT TO LIGHTS AS REQUIRED.
13. BMS PANEL BY H.C., 120V-1ø. PROVIDE CAT6 TO OWNER ELECTRIC METER IN ADDITION TO THE CAT6 CABLE FROM THE BMS PANEL TO THE IT RACK. PROVIDE THERMALLY PROTECTED SWITCH AS DISCONNECTING MEANS.
14. PANEL 'P3' EMERGENCY SHUNT TRIP PUSHBUTTON. SEE DETAIL, DWG. E.2.1.
15. PROVIDE DOUBLE DUPLEX OUTLETS, ONE WIRED TO PANEL 'P2' FOR CONTINUOUS POWER (COLOR GRAY), AND THE OTHER WIRED TO SHUNT TRIPPED PANEL 'P3' (COLOR RED), TYPICAL.
16. ANTENNA MAST AND SMALL EAVE MOUNTED ANTENNA FURNISHED BY GOVERNMENT, GROUNDED BY E.C. ACCORDING TO GROUNDING PLAN. PROVIDE 2" RIGID CONDUIT SLEEVE THRU WALL ABOVE CEILING. PROVIDE A RGS WEATHERPROOF HEAD WITH RUBBER CONDUCTOR INSERT ON EXTERIOR. PROVIDE LOOSELY FITTED THREADED CAP ON INTERIOR.
17. CT CABINET AND UTILITY SMART METER, SEE RISER DIAGRAM, DWG. E.3.1.
18. 4'x4'x1" DEEP CT CABINET FOR COMMUNICATION CABLE. TERMINATE BOTH 4" CONDUITS INTO BOTTOM OF CT CABINET. PROVIDE (1) 4" RGS CONDUIT FROM CT CABINET THRU WALL. PROVIDE NYLON BUSHINGS BOTH ENDS.
19. IT FLOOR MOUNTED RACK WITH BOTH HORIZONTAL AND VERTICAL WIRE MANAGEMENT BY E.C. PROVIDE CAT6 CABLE TERMINATIONS IN MULTIPLES OF 48 PORT PATCH PANELS AS NECESSARY. PROVIDE FIBER PATCH PANELS AND TERMINATE 12S SM FIBER AS NECESSARY. PROVIDE PATCH PANEL FOR TERMINATION OF 25PR CU TELEPHONE LINES.
20. SEE SITE PLAN, DWG. E.0.1 AND RISER DIAGRAM, DWG. E.3.1
21. PROVIDE 3"x12" LADDER STYLE CABLE TRAY THAT RINGS THE ENTIRE ROOM.
22. PROVIDE COMMERCIAL GRADE BUZZER SYSTEM, COMPLETE WITH TRANSFORMER (IF NECESSARY), EXTERIOR FLUSH MOUNTED BUTTON, TWO BUZZERS, AND ALL CONDUIT AND WIRING NECESSARY FOR OPERATION.
23. AIR COMPRESSOR BY P.C., 208V-3ø, 5HP, 16.7 FLA, PROVIDE 60A-3P FDS, FUSED AT 35A.
24. WH-1 BY P.C., 120V, 2A. PROVIDE A THERMALLY PROTECTED SNAP SWITCH AS DISCONNECTING MEANS.

**GENERAL NOTES FOR ALL ELECTRICAL PLANS**

1. VERIFY LOCATION OF ALL EQUIPMENT TO BE CONNECTED PRIOR TO ROUGH-IN.
2. ALL WORK MUST MEET UCC REQUIREMENTS. ALL WORK MUST MEET NEC, 2014.
3. THE ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE ALL MATERIALS AND WORK FOR A COMPLETE AND OPERATIONAL SYSTEM. THE E.C. IS RESPONSIBLE FOR ALL "WAYS AND MEANS OF CONSTRUCTION" NOT SPECIFICALLY DETAILED, I.E. JUNCTION BOXES, ETC.
4. ALL ELECTRICAL EQUIPMENT AND/OR CONNECTIONS ARE BY E.C. UNLESS NOTED OTHERWISE. THE E.C. SHALL BECOME FAMILIAR WITH ALL OF THE CONTRACT DOCUMENTS TO VERIFY ALL ELECTRICAL REQUIREMENTS REGARDING EXISTING CONDITIONS AND INTENDED FINAL RESULT.
5. ALL ELECTRICAL PENETRATIONS THROUGH MECHANICAL ROOMS, CORRIDORS, STAIRWAYS AND FROM FLOOR TO FLOOR SHALL BE 1 HOUR RATED AND SHALL BE BY MANUFACTURER'S DETAILS. THE DETAILS SHALL MEET OR EXCEED RATINGS OF CONSTRUCTION BEING PENETRATED. PENETRATION DETAILS SHALL BE EXACTLY AS TESTED BY AN APPROVED TESTING LABORATORY OR AGENCY AND SHALL INCLUDE THEIR SYSTEM NUMBERS ON SUBMITTALS.
6. WHEN THE PHRASE "EXTEND AND CONNECT" IS USED IN ANY VARIATION, IT SHALL MEAN TO PROVIDE CONDUIT AND WIRE AS INDICATED FOR THE ASSOCIATED CIRCUIT, TO THE POINT INDICATED EITHER IN THE NOTE OR ON THE DRAWING. PROVIDE ALL TERMINATIONS, BOXES, CONDUIT, WIRE, CONNECTORS, ETC. FOR A COMPLETE AND OPERATIONAL SYSTEM.
7. THE DRAWINGS ARE NOT INDICATIVE OF SOME MINOR MODIFICATIONS NECESSARY TO PERFORM THE SCOPE OF WORK, I.E. THE MOUNTING OF SUPPORTS, BRACKETS, AND THE LIKE. THE CONTRACTOR IS RESPONSIBLE FOR ALL MATERIALS AND LABOR TO PERFORM THE SCOPE OF WORK SUCH THAT THE END RESULT IS A COMPLETE AND OPERATIONAL SYSTEM, AS APPROVED BY DMVA.
8. THE OCCUPANCY SENSORS SHALL BE WIRED SUCH THAT CHANNEL 1 SHALL BE WIRED TO THE SINGLE LAMP BALLAST, AND CHANNEL 2 SHALL BE WIRED TO THE TWO LAMP BALLAST. CHANNEL 2 SHALL BE CONFIGURED FOR MANUAL ON ONLY. WHEN THE 2ND CHANNEL IS NOT USED, IT SHALL BE CAPPED AND MADE SPARE. RESTROOM OCCUPANCY SENSORS SHALL BE WIRED SUCH THAT CHANNEL 1 CONTROLS THE LIGHTING AND CHANNEL 2 CONTROLS THE EXHAUST FAN. THE TIME SETTING FOR EXHAUST FAN SHALL BE 5 MINUTES LONGER THAN LIGHTING. ALL OTHER TIME SETTINGS SHALL BE SET AT 10 MINUTES.
9. DATA OUTLETS SHOWN ON THESE PLANS SHALL CONSIST OF SINGLE OUTLET BOX, (2) 4 PAIR CAT6 CABLES IN 1" CONDUIT UP TO ACCESSIBLE CEILING, WITH BUSHING, AND EXTEND CABLES TO PATCH PANEL IN DATA RACK VIA J-HOOKS. PROVIDE 4 PORT COVER, 2 SPARE PORTS.
10. THE CONTRACTOR (EC) IS RESPONSIBLE TO COORDINATE WITH THE SRM FOR ANY SERVICE MODIFICATIONS REQUIRING THEIR ATTENTION.
11. NEUTRAL SHARING IS NOT ACCEPTABLE. ALL BRANCH CIRCUITS AND FEEDERS SHALL INCLUDE A DEDICATED NEUTRAL.

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING 0-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION: AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT: NEW CSMS  
 CALIBRATION LAB

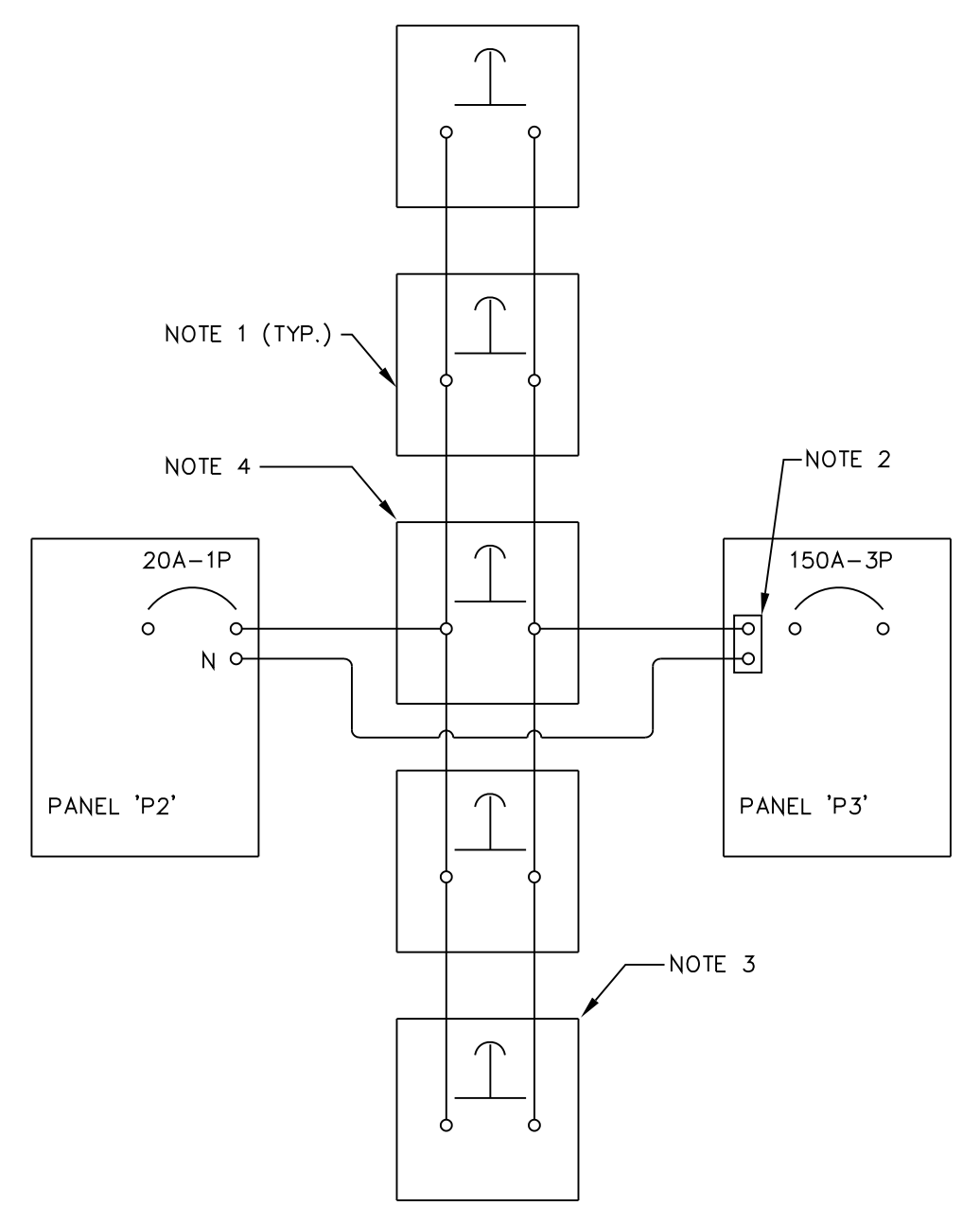
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| B. BARGER   | 2 APR 2020 |     |             |           |      |
| B. BARGER   |            |     |             |           |      |
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| B. BARGER   |            |     |             |           |      |

DRAWING: ELECTRICAL LIGHTING AND POWER FLOOR PLANS  
 DRAWING NO. E.1.1



- SYMBOLS**  
NOTE 1
- LIGHT FIXTURE, CEILING
  - LIGHT FIXTURE, CEILING EMERGENCY
  - SPLIT-WIRED LIGHT FIXTURE
  - LIGHT FIXTURE, WALL
  - SINGLE POLE SWITCH, 48" AFF TO TOB, TYPICAL UNO
  - SINGLE GANG BOX W/BLANK COVER PLATE
  - DOUBLE POLE SWITCH
  - THREE-WAY SWITCH
  - FOUR-WAY SWITCH
  - DIMMER SWITCH
  - OCCUPANCY SENSOR, DUAL TECH.
  - OCCUPANCY SENSOR, 0-10V DIMMING
  - OCCUPANCY SENSOR, DUAL TECH., 2 CIRCUIT
  - OCCUPANCY SENSOR, DUAL TECH., 2 CIRCUIT, PHOTOCELL
  - ELECTRONIC IN WALL TIMER, 5 PRESETS, NON-ADJUSTABLE
  - DUPLEX RECEPTACLE, MOUNT 18" AFF TO COB, TYPICAL UNO.
  - DUPLEX RECEPTACLE, MOUNT 18" AFF TO COB, TYPICAL UNO, COUNTER
  - DUPLEX RECEPTACLE, MOUNT 18" AFF TO COB, TYPICAL UNO, CLO - CLOCK HANGER RECEPTACLE
  - SPECIAL PURPOSE RECEPTACLE
  - QUADRUPLEX RECEPTACLE
  - GROUND FAULT INTERRUPTING RECEPTACLE
  - WP - WEATHERPROOF WHILE IN USE
  - ISOLATED GROUND RECEPTACLE
  - TELEPHONE OUTLET - ANALOG, 18" AFF TO COB, TYPICAL UNO
  - W - WALL PHONE OUTLET
  - DATA OUTLET, 4 PORT, 2 ACTIVE, 2 BLANK
  - DATA OUTLET, 4 PORT, 4 ACTIVE
  - MANUAL STARTER WITH THERMAL OVERLOAD & PILOT LIGHT
  - MANUAL STARTER WITHOUT THERMAL OVERLOAD
  - DISCONNECT SWITCH
  - DOOR CONTROLLER, COORDINATE W/G.C.
  - CABLE TV OUTLET

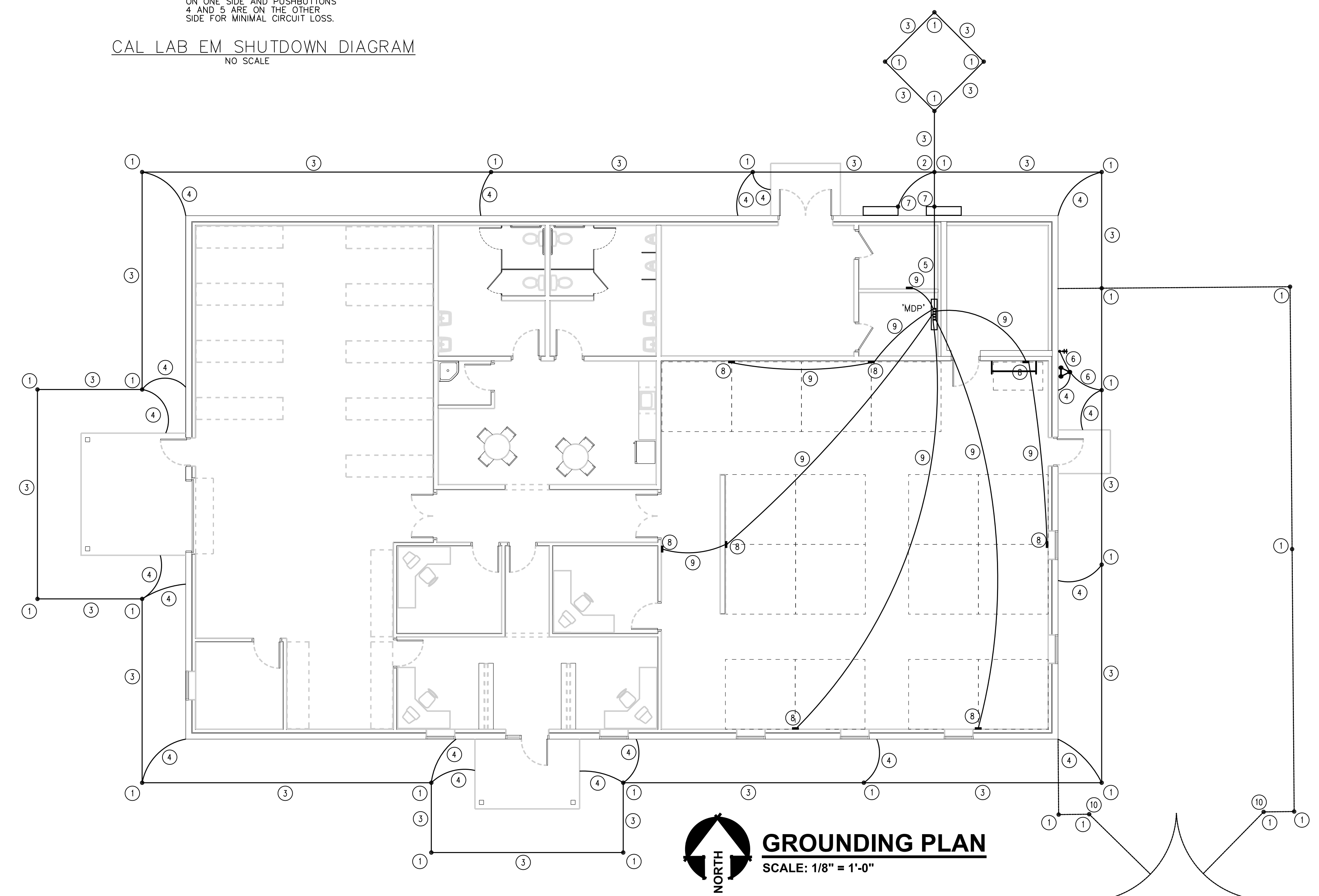
- CEILING OCCUPANCY SENSOR, DUAL TECH., 2 CIRCUIT
- CEILING OCCUPANCY SENSOR, DUAL TECH., 2 CIRCUIT, LONG RANGE
- CONTACTOR
- AC MAGNETIC STARTER
- COMBINATION STARTER/DISCONNECT
- MOTOR
- JUNCTION BOX
- PHOTOCELL
- FIRE ALARM PULL STATION
- FIRE ALARM FLOW SENSOR
- FIRE ALARM TAMPER SWITCH
- SMOKE DAMPER
- SMOKE / FIRE DAMPER COMBINATION
- FIRE ALARM SPEAKER/STROBE
- FIRE ALARM STROBE
- SMOKE DETECTOR
- HEAT DETECTOR
- DUCT DETECTOR, COORDINATE LOCATION W/H.C.
- FIRE ALARM EXTERNAL SPEAKER(MNS), WP, 12"-0" AFF
- BOSCH D-9370i SENSOR
- POSITION SENSOR
- ADEMCO VISTA 128
- SEISMIC SENSOR, WALL MOUNT 12" BELOW DECK
- OUTSIDE SIREN
- VAULT SOUND ALARM
- MICROPHONE
- KEYPAD, WALL MOUNT 55" AFF.
- CELLULAR ANTENNA
- CELLULAR BACK-UP SYSTEM
- TIME CLOCK
- LINE VOLTAGE THERMOSTAT
- JUNCTION BOX
- HOMERUN TO PANEL INDICATED
- EMERGENCY LIGHTING CIRCUIT
- CIRCUIT UNDERGROUND OR UNDERFLOOR
- PANELBOARD
- EMERGENCY BATTERY PACK
- REMOTE EMERGENCY HEAD
- EXIT SIGN
- CU GROUND BAR, 1/4"x1"x8" MIN.
- CU GROUND BAR, 1/4"x2"x12" MIN.



- NOTES:**
- MOMENTARY PUSHBUTTON WITH 1 3/8" MUSHROOM BUTTON, COLOR RED. NORMALLY - OPEN CONTACT BLOCK.
  - SHUNT TRIP MAIN CIRCUIT BREAKER. WIRE TO SHUNT TRIP UNIT AS REQUIRED FOR PROPER OPERATION.
  - WIRE ALL EMERGENCY SHUTOFF PUSHBUTTONS IN PARALLEL, TYPICAL 5.
  - WIRE PUSHBUTTON 3 SUCH THAT PUSHBUTTONS 1 AND 2 ARE ON ONE SIDE AND PUSHBUTTONS 4 AND 5 ARE ON THE OTHER SIDE FOR MINIMAL CIRCUIT LOSS.

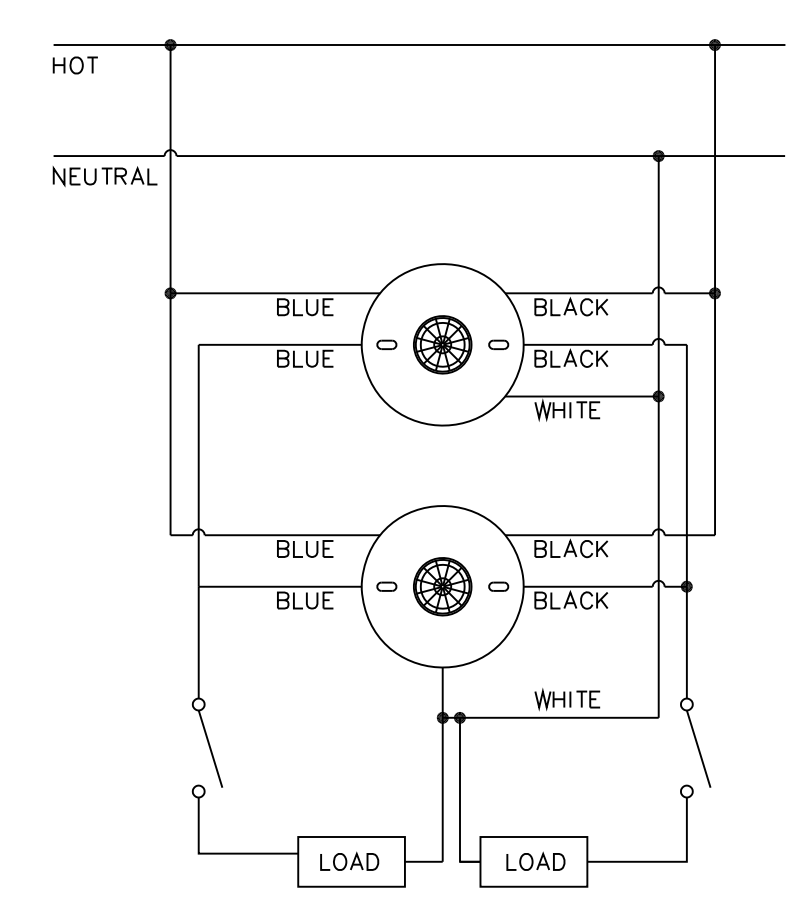
**CAL LAB EM SHUTDOWN DIAGRAM**  
NO SCALE

- GROUNDING PLAN NOTES:**
- GROUND ROD, 3/4"x8" COPPER CLAD STEEL DRIVEN TO 3'-0" BELOW GRADE, EXOTHERMICALLY WELDED (EXCEPT AT TEST WELL).
  - GROUND TEST WELL.
  - 4/0 BARE CU GROUND CONDUCTOR, EXOTHERMICALLY WELDED, APPROX 3'-0" BELOW GRADE.
  - 2/0 BARE CU CONDUCTOR, EXOTHERMICALLY WELDED TO REBAR IN FOUNDATION AND WALLS.
  - 2/0 INSULATED CU GROUND CONDUCTOR TERMINATED ON GROUND BUS IN 'MDP' AS SERVICE ENTRANCE GROUND.
  - 2/0 BARE CU CONDUCTOR TO ANTENNA MAST AND EAVE MOUNT.
  - BOND 2/0 INSULATED CU GROUND CONDUCTOR TO CT CABINET AND COMMUNICATIONS CABINET.
  - PROVIDE 2"x8"x1/4" CU GROUND BAR, PREDRILLED AND INSULATED FROM WALL. TERMINATE GROUND CONDUCTOR AS REQUIRED.
  - PROVIDE 2/0 CU INSULATED GROUND CONDUCTOR TERMINATED AS INDICATED.
  - PROVIDE BONDING JUMPER FRO ALL MOVING GATE PARTITIONS.



**ABBREVIATIONS**  
WITH OR WITHOUT PERIODS

- |  |                                    |
|--|------------------------------------|
| A AMPERE                                   | H-O-A HAND-OFF-AUTO                |
| AFF ABOVE                                  | HP HORSEPOWER                      |
| AFB ABOVE FINISHED FLOOR                   | HTR HEATER                         |
| AFC ABOVE FINISHED GRADE                   | HUH HORIZONTAL UNIT HEATER         |
| ATS AUTOMATIC TRANSFER SWITCH              | IG ISOLATED GROUND                 |
| BOB BOTTOM OF BOX                          | JB JUNCTION BOX                    |
| C CONDUIT                                  | KW KILOWATT                        |
| CKT CIRCUIT                                | LTG LIGHTING                       |
| COB CENTER OF BOX                          | MC MECHANICAL CONTRACTOR           |
| CPT CONTROL POWER TRANSFORMER              | MTD MOUNTED                        |
| CT CURRENT TRANSFORMER                     | MTR MOTOR                          |
| CU COPPER                                  | MLO MAIN LUG ONLY                  |
| C/B CIRCUIT BREAKER                        | Ø PHASE                            |
| DISC DISCONNECT                            | P POLE                             |
| DN DOWN                                    | PC PLUMBING CONTRACTOR             |
| DS DISCONNECT SWITCH                       | PNL PANELBOARD                     |
| DWG DRAWING                                | PWR POWER                          |
| EBB ELECTRICAL BASEBOARD                   | PHR PHASE                          |
| EC ELECTRICAL CONTRACTOR                   | RGS RIGID GALVANIZED STEEL CONDUIT |
| ETR EXISTING TO REMAIN                     | SW SWITCH                          |
| EWC ELECTRIC WATER COOLER                  | TBB TELEPHONE BACKBOARD            |
| FACP FIRE ALARM CONTROL PANEL              | TOB TOP OF BOX                     |
| FAAP FIRE ALARM ANNUNCIATOR PANEL (KEYPAD) | TV TELEVISION                      |
| FACS FIRE ALARM COMMAND SYSTEM/VOICE EVAC  | UNO UNLESS NOTED OTHERWISE         |
| FU FUSED                                   | V VOLT                             |
| FDR FEEDER                                 | W WATT OR WIRE                     |
| FDS FUSED DISCONNECT SWITCH                | WITH WITH                          |
| FT FEET                                    | W/G WITH GROUND                    |
| GC GENERAL CONTRACTOR                      | W/O WITH OUT                       |
| GFI GROUND FAULT INTERRUPTING              | WP WEATHER-PROOF                   |
| GND GROUND                                 | WPU WEATHER-PROOF WHILE IN USE     |
| HC HEATING CONTRACTOR                      | XFMR TRANSFORMER                   |



**TYPICAL LINE VOLTAGE SENSOR DETAIL**  
NO SCALE

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
DIV. OF ENGINEERING & ARCHITECTURE  
BUILDING 0-10, FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
AREA 10  
FORT INDIANTOWN GAP  
ANNVILLE, PA 17003

PROJECT:  
NEW CSMS  
CALIBRATION LAB

| DESIGNED BY | DATE       | REVISIONS |             |
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|             |            | NO.       | DESCRIPTION |
| B. BARGER   | 2 APR 2020 |           |             |
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DRAWING:  
ELECTRICAL  
SYMBOLS, ABBREVIATIONS  
AND DETAILS

DRAWING NO.  
**E.2.1**

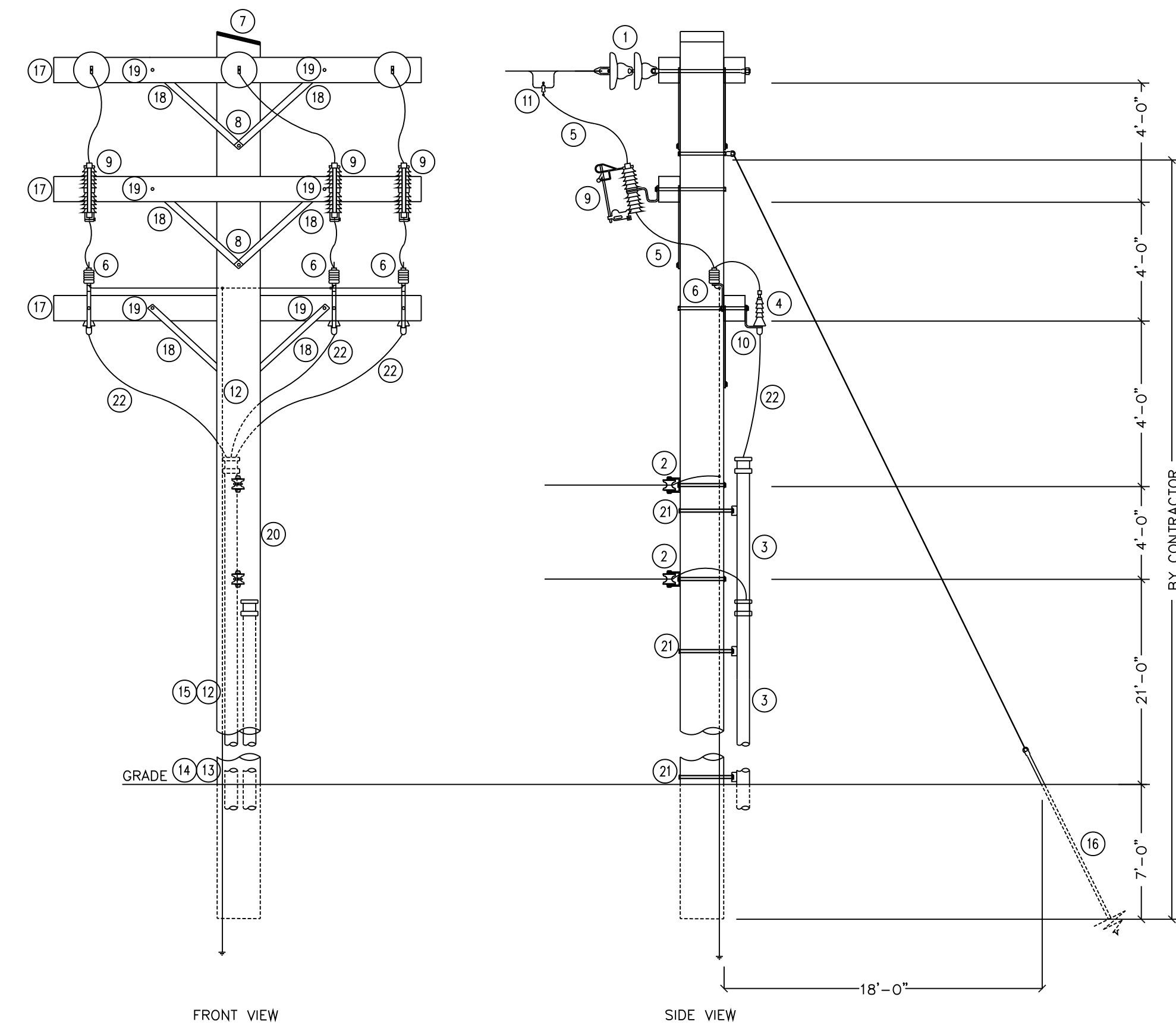
| NOTE  | SPACE (1.5') | MAIN C/B: 600A MCB (ELECTRONIC TRIP)<br>FRAME: 600A |         |        |                          | PANEL: 'MDP' - 22KAIC NOTE 1<br>VOLTAGE: 208/120-3Ø-4W |            |        |         | CB SPACE: 72 IN<br>MOUNTING: WALL-42"W |            |            |            | SPACE (1.5') | NOTE |
|---|--------------|---|---------|--------|--------------------------|--|------------|--------|---------|--|------------|------------|------------|--------------|------|
|   |              | EQUIPMENT   | BREAKER | FEEDER | 9A<br>AMPS               | 9B<br>AMPS   | 9C<br>AMPS | FEEDER | BREAKER | EQUIPMENT                              | 9A<br>AMPS | 9B<br>AMPS | 9C<br>AMPS |              |      |
|   | 1            |   |         |        | 176                      | 100  |            |        |         |  |            |            |            | 2            |      |
|   | 3            | PANEL 'P1'  | 225A-3P | RISER  |                          | 179  | 90         |        |         |  |            |            |            | 4            |      |
|   | 5            |   |         |        |                          |  |            | 156    | 80      |  |            |            |            | 6            |      |
|   | 7            |   |         |        | 70                       | 38   |            |        |         |  |            |            |            | 8            |      |
|   | 9            | PANEL 'P2'  | 150A-3P | RISER  |                          | 60   | 36         |        |         |  |            |            |            | 10           |      |
|   | 11           |   |         |        |                          |  |            | 50     | 36      |  |            |            |            | 12           |      |
|   | 13           |   |         |        | 80                       | 0  |            |        |         |  |            |            |            | 14           |      |
|   | 15           | MOBILE TRAILER                                      | 100A-3P | RISER  |                          | 80   | 0          |        |         |  |            |            |            | 16           |      |
|   | 17           |   |         |        |                          |  |            | 80     | 0       |  |            |            |            | 18           |      |
|   | 19           |   |         |        | 0                        | 0  |            |        |         |  |            |            |            | 20           |      |
|   | 21           | SPARE   | 100A-3P |        |                          | 0  | 0          |        |         |  |            |            |            | 22           |      |
|   | 23           |   |         |        |                          | 0  | 0          |        |         |  |            |            |            | 24           |      |
|   | 25           | BUSSED SPACE  |         |        | 0                        | 0  |            |        |         |  |            |            |            | 26           |      |
|   | 27           | BUSSED SPACE  |         |        |                          | 0  | 0          |        |         |  |            |            |            | 28           |      |
|   | 29           | BUSSED SPACE  |         |        |                          |  |            | 0      | 0       |  |            |            |            | 30           |      |
|   | 31           | BUSSED SPACE  |         |        | 0                        | 0  |            |        |         |  |            |            |            | 32           |      |
|   | 33           | BUSSED SPACE  |         |        |                          |  | 0          | 0      |         |  |            |            |            | 34           |      |
|   | 35           | BUSSED SPACE  |         |        |                          |  |            | 0      | 0       |  |            |            |            | 36           |      |
|   | 37           | BUSSED SPACE  |         |        | 0                        | 0  |            |        |         |  |            |            |            | 38           |      |
|   | 39           | BUSSED SPACE  |         |        |                          |  | 0          | 0      |         |  |            |            |            | 40           |      |
|   | 41           | BUSSED SPACE  |         |        |                          |  |            | 0      | 0       |  |            |            |            | 42           |      |
|   | 43           | BUSSED SPACE  |         |        | 0                        | 0  |            |        |         |  |            |            |            | 44           |      |
|   | 45           | BUSSED SPACE  |         |        |                          |  | 0          | 0      |         |  |            |            |            | 46           |      |
|   | 47           | BUSSED SPACE  |         |        |                          |  |            | 0      | 0       |  |            |            |            | 48           |      |
| <b>NOTES:</b>                               |              |   |         |        | TOTAL CONNECTED AMPS/LEG |  | 464        | 445    | 402     |  |            |            |            |              |      |
| 1. THIS AIC RATING BASED ON XFMR WITH 4% Z. |              |   |         |        |                          |  |            |        |         |  |            |            |            |              |      |
| 2. XXXX                                     |              |   |         |        |                          |  |            |        |         |  |            |            |            |              |      |

| FEEDER SIZE SCHEDULE       |            |      |                       |       |                            |        |            |      |                       |
|----------------------------|------------|------|-----------------------|-------|----------------------------|--------|------------|------|-----------------------|
| 4 WIRE FEEDERS WITH GROUND |            |      |                       |       | 3 WIRE FEEDERS WITH GROUND |        |            |      |                       |
| IDENT.                     | CONDUIT    | AMP  | WIRE SIZE AWG. OR MCM | AMP   | CONDUIT                    | IDENT. | CONDUIT    | AMP  | WIRE SIZE AWG. OR MCM |
| A                          | 3/4"       | 20   | 12                    | 12    | 3/4"                       | A1     | 3/4"       | 20   | 12                    |
| B                          | 3/4"       | 30   | 10                    | 10    | 3/4"                       | B1     | 3/4"       | 30   | 10                    |
| C                          | 1"         | 40   | 8                     | 10    | 3/4"                       | C1     | 3/4"       | 40   | 8                     |
| D                          | 1 1/4"     | 55   | 6                     | 10    | 1"                         | D1     | 1"         | 55   | 6                     |
| E                          | 1 1/4"     | 70   | 4                     | 8     | 1 1/4"                     | E1     | 1 1/4"     | 70   | 4                     |
| F                          | 1 1/4"     | 95   | 2                     | 8     | 1 1/4"                     | F1     | 1 1/4"     | 95   | 2                     |
| G                          | 1 1/2"     | 110  | 1                     | 8     | 1 1/2"                     | G1     | 1 1/2"     | 110  | 1                     |
| H                          | 2"         | 150  | 1/0                   | 6     | 1 1/2"                     | H1     | 1 1/2"     | 150  | 1/0                   |
| J                          | 2"         | 175  | 2/0                   | 6     | 2"                         | J1     | 2"         | 175  | 2/0                   |
| K                          | 2"         | 200  | 3/0                   | 6     | 2"                         | K1     | 2"         | 200  | 3/0                   |
| L                          | 2-1/2"     | 225  | 4/0                   | 4     | 2 1/2"                     | L1     | 2 1/2"     | 225  | 4/0                   |
| M                          | 2-1/2"     | 250  | 250                   | 4     | 2 1/2"                     | M1     | 2 1/2"     | 250  | 250                   |
| N                          | 3"         | 300  | 350                   | 4     | 3"                         | N1     | 3"         | 300  | 350                   |
| O                          | 3 1/2"     | 350  | 500                   | 2     | 3 1/2"                     | O1     | 3 1/2"     | 350  | 500                   |
| P                          | 4"         | 400  | 600                   | 2     | 4"                         | P1     | 4"         | 400  | 600                   |
| Q                          | (2) 2 1/2" | 450  | 2-4/0                 | * 2   | (2) 2"                     | Q1     | (2) 2"     | 450  | 2-4/0                 |
| R                          | (2) 2 1/2" | 500  | 2-250                 | * 2   | (2) 2 1/2"                 | R1     | (2) 2 1/2" | 500  | 2-250                 |
| S                          | (2) 3"     | 550  | 2-300                 | * 1   | (2) 2 1/2"                 | S1     | (2) 2 1/2" | 550  | 2-300                 |
| T                          | (2) 3"     | 600  | 2-350                 | * 1   | (2) 3"                     | T1     | (2) 3"     | 600  | 2-350                 |
| U                          | (2) 4"     | 800  | 2-600                 | * 1/0 | (2) 3 1/2"                 | U1     | (2) 3 1/2" | 800  | 2-600                 |
| V                          | (3) 3"     | 1000 | 3-400                 | * 2/0 | (3) 3"                     | V1     | (3) 3"     | 1000 | 3-400                 |
| W                          | (3) 4"     | 1200 | 3-600                 | * 3/0 | (3) 3 1/2"                 | W1     | (3) 3 1/2" | 1200 | 3-600                 |

**NOTES:**

- CONDUIT SIZES ARE BASED, IN GENERAL, ON TYPE TW OR THW INSULATED WIRE.
- INDICATES SIZE AND NUMBER OF CONDUCTORS PER PHASE (AND NEUTRAL WHERE APPLICABLE) IN FEEDERS.
- WHERE MULTIPLE SETS OF CONDUCTORS ARE SPECIFIED FOR A FEEDER, EACH SET SHALL BE INSTALLED IN A CONDUIT AND ONE CONDUCTOR IN EACH SET SHALL BE CONNECTED TO EACH PHASE TERMINAL (AND NEUTRAL TERMINAL WHERE APPLICABLE).
- WHERE MULTIPLE SETS OF CONDUCTORS ARE SPECIFIED FOR A FEEDER, ALL CONDUCTORS SHALL BE OF IDENTICAL LENGTH AND OF SAME MANUFACTURER. CONDUIT RUNS SHALL BE IDENTICAL (WITHIN PRACTICAL LIMITS).

\* INDICATED GROUND FOR EACH CONDUIT.



RISER POLE DETAIL  
NO SCALE

| SCHEDULE OF POLE EQUIPMENT |  |
|----------------------------|--|
| NO.                        | DESCRIPTION  |
| 1                          | INSULATOR SUSPENSION TYPE 15 KV, DEAD END BY GOV                             |
| 2                          | SECONDARY CLEVIS WITH SPOOL INSULATOR  |
| 3                          | RGS CONDUIT RISER WITH END FITTING (OR END BELL IF PVC), 4", LENGTH AS REQD. |
| 4                          | 1/2" AIR TERMINATION, 15 KV  |
| 5                          | PRIMARY CONDUCTOR, #4 BARE SOLID COPPER                                      |
| 6                          | LIGHTNING ARRESTOR, 9KV MOV  |
| 7                          | POLYMER POLE CAP 15" IN DIA. BY GOV  |
| 8                          | LAG BOLT 1/2"x4" TWIST DRIVE, SQUARE HEAD, GALVANIZED                        |
| 9                          | FUSED CUT OUT 15 KV, POLYMER, 200A, 110KV BIL                                |
| 10                         | MOUNTING BRACKET   |
| 11                         | STIRRUP, COMPRESSION TYPE AND HOT LINE CLAMP                                 |
| 12                         | NO. 4 SOLID COPPER   |
| 13                         | GROUND ROD, 5/8"x8" COPPER CLAD STEEL  |
| 14                         | GROUND ROD CLAMP   |
| 15                         | HALF ROUND PLASTIC OR FIBER MOLDING  |
| 16                         | GUY ANCHOR WITH GALVANIZED 1/2" CABLE BY GOV IF REQUIRED.                    |
| 17                         | WOOD CROSSARM - PENTA TREATED - DRILLED AS REQUIRED                          |
| 18                         | CROSSARM BRACE, GALVANIZED STEEL   |
| 19                         | 3/8"x5" GALVANIZED STOVE BOLT  |
| 20                         | 45" CLASS 2 WOOD POLE, PENTA TREATED   |
| 21                         | 5/8" ALLTHREAD WITH 1" C CHANNEL, 6" OFFSET. PROVIDE CONDUIT STRAPS          |
| 22                         | #2 CU, 15KV CABLE TERMINATED IN AIR TERMINALS.                               |

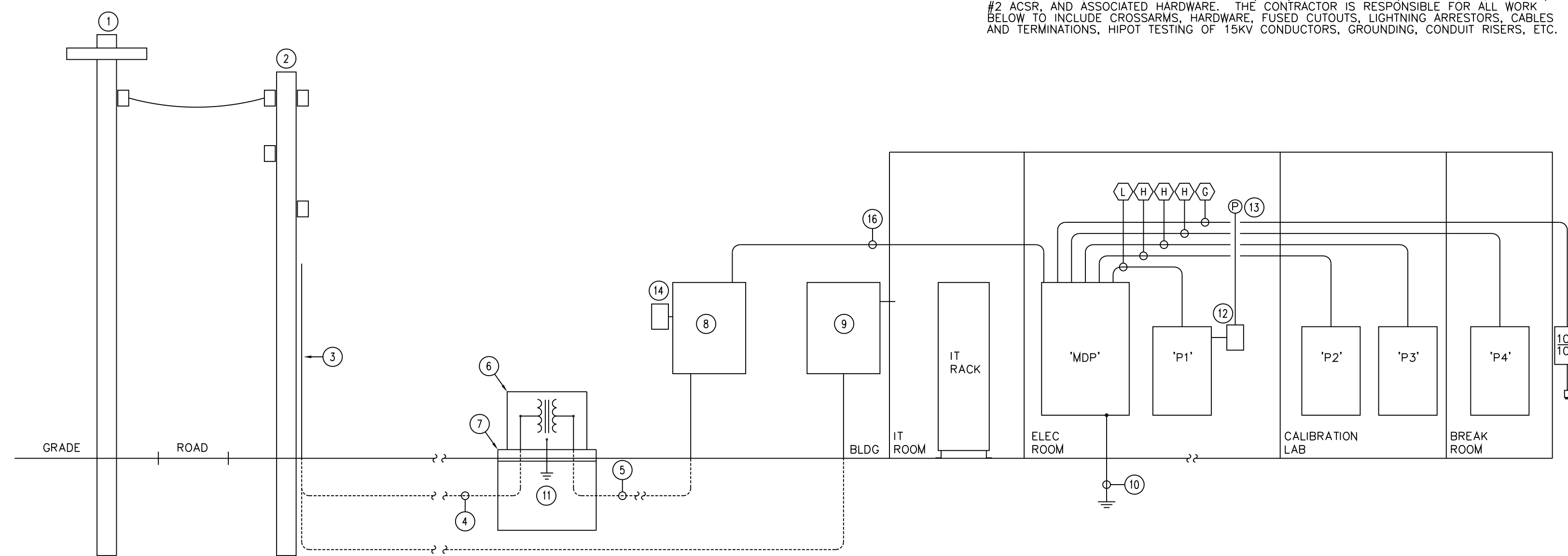
- NOTES:**
- SCHEDULE ABOVE LISTS THE MAJOR ITEMS OF EQUIPMENT ONLY. ALL OTHER EQUIPMENT NECESSARY FOR PURPOSE INDICATED SHALL BE PROVIDED UNDER THIS CONTRACT.
  - RISER CONDUIT (POLE EQUIPMENT ITEM NO. 3) SHALL BE RIGID STEEL CONDUIT UP TO 10 FEET ABOVE GROUND LEVEL, BUT MAY BE SCHEDULE 40 PVC THEREAFTER.
  - ALL HARDWARE SHALL BE GALVANIZED, UTILITY GRADE, AND SUITABLE FOR 15KV CLASS UTILITY WORK. ALL MEANS AND METHODS SHALL BE 15KV STANDARD PRACTICE.
  - THE GOVERNMENT SHALL PROVIDE THE POLE, CAP, TOP CROSSARMS, DEAD END INSULATORS, #2 ACSR, AND ASSOCIATED HARDWARE. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK BELOW TO INCLUDE CROSSARMS, HARDWARE, FUSED CUTOUPS, LIGHTNING ARRESTORS, CABLES AND TERMINATIONS, HIPOT TESTING OF 15KV CONDUCTORS, GROUNDING, CONDUIT RISERS, ETC.

RISER DIAGRAM PLAN NOTES

- EXISTING POLE EAST OF UTILITY ROAD.
- NEW POLE BY GOVERNMENT. THE GOVERNMENT WILL INSTALL POLE, TOP CROSS ARMS, POLE CAP, DEAD END INSULATORS, AND #2 ACSR. THE CONTRACTOR SHALL PROVIDE ALL OTHER WORK, SEE DETAIL THIS DRAWING.
- THE E.C. SHALL PROVIDE 4" RIGID STEEL CONDUIT UP THE FIRST TEN FEET UP POLE AND THEN TRANSITION TO PVC FOR THE REMAINING DISTANCE. COORDINATE WITH SRM PRIOR TO ROUGH-IN. PROVIDE UNISTRUT MOUNTS OFFSET 6" FROM POLE FOR THE ENTIRE LENGTH OF CONDUIT. THE UNISTRUT SHALL BE MOUNTED USING ALLTHREAD CONNECTION THROUGH ENTIRE POLE. SEE POLE DETAIL THIS DRAWING.
- PROVIDE (2) 4" CONDUITS, 1 ACTIVE AND 1 SPARE. CAP SPARE CONDUIT 12" AFG AT POLE END. ALL CONDUITS SHALL BE SCH 40 PVC AND TRANSITIONED TO RGS PRIOR TO THE LARGE SWEEP RGS ELBOWS AT UP SWEEP AND TERMINATED AS INDICATED. ACTIVE CONDUIT SHALL BE PROVIDED WITH (3) #2, 15KV CU CONDUCTORS; SEE POLE DETAIL THIS DRAWING. PROVIDE ALL TERMINATIONS AT TRANSFORMER PRIMARY UTILIZING LOAD BREAK ELBOWS AS PER SPECIFICATION.
- PROVIDE (4) 4" CONDUITS, 2 ACTIVE AND 2 SPARE. CONDUITS SHALL BE SCH 40 PVC AND TRANSITIONED TO RGS PRIOR TO THE LARGE SWEEP RGS UP SWEEP ELBOWS AND TERMINATED AT CT CABINET. ACTIVE CONDUITS SHALL BE PROVIDED WITH (1) SET OF 4-350 KCMIL CU CONDUCTORS (EACH).
- 225 KVA TRANSFORMER, OIL FILLED, LOOP FEED, DEAD FRONT, BAYONET FUSED, 4 POSITION TBOR SWITCHED PROVIDED BY E.C. SEE SPECIFICATIONS. PROVIDE ALL PRIMARY AND SECONDARY TERMINATIONS AND TESTING, TO INCLUDE HIPOT TESTING.
- 7'x7'x5' PRECAST TRANSFORMER FOUNDATION AS PER PPL SPECIFICATION PROVIDED BY E.C.
- PROVIDE 4'x4'x1' NEMA 3R CT CABINET WITH LOCKABLE, HINGED DOORS. PROVIDE 600:5 SPLIT CORE CT'S. WIRE CT'S TO SMART METER IN ADJACENT WP ENCLOSURE VIA CONTROL CABLE AND/OR CONDUCTORS RECOMMENDED BY METER MANUFACTURER IN A 1 1/2" RGS CONDUIT.
- PROVIDE 4'x4'x1' NEMA 3R CT CABINET WITH LOCKABLE, HINGED DOORS FOR COMMUNICATION 10' MAINTENANCE LOOP FOR BOTH 12S SM FIBER AND 25PR CU COMMUNICATION CABLE. PROVIDE 4" SLEEVE THRU WALL AND TERMINATE CABLES (FIBER AND CU) AS PER SPECIFICATION.
- 2/0 GROUNDING ELECTRODE CONDUCTOR. PROVIDE BONDING JUMPER TO BLDG. STEEL, WATER PIPE, ACROSS WATER METER, ANY CONCRETE ENCASED ELECTRODES (INCLUDING REBAR IN FLOOR AND FOUNDATION AND/OR BLOCK WALLS), AND GROUND COUNTERPOISE CONSISTING OF AT LEAST (4) 5/8" COPPER CLAD STEEL GROUND RODS OF 8' IN LENGTH, DRIVEN AT LEAST ONE ROD LENGTH APART AND INTERCONNECTED WITH 4/0 BARE COPPER EXOTHERMICALLY WELDED TO GROUND COUNTERPOISE AROUND BUILDING. THESE GROUNDING REQUIREMENTS ARE NOT ALL INCLUSIVE. ALL GROUNDING SHALL BE AS PER NEC WHETHER MENTIONED SPECIFICALLY OR NOT. SEE GROUNDING DETAIL, DRAWING E.2.1.
- PROVIDE A 4/0 BARE COPPER CONDUCTOR COUNTERPOISE AROUND TRANSFORMER FOUNDATION USING 5/8"x8" COPPER CLAD STEEL GROUND ROD AT EACH CORNER EXOTHERMICALLY WELDED TO CONDUCTOR. RUN INTO TRANSFORMER FOUNDATION AND GROUND TRANSFORMER AS REQUIRED BY CODE.
- PROVIDE 2 CHANNEL DIGITAL TIME SWITCH (ASTRONOMIC), WIRED FOR PHOTOCELL ON/TIMECLOCK OFF OPERATION.
- PHOTOCELL MOUNTED HIGH ON BUILDING.
- PROVIDE SQUARE D 5560 SMART METER (NO SUBSTITUTIONS) IN MANUFACTURER'S RECOMMENDED NEMA 3R ENCLOSURE. THE ENCLOSURE SHALL BE PROVIDED WITH CLEAR FRONT WINDOW FOR READINGS WITHOUT OPENING ENCLOSURE.
- 100A-3P WP FDS, FUSED AT 100A FOR MOBILE TRAILER CONNECTION. THE TRAILER WHIP WILL BE FURNISHED BY GOVERNMENT FOR INSTALLATION BY CONTRACTOR.
- PROVIDE (2) SETS OF 4-350 KCMIL CU THHN, 3" CONDUIT. CONDUIT SHALL BE RGS ON EXTERIOR AND CAN TRANSITION TO EMT IN INTERIOR OF BLDG.

RISER DIAGRAM GENERAL NOTES

- ALL CONDUCTORS MUST HAVE A MEGGER TEST PERFORMED BY THE CONTRACTOR PRIOR TO CONNECTION. COORDINATE WITH SRM FOR WITNESS.
- THE CONTRACTOR MUST OBTAIN A DIGGING PERMIT FROM SRM IN ADDITION TO ANY PA ONECALL REQUIREMENTS AT LEAST ONE WEEK IN ADVANCE OF ANY EXCAVATION.
- ALL UNDERGROUND TERMINATIONS MUST BE APPROVED BY SRM PRIOR TO ANY BACKFILLING WORK.
- ALL UNDERGROUND CONDUIT SHALL BE PVC (TO INCLUDE COMMUNICATIONS) EXCEPT ALL ELBOWS SHALL BE WIDE SWEEP RGS CONDUIT. IF THE CONDUIT REMAINS UNDERGROUND LATERALLY, IT CAN TRANSITION BACK TO PVC. HOWEVER, IF THE SWEEP IS RISING, IT SHALL REMAIN RGS UNTIL TERMINATION INTO CABINETS OR UP POLE AS DIRECTED.



RISER DIAGRAM  
NO SCALE

PENNSYLVANIA DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
 BUR. OF MILITARY CONSTRUCTION & ENGINEERING  
 DIV. OF ENGINEERING & ARCHITECTURE  
 BUILDING 0-10, FORT INDIANTOWN GAP  
 ANNVILLE, PENNSYLVANIA 17003

LOCATION:  
 AREA 10  
 FORT INDIANTOWN GAP  
 ANNVILLE, PA 17003

PROJECT:  
 NEW CSMS  
 CALIBRATION LAB

| DESIGNED BY | DATE       | NO. | DATE | REVISIONS | DESCRIPTION |
|-------------|------------|-----|------|-----------|-------------|
| B. BARGER   | 2 APR 2020 |     |      |           |             |
| B. BARGER   |            |     |      |           |             |
| B. BARGER   |            |     |      |           |             |
| B. BARGER   |            |     |      |           |             |

ALL DIMENSIONS AND EQUIPMENT CONFORMANCE SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE PROJECT SITE. THIS DRAWING SHALL NOT BE SCALED TO OBTAIN DIMENSIONS AND/OR DISTANCES.

DRAWING:  
 ELECTRICAL  
 RISER DIAGRAM

DRAWING NO.  
**E.3.1**





# **ADMINISTRATIVE PROCEDURES**

**FOR  
CONSTRUCTION CONTRACTS**

**FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA**

**2019 EDITION**

**DEPARTMENT OF MILITARY AND VETERANS AFFAIRS  
ADMINISTRATIVE PROCEDURES**

**ADMINISTRATIVE PROCEDURE NO. 1**

Orientation Meeting

**ADMINISTRATIVE PROCEDURE NO. 2**

Job Conferences

**ADMINISTRATIVE PROCEDURE NO. 3**

Schedule of Values

**ADMINISTRATIVE PROCEDURE NO. 4**

Progress Schedule  
and Critical Path Method (CPM) Scheduling

**ADMINISTRATIVE PROCEDURE NO. 5**

Materials Testing (All Items – General Requirements)  
Laboratory Sample or Field Test Identification  
Materials Testing (Selection of Testing Laboratory)  
Concrete Testing (Approval of Mix Computations)  
Concrete Mix Computation  
Invoice Procedure for Payment of Testing Services (Professional)  
Invoice/Billing for Professionals & Testing Labs  
Manufacturers' High Voltage Cable Test (Birth Certificate)  
Field High Voltage Cable Test  
HVAC Systems Balancing

**ADMINISTRATIVE PROCEDURE NO. 6**

Submittals

**ADMINISTRATIVE PROCEDURE NO. 7**

Contractor's Invoice  
Prevailing Minimum Wage Certificate  
Invoice of Labor, Materials/Equipment  
Stored Materials  
Payroll Affidavit, Contractor's Certificate and Statement of Surety, Power of Attorney

**ADMINISTRATIVE PROCEDURE NO. 8**

Changes in Contract Work (Field Orders/Change Orders)

**ADMINISTRATIVE PROCEDURE NO. 9**

Request for Extension of Time Change Order

**ADMINISTRATIVE PROCEDURE NO. 10**

Submission Guidelines for Steel Certificates for DMVA Projects  
Steel Origin Certification: Prime Contractor – Form ST-1  
Steel Origin Certification: Fabricator – Form ST-2  
75% U.S. Manufacture Certification: Fabricator – Form ST-3  
Not Domestically Manufactured: Prime Contractor – Form ST-4

**ADMINISTRATIVE PROCEDURE NO. 11**

Dispute Resolution Form

**ADMINISTRATIVE PROCEDURE NO. 12**

Utilization/Occupancy Inspection  
Occupancy/Utilization  
Final Inspection  
Conclusion of Final Inspection

**ADMINISTRATIVE PROCEDURE NO. 13**

Small Diverse Business and Small Business Participation

## ADMINISTRATIVE PROCEDURE NO. 1

### ORIENTATION MEETING

#### A. Scheduling of Orientation Meeting

Within ten (10) days of the Effective Date of the Contract, (or earlier if authorized in a Letter of Intent) the Construction Project Manager will contact the Contractor(s) to schedule an Orientation Meeting to familiarize the Contractor(s) with Departmental procedures and processes.

At DMVA's discretion, Contractors are required to attend the scheduled Orientation Meeting. Notification of the meeting date, time and place will be confirmed by email. Personnel from the Contractor's office that will be associated with the Project, such as the principal of the firm, project manager and project superintendent **must attend** the meeting.

#### B. Agenda for Orientation Meeting

1. Introduction of personnel by Construction Project Manager.
2. Explanation of Administrative Procedures and DMVA's processes and forms.
3. Question and answer period.

#### C. Submission of Documentation

All required documentation referenced in these Administrative Procedures shall be forwarded to the Project Manager(s) with a copy provided to the Professional, Contracting Officer, and any additional DMVA Personnel represented at the Orientation Meeting unless otherwise noted.



## ADMINISTRATIVE PROCEDURE NO. 2

### JOB CONFERENCES

#### A. General Information Concerning Job Conferences

1. The following representatives **must attend** Initial, Regular and Special Job Conferences\*\*:

- All Prime Contractors (i.e., assigned Project Manager and approved Superintendent)
- Professional Representative
- DMVA Construction Project Manager

\*\* **Special Job Conferences are scheduled by the Construction Regional Director or designee.**

2. Unless DMVA direct otherwise, the following representatives may attend any Job Conference, but are not required to be present:

- Client Entity
- Facility personnel
- Testing Laboratory Technicians
- Office of Facilities and Engineering, as required
- DMVA Construction Project Manager
- Other representatives, as appropriate (determined by DMVA)

3. The Department shall appoint a person to take the minutes of the Job Conferences.

4. Failure to attend any Job Conference is a violation of the Contract as indicated in the General Conditions of Contract. Any Contractor who does not attend the Job Conference is subject to termination, unless absence is excused by the Department. The Department may issue a credit change order to any Prime Contractor who does not attend and is not excused from any Job Conference.

#### B. Initial Job Conference

1. The Construction Project Manager or designee will set the time, date and place for the Initial Job Conference, which will be no later than the thirty (30) days following the Effective Date of the Contract.

2. The Notice initiating the Conference shall be distributed to all parties by the Project Manager.

3. The date of the Initial Job Conference will signify the Contract Start Date for purposes of calculating the Contract Completion Date.

a. If a Letter of Intent was issued on the project, Contractors are required to proceed with the off-site scope of Work set forth in the letter. On-site Work may start only when the contract is fully executed.

b. Contractors are required to commence on-site work within ten (10) days after the Initial Job Conference.

4. During the Initial Job Conference, the DMVA Project Manager or designee shall conduct the order of business and discuss specific requirements and particulars of project construction.

5. Distribution of the Initial Job Conference Report will be made electronically.

6. Agenda for the Initial Job Conference

- a. Introduction of attendees.
- b. Review of Special Requirements, which may include some, none or all of these examples:

- (1) Protection of the Environment
- (2) Asbestos
- (3) Parking
- (4) Office for Contractor
- (5) Field Office
- (6) Temporary Heat
- (7) Existing Utilities
- (8) Working Hours
- (9) Operation and Maintenance Instructions/Manuals
- (10) Small Diverse Business Program
- (11) Contractor Integrity Provision
- (12) Debarment, Suspension and Other Responsibilities
- (13) Excavation
- (14) Roof Deck
- (15) Product Discrimination
- (16) Mobilization
- (17) Steel Products Procurement Act
- (18) Insurance Coverage
- (19) Privity of Contract
- (20) Public Works Employment Verification Act
- (21) Other

c. General Remarks

- (1) Safety
- (2) Discrepancies
- (3) Coordination

d. General Information

- (1) Project Sign
- (2) Roof Bond/Warranties
- (3) Concrete
- (4) As-Built Record Drawings
- (5) Project Supervision
- (6) Miscellaneous

e. Permits, Fees, Notices

f. Establishment of date, time and location of the first Regular Job Conference

g. Review of General Conditions

h. General Comments

**C. Regular Job Conference**

- 1. Job Conferences may be held as often as necessary, however, normally bi-weekly.
- 2. The DMVA Project Manager, or designee, shall conduct Job Conferences. These Job Conferences shall be attended by those described at the beginning of this Administrative Procedure.

3. The agenda of a Regular Job Conference shall include, at a minimum, the following:
  - a. General Review of Previous Report
    - i. Unsatisfactory conditions and/or workmanship, as noted on previous Job Conference Reports, must be noted when corrected by the Contractor in the minutes of the first report following the correction. The manner in which the correction was made should also be noted in the minutes. The unsatisfactory item will be included as an item in each report until the issue is corrected.
  - b. General discussion of Job Conditions
  - c. Review of past due Shop Drawings
  - d. Review of outstanding Change Orders
  - e. Review of Progress Schedule
    - i. Special attention will be given to items that are behind schedule.
  - f. Projected work for the next bi-weekly period
  - g. Delays
    - i. Each Prime Contractor should pay special attention to ensure that delays are documented on the Job Conference Reports since the Department will review the minutes of the Job Conferences in reviewing the Contractor's request for any Extension of Time.
  - h. General Information will be inserted onto the written Job Conference Reports, such as, percentage of elapsed time for project, percentage of payment for project, percentage of job completion for project (based upon physical inspection), date, time and place of next job conference and name of person who prepared the Report.
4. Job Conference Reports will be distributed electronically.

**D. Special Job Conferences**

1. The Project Manager or other DMVA representative may call a Special Job Conference to consider any emergency or unusual job condition. Only the subject(s) mentioned in the request for the Special Job Conference shall be discussed.



## ADMINISTRATIVE PROCEDURE NO. 3

### SCHEDULE OF VALUES

- A. The Schedule of Values shall be prepared and submitted by each Contractor for the Department's and the Professional's approval **within 45 days of the Effective Date of the Contract and prior to the first invoice, unless required to be submitted earlier in a Letter of Intent issued by DMVA.**
- B. The DMVA Project Manager, and the Professional will review and provide comments. Contractors are advised that a **minimum of 10 work days** after the receipt of the submission will be required by the Department for review and approval of the Schedule of Values or Supplemental Schedule of Values.
- C. No Invoice will be approved by the Department until the Schedule of Values has been approved.
- D. The Schedule of Values, when approved by the Department, will be utilized as the basis for the Contractor's Invoices. The Schedule of Values may also be used by the Department to determine the debit or credit to the Department resulting from changes in the work.
- E. General Information
1. Items must be listed according to building or area.
  2. Temporary services and/or equipment furnished at the Contractor's cost that are not an integral part of the Project may not be shown on the Schedule of Values. The cost of these items (with the exception of temporary heat) must be prorated throughout the items of Work, material and/or equipment to which it pertains.
  3. Contract Bond shall be shown as an item. The bond may not exceed the Contractor's percent/amount of their bond receipt. The receipt for the bond must be submitted with the original Schedule of Values.
  4. The Roof Bond/Guaranty must be a separate item, when applicable.
  5. The Contractor may include in its Schedule of Values a single line item for Mobilization. Mobilization costs shall be limited to include only those items listed in the Mobilization Paragraph of the General Conditions of Contract. For contracts up to \$6,000,000, the Contractor may include on the cost breakdown a line item for mobilization costs listed at 1.5 percent of the contract award amount, not to exceed \$90,000. For contracts exceeding \$6,000,000, mobilization costs in excess of \$90,000 will be determined by negotiation prior to submission of the breakdown.
  6. Excavation and backfill must be shown as separate items. If hand excavation is required, it must also be separately listed. All excavation and backfill quantities shall be indicated in cubic yard units. If there is no backfill, an explanation must be provided.
  7. Concrete for structures is to be indicated in cubic yard units. Concrete sidewalk and concrete paving may be indicated as square yard units. All unit prices for concrete work are to include forming. Forming may not be indicated as a separate line item.
  8. Painting must be listed as a separate item in square feet. Lump sum costs will not be accepted.
  9. "Furnish" or "Install" are not to be used as part of the description of a line item. Procurement and installation costs must be included in the line item of work. The only exception shall be in cases where materials or equipment are furnished by the owner or using agency for installation by the contractor.
  10. "Demolition" is to be followed in parenthesis indicating the item to be demolished.
  11. Scaffolding is not to be shown as a separate line item, but is to be included in the item with which it is associated.
  12. Site surveying, as a line item, is permitted only for the General Contractor.

13. Engineering of plans is not permitted as a line item.
14. The HVAC Contractor may show sheet metal work as two items, i.e., (a) Sheet metal shop drawings; and, (b) Sheet metal fabrication and installation. Shop drawings must be shown at actual cost and as one lump sum/line-item. Shop drawings must be approved prior to being invoiced on an Invoice. When the Contractor requests payment for shop drawings, a copy of the subcontractor's invoice, if a subcontractor is used for that item, must be attached to the Invoice.
15. When balancing of heating and ventilating systems is required by the specifications, it shall be shown as a separate item.
16. Costs retained for Commissioning, as described in the General Conditions, must appear as a separate line item in the amount described in the Contract Documents.
17. Lump Sum items cannot be paid until the item is completely finished, inspected, and accepted by the Department, except on unit price projects, where lump sum items can be paid based upon the percentage completed.
18. Operation and Maintenance Manuals shall be indicated as one line item. The value shall be not less than ten percent (10%) of the amount included for mobilization. The amount included is subject to the approval of the Department.
19. Record Drawings shall be indicated as one line item. The value shall be not less than ten percent (10%) of the amount included for mobilization. The amount included is subject to the approval of the Department.
20. Site work shall be identified for each applicable line item. Site work includes, but is not limited to, site preparation, erosion and sediment controls, earth work, grading, excavation, landscaping, seeding, concrete or bituminous paving, sidewalks, and any site utility (e.g., water, gas, sewer, etc.) work.
21. A supplemental Schedule of Values for those items listed as Lump Sum on the original approved Schedule of Values may be submitted at a later date, indicating quantity, unit price and extensions for all items to be furnished and installed under each Lump Sum item. Lump Sum items should be kept to a minimum. Supplemental breakdowns cannot be submitted on items where partial payment has been made.
  - a. **Items to be subcontracted must be designated by the word "subcontractor."**
  - b. Descriptions shall be clear and concise for each item of work, material or equipment, using the same designation as the specifications. All items (examples: concrete masonry units, conduit, pipe fittings, wire, cable, etc.) must be listed by type and size to be installed.
  - c. Temporary heat, if required by the Contract Documents, must be shown on the breakdown as a separate line item. This item will be shown as the last item on the Schedule of Values and must include the number of days specified in the Special Requirements, the Unit Price per twenty-four hour day, and the extension of the figures. **Any adjustment to the number of days of temporary heat, used or not, will be based on the Unit Price shown on the breakdown.**
  - d. Items listed in the index of the specifications must be included, in chronological order, on the breakdown. Additional items may be listed at the Contractor's discretion. Do not utilize alpha-numeric numbering except in cases where supplemental breakdowns are submitted.
  - e. Unit price proposals are an exception to the above procedures. Unit price proposals must be reflected on the breakdown sheet in the same amount and in the same order as in the Contract.

## ADMINISTRATIVE PROCEDURE NO. 4

### PROJECT SCHEDULE and CRITICAL PATH METHOD (CPM) SCHEDULING

#### A. General Information on Project Scheduling

The Lead Contractor shall be responsible for coordinating the schedule among the Contractors, as described in detail in the General Conditions. The Project Schedule shall be a CPM Schedule developed, prepared and submitted in accordance with the same requirements and time frames as required by the General Conditions of the Construction Contract and the requirements of this Administrative Procedure.

1. The CPM Scheduling system is to be implemented by the Lead Contractor, utilizing the services of a qualified subcontractor or its own in-house staff. The subcontractor or Contractor, if utilizing in-house staff, must provide evidence to the Department's satisfaction, that the Contractor or subcontractor has computer hardware and software which is standard in the industry for CPM scheduling. The Contractor/subcontractor and must also provide evidence of at least five years scheduling experience with projects of the same size and nature.
2. In no event shall any activity indicated on the Schedule exceed a 20-day duration unless authorized by the Department.
3. **Within seven (7) days of the Effective Date of the Contract (or earlier if authorized in a Letter of Intent)**, the Lead Contractor on the Project shall furnish each separate Prime Contractor a schedule of the proposed prosecution of the Work under that Prime Contractor's Contract.
4. **Within seven (7) days of receipt of the Lead Contractor's proposed progress schedule**, each separate Prime Contractor shall submit to the Lead Contractor a schedule of the proposed prosecution of its Work, which shall be integrated with the Lead Contractor's Work.
5. **No later than thirty (30) days after the Effective Date of the Contract**, the Lead Contractor shall (in accordance with the scheduling provisions of the General Conditions) submit the Integrated Progress Schedule signed by all Prime Contractors (indicating their approval of the contents of the Schedule).
6. **Within seven (7) days of receipt of the Schedule from the Lead Contractor**, the Project Manager or designated representative and the Professional will review and accept/reject.
7. The construction sequences, activity duration and logic utilized in the development and preparation of the Schedule shall result in an as-planned schedule that must meet the Contract Completion Date set forth in the Contract Documents.
8. Each Prime contractor shall be responsible for providing a daily report of all work performed each day on the project until project close-out. This report shall include, but is not limited to: the Prime Contractor's numerated work force and related work activities performed, the Prime Contractor's numerated sub-contractors' workforce on site (of all tiers) and related work activities performed, equipment on site, testing performed, weather conditions (high and low temperatures, precipitation, etc.), material deliveries and L&I inspection activities. Each daily report shall be provided to the Project Manager within 24 hours of each work day. If no work is performed, a daily report shall be submitted stating no work was performed. Submission of this daily report shall not preclude or waive the need to address issues and activities that shall be addressed within the contract documents via required processes and/or forms. **Failure of a Prime Contractor to submit timely, consistent and accurate daily reports shall be considered a non-conformance of the contract and shall be handled in a manner defined by the Contract Documents.**

9. All Work is to be completed in accordance with the accepted Master Project Schedule. The Master Project Schedule will reflect the decisions of all Contractors as to sequence, duration, construction logic and all means and methods of construction.
10. **The Department will only review and pay (if the application is otherwise acceptable) the Contractor's first Invoice without a Master Project Schedule being submitted and accepted by the Department. No further Applications for Payment will be accepted from any Contractor until the Department has accepted the Master Project Schedule. Since it is the Contractors' affirmative duty to coordinate the Work and prepare the Master Project Schedule, any delay to the Project due to not having an acceptable Master Project Schedule will be attributable to the Contractors.**
11. Activity time delays shall not automatically mean that an extension of time is warranted or due any Prime Contractor. A contract modification or delay may result in only absorbing a part of the available total float that may exist within an activity or chain of activities, therefore, the modification or delay may not affect existing critical activities, interim milestone dates or cause non-critical activities to become critical.
12. The Department owns the float. No float shall be used by the Contractor without a written request and subsequent directive from the Department or its designee. Total float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, for each and every activity in the Master Project Schedule. Extensions of time to interim milestone dates or the Contract Completion Date under the various contracts will be considered only to the extent that equitable time adjustments to the activity or activities affected by the contract modification or delay exceeds the total float of the affected or subsequent paths and extends any interim milestone date or the Contract Completion Date.
13. General Information
  - a. List items of construction as they will be installed. When more than one building, level or floor is included, each building, level or floor shall be listed separately. The Master Project Schedule **must also include** critical submittals, submissions of shop drawings for approval, approval of shop drawings, placing of orders for materials and delivery of materials.
  - b. Each Prime Contractor is responsible for assuring that any and all subcontract work as well as its own work is included in the schedule.
  - c. The Master Project Schedule shall reflect Early Start/Early Finish Dates, Late Start/Late Finish Dates and available Float or Slack time for each and every activity.
  - d. From the activities of the various contracts critical to the Scheduled Completion Date, the Lead Contractor shall identify and incorporate construction progress milestones for the Project into the Master Project schedule, in accordance with the General Conditions of Contract. Unless the Contract Documents state otherwise, the milestones are to signify the start date of a specific activity that is critical to the completion of the project on schedule. **Each contractor must show at least one milestone in each month of the scheduled construction period.**

**ADMINISTRATIVE PROCEDURE NO. 5**

**MATERIALS TESTING (ALL ITEMS-GENERAL REQUIREMENTS)  
LABORATORY SAMPLE OR FIELD TEST IDENTIFICATION**

**MATERIALS TESTING (SELECTION OF TESTING LABORATORY)  
CONCRETE TESTING (APPROVAL OF MIX COMPUTATIONS)  
CONCRETE MIX COMPUTATION**

**INVOICE AND BILLING FOR PROFESSIONALS AND TESTING  
LABORATORIES  
MANUFACTURERS' HIGH VOLTAGE CABLE TEST (BIRTH CERTIFICATE)  
FIELD HIGH VOLTAGE CABLE TEST  
HVAC SYSTEMS BALANCING**

**A. Materials and Concrete Testing Performed by the Contractor (General Requirements)**

**The Contractor shall:**

1. Give the Department and the Professional timely notice of its readiness and of the date arranged, so the Professional may observe such inspection or testing.
2. Bear all costs of such inspections and tests, unless otherwise provided. All expenses incurred in the collecting, packing and delivering of samples of materials or equipment to or from the site or laboratory will be paid by the Contractor, unless otherwise noted in the General Conditions, Specifications or Contract Drawings.
3. All testing information shall be provided to the Professional. This shall include all test reports.
4. For all concrete testing, the test reports and the following information and/or data must be provided to the Professional:
  - a. Placement Date;
  - b. Design Strength;
  - c. Ambient temperature;
  - d. Slump;
  - e. Air Content percentage;
  - f. Temperature of Concrete;
  - g. Who took the test/sample;
  - h. Where are cylinders being cured;
  - i. Name of Approved testing laboratory;
  - j. 3 Day Break Strength;
  - k. 7 Day Break Strength;
  - l. 28 Day Break Strength; and
  - m. 56 Day Break Strength,
5. A Laboratory Sample or Field Test Identification shall accompany each sample to be tested.
6. When testing concrete cylinders, each cylinder shall be numbered consecutively and prefaced for design mix tests, precast concrete and pre-stressed concrete. The type of cylinder shall be noted on the form as follows:

DM - Design Mix  
PC - Precast Concrete  
PS – Pre-stressed Concrete

7. Cylinders for concrete other than the above will not be prefaced. Approved samples to be incorporated into the work shall be returned to the site by the Testing Laboratory.

**The Professional shall:**

1. Secure, review, and approve/reject all submitted testing information and data.

**B. Materials Testing (Selection of Testing Laboratory)**

- A. When the Department is paying for the testing of materials, the DMVA Project Manager will notify the Professional to seek cost quotes to perform the required testing. The Professional will submit the name of the laboratory it has selected to the DMVA Project Manager. If the DMVA Project Manager approves the selection, they will authorize the Professional to contract with the laboratory selected. Contractors will be notified of this selection at the Initial Job Conference by the Professional.
- B. When the Contractor is responsible for testing, the Contractor will select an independent testing laboratory. The Contractor must notify all parties concerned of the selection at the Initial Job Conference.

**C. Concrete Testing (Approval of Mix Computations)**

1. The Contractor shall material submittal process to supply all mix computation information.

**D. Manufacturer's High Voltage Cable Test Report (Birth Certificate)**

1. The Contractor will ensure the Cable Test Report (Birth Certificate) is in compliance with the Contract Documents. The Contractor shall submit all testing information through the material submittal process. This shall include attaching all test reports and select data and information from the test reports.
2. The Professional will review and approve/reject the report for compliance with the Contract Documents.
3. High Voltage Cable may not be installed until the Manufacturer's Cable Test Reports are approved by the Professional.
4. If the report is rejected by the Professional, the report will be returned to the Contractor with an explanation.

**E. High Voltage Cable Field Test Report**

1. The Contractor shall submit all testing information through the material submittal process. This shall include all test reports.
2. The Professional shall review the report for compliance and approve/reject the report.
3. Payment for High Voltage Cable will be made only after the Manufacturer's Test Report is approved, cable is installed and the Field Test Report is approved by the Professional and reviewed by the Department.
4. If the report is rejected, the Professional shall return it to the Contractor with an explanation.

**F. HVAC Systems Balancing Report**

1. The Contractor shall provide all testing and balancing information through the material submittal process. This shall include attaching the final balancing report.

2. The Professional shall, upon receipt of the Balancing Report from the Contractor, review it for compliance with balancing procedures and the Contract Documents. The Professional will review the report for compliance and approve/reject.
3. If the report is rejected, the Professional shall return the report to the Contractor with an explanation.
4. Payment for test and balancing will not be made until the report(s) are approved by the Professional.

## ADMINISTRATIVE PROCEDURE NO. 6

### SUBMITTALS

- A. Each Prime Contractor shall prepare and submit to the Lead Contractor a **Draft Submittal Schedule** showing all items requiring submission including, but not limited to the items listed on the Submittal Register. The **Submittal Schedule** shall be prepared in accordance with the Submittal Article of the General Conditions. All critical and long lead submittal items from the **Submittal Schedule** shall then be integrated by the Lead Contractor and tied to the logic of activities in the Master Project Schedule.
- B. Each Prime Contractor's draft Submittal Schedule (to be submitted to the Lead Contractor) shall include the following as a minimum:
1. Submittal breakdown by Specification Section number and division;
  2. Scheduled date for initial submittal of item; and
  3. Days required after return of an approved submittal to order, fabricate and deliver the specific item to the site.
- C. If the development of the Submittal Schedule affects the construction sequencing, durations, logic or any other aspect of the Project Schedule, including established milestones, the Lead Contractor, in concert with the other Prime Contractors, shall make any necessary revisions to the Project Schedule. The contract completion date will not be adjusted as a result of these revisions. Review and acceptance of this revised integrated Progress Schedule, by the Department and Professional, shall follow the procedures established in Project Schedule Administrative Procedure. The Contractor shall also provide an explanation detailing the reasons for the revision and the activities affected in the letter of transmittal.
- D. The Prime Contractor shall provide the Submittal Schedule and all subsequent submittals and material submittals electronically to the Project Manager, the Professional, and the DMVA Contracting Officer.
- E. The Professional will review and approve/reject/other all submittals electronically and place its appropriately worded stamp on the submittal. Accepted language is Approved, Approved as Noted, For Record Only, Not Approved, and Revise and Resubmit.
- F. The Contractor shall make any corrections required by the Professional and shall resubmit shop drawings or new samples until approved. The resubmission shall be acted upon by the Professional **within ten (10) days of its receipt**, unless a different period of time is approved by the Department. The resubmission of submittals by the Contractor and subsequent review by the Professional shall be in accordance with the General Conditions of Contract.
- G. **Any work commenced by the Contractor prior to final approval of the submittals by the Professional is performed by the Contractor at its own risk.**



## ADMINISTRATIVE PROCEDURE NO. 7

### CONTRACTOR'S INVOICE PREVAILING MINIMUM WAGE CERTIFICATE INVOICE OF LABOR, MATERIALS/EQUIPMENT PAYROLL AFFIDAVIT, CONTRACTOR'S CERTIFICATE AND STATEMENT OF SURETY, POWER OF ATTORNEY STORED MATERIALS

#### A. General Information

1. Contractor's Invoices shall be created and submitted to the DMVA Contracting Officer in accordance with the Payment Article of the General Conditions and this Administrative Procedure.
2. No Invoice will be processed until the Schedule of Values, has been approved.
3. An Invoice will not be processed unless the Small Diverse Business Utilization Report (See AP 15) has been submitted within 30 days prior to the Invoice.
4. When an Invoice is received, the DMVA Construction Project Manager shall review and approve/deny the invoice. The DMVA Construction Project Manager **has five calendar days, from this date, to review and take action.**
5. In accordance with the Prompt Payment Schedule (62 Pa. C.S. §3931-§3939) the Department shall make payment **within forty-five (45) calendar days of the date the Invoice is received in a complete and acceptable format.** The time does not start until the invoice is accepted by the Department. For purposes of calculating the forty-five calendar days, the start date will be the day on which the Department approves the Invoice.

#### B. Prevailing Minimum Wage Certificate or Davis Bacon Wage Act Certification

- A. The Prevailing Minimum Wage Certificate must be completed, by the Contractor, and attached to each Invoice to certify compliance with the payment of Prevailing Minimum Wages as required by the Contract Documents.
- B. All Prime Contractors are required to submit the Form LLC-25 (or Form WH-347 if Davis-Bacon Wage Act applies to the contract) for themselves and all subcontractors of every tier on a weekly basis. The Contractor shall provide ONLY the information required on the form and shall not include any employee personal information (i.e., social security numbers, home addresses, phone numbers, etc.). If the Contractor intends to provide forms with employee personal information, the Contractor shall redact it prior to submitting the forms and attachments.

#### C. Invoice for Work Completed

1. The Contractor must provide a true and correct list of the work performed for each pay period.
2. An approved change order may be paid on a percentage basis as the work is completed.

**D. Stored Materials**

1. Stored Materials may be invoiced by a Contractor when materials are ordered in advance and stored at an appropriate facility or the site until installation will occur. Material that is scheduled for installation **in less than forty-five days** from the date of procurement is not eligible for payment as stored material.
2. A completed Stored Materials Form must be submitted with the Invoice.
3. Prior approval to store materials is not required by the Department.
4. It is not necessary for the Project Manager to visit the warehouse where materials are stored off-site. By executing the Stored Materials Form and submitting photographs, the Contractor will be attesting to the fact that the materials are properly stored. The Contractor is responsible for proper storage of the materials at the project site. Materials must be stored off the ground and properly protected from the elements.
5. Only one supplier may be submitted on each Stored Materials Form.
6. The description of line items on the vendor's invoice should be identical to the description on the Stored Materials Form and the Schedule of Values. If an item description on the vendor's invoice is not identical, the Contractor must clearly describe, either on the invoice or an attachment, the invoiced item(s) as related to the items on the Stored Materials and Schedule of Values.
7. The vendor's invoice must also show the Unit Wholesale Price and the Extended Unit Wholesale Price. It is permissible for the Contractor to add information to the vendor's invoice for the purpose of clarity.
8. If items that are being submitted as stored material are intermixed with other items on a vendor's invoice, the claimed items must be highlighted or underlined.
9. Requests for payment may not exceed eighty-five percent (85%) of the price of the item as indicated on the approved Schedule of Values.
10. When a vendor's invoice lists two or more separate items that are component parts of a single line item previously submitted on the Schedule of Values, a "Supplemental Schedule of Values Sheet" must be submitted and approved prior to payment for the individual items. Line items with differing unit prices must be shown as separate items on the Supplemental Cost Breakdown Sheet. Each component part must be shown as an individual item.
11. The completed Stored Materials Form, submitted with the Invoice, must also have the following documents attached:
  - a. Vendor's Invoice
  - b. Photographs of material and its location
  - c. Fire and theft insurance policy rider for the materials
  - d. Evidence of payment, or when payment has not been made, a letter on the contractor's letterhead authorizing payment to be made jointly to the contractor and the supplier.
  - e. Power of Attorney (from bonding company)

**E. Payroll Affidavit, Contractor's Affidavit and Statement of Surety Company / Power of Attorney**

1. A Final Invoice must be accompanied by a completed Payroll Affidavit, Contractor's Affidavit and Statement of Surety Company / Power of Attorney. If this Form is not submitted with the Final Invoice, the sum of \$500 will be withheld until the form is submitted.
2. The Payroll Affidavit section of the form need not be completed, if the prevailing minimum wage scale does not apply. However, a statement must be made by the Contractor on the reverse side of the Payroll Affidavit, indicating that the prevailing minimum wage scale does not apply.

3. A copy of this form should be retained by the Contractor, and an original and two copies must be forwarded with the Invoice. A copy of the Power of Attorney must be attached to each Statement of Surety Company section.

**F. Small Diverse Business and Small Business Utilization Report**

1. A Small Diverse Business Utilization Report must be submitted within 30 calendar days prior to submitting an invoice. If this Report is not submitted as noted, you will not be able to submit an Invoice. Time for payment does not start until such time as an acceptable invoice is submitted to the Department.

**G. For Each Invoice**

1. Contractor shall provide the invoice based upon work completed since last invoice. Prior to submission of the Invoice by the Contractor, the following documents shall be included as attached documents in this order:
  - a. Prevailing Minimum Wage Certificate
  - b. Small Diverse Business Utilization Report – This is submitted prior to an invoice and is a check box when starting an invoice process. If a SDBUR form has not been submitted within 30 days of an invoice process, the invoice will not be accepted by the Department and time for payment will not start until the Contractor submits the SDBUR form.
  - c. Stored materials information (if applicable)
    1. Power of Attorney (from bonding company)
    2. Vendor's Invoice
    3. Photographs of material and its location
    4. Fire and theft insurance policy rider
    5. Evidence of payment, or when payment has not been made a letter on Contractor's letterhead authorizing payment to be made jointly to the contractor and the supplier
  - d. Payroll Affidavit, Contractor's Affidavit and Statement of Surety Company / Power of Attorney (if Final Invoice)
  - e. Notarized LLC-25 for Commonwealth funded projects or WH-347 for federal funded projects (if Final Invoice)
2. Upon Final Inspection, the monetary amount to be retained shall be adjusted to reflect the actual amounts retained, as set out in the various sections of the General Conditions of Contract. The pertinent pages of the punch list, including the Professional's Certificate detailing the uncompleted items and value, pending credit change orders, liquidated damages, claims, etc., must be attached to the Invoice. The items indicated on the punch list shall not be paid until completed in their entirety. As the paperwork items are completed, change orders and extensions of time are approved, claims resolved, the retained amount may be reduced accordingly. The pertinent pages of punch list shall be attached with a strikethrough the items acceptably completed and/or approved. The adjusted retained amount should then be calculated, inserted and highlighted on the copies of the punch list attached to the Invoice. The adjusted retained amount must equal the amount shown on the schedule of values.

## ADMINISTRATIVE PROCEDURE NO. 8

### CHANGES IN CONTRACT WORK (FIELD ORDERS/CHANGE ORDERS)

- A. Any change to Project Contract must be documented by issuance of a Change Order. All Change Orders are to be started and processed electronically. All information and required fields for the Change Order process shall be completed by the initiator prior to submitting it.
- B. A Change Order may be commenced by the Professional, DMVA Personnel, and under limited circumstances, the Contractor.
- C. The Professional is required to provide an opinion as to the reason that the Change Order is required. The Professional must provide detailed explanation supporting the Change Order.
- D. DMVA will review the Change Order and make a final determination on cause based upon on all applicable factors including input provided by the Professional.
- E. Professional's Cost Guesstimate
  - 1. The Professional must provide their best estimate of the cost to perform the subject Change order work. DMVA secures Project Funds based on the Professional's Guesstimate amount, so the Professional should use whatever means are necessary to provide the most accurate Guesstimate possible.
  - 2. In the event the Professional disagrees with the need or legitimacy of the subject Change Order, they are still required to provide a Guesstimate cost to perform that work. That Guesstimate shall be based solely on the cost value of the work. The legitimacy of the Change Order request shall have no bearing on this Guesstimate cost figure. DMVA reserves the right to secure funds at the Contractor's cost breakdown figure in lieu of the Professional's Guesstimate cost figure for any Contractor originated Change Order request disputed by the Professional.
- F. A detailed cost breakdown shall be attached to the Change Order by the Contractor for any changes to the Prime Contractor's scope of Work utilizing the format established by the sample change order included in this Administrative Procedure.
  - 1. **Material Costs** - The Cost Breakdown shall list, as a minimum for each material item used, the material description, the unit, (U) used to detail quantity, the quantity, (Q) showing the total amount of that unit, the unit cost, (MU) and the individual cost total, (Q x MU). The Cost Breakdown shall then include the total of all the individual cost totals which is defined as the pre-mark-up cost total. The Contractor may optionally provide (but is not required to provide) the applicable labor hours per material unit (HU) and the respective labor extension for that unit (Q x HU). If the Contractor chooses to provide unit labor information in the material section, the total hours of labor shown must match the total labor hours shown under the LABOR section of the cost breakdown. The total material cost will be the sum of the pre-mark-up material cost total plus the sales tax mark-up plus the overhead, general support and profit mark-up.
    - i. DMVA will not acknowledge or honor any separate line items in the Cost Breakdown for such freight charges.
    - ii. The Contractor is entitled to and may claim the following mark-up for material listed on the Cost Breakdown:
      - a. state and local sales tax equal to the applicable sales tax rate times the pre-mark-up material cost total listed;
      - b. mark-up material cost total plus the sales tax mark-up, overhead, general support and profit equal to 10% times the sum of the pre-markup material costs.

2. **Labor Costs** - The Cost Breakdown shall include for each labor classification listed, the number of workers, duration of work for each worker, the total labor hours (H), the classification description, the hourly base wage rate paid (BR), the total hourly wage rate paid (WR), the base rate individual cost (H x BR) and the wage rate individual cost (H x WR). The Cost Breakdown shall then include the total of all the individual base rate costs (TBR) and the total of all the individual wage rate costs. (TWR) The hourly base wage rate (BR) is defined as the rate of wages paid by the employer directly to the employee. The total hourly wage rate (WR) is defined as the total rate of wages paid by the employer including wages paid directly to the employee (BR) plus any employer participation or contribution to employee benefits paid on behalf of the employee. DMVA acknowledges that for certain Contractors the base rate (BR) and the wage rate (WR) are equivalent. The total labor cost will be the sum of the total wage rate cost (TWR) plus the total mandated burden mark-up (TMB) plus the overhead, general support and profit mark-up.
  - i. DMVA will not accept or reimburse line items for travel, lodging and per-diem. Exceptions may be made on a case-by-case basis for instances including use of a specialty out-of-state, or non-local Sub-Contractor for Change Order Work, or in the event that the Change Order Work is being issued after Project Final Completion and the Prime Contractor claims travel and lodging costs in lieu of remobilization costs.
  - ii. The Contractor is entitled to and may claim the following mark-up for labor listed on the cost breakdown:
    - a. mark-up for mandatory labor burden costs including (and limited to) social security, federal and state unemployment taxes, workmen's compensation insurance and public liability insurance. The allowable mark-up for each is equal to the applicable social security, unemployment compensation tax, workmen's comp. insurance, or public liability insurance rate times the total base rate cost (TBR) not the total wage rate (TWR). DMVA will disallow any excessive burden mark-up calculated as a percentage of the TWR (excepting those instances where the TBR and TWR are identical). DMVA will also not honor any mark-up for types of labor burden additional to those listed;
    - b. mark-up for overhead, general support and profit equal to 15% times the sum of the total wage rate cost (TWR) plus the total mandated burden mark-up (TMB). The total mandated burden mark-up is defined as the total of all the allowable individual burden costs for social security, unemployment compensation tax, workmen's compensation insurance and public liability insurance.
3. **Equipment Costs** The Cost Breakdown shall include for each piece of equipment used to perform the subject work, the description of the piece of equipment used, the quantity of that particular piece used, the duration the piece of equipment was used, the rental rate for the duration used and the total rental cost. DMVA expects the Contractor to procure/provide the most economical rental rate available over the duration of the work performed. For example, if the piece of equipment was used over a four-week period, DMVA will expect a monthly rate in lieu of a daily or weekly rate, if the monthly rate is more economical than the other two rates.
  - i. DMVA will not pay equipment costs for any piece of equipment not specifically identified, or for any tools such as hand tools used in the everyday performance of contract work.
  - ii. The Contractor may claim sales tax paid for any piece of equipment rented from an outside (non-Contractor owned) rental agency provided that a receipt showing the sales tax paid amount accompanies the cost breakdown. DMVA will disallow sales tax for any rental item without such proper verification.
  - iii. The Contractor may claim mark-up for overhead, general support and profit equal to 10% times the sum of the total rental costs plus the total applicable sales tax. The total rental costs are the sum of all the individual rental costs. The total applicable sales tax is the sum of all the individual verified sales taxes
4. **Subcontractors** – A detailed cost breakdown or acceptable alternate quote from the Subcontractor is required for any detailed cost breakdown from the Prime Contractor showing that any or all of the Change

Order work is being performed by the Subcontractor. An acceptable alternate quote is defined as a lump sum cost quotation provided by the Sub-Contractor on Sub-Contractor letterhead paper which details the exact scope of work to be done by the Contractor including detailed information of quantities and description of material items installed. DMVA will consider the lump sum cost to be inclusive of all material, labor and equipment costs including all applicable markups for overhead, profit, general support, total mandated burden, taxes and bond adjustment to which the Sub-Contractor is entitled as defined within this manual section. For breakdowns containing work performed by one or more Sub-Contractors and the Prime Contractor, the Prime is responsible for clarifying somewhere in the breakdown, the exact scope of work being performed by the Prime and each Sub-Contractor. In the absence of such clear definition of work scopes, DMVA reserves the right to disallow any Prime Contractor labor hours charged for Change Orders where it appears that all of the work is being performed by the Sub-Contractor.

- i. The Prime Contractor may claim mark-up for overhead, general support and profit equal to 10% times the sum of the total costs realized by the Prime's Sub-Contractor in performance of the work. Any Sub-Contractor receiving work from the Prime Contractor (or another Sub-Contractor) who in turn subs that work to another Sub-Contractor may claim mark-up for overhead, general support and profit equal to 10% times the sum of the total costs realized by the Sub's Sub-Contractor in performance of the work.
5. **Verifications** -In order for DMVA to verify the individual wage rates, mandated burden rates and bond rates claimed by the Contractor, the Contractor will provide the following to be attached to the detailed cost breakdown accompanying the **first Change Order** for each Contract: The verification documentation listed above comprises what DMVA considers to be the standard for verification of a given rate. DMVA will consider for submittal, alternatives to those standards provided that those alternatives furnish the same conclusive, independent substantiation provided by the replaced standard. Acceptance of alternative verification documentation will be made exclusively by DMVA Office of Facilities and Engineering and will be reviewed on a case-by-case basis.
- i. **Base Rate** - The Prime Contractor shall provide a copy of a Certified Payroll which shows total wages, hours worked and resulting wage rate being paid directly to the Prime Contractor's employee for each Prime Contractor's labor classification being used in the performance of the Change Order work. DMVA considers the Certified Payroll to be the LIPW-128 Form or equivalent. The Prime Contractor has the option to submit BASE RATE VERIFICATION for all Prime Contractor labor classifications at the time the first Change Order is submitted or individual BASE RATE VERIFICATIONS may be submitted with subsequent Change Orders as labor classifications unique to those used in performance of the first Change Order are required for performance of those subsequent Change Orders. In lieu of proper verification, DMVA will apply as Contractor's Base Rate, the Prevailing Wage Hourly Rate as determined in the Specifications.
  - ii. **Wage Rate** - The Prime Contractor shall provide to DMVA, written documentation showing the dollar per hour rate of employer contributions made on behalf of the employee towards the employee's benefits. DMVA will accept as such documentation, either a written excerpt from a labor contract/agreement identifying mandatory benefits, or a certified statement from the Prime Contractor's independent Auditor which outlines actual costs for benefits. This Employee Benefit Rate (EBR) contribution must represent moneys that are not paid directly to the employee but are paid to a separate source maintaining the benefits. This documentation should itemize all individual benefits contributed to by the employer. The documentation should list the employer dollar per hour contribution to each individual benefit and the total dollar per hour contribution for all the benefits combined. The total dollar per hour contribution is the employee Benefit Rate (EBR). Upon receipt of such acceptable documentation, DMVA will consider the Prime Contractor's Wage Rate (WR) to be equal to the Contractor's verified Base Rate (BR) plus Employee Benefit Rate (EBR). This can be represented mathematically as:  $WR = BR + EBR$ . In lieu of proper verification, DMVA will apply as Contractor's Wage Rate, the Prevailing Wage Total Rate as determined in the Specifications.

- iii. **Unemployment Tax Rate** -To substantiate the State Unemployment Tax (SUTA) employer contribution rate, the Prime Contractor shall submit a copy of the effective Contribution Rate Notice issued from the Department of Labor & Industry. Any claimed Federal Unemployment Tax (FUTA) employer contribution will be consistent with the rate as determined in the current I.R.S. Circular 'E', Employer's Tax Rate Guide. Since the FUTA employer contribution is applicable only for the first few thousand dollars of annual employee wages (currently the first \$7,000), DMVA reserves the right to ask for verification of the employee's annual wage records if FUTA is claimed by the Prime Contractor.
- iv. **Workmen's Comp Rate** - The Prime Contractor shall submit a copy of the Workmen's Compensation Insurance Policy that shall verify the basic rate, all individual discounts (such as premium and payment), modifier(s) and resulting final adjusted rate.
- v. **Public Liability Insurance** - The Prime Contractor shall submit a copy of the paid insurance premium which shows the total premium paid, the total payroll on which the premium was paid and the resulting rate.
- vi. **Bond Rate** - The Prime Contractor shall submit an invoice from the Surety Company showing the total bond paid, the total contract amount on which the bond was paid and the resulting bond rate.
- vii. **Subcontractor's Rates** - Generally, DMVA will not require the Prime or Sub-Contractor to submit verification of rates claimed (in Sub-Contractor's Cost Breakdown) by any of the Prime's Sub-Contractor's performing work for a given Change Order. However, in the event that a certain Sub-Contractor is being used continually by the Prime to perform Change Order work and/or if that Sub-Contractor's rates appear excessive to DMVA, DMVA reserves the right to ask the Prime Contractor to procure and submit to DMVA, verification of rates used by the Sub-Contractor in question. This information shall be submitted to DMVA only upon DMVA request.

#### EXAMPLE COMPLETED COST BREAKDOWN

ABC GENERAL CONTRACTORS

|  |                    |                        | <u>MATERIAL</u>          |                               | <u>LABOR HOURS (OPTIONAL)</u> |                                |
|--|--------------------|------------------------|--------------------------|-------------------------------|-------------------------------|--------------------------------|
| <u>QTY.</u><br>(Q)                             | <u>UNIT</u><br>(U) | <u>DESCRIPTION</u>     | <u>UNIT COST</u><br>(MU) | <u>COST TOTAL</u><br>(Q x MU) | <u>HOURS/UNIT</u><br>(HU)     | <u>TOTAL HOURS</u><br>(Q x HU) |
| 8000   | S.F.               | 1/2" GYPSUM WALL BOARD | \$0.15                   | \$1,200.00                    | .008                          | 64                             |
| 15   | EACH               | DOUBLE HUNG WINDOWS    | \$120.00                 | \$1,800.00                    | .800                          | 12                             |
| PRE-MARK-UP MAT'L. COST TOTAL                  |                    |                        |                          | \$3,000.00                    | TOTAL LABOR HRS.              | 76                             |
| 6% SALES TAX                                   |                    |                        |                          | \$180.00                      |                               |                                |
| SUBTOTAL                                       |                    |                        |                          | \$3,180.00                    |                               |                                |
| 10% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |                    |                        |                          | \$318.00                      |                               |                                |
| <b>TOTAL MATERIAL COST</b>                     |                    |                        |                          | <b>\$3,498.00</b>             |                               |                                |

|                            |                 |                     | <u>LABOR</u>               |                                 |                                       |                                    |                                   |
|----------------------------|-----------------|---------------------|----------------------------|---------------------------------|---------------------------------------|------------------------------------|-----------------------------------|
| <u>NUMBER OF WORKERS</u>   | <u>DURATION</u> | <u>HOURS</u><br>(H) | <u>CLASSIFICATION</u>      | <u>HOURLY BASE RATE</u><br>(BR) | <u>TOTAL HOURLY WAGE RATE</u><br>(WR) | <u>BASE RATE COSTS</u><br>(H x BR) | <u>WAGE RATE COST</u><br>(H x WR) |
| 2                          | 38              | 76                  | CARPENTER                  | \$20.27                         | \$30.59                               | \$1,540.52                         | \$2,324.84                        |
| TOTAL LABOR HOURS          |                 | 76                  | TOTAL BASE RATE COST (TBR) |                                 | \$1,540.52                            |                                    |                                   |
| TOTAL WAGE RATE COST (TWR) |                 |                     |                            |                                 |                                       | \$2,324.84                         |                                   |

| <u>RATE</u>                                    | <u>MANDATED BURDEN</u>               |                   |
|--|--------------------------------------|-------------------|
| 7.65%  | SOCIAL SECURITY (ON TOTAL TBR)       | \$117.85          |
| 12.39%   | UNEMPLOYMENT TAXES (ON TOTAL TBR)    | \$190.87          |
| 8.90%  | WORKMEN'S COMP. INS. (ON TOTAL TBR)  | \$137.11          |
| 2.46%  | PUBLIC LIABILITY INS. (ON TOTAL TBR) | \$37.90           |
| TOTAL MANDATED BURDEN (TMB)                    |                                      | \$483.73          |
| SUBTOTAL LABOR COSTS (TWR + TMB)               |                                      | \$2,808.57        |
| 15% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |                                      | \$421.29          |
| <b>TOTAL LABOR COST</b>                        |                                      | <b>\$3,229.86</b> |

|  |             |                  | <u>EQUIPMENT</u>                |                    |
|--|-------------|------------------|---------------------------------|--------------------|
| <u>DURATION</u>                                | <u>QTY.</u> | <u>EQUIPMENT</u> | <u>RENTAL RATE FOR DURATION</u> | <u>RENTAL COST</u> |
| N/A  | 1           | N/A              | N/A                             | N/A                |
| % SALES TAX (IF RENTED)                        |             |                  |                                 |                    |
| SUBTOTAL EQUIPMENT COST                        |             |                  |                                 |                    |
| 10% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |             |                  |                                 |                    |
| <b>TOTAL EQUIPMENT COST</b>                    |             |                  |                                 | <b>\$0</b>         |

| <u>SUBCONTRACTORS (IF APPLICABLE)</u>          |   |                     |
|--|---|---------------------|
| <u>COMPANY</u>                                 | *Total Cost From Attached Sub-Contractor's Detailed Breakdown | * <u>TOTAL COST</u> |
| XYZ Paving                                     |   | \$31,973.26         |
| SUBTOTAL                                       |   | \$31,973.26         |
| 10% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |   | \$3,197.33          |
| <b>TOTAL SUBCONTRACTS</b>                      |   | <b>\$35,170.59</b>  |

| <u>SUMMARY</u>                         |                    |
|--|--------------------|
| TOTAL MATERIAL                         | \$3,498.00         |
| TOTAL LABOR                            | \$3,229.86         |
| TOTAL EQUIPMENT                        | N/A                |
| TOTAL SUBCONTRACTS                     | \$35,170.59        |
| LESS DEDUCTS (Explain Separately)      | N/A                |
| SUBTOTAL                               | \$41,898.45        |
| 2.0% BOND COST ADJUSTMENT(ON SUBTOTAL) | \$837.97           |
| <b>TOTAL PROPOSAL</b>                  | <b>\$42,736.42</b> |

Contractor's Signature



XYZ PAVING (SUB-CONTRACTOR)

|  |                    |                          | <u>MATERIAL</u>          |                               | <u>LABOR HOURS (OPTIONAL)</u> |                                |
|--|--------------------|--------------------------|--------------------------|-------------------------------|-------------------------------|--------------------------------|
| <u>QTY.</u><br>(Q)                             | <u>UNIT</u><br>(U) | <u>DESCRIPTION</u>       | <u>UNIT COST</u><br>(MU) | <u>COST TOTAL</u><br>(Q x MU) | <u>HOURS/UNIT</u><br>(HU)     | <u>TOTAL HOURS</u><br>(Q x HU) |
| 4900   | S.Y.               | 3" BITUM. ASPHALT PAVING | \$4.50                   | \$22,050.00                   | .0196                         | 96                             |
| PRE-MARK-UP MAT'L. COST TOTAL                  |                    |                          |                          | \$22,050.00                   | TOTAL LABOR HRS. 96           |                                |
| 6% SALES TAX                                   |                    |                          |                          | \$1,323.00                    |                               |                                |
| SUBTOTAL                                       |                    |                          |                          | \$23,373.00                   |                               |                                |
| 10% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |                    |                          |                          | \$2,337.30                    |                               |                                |
| <b>TOTAL MATERIAL COST</b>                     |                    |                          |                          | <b>\$25,710.30</b>            |                               |                                |

|                          |                 |                     | <u>LABOR</u>               |                                 |                                       |                                    |                                   |
|--------------------------|-----------------|---------------------|----------------------------|---------------------------------|---------------------------------------|------------------------------------|-----------------------------------|
| <u>NUMBER OF WORKERS</u> | <u>DURATION</u> | <u>HOURS</u><br>(H) | <u>CLASSIFICATION</u>      | <u>HOURLY BASE RATE</u><br>(BR) | <u>TOTAL HOURLY WAGE RATE</u><br>(WR) | <u>BASE RATE COSTS</u><br>(H x BR) | <u>WAGE RATE COST</u><br>(H x WR) |
| 1                        | 8               | 8                   | LAB. FOREMAN               | \$16.91                         | \$24.80                               | \$135.28                           | \$198.40                          |
| 7                        | 8               | 56                  | LABORER                    | \$16.16                         | \$24.05                               | \$904.96                           | \$1,346.80                        |
| 4                        | 8               | 32                  | OPERATOR                   | \$21.03                         | \$31.69                               | \$672.96                           | \$1,014.08                        |
| TOTAL LABOR HOURS        |                 | 96                  | TOTAL BASE RATE COST (TBR) |                                 | \$1,713.20                            |                                    |                                   |

TOTAL WAGE RATE COST (TWR) \$2,559.28

| <u>RATE</u>                                    | <u>MANDATED BURDEN</u>               |                   |
|--|--------------------------------------|-------------------|
| 7.65%  | SOCIAL SECURITY (ON TOTAL TBR)       | \$131.06          |
| 11.91%   | UNEMPLOYMENT TAXES (ON TOTAL TBR)    | \$204.04          |
| 10.23%   | WORKMEN'S COMP. INS. (ON TOTAL TBR)  | \$175.26          |
| 3.17%  | PUBLIC LIABILITY INS. (ON TOTAL TBR) | \$54.31           |
| TOTAL MANDATED BURDEN (TMB)                    |                                      | \$564.67          |
| SUBTOTAL LABOR COSTS (TWR + TMB)               |                                      | \$3,123.95        |
| 15% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |                                      | \$468.59          |
| <b>TOTAL LABOR COST</b>                        |                                      | <b>\$3,592.54</b> |

| <u>DURATION</u>                                | <u>QTY.</u> | <u>EQUIPMENT</u>       | <u>RENTAL RATE FOR DURATION</u> | <u>RENTAL COST</u> |
|--|-------------|------------------------|---------------------------------|--------------------|
| 1 DAY  | 1           | ASPHALT PAVER 130 H.P. | \$1200.00/DAY                   | \$1,200.00         |
| 1 DAY  | 2           | STEEL WHEEL ROLLERS    | \$230.00/DAY (EACH)             | \$460.00           |
| 1 DAY  | 1           | PNEUMATIC WHEEL ROLLER | \$225.00/DAY                    | \$225.00           |
| 6% SALES TAX (IF RENTED)                       |             |                        |                                 | \$113.10           |
| SUBTOTAL EQUIPMENT COST                        |             |                        |                                 | \$1,998.10         |
| 10% OVERHEAD, GEN. SUPT. & PROFIT(ON SUBTOTAL) |             |                        |                                 | \$199.81           |
| <b>TOTAL EQUIPMENT COST</b>                    |             |                        |                                 | <b>\$2,197.91</b>  |

| <u>SUMMARY</u>                         |                    |
|--|--------------------|
| TOTAL MATERIAL                         | \$25,710.30        |
| TOTAL LABOR                            | \$3,592.54         |
| TOTAL EQUIPMENT                        | \$2,197.91         |
| LESS DEDUCTS (Explain Separately)      | N/A                |
| SUBTOTAL                               | \$31,500.75        |
| 1.5% BOND COST ADJUSTMENT(ON SUBTOTAL) | \$472.51           |
| <b>TOTAL PROPOSAL</b>                  | <b>\$31,973.26</b> |

- A. **Force Account Change Orders** - Force Account Records are required to substantiate time and material costs for all Force Account Change Orders which are initiated because quantities, exact scope and unit costs for work cannot be established prior to the performance of the work. The Prime Contractor and all Sub-Contractor's working under the Force Account Change Order must keep written, signed daily records of labor, material and equipment. Those records will be monitored and signed daily by DMVA Personnel. The Contractor completing the Force Account work shall identify as a minimum, the date of work performed, the contract number of DMVA Project, the description (including location) of exact work performed under Today's Work. If known, the Contractor may provide as an option, the date the work was authorized and the person authorizing the work DMVA requires as verification of material unit prices and equipment use or rental unit prices that the Contractor include receipts, invoices, truck slips, etc., along with the Force Account Daily Work Record Sheet for each material and equipment item listed on the sheet. In absence of such individual verification, DMVA reserves the right to make its own determination of proper unit rate. DMVA will make such a determination based on the most economical rate that can be applied to the total material quantities or total equipment rental/usage duration accumulated over the duration of the Change Order work. At the end of each day the Contractor or Sub-Contractor shall submit to the Project Manager, the applicable FORCE ACCOUNT DAILY WORK RECORD Sheet(s). This sheet shall contain all completed information pertaining to duration of labor and equipment usage/rental and quantities of material. The submitted sheet should be signed by the Contractor.

## ADMINISTRATIVE PROCEDURE NO. 9

### REQUEST FOR EXTENSION OF TIME CHANGE ORDER

- A. All Requests for Extensions of Time shall be prepared and submitted to the Project Manager by the Contractor.
- B. The Contractor must **verbally inform the Department at the first Job Conference after any alleged delay it has encountered**. No forms or correspondence are required at this time, however, the Contractor should verify that the verbal notification of the alleged delay has been noted in the Job Conference Report. **Within ten (10) days** after the end of the alleged delay, the Contractor must submit the EOT.
- C. **Failure to submit the form within ten days may constitute a waiver of the request and result in the denial of the request.**
- D. The Contractor must enter all required information including but not limited to, beginning date of delay, the ending date of delay, number of days delayed, cause of delay, effect on construction progress, the item of work affected, and list work items that could have been done during the delay. The Contractor must utilize the Master Project Schedule (updated and approved as of the date of the submission of the EOT request) to establish the critical activities delayed by the facts submitted with the EOT as discussed in depth in the Scheduling Article of the General Conditions. Omission of data or failure to answer any of the questions **will result in the EOT Change Order being returned** to the Contractor for completion
- E. Only one delay shall be submitted per Change Order.
- F. If explanation of the delay is lengthy, the Contractor may attach additional documentation to the Change Order. It is mandatory, however, that as much of a factual synopsis as possible be included with the submission.
- G. Claims for weather related delays must be substantiated by Weather Data, which may be secured from local weather records and/or the National Oceanic & Atmospheric Administration, National Climatic Center, Asheville, North Carolina 28801.
- H. The Professional will review an extension of time change order request. The Professional will attach any additional pertinent information and documentation required to justify and support the recommendation.

**ADMINISTRATIVE PROCEDURE NO. 10**

**SUBMISSION GUIDELINES FOR  
STEEL CERTIFICATIONS FOR PROJECTS  
PURSUANT TO THE STEEL PRODUCTS PROCUREMENT ACT  
73 P.S. §1881, ET SEQ.**

**GENERAL INFORMATION CONCERNING THE STEEL PRODUCTS PROCUREMENT ACT AND STEEL  
CERTIFICATIONS**

- A. All Prime Contractors shall submit Steel Certification forms. Only one fully-executed certification form for each product must be submitted.
- B. According to Section 1886 of the Steel Products Procurement Act (the Act), cast iron products are considered to be steel products. The appropriate certification form, therefore, is required to be submitted for cast iron products.
- C. Aluminum and brass products are not steel products; therefore, steel certification forms are not required for such items.
- D. Pursuant to Section 1884(b)(2) of the Act, DGS has created a list of exempt machinery and equipment steel products, which is posted on the DGS website at [www.dgs.state.pa.us](http://www.dgs.state.pa.us). If a product to be utilized on the project appears on the exemption list, steel certification forms are not required.
- E. Modification or alteration of the Steel Certification forms is strictly prohibited.
- F. If the entity executing an ST form has a corporate seal, that seal should be impressed in the signature area of the form. The signatures on the ST forms do not have to be notarized, but they must be original signatures. Signature stamps are not acceptable; a form submitted with such a stamp will be rejected.
- G. Questions regarding steel certification submissions and/or compliance with the Act shall be submitted **in writing** to the Project Manager as soon as possible after the Initial Job Conference. DMVA will investigate and render a response in a timely fashion.
- H. **Nothing in this Administrative Procedure should be construed as relieving any prime contractor, subcontractor, supplier or fabricator from complying with the requirements of the Act. Steel Certification forms must be submitted and approved by Departmental personnel before a steel product arrives on site. Any contractor entering into a purchase order for a "steel product" prior to submitting acceptable steel certifications does so at its own risk and faces penalties which include, but are not limited to, nonpayment, and/or replacement costs, and/or debarment. If steel products are incorporated into the project prior to the submission of proper certification, the contractor assumes the full risk of nonpayment, replacement costs and/or debarment if the products are not certifiable.**
- I. No Invoice containing steel products will be processed until the appropriate steel certification form(s) has been approved by the Department.
- J. **Domestic availability will be determined as of the date the ST-4 form is submitted to DMVA for approval.**
- K. The forms that follow ST-1 through ST-4 - have been developed by the Department of General Services for use on the Department's projects alone. The Department assumes no responsibility or liability for any use of these forms on the public works projects of any other entity subject to the Act.
- L. The North American Free Trade Agreement (NAFTA) does not supersede or preempt the Act.

## ST-1

**THIS FORM MUST BE FILLED OUT FOR EACH "STEEL PRODUCT"  
ON A DMVA PROJECT UNLESS OTHERWISE NOTED.**

### SECTION A

**Line #1** This is the Prime Contractor's formal business name. If a sub's name appears on this form, the form must be rejected and resubmitted.

**Line #2** This is the prime contractor's business address.

**Line #3** This is the prime contractor's business phone number.

**Line #4** This is the date the ST form is submitted to DMVA.

**Line #5** This is the DMVA contract number for the project.

**Line #6** This is the DMVA project description.

**Line #7** This is the "steel product" being certified, such as an I-beam, angle, bolt, channel, etc. The prime contractor may not fill in the line with a description like "structural steel", heating unit" or "air conditioning system".

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.  
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM  
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE SUBMITTED.**

**NOTE:** The prime contractor does not have to submit a form for each piece of steel which is being put into the project. The prime contractor only has to submit an ST form for each type of steel product. For example, if the project needs 56 I-Beams of varying lengths, the contractor must submit **1 ST form** for "steel I-Beams" with a listing of the various sizes covered by that ST form. The contractor does not submit 56 ST-1 forms. If, on the other hand, only 30 of the I-Beams are identifiable (stamped) structural steel, the contractor submits an ST-1 form with Section B(1) marked off. The other 26 I-Beams are non-identifiable structural steel, so the contractor must also submit an ST-1 with Section B(2) marked off and attached the appropriate supporting documentation.

If the contractor is using different suppliers, each supplier must submit the appropriate steel form.

**Line #8** This is the fabricator or supplier of the product listed on Line #7.

### SECTION B

**ONLY ONE OF THESE ITEMS CAN BE CHECKED AS APPLICABLE**

\_\_\_\_\_ **1. Identifiable Steel Product**

This type of steel product is limited to products which are stamped "made in the USA" or otherwise identifiable as U.S. Steel.

- a) supporting documentation:** Prime Contractor only needs to submit the ST-1 form. DMVA field personnel will verify the markings when product arrives on-site.

**2. Non-identifiable Structural Steel Product**

This type of steel product is limited to items of structural steel which are not marked as made in USA.

**a) supporting documentation:** Prime contractor must also submit, attached to the ST-1 form, bills of lading, invoices and mill certificates.

**3. Non-identifiable, Non-structural Steel Product**

This type of steel product is every product which is non-structural steel, including, but not limited to, doors, door frames, windows, machinery and equipment.

**a) supporting documentation:** Fully executed ST-2

**b) NOTE:** A steel product may not appear on any Invoice until such time as the ST-1 and ST-2 are accepted by DMVA.

**SECTION C**

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-1 form. The Prime Contractor's President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names **does not** invalidate the ST form.

**ST-1 STEEL ORIGIN CERTIFICATION: PRIME CONTRACTOR**

This form must be executed by the Prime Contractor and submitted to the APM within 30 days from the date the Professional approves a submittal listing a "steel product". No steel product may be delivered on-site unless DMVA has received an ST form. A completed form is required for each type of steel product (e.g., beams, columns, stairways, etc.), from each supplier but not for each piece of steel product.

**A. TO BE COMPLETED BY THE PRIME CONTRACTOR:**

1. Name of Contractor's firm \_\_\_\_\_
2. Firm's address: \_\_\_\_\_
3. Firm's phone number: \_\_\_\_\_ 4. Date submitted: \_\_\_\_\_
5. Contract No. \_\_\_\_\_ 6. Contract Title \_\_\_\_\_
7. Steel Product Certified: \_\_\_\_\_
8. Name & Address of Supplier: \_\_\_\_\_

**B. TYPE OF STEEL PRODUCT (Check and complete one (1) applicable category):**

9. \_\_\_\_\_ **Identifiable steel product:** 100% of the steel in the product is identifiably marked as manufactured in the United States.
  - a. Other documentation required: **NONE**
  - b. Manner in which steel product is identifiable:
    - (1) \_\_\_\_\_ Stamped "Made in U.S.A."
    - (2) \_\_\_\_\_ Stamped "Made in \_\_\_\_\_."
    - (3) \_\_\_\_\_ Other: Explain: \_\_\_\_\_
10. \_\_\_\_\_ **Non-identifiable structural steel:** Less than 100% of the steel contained in the product is identifiable as provided above. Structural steel is defined as steel products used as a basic structural element of a project (i.e., steel beams, columns, decking, stairways, reinforcing bars, structural lintels, pipes, etc.)
  - a. Other documentation **required:** Bills of lading, invoices and mill certificates that certify that the steel contained in the product was melted and/or manufactured in the United States.
11. \_\_\_\_\_ **Non-identifiable non-structural steel:** all other steel products including door and window frames, machines, equipment, etc.
  - a. Other documentation **required:** Executed Form ST-2

**CERTIFICATION:** I, the undersigned office of the Contractor, do certify that, to the best of my knowledge, the steel product listed above complies with the provisions of the Steel Products Procurement Act (73 P.S. § 1881, et seq., as amended). I understand that by signing this document I certify that the facts contained herein are true. I further understand that this document is subject to the provision of the Unsworn Falsification to Authorities (18 P.S. § 4904) and the Steel Products Procurement Act, which provides penalties including, but not limited to, debarment from bidding on any Commonwealth of Pennsylvania public works project for a period of five years. I agree to provide documentation supporting these facts if requested by the Commonwealth. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

**WITNESS:**

\_\_\_\_\_  
Name:  
Secretary or Treasurer

\_\_\_\_\_  
Name:  
President or Vice President

(Seal)

## ST-2

This form must be filled out for non-identifiable, non-structural steel products.

### **SECTION A      To be filled out by the Purchaser, the firm that pays the Fabricator**

**Line #1** This is the name of the firm that is dealing directly with the Fabricator

**Line #2** This is the purchaser's mailing address.

**Line #3** This is the purchaser's business phone.

**Line #4** This is the date the ST-2 form is sent to the fabricator.

**Line #5** This is the DMVA contract number or the project.

**Line #6** This is the DMVA project description.

**Line #7** This is the "steel product" being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like "structural steel", "heating unit" or "air conditioning Unit". The model number, if any, of the steel product must be listed as indicated.

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.  
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM  
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE  
SUBMITTED.**

### **SECTION B      To be filled out by the Fabricator, the firm that assembles the product listed on Line #7.**

**Line #1** This is the Fabricator's name.

**Line #2** This is the Fabricator's mailing address.

**Line #3** This is the Fabricator's business phone.

**Line #4** This is the date the Fabricator receives the ST-2 from the Purchaser.

**Line #5** This is the Fabricator's Federal I.D. number.

### **SECTION C**

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-1 form. The Prime Contractor's President/Vice President must sign on one line and the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names **does not** invalidate the ST form.



**ST-2 STEEL ORIGIN CERTIFICATION:**  
**NON-IDENTIFIABLE, NON-STRUCTURAL STEEL**

This form must be executed by the Purchaser and the Fabricator of any item containing steel that is not structural steel. This form must be submitted to the APM within 30 days from the date the Professional approved a submittal listing a "steel product". No steel product may be delivered on-site unless DMVA has received the ST form. Structural steel is defined as steel products used as a basic structural element or a project (i.e. steel beams, columns, decking stairways, reinforcing bars, pipes, etc.). Purchasers of structural steel products (contractors or subcontractors) **must** provide bills of lading, invoices **and** mill certifications that the steel was manufactured in the United States instead of this form. The Fabricator shall be herein defined as the firm that assembles the component parts of the product to be purchased. The Department of Military and Veterans Affairs will accept the certification of firms that are earlier in the chain of purchase (i.e. manufacturers of components, steel suppliers) in lieu of the Fabricator.

**A. TO BE COMPLETED BY THE PURHCASER:**

1. Name of purchasing firm: \_\_\_\_\_
  2. Firm's address: \_\_\_\_\_
  3. Firm's phone number: \_\_\_\_\_ 4. Date submitted to Fabricator: \_\_\_\_\_
  5. Contract No. DMVA \_\_\_\_\_ 6. Contract Title: \_\_\_\_\_
  7. Steel Product Certified: \_\_\_\_\_
- Model: \_\_\_\_\_

---

**B.TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:**

1. Name of firm: \_\_\_\_\_
2. Address of firm: \_\_\_\_\_
3. Firms phone number: \_\_\_\_\_ 4. Date Received: \_\_\_\_\_
5. Federal Employer ID. No: \_\_\_\_\_

**CERTIFICATION:** I, the undersigned officer of the Fabricator/Manufacturer, do certify that our firm assembled/fabricated the components to the steel products listed in Section A, Item 7, and that all steel components therein are comprised of steel that is melted and/or fabricated in the United States. I understand that, by signing this document, I certify that I have received assurances from the suppliers/manufacturers of the components that said components do not contain foreign manufactured steel. I further understand that this document is subject to the provisions of the Unsworn Falsification to Authorities Act (18 P.S. § 4904). I also understand that I am subject to the provisions of the Steel Products Procurement Act (73 P.S. § 1881, et. seq.) which provides penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania Public works projects for a period of five (5) years for violations therein. I agree to provide documentation supporting these facts if requested by the Commonwealth. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

**WITNESS:**

\_\_\_\_\_  
Name:  
Secretary or Treasurer

\_\_\_\_\_  
Name: \_\_\_\_\_ (Seal)  
President or Vice President

## ST-3

### 2-STEP ELIGIBILITY ANALYSIS:

#### **BEFORE A PRIME CONTRACTOR CAN SUBMIT AN ST-3, THE FOLLOWING ANALYSIS MUST BE SATISFIED**

**STEP #1:** The contractor must establish that the “product” **contains BOTH:**

- Steel melted in the USA

AND

- Foreign Steel

Note: Step #1 focuses upon the content of the “product”.

Note: The % need not be close; it can be 99-1, so long as there is both foreign and domestic steel in the “product”.

**STEP #2:** The contractor must establish that 75% of the cost of the “product” has been mined, produced or manufactured in the USA.

**Note:** Step #2 focuses upon the cost of the entire “product”, not just the steel within it.

### SECTION A

**Line #1** This is the Prime Contractor’s name.

**Line #2** This is the Prime Contractor’s business address.

**Line #3** This is the Prime Contractor’s phone number.

**Line #4** This is the date the ST-3 is submitted to the fabricator.

**Line #5** This is the DMVA contract number for the project.

**Line #6** This is the DMVA project description.

**Line #7** This is the “steel product” being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like “structural steel”, “heating unit” or “air conditioning unit”. The model number, if any, or the steel product must be listed as indicated.

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.  
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM  
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE  
SUBMITTED.**

**SECTION B** To be filled out by the Fabricator/Manufacturer, the firm that fabricates the product listed on Line A7.

**Line #1** This is the Fabricator's name.

**Line #2** This is the Fabricator's business address.

**Line #3** This is the Fabricator's business phone.

**Line #4** This is the date the Fabricator receives the ST-3 from the purchaser.

**Line #5** This is the Fabricator's Federal I.D. Number.

**Line #6** The Fabricator must insert the percentage of the cost of the articles, materials and supplies which have been mined, produced or manufactured in the U.S. for the product listed on Line A7.

**SECTION C**

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-3 form. The Fabricator's President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names does not validate the ST form.

**NOTES on ST-3 Forms:**

- It is not necessary to submit an ST-1 with the ST-3.

- **DMVA reserves the right to request additional documentation to support the percentage specified on Line 14. If the Fabricator/manufacturer refuses to produce such documentation and/or DMVA deems it to be in the Commonwealth's best interests, DMVA may request the Office of Inspector General to investigate the submission of the ST-3 form.**

**ST-3**  
**75% U.S. MANUFACTURE CERTIFICATION**

The Steel Products Procurement Act (73 P.S. § 1881, et. seq.) allows the use of steel products with **both** foreign and domestic steel **if at least 75 percent of the cost** of the materials (including steel, rubber, wood, plastics, etc.) in the product are manufactured or produced, as the case may be, in the United States.

**This form must be executed by a Fabricator of any item containing BOTH U.S. AND FOREIGN STEEL.** The fabricator shall hereby be defined as the firm that assembles the component parts of the product to be purchased. The Department of Military and Veterans Affairs will accept the certification of firms that are **earlier** in the chain of purchase (i.e., manufacturers of components, steel suppliers) in lieu of the Fabricator.

**This form must be submitted to the APM within 30 days from the date the Professional approves a Submittal listing a "steel product". No steel product may be delivered on-site unless DMVA has received an ST form.**

**A. TO BE COMPLETED BY THE PRIME CONTRACTOR (PURCHASER):**

1. Name of Contractor: \_\_\_\_\_
2. Address of Contractor: \_\_\_\_\_
3. Phone Number: \_\_\_\_\_ 4. Date submitted to Fabricator: \_\_\_\_\_
5. Contract No. DMVA: \_\_\_\_\_ 6. Contract Title: \_\_\_\_\_
7. Steel Product Certified: \_\_\_\_\_  
Model: \_\_\_\_\_

**B. TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:**

1. Name of Firm: \_\_\_\_\_
2. Address of Firm: \_\_\_\_\_
3. Firm's Phone number: \_\_\_\_\_ 4. Date Received: \_\_\_\_\_
5. Federal Employer ID No. \_\_\_\_\_
6. Percentage of the cost of the articles, materials and supplies which have been mined, produced or manufactured in the U.S. for the product listed above on line A7: \_\_\_\_\_

**CERTIFICATION:** I, the undersigned Officer of the Fabricator/Manufacturer, do certify that our firm assembled/manufactured the components to the steel product listed in Section 7, that the steel in said product is both foreign and domestically manufactured, and that all the facts contained in this document are true. I agree to provide documentation supporting these facts if requested by the Commonwealth. I further understand that this document is subject to the provisions of the unsworn Falsification to Authorities Act (18 P.S. § 4904) and the Steel products Procurement Act (73 P.S. §1881, et seq.) which provide penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania public works projects for a period of five (5) years for violations therein. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

**WITNESS:**

\_\_\_\_\_  
Name:  
Secretary or Treasurer

\_\_\_\_\_  
Name: \_\_\_\_\_ (Seal)  
President or Vice President

## ST-4

This form may be submitted in circumstances where the Prime contractor believes that the “product” on Line #7 is not made in sufficient quantities to satisfy the requirements of the contract.

The information submitted by a Prime contractor is subject to verification by the Department. Any Prime contractor who executes a Purchase Order or other type of purchase agreement encompassing a “steel product” prior to receiving the Department’s written determination that the “steel product” listed on Line #7 of the ST-4 form is not manufactured in sufficient quantity to meet the requirements of the project does so at its own risk and faces penalties including, but not limited to, non-payment for the product; removal and replacement of the product at its own costs; and/or an Office of Inspector General investigation which may lead to debarment.

**Domestic availability will be determined as of the date  
the ST-4 form is submitted to DMVA for approval**

**Line #1** this is the Prime Contractor’s formal business name.

**Line #2** This is the Prime Contractor’s business address.

**Line #3** This is the Prime Contractor’s business phone.

**Line #4** This is the date the ST-4 form is submitted to DMVA.

**Line #5** This is the DMVA contract number for the project.

**Line #6** This is the DMVA project description.

**Line #7** This is the “steel product” being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like “structural steel”, “heating unit” or air conditioning unit”.

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.  
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM  
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE  
SUBMITTED FOR APPROVAL.**

**Line #8** These four lines, (a) through (d), are to be filled out completely by the Prime Contractor. At least four suppliers/manufacturers must be contacted by the Prime Contractor to ascertain if the “product” on Line #7 is manufactured with domestic steel.

### **CERTIFICATION**

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-4 form. The Prime Contractor’s President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature line. Failure to type in the names **does not** invalidate the ST form.

### **NOTE ON ST-4 FORMS:**

- It is not necessary to submit an ST-1 form with an ST-4 form.

**ST-4 NOT DOMESTICALLY MANUFACTURED: PRIME CONTRACTOR**

**This form must be executed by the Prime Contractor and submitted to the APM within 30 days from the date the Professional approves a submittal listing a “steel product”. No steel product may be delivered on-site unless DMVA has received, reviewed and provided written approval of the ST-4 form. An ST-4 form can only be submitted for approval when a steel product is not domestically produced in sufficient quantities. DMVA will verify the accuracy of the information on the ST-4 form and will contact additional suppliers/manufacturers to ascertain the availability of a domestic steel product.**

1. Prime Contractor: \_\_\_\_\_ 2. Address: \_\_\_\_\_

3. Phone Number: \_\_\_\_\_ 4. Date Submitted: \_\_\_\_\_ 5. Contract No. DMVA: \_\_\_\_\_

6. Contract Title: \_\_\_\_\_ 7. Steel Product: \_\_\_\_\_

8. Suppliers/manufacturers contacted by the Prime Contractor that claimed that the above product is not produced/manufactured with U.S. manufactured steel. At least four Suppliers/Manufacturers are needed. Manufacturers listed in specifications must be contacted.

a. Firm Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

b. Firm Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

c. Firm Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

d. Firm Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

**CERTIFICATION:** I, the undersigned Officer of the Contractor, do certify that I have contacted the firms listed in Section 9, and was informed that said firms do not produce/manufacture the steel product listed on Line 7 with U.S. Steel in sufficient quantities to complete the above-referenced project. I understand that this document is subject to the provisions of the Unsworn Falsifications to Authorities Act (18 P.S. § 4904) and the Steel Products Procurement Act, which provide penalties including, but not limited to, debarment from bidding on any Commonwealth of Pennsylvania public works project for a period of five years. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth’s interest and ensure compliance with the laws of the Commonwealth.

**WITNESS:**

\_\_\_\_\_  
Name:  
Secretary or Treasurer

\_\_\_\_\_  
Name: (SEAL)  
President or Vice President

**ST-4 FORM FOR DMVA USE ONLY – CONTRACTORS – DO NOT WRITE ON THIS SIDE OF ST FORM**

A. Field Personnel                    APM: \_\_\_\_\_

1.     Date ST-4 submitted by Prime Contractor: \_\_\_\_\_
- 2.
3.     Date ST-4 forwarded to Project Manager: \_\_\_\_\_

B. Project Manager

1.     Date ST-4 forwarded to Professional: \_\_\_\_\_

C. Professional

1.     Date received from the Project Manager: \_\_\_\_\_

2.     Referred to for review: \_\_\_\_\_

3.     Additional Suppliers/Manufacturers Contacted to verify domestic availability:

    a.     Firm Name: \_\_\_\_\_ Phone: \_\_\_\_\_

          Address: \_\_\_\_\_

          Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

    b.     Firm Name: \_\_\_\_\_ Phone: \_\_\_\_\_

          Address: \_\_\_\_\_

          Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

    c.     Firm Name: \_\_\_\_\_ Phone: \_\_\_\_\_

          Address: \_\_\_\_\_

          Person Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_

D. Office of Chief Counsel   Date received: \_\_\_\_\_                    Action: \_\_\_\_\_

E. Deputy Facilities           Date received: \_\_\_\_\_                    Action: \_\_\_\_\_

**ADMINISTRATIVE PROCEDURE NO. 11**

**FIELD DISPUTE FORM**

**A. General Information on Dispute Process**

1. The Dispute Process is set forth in detail in the Disputes Article of the General Conditions.



**ADMINISTRATIVE PROCEDURE NO. 12**

**UTILIZATION/OCCUPANCY INSPECTION  
FINAL INSPECTION  
CONCLUSION OF FINAL INSPECTION**

**A. Utilization/Occupancy Inspection**

1. The Department may use or permit the Client Entity to use or occupy any completed or partially completed portion(s) of the Work in accordance with the General Conditions and this Administrative Procedure.
2. The request for partial occupancy by the Client Entity must be made, in writing, to the Project Manager. If permission is granted, by the Department, the Project Manager or designee will establish the date and time for an Occupancy/Utilization Inspection and will notify the following:
  - a. Deputy Facilities and Engineering
  - b. Professional
  - c. Prime Contractor(s), as required
  - d. Project Site
  - e. Client Entity
  - f. Facility
3. **The Occupancy/Utilization Inspection will be conducted to evaluate the area(s) to be occupied or equipment to be utilized for conformity to the Contract Documents. The use and/or occupancy of the work does not constitute acceptance of any portion so taken or used. The Occupancy/Utilization Inspection must be attended by the Department, the Professional, the Contractor(s) and a representative of the Using Entity.**
4. The Professional shall conduct the inspection, unless another party is designated by the Department.

**B. Occupancy/Utilization**

1. At the conclusion of the Occupancy/Utilization Inspection, the attendees shall review the responsibilities of the Contractor for maintenance, heat and utilities, the remaining items to be completed or corrected.
2. A Punch List, prepared by the Professional or designee, as determined by the Department, shall be generated and submitted. The Punch List shall indicate, in detail, all items requiring completion or correction. The failure to include an item on the Punch List will not relieve the Contractor(s) of its responsibility to complete all Work in accordance with the Contract Documents.
3. The Client Entity shall not be permitted to occupy nor utilize any portion of the Work until directed by the Department.
4. **The date of Occupancy/Utilization by the Client Entity shall be the start date of any warranties or guarantees associated with the occupied area(s) or utilized equipment.**

5. Any damage subsequent to the inspection due solely to the use and/or occupancy of the completed or partially completed portion of the Work shall not be the responsibility of the Contractor.

### C. **Final Inspection**

1. The Final Inspection for the contract shall be requested and conducted in accordance with the General Conditions and this Administrative Procedure. The Contractor's request for a Final Inspection **must be submitted electronically**.
2. **Within five (5) days of receipt of the request**, the Department will determine if the Project is at substantial completion. If determined to be at substantial completion, the Final Inspection will be conducted within ten (10) days by the Professional and Department and the following will be notified:
  - a. Deputy Facilities and Engineering
  - b. Professional
  - c. Prime Contractor(s), as required
  - d. Project Site
  - e. Client Entity
  - f. Facility
3. The Final Inspection must be attended by the Department, the Professional, the Contractor(s) and a representative of the Client Entity.
4. The Contractor shall submit, at the Final Inspection, a Final Invoice for Payment to the Project Manager. The final Invoice should be completed and submitted in its entirety.
5. The Professional, in conjunction with the Department shall conduct the Final Inspection. The inspection shall include all aspects of the Contract(s), including any areas or equipment previously occupied or utilized by the Client Entity or Department. If the work is at "substantial completion", in accordance with the definition set forth in the General Conditions, a final inspection shall be conducted at which time a punch list shall be generated.

If, through the course of the inspection, it is determined by the Professional that the work is not "substantially complete" in accordance with the definition in the General Conditions of Contract, the Professional shall notify the Department and the Contractor substantiating the reasons for the denial.

6. At the Department's discretion, the Professional shall visit the site for the purpose of verifying and accepting Punch List work. The Department will be responsible for managing the punch list completion process and requesting the Professional's presence.

### **Conclusion of Final Inspection**

1. At the conclusion of the Final Inspection, the attendees shall review all of the remaining responsibilities of the Contractor, the remaining responsibilities of the Professional, the status of all pending change orders, the status of all pending Requests for Extension of Time Change Orders, the status of any pending claims against the Department or any other Prime Contractor and any other obligations of any party necessary to fulfill the requirements of the Contract Documents. Upon completion of this review the Contractor, Professional and the Project Manager or designee shall approve the punch

list containing these items to indicate their concurrence with the remaining responsibilities of each party.

2. The Punch List shall indicate, in detail, all items requiring completion or correction and a reasonable cost of completion plus one and one-half times the aggregate value of the items.

## ADMINISTRATIVE PROCEDURE NO. 13

### SMALL DIVERSE BUSINESS and SMALL BUSINESS PARTICIPATION

- A. **General Information:** The Contractor must meet or exceed the participation percentages provided in the Small Diverse Business and Small Business Submittal by the Final Inspection of the Contract for Small Businesses and for Minority Business Enterprises (MBE), Women Business Enterprises (WBE), Veteran Business Enterprises (VBEs), Service-Disabled Veteran Business Enterprises (SDVBEs), Disability-Owned Business Enterprise (DOBE), and LGBT Business Enterprise (LGBTBE) (together referred to hereinafter as Small Diverse Businesses) on the Project. The Contractor acknowledges that the total percentages committed to Small Diverse Businesses and Small Businesses are contractual obligations.
- B. **Contractor's Duty.**
- a. The Contractor must meet or exceed the participation percentages provided by the Final Inspection of the Contract as applied to the contract award value. This will be tracked by BDISBO through the Small Diverse Business / Small Business Utilization Report forms.
  - b. The Contractor shall submit a Small Diverse Business / Small Business Utilization Report within 30 days prior to submitting an Invoice. (See section C below).
- C. **Small Diverse Business /Small Business Utilization Report**
- a. This report must be submitted within 30 days prior to submission of each Invoice.
  - b. Each Small Diverse Business / Small Business Utilization Report must have current data (totals to date) identifying at least each element as follows:
    1. Detailed information including, but not limited to, any subcontracts and purchase orders documenting the dollar value commitments to Small Diverse Business and Small Business firms to be used toward the satisfaction of the Contractor's participation percentages. All Small Diverse Businesses and Small Businesses identified on the Utilization Report shall be retained on the Utilization Report throughout the duration of the Project.
    2. **Construction Subcontracts and Purchase Orders:**
      - a. All Subcontract/Purchase Orders awarded to date are \$ \_\_\_\_\_
      - b. Commitment total to Small Diverse Businesses to date:
        - i. \$ \_\_\_\_\_
        - ii. % \_\_\_\_\_ of Contract
      - c. Commitment total to Small Business to date:
        - i. \$ \_\_\_\_\_
        - ii. % \_\_\_\_\_ of Contract
      - d. For each subcontract and purchase order awarded since the previous Invoice the:

- i. Identity and status of the Small Diverse Business as a MBE / WBE / VBE / SDVBE / DOBE / LGBTBE that will be performing the work; and
  - ii. Identity of the Small Business that will be performing the work; and
  - iii. The type of work/service/material to be performed/supplied; and
  - iv. The amount paid to date on each Small Diverse Business or Small Business subcontract/purchase order this month.
  - v. The designation of Small Diverse Business / Small Business Stocking Suppliers as either a MEP (i.e., mechanical, electrical, and plumbing) Stocking Suppliers or a General Construction Stocking Supplier.
  - vi. The fee or commission paid to the Nonstocking Supplier. No participation credit will be given if the fee or commission is not listed and, the maximum credit shall not exceed 10 percent of the purchase order cost.
- c. Failure to submit a Small Diverse Business / Small Business Utilization Report within thirty (30) days prior to submittal of an Invoice will result in the Invoice not being able to be submitted.

**D. The Contractor's Commitments Toward Their Submitted Participation Percentages will be Calculated and Credited as follows:**

- a. Only DGS self-certified Small Businesses and/or DGS-verified Small Diverse Businesses can be credited toward satisfying the participation percentages.
- b. Small Diverse Business and Small Business (SDB/SB) subcontractors performing at least sixty percent (60%) of the subcontract with their own employees will be credited toward the participation percentages at 100 percent of the total dollar value of the subcontract/supply contract. Any SDB/SB subcontract, where the subcontractor performs less than 60% of the subcontract, will not be credited toward the participation percentages.
- c. SDB/SB stocking suppliers are credited at 60 percent of the total cost of the materials or supplies purchased. A stocking supplier is a regular dealer that owns, operates, or maintains a store, warehouse, or other establishment, in which the materials or supplies of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.
- d. SDB/SB nonstocking suppliers are credited at only the amount of the fee or commission charged by the SDB/SB nonstocking supplier for assistance in the procurement of the materials and supplies provided the fees are reasonable and not excessive as compared with fees customarily allowed for similar services and under no circumstances shall the credit, for a SDB/SB nonstocking supplier, exceed 10% of the purchase order cost. A nonstocking supplier does not carry inventory but orders materials from a manufacturer, manufacturer's representative or a stocking supplier. In order for a nonstocking supplier to receive credit, it must perform a useful business function by engaging in meaningful work (i.e., negotiating price; AND determining quality and quantity; AND ordering materials; AND paying for the materials) and the fee or commission must be provided with the purchase order and the Small Diverse Business / Small Business Utilization Report. Industry practices and other relevant factors will be considered.

- e. SDB/SB manufacturers are credited at 100 percent of the total cost of the materials or supplies purchased.
- f. The Contractor is allowed to use contract amounts at any tier of supply or subcontracting; however, the dollar value of any commitment to an SDB/SB cannot be double counted.
  - i. If the Contractor or any of its non-SDB/SB Subcontractors or Suppliers makes a commitment to a SDB/SB, the credit for the subcontract/purchase order commitment, regardless of the level or tier, shall be calculated as indicated in Section D and credited toward the Contractor's participation percentages.
  - ii. In the event that the SDB/SB whose entire subcontract value is counted towards the Contractor's participation percentages and then subcontracts a portion of the work or supplies associated with this subcontract to another SDB/SB, the dollar value of the subcontract with/to this lower tier SDB/SB is NOT counted in the Contractor's participation percentages in order to prevent the duplicate counting of SDB/SB commitment dollars. In this case, the dollar value of this subsequent SDB/SB subcontract has already been included within the scope of work and dollar value of the SDB/SB commitment already counted as a part of the Contractor's participation percentages.
- g. To assist the Contractor, the Contractor should request all Small Diverse Businesses to present a photocopy of their current DGS-issued "Notice of Small Business Self-Certification and Small Diverse Business Verification," to the Contractor. **The verification must be current as of the subcontract / purchase order execution date, not revoked, lapsed or pending in order to obtain credit for the commitment. However, BDISBO will check its database for all firms listed on the Utilization Report and BDISBO's decision will govern.**
- h. To assist the Contractor, the Contractor should request all Small Businesses to present a photocopy of their current DGS-issued "Notice of Small Self-Certification" to the Contractor. **The certificate must be current as of the subcontract / purchase order execution date, not revoked, lapsed or pending, in order to obtain credit for the commitment. However, BDISBO will check its database for all firms listed on the Utilization Report and BDISBO's decision will govern.**
- i. A Contractor's Small Diverse Business participation percentage is calculated by adding all or a percentage of the dollar commitments (as described in this section D) to DGS-verified Small Diverse Business subcontractors of all tiers, DGS-verified Small Diverse Business manufacturers, DGS-verified Small Diverse Business stocking suppliers, and the fee or commission paid to the DGS-verified non-stocking supplier and dividing that total amount by the total contract award price.
- j. A Contractor's Small Business participation percentage is calculated by adding all or a percentage of the dollar commitments (as described in this section D) to self-certified Small Business subcontractors of all tiers, self-certified Small Business manufacturers, self-certified Small Business stocking suppliers, and the fee or commission paid to the self-certified non-stocking supplier and dividing that total amount by the total contract award price.

- k. Upon receipt of the Contractor Small Diverse Business / Small Business Utilization Report, BDISBO will verify the certification status of the subcontractor, manufacturer, stocking supplier, or non-stocking supplier. Once reviewed by BDISBO, the dollar value of the subcontract or purchase order, or a percentage thereof, shall be calculated as part of the total dollar value of the Small Diverse Business or Small Business participation percentage.

#### **E. Remedies**

- a. If the Small Diverse Business / Small Business Utilization Report is not submitted within thirty (30) days prior to the submittal of an Invoice, the Invoice will not be able to be submitted.
- b. If after the first three months following Contract execution, the Contractor fails to progress in achieving the minimum participation percentages (based upon the data supplied in the Small Diverse Business /Small Business Utilization Report), the DMVA may withhold payments until the Contractor and DMVA discuss the reasons for lack of progress and achieve a resolution. The Contractor is not entitled to interest on any funds withheld due to their failure to submit a properly completed Small Diverse Business / Small Business Utilization Report or their failure to progress in achieving the participation percentages.
- c. The Contractor's compliance with requirements of the Small Diverse Business and Small Business participation component, including the fulfillment of any Small Diverse Business or Small Business commitments in all subcontracts and purchase orders is material to the contract between the Contractor and the DMVA. Any failure to comply with these requirements constitutes a substantial breach of the Contract. It is further understood and agreed that in the event the DMVA determines that the Contractor has failed to comply with these requirements, the DMVA may, in addition to any other rights and remedies the DMVA may have under the contract, any bond filed in connection therewith, or at law or in equity, impose remedies as applicable on the Contractor. Remedies for breach of this component may include entry into the CRP, termination, suspension, default, penalties, and/or debarment from future contracting opportunities with the Commonwealth of Pennsylvania. The remedies enumerated herein are for the sole benefit of the DMVA and the DMVA's enforcement of any provision or the DMVA's indulgence of any non-compliance with any provision hereunder shall not operate as a waiver of any of the DMVA's rights in connection with the Contract, nor shall it give rise to actions by any third parties, including any Small Diverse Business or Small Business enterprises.

**DEPARTMENT OF MILITARY AND VETERANS AFFAIRS**

**GENERAL CONDITIONS  
OF THE CONSTRUCTION CONTRACT**

**2019 Edition**

**FORT INDIANTOWN GAP  
ANNVILLE, PENNSYLVANIA**



# GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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# GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## ARTICLE 1: DEFINITIONS

Whenever in this Contract the following words and expressions occur, they have the following meanings, which shall be construed in conjunction with the applicable definitions of the Commonwealth Procurement Code:

- 1.1 **ADMINISTRATIVE PROCEDURES:** The Department's construction procedures manual to be followed for various administrative functions, as set forth therein.
- 1.2 **AGREEMENT FOR PROFESSIONAL SERVICES:** The Agreement for Professional Services and any Special Conditions, in addition to any Amendments, between the Department and the Professional. The Agreement for Professional Services is commonly referred to as the "Agreement" or "Professional Agreement".
- 1.3 **AGREEMENT FOR CONSTRUCTION MANAGEMENT SERVICES:** The contract, including any amendments, between the Department and its Construction Manager for Construction Management Services.
- 1.4 **APPLICATION FOR PAYMENT (A.K.A. INVOICE OR INVOICE APPROVAL-PAY APPLICATION):** The information submitted by the Contractor pursuant to the Administrative Procedure for Department's review and/or release of payment.
- 1.5 **BENEFICIAL OCCUPANCY:** The date upon which the Professional certifies, and the Department concurs that the Work is sufficiently complete, in accordance with the Contract Documents, so that the Client Entity may use, occupy or operate the Project as fit for the use for which it was intended. The Department, in its sole discretion, reserves the right to designate a portion of the Project for the Professional's certification of beneficial occupancy.
- 1.6 **BI-WEEKLY:** An event occurring every two weeks.
- 1.7 **CHANGE ORDER:** A written order signed by the Department directing the Contractor to make changes that the Contract authorizes the Department to order. The change order may be either with the consent of the Contractor or a unilateral order by the Department. The Contract Sum may only be changed by Change Order.
- 1.8 **CLIENT ENTITY:** This term refers to any executive entity, government body, federal Entity, federal-affiliated entity, state-affiliated entity, or state-related institution that will ultimately use the completed Project, which includes the Work covered by the construction contract.
- 1.9 **COMMONWEALTH:** The Commonwealth of Pennsylvania.
- 1.10 **CONSTRUCTION MANAGER:** The consultant retained by the Department to act as the Department's designee and authorized representative to manage the Project. If the Department does not retain a Construction Manager, any reference in the General Conditions to "Construction Manager" shall be interpreted to mean the Department's representative from the Bureau of Construction.
- 1.11 **CONSULTANT:** A specialist retained by the Department, the Construction Manager or the Professional for the performance of its specialty.

- 1.12 **CONTRACT:** A written agreement consisting of the Contract Documents, as defined in Article I of the Standard Construction Contract and executed by all parties in accordance with the Commonwealth Attorneys Act. The Contract represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations, or agreements, either written or oral. To the extent that any of these documents are amended by statute, the statutory language will control.
- 1.13 **CONTRACT BONDS:** The bonds required by the Contract Documents which must be executed by one or more surety companies legally authorized to do business in the Commonwealth of Pennsylvania including, but not limited to, bonds for the faithful performance of the contract and for payment of labor and material, as required by the Department.
- 1.14 **CONTRACT COMPLETION DATE:** The date calculated by adding the Contract Duration and any approved Extensions of Time to the Construction Contract Start Date for the completion of the Work.
- 1.15 **CONTRACT DOCUMENTS:** The documents listed in Article 1 of the Standard Construction Contract. To the extent that any of these documents are amended by statute, the statutory language will control.
- 1.16 **CONTRACT DURATION:** The number of calendar days set forth in the Contract Documents for completion of the Work, also referred to as Contract Time.
- 1.17 **CONTRACT LIMITS:** The area designated in the Contract Documents as the limit of construction within which the Contractor may perform the Work.
- 1.18 **CONTRACT START DATE:** For purposes of calculating dates for completion of the Work, this is the date upon which the Initial Job Conference is held for the Project.
- 1.19 **CONTRACT SUM:** The total amount payable by the Department to the Contractor for the performance of the Work under the Contract Documents.
- 1.20 **CONTRACTOR:** The person or organization identified as such in the Contract and is referred throughout the Contract Documents, as singular in number. Unless otherwise indicated, the Contractor is a Prime Contractor. The Contractor may be referred to throughout these General Conditions as the "Prime Contractor", when the term is needed for clarity. The term "Contractors" means the group of Prime Contractors working on the Project.
- 1.21 **DAYS:** Calendar days unless specifically stated otherwise in the Contract.
- 1.22 **DEFICIENCY ITEM:** Any work or activity, either performed or unperformed, which the Department will not certify as being performed in accordance with the Contract Documents.
- 1.23 **DEPARTMENT:** The Department of Military and Veterans Affairs of the Commonwealth of Pennsylvania, also known as "DMVA", or any authorized representative or designee, and is referred throughout the Contract Documents as singular in number.
- 1.24 **DEPARTMENT'S DESIGNATED REPRESENTATIVE:** The Department's employee assigned to the Project to manage construction.
- 1.25 **DEPARTMENT OF LABOR AND INDUSTRY PLAN REVISION SUBMISSION:** The revised set of Construction documents submitted by the Professional to the Department of Labor and



Industry for approval of design and construction changes made after the UCC Building Permit is issued. This "Plan Revision Submission" is also referred to as the "Department of Labor and Industry Record Drawings" and shall be submitted in accordance with PA L&I and PA UCC requirements. Receipt of the approved Plan Revision Submission is required before an L&I Occupancy Permit will be issued

- 1.26 **EFFECTIVE DATE OF CONTRACT:** The date on which the last Commonwealth official who is required to execute the contract executes it.
- 1.27 **EXTENSION OF TIME:** A Department approval of additional calendar days to the contract duration.
- 1.28 **FIELD ORDER:** A record of a minor adjustment in the Work that results in no change in cost or duration of the Contract.
- 1.29 **FINAL INSPECTION:** A review of the Work conducted by the Professional, when requested by the Contractor, to determine whether the Project is substantially complete. If, as a result of this inspection, the Work is determined to be substantially complete, the Professional generates a certificate of completion and a Punch List of uncompleted items and a reasonable cost of completion.
- 1.30 **LABOR & INDUSTRY:** The Commonwealth of Pennsylvania's Department of Labor & Industry also referred to as "L&I".
- 1.31 **LEAD CONTRACTOR:** The Prime Contractor designated in the specifications to coordinate the progress of the Work.
- 1.32 **LETTER OF INTENT:** A letter might be issued by the Department at the time of contract award if, in the Department's sole discretion, such letter is necessary on the Project. If issued, the Contractor may rely upon the letter to initiate the scope of Work described in the letter before there is a fully executed contract with the Department and to incur costs in conducting the described scope of Work.
- 1.33 **MANUFACTURER:** A firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications and who receives compensation from the Contractor, pursuant to the terms of a purchase order or invoice, to provide any material and/or any equipment to the Project. Nothing contained in the Contract Documents between the Contractor and the Department creates any contractual relationship between the Department and any Manufacturer. A Manufacturer lacks privity of Contract to the Department and every Manufacturer agrees that it neither acquires nor intends to acquire any rights against the Department on a third party beneficiary theory or any other theory.
- 1.34 **MILESTONE:** An indication on the Project Schedule that designates the start or completion of a significant construction activity
- 1.35 **NOTICE OF DEFICIENCY:** A document to record non-conforming work, deficient work and/or schedule slippage.
- 1.36 **OFF-SITE WORK:** All Work that is not physically carried out within the Contract Limits.
- 1.37 **ON-SITE WORK:** All Work that is physically carried out within the Contract Limits.

- 1.38 **POSTCONSUMER RECOVERED PAPER:** Any paper, paperboard and fibrous wastes from retail stores, office buildings, homes and so forth, after they have been passed through their end-usage as a consumer item including: used corrugated boxes, old newspapers, old magazines, mixed waste paper, tabulating cards and used cordage, as well as all paper, paperboard and fibrous wastes that enter and are collected from municipal solid waste.
- 1.39 **PRIME CONTRACTOR:** Any Contractor holding a Contract with the Department for construction of the Project.
- 1.40 **PROFESSIONAL:** The Commonwealth employee or the Architect and/or Engineer retained by the Department. The term may also include the Architect's and/or Engineer's authorized representative or consultant(s).
- 1.41 **PROJECT:** The total Work to be performed by all the separate Prime Contractors under the Project Number.
- 1.42 **PROJECT SCHEDULE:** The Critical Path Method (CPM) schedule prepared as a result of the affirmative contractual obligation to coordinate the Work through the cooperative efforts of each Prime Contractor on the Project.
- 1.43 **RECORD DRAWINGS:** Terminology used by the Department to identify contract prints or drawings, corrected with suitable markings to show all changes or variations from the original contract drawings, including all items uncovered during the Work and showing details of the work as actually built, including but not limited to horizontal and vertical dimensional references of all concealed pipe, conduit and other lines and equipment and similar items.
- “Record Drawings” are not the same as the Department of Labor and Industry “Plan Revision” submission.
- 1.44 **RECOVERED MATERIALS:** Waste material and byproducts which have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process.
- 1.45 **REQUEST FOR INFORMATION:** A written question issued by the Contractor seeking clarification of the Contract Documents.
- 1.46 **SAMPLES:** Physical examples furnished by the Contractor to illustrate materials, equipment or workmanship, and to establish standards by which the work will be judged.
- 1.47 **SMALL BUSINESS:** Those Small Businesses that have registered with the Commonwealth and completed the self-certification process on the Department of General Service's web site.
- 1.48 **SMALL DIVERSE BUSINESS:** Department verified Minority Business Enterprises (MBEs), Woman Business Enterprises (WBEs), Veteran Business Enterprises (VBEs) Service-Disabled Veteran Business Enterprises (SDVBEs), Disability-Owned Business Enterprises (DOBE), or LGBT Business Enterprises (LGBTBE).
- 1.49 **SPECIFICATION:** A description of the physical or functional characteristics or the nature of a construction item, including a description of any requirement for inspecting, testing or preparing a construction item for delivery. The specifications are a part of the Contract Documents and must be interpreted in conjunction with the other Contract Documents, as specified further in the General Conditions.

- 1.50 **SUBCONTRACTOR:** A person or organization that has a Contract with the Contractor to perform any of the Work. The term Subcontractor is referred throughout the Contract Documents as singular in number and means a Subcontractor or its authorized representative. The Contractor and every Subcontractor agree that there is no privity of contract between the Department and any Subcontractor and that, to the extent set forth by law, the Subcontractor has no direct cause of action against the Department for any claim arising out of the Project.
- 1.51 **SUBMITTALS:** Administrative or technical information, including but not limited to drawings, diagrams, illustrations, schedules, performance charts, brochures, catalog data, and other data that are prepared by the Contractor or any Subcontractor, manufacturer, supplier, or distributor, and which illustrate some portion of the Work or how it fits in relation to other parts of the Work.
- 1.52 **SUBSTANTIALLY COMPLETE:** When the Work on the Contract is sufficiently completed in accordance with the Contract Documents and certified by the Department and the Professional so that the Project or specified part(s) of the Project can be used, occupied or operated for its intended use. In no event shall a Project be certified as substantially complete until at least 90% of the Work has been completed and accepted by the Department and is capable of Beneficial Occupancy.
- 1.53 **SUB-SUBCONTRACTOR:** A person or organization that has a Contract with a Subcontractor to perform any of the Work. The term Sub-subcontractor is referred throughout the Contract Documents as singular in number and means a Sub-subcontractor or its authorized representative. The Contractor, every Subcontractor and every Sub-subcontractor agree that there is no privity of contract between the Department and any Sub-subcontractor and that, to the extent set forth by law, the Sub-subcontractor has no direct cause of action against the Department for any claim arising out of the Project.
- 1.54 **SUPERINTENDENT:** The Contractor's representative at the Project site. The Superintendent is responsible for continuous field supervision, coordination and completion of the Work, and, unless another person is designated in writing by the Contractor, for the prevention of accidents. The Superintendent shall have full authority to act on behalf of the Contractor in relation to Project activities and associated work.
- 1.55 **SUPPLIER:** An individual, firm, partnership, association, corporation or other legal entity who receives compensation from the Contractor, pursuant to the terms of a purchase order or invoice, to provide any material and/or any equipment to the Project. Nothing contained in the Contract Documents between the Contractor and the Department creates any contractual relationship between the Department and any Supplier. A Supplier lacks privity of Contract to the Department and every Supplier agrees that it neither acquires nor intends to acquire any rights against the Department on a third-party beneficiary theory or any other theory.
- A. Stocking Supplier:** a firm that owns, operates, or maintains a store, warehouse, or other establishment, in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.
- B. Non-stocking Supplier:** Non-stocking supplier does not carry inventory but orders materials from a manufacturer, manufacturer's representative or a stocking supplier. In order for a non-stocking supplier to receive credit, it must perform a useful business function by engaging in meaningful work (i.e., negotiating price; and determining quality and quantity; and ordering materials; and paying for the materials).

- 1.56 **UNIFORM CONSTRUCTION CODE (UCC):** Pennsylvania's Uniform Construction Code (35 P.S. §7210.101 *et seq.*) that grants the Pennsylvania Department of Labor & Industry sole jurisdiction over state-owned buildings. A general description and important links can be found at [www.dli.pa.gov](http://www.dli.pa.gov) and clicking on the Uniform Construction Code Link. The Contractor is responsible for compliance as set forth in the UCC and these General Conditions.
- 1.57 **WORK:** The construction and services required by Contract Documents, whether completed or partially completed, including all labor, materials, equipment and services provided or to be provided by a construction contractor to fulfill its obligations. The Work may constitute the whole or a part of the Project.

## **ARTICLE 2: EXECUTION, CORRELATION, INTENT, AND INTERPRETATIONS**

- 2.1 **CONTRACT EXECUTION.** The Department and the Contractor shall sign the Contract Documents. The Professional shall seal all drawings. The Licensed Consultant(s) of the Professional shall sign and seal for their part of the Work. No oral contract or conversation with any officer, agent, or personnel of the Department, or Client Entity, or with the Professional, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations of the Contract Documents.
- 2.2 **CONTRACT ADMINISTRATION.** The Department and all Prime Contractors will ensure timely communications for the duration of this Project. Any and all notifications, requests, submittals, approvals, etc. between the Department, the Prime Contractors, the Professional, and/or the Construction Manager (if a CM is assigned to the Project) shall be in writing.
- 2.3 **CONTRACT INTERPRETATION.** The Contract Documents are complementary and what is required by any one of the Contract Documents is binding as if required by all. The intention of the Contract Documents is to include all labor, materials, equipment, services and other items or conditions necessary for the proper execution and completion of the Work. Work not covered under any heading, section, branch, class or trade of the specifications need not be supplied, unless it is required elsewhere in the Contract Documents or is reasonably inferable as being necessary to produce the intended results.

The omission of words or phrases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not nullify the Department's or their representative's interpretation so long as that interpretation is reasonably inferable from the Contract Documents as a whole. Except as noted otherwise, references to standard specifications or publications or associations, bureaus, or organizations shall mean the latest edition or revision of the referenced standard specification or publication as of the date of the Invitation for Bids. Words that have well-known technical or trade meanings are used in this Contract in accordance with such recognized meanings.

In the event of conflict in the Contract Documents, the priorities stated below shall govern:

1. Addenda shall govern over all other Contract Documents, and subsequent addenda shall govern over prior addenda only to the extent modified.
2. Special Conditions shall govern over all specifications, General Conditions, and drawings.

3. Specifications and drawings shall govern over the General Conditions.
  4. If there is a conflict regarding quantities or quality of products in the Contract Documents, the higher quantity or quality product shall be delivered.
  5. **If there is a conflict between the contract drawings and the specifications, the specifications shall prevail.**
- 2.4 **CONTRACT ORGANIZATION.** The organization of the specifications into divisions, sections and articles and the arrangement of drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.
- 2.5 **CONTRACT DETAIL.** Where the Work is shown in complete detail on only a portion of a drawing or there is an indication of continuation, the remainder being depicted or described in an outline or schematic form, the Work drawn out in detail applies to other like portions of the structure.
- 2.6 **CONTRACT ERRORS OR CONFLICTS.** If the Contractor, in the course of construction, finds any conflict, error or discrepancy on or among the Contract Documents, such conflict, error or discrepancy shall be immediately referred in writing to the Department and the Professional. The Professional, with appropriate input from the Department, will review the matter and issue an interpretation to the Contractor in writing within seven (7) calendar days after the Professional receives the Contractor's Request for Information.
- 2.7 **OWNERSHIP AND AVAILABILITY OF CONTRACT DOCUMENTS.** The drawings and specifications will be made available for download and printing by the Contractor. All Contract Documents and any copies/prints made by the Contractor are and shall remain the property of the Department.
- 2.8 **CONTRACT NOTIFICATIONS** Any and all notifications, requests, submittals, approvals, etc. between the Department, the Prime Contractors, and the Construction Manager (if a CM is assigned to the Project) shall be submitted in writing.

### **ARTICLE 3: THE PROFESSIONAL**

- 3.1 **ADMINISTRATION OF CONTRACT.** The Professional will assist the Department and/or the Department's designee, in administering the Construction Contracts. The Professional will review and execute (if acceptable) all Department forms that require the Professional's review and signature under the Contract. The Professional will also review submittals as provided in the Submittal Article of these General Conditions. The Professional shall assist the Department, if requested, in the review of Extension of Time requests and claims of any type.
- 3.2 **PROFESSIONAL SITE VISITS.** The Professional will attend the number of meetings listed in their Agreement. The meetings include Job Conferences and all special meetings and Project Site conferences required by the Department and/or the Department's designee during periods of active construction in accordance with the terms of their Agreement. The Professional or Professional's Consultants will visit the site for a full day, up to eight hours, at such intervals and duration as deemed necessary by the Department, to review the respective phases of the Work in order to achieve the requirements of each Contract, with a maximum number of visits as set forth in the Agreement. When directed by the Department, the Professional and Professional's Consultants will attend any and all meetings and job conferences that are required by the Department. A meeting on a given day is counted as one (1) meeting regardless of the number of attendees; however, a consultant will not be required to attend more than one meeting per thirty (30) days of the

construction duration while work related to the Consultant's expertise is ongoing without an additional meeting being counted towards the number of meetings set forth in the Agreement. The Professional will review the progress of the Work, including the completeness of the construction contractors' installation drawings, and take actions necessary or appropriate to assist in achieving the compliance with the Contract Documents and submit a Progress Report.

- 3.3 **PROFESSIONAL ACCESS TO WORK.** The Professional, its Consultants and authorized representatives shall have access to the Work at all times. The Contractor shall provide the facilities for such access so the Professional may perform its functions under the Contract Documents.
- 3.4 **PROFESSIONAL INTERPRETATION OF DOCUMENTS.** The Professional is the initial interpreter of the requirements of the Contract Documents. The Professional will, within seven (7) days after receipt of a request, (in the form of a Request for Information) render an interpretation. All interpretations by the Professional will be consistent with the Contract Documents. In its capacity as interpreter, the Professional will exercise its best efforts to interpret the documents impartially. Any dispute regarding such interpretation shall be handled in accordance with the Disputes Article of these General Conditions.
- 3.5 **REJECTION OR STOPPAGE OF WORK.** Whenever the Professional observes deficiencies or observes the Contractor failing to execute the Work in accordance with the Contract Documents, the Professional will promptly notify the Contractor of all such deficiencies and will issue such notices of Non-Compliant Work that the Professional deems appropriate. The Professional will recommend rejection of work that does not conform to the Contract Documents and immediately notify the Department of the recommendation of rejection. The Professional will recommend stoppage of Contractors' work or special testing whenever such testing or stoppage is necessary, in the Professional's opinion, to achieve compliance of the finished Work with the Contract Documents. Neither the Professional's authority to make recommendations under this paragraph, nor any decision made by the Professional in good faith to either exercise or not to exercise such authority shall give rise to any duty or responsibility of the Professional to the Contractor, or any Subcontractor, any of their agents or employees, or any other person performing any of the Work.
- 3.6 **PROFESSIONAL REVIEW OF CHANGE ORDERS.** The Professional will prepare specifications and drawings necessary for the Department to authorize change orders in accordance with the Change Order Article of these General Conditions. The Professional will review all costs submitted by the Contractor for all Change Orders and advise the Department and/or the Department's designee, of the Professional's acceptance or rejection of the scope and cost of the change order within seven (7) days of the Professional's receipt of the Contractor's cost estimate. The Professional will provide written justification to the Department and/or the Department's designee to substantiate disputed costs.
- 3.7 **NON-CONFORMING WORK.** If the Professional is required to design corrective work to remedy defective or nonconforming Work by the Contractor, the cost for any and all additional professional services shall be paid by the Contractor, provided that the Professional submits those costs to the Department and the Contractor within thirty (30) days after the completion of said additional services. The Department shall review the corrective work and/or drawings that are prepared by the Professional in order to determine if the corrective work and/or drawings fall within the original scope of the Contract.
- 3.8 **RECORD DOCUMENTS.** On the day of Final Inspection, the Contractor shall deliver to the Professional a complete set of contract prints in PDF format, corrected with suitable markings to show all changes or variations from the original contract, including all items

uncovered during the work and showing the details of the work as actually built, including but not limited to horizontal and vertical dimensional references of all concealed pipe, conduit and other lines and equipment.

- 3.9 **PROFESSIONAL NOT RESPONSIBLE FOR CONTRACTOR MEANS/METHODS/TECHNIQUES**. The Professional is not responsible for the construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work since these are solely the Contractor's responsibilities.
- 3.10 **PROFESSIONAL NOT RESPONSIBLE FOR CONTRACTOR ACTS OR OMISSIONS**. The Professional will not be responsible for the acts or omissions of any Contractor, or any Subcontractor, or any of their agents or employees, or any other persons performing any of the Work.
- 3.11 **CONTRACTOR NOT AN INTENDED THIRD-PARTY BENEFICIARY OF THE PROFESSIONAL AGREEMENT**. The Contractor is not an intended third-party beneficiary of the Professional Agreement between the Department and the Professional. Nothing in the Contract Documents between the Department and the Contractor should be construed to authorize any person not a party to the Professional Agreement to maintain any lawsuit involving that contract, unless otherwise provided by law.
- 3.12 **REPLACEMENT OF PROFESSIONAL**. In case of the termination of the Agreement for Professional Services, if applicable, the Department may appoint a new Professional whose status under the Contract Documents shall be that of the former Professional. The decision of whether or not to terminate a Professional and appoint a new Professional rest solely with the Department.

#### **ARTICLE 4: THE DEPARTMENT**

- 4.1 **EASEMENTS AND RIGHTS OF ACCESS**. If necessary, the Department will secure and pay for easements for permanent structures with a right of access to the structures. If such easements are insufficient for the erection of temporary construction facilities and storage of materials, the Contractor shall obtain easements and space as necessary at no cost to the Department.
- 4.2 **ADMINISTRATIVE PROCEDURES**. The Administrative Procedures are included in the Contract Documents and are incorporated by reference and made a part hereof, as if fully set forth herein. In the event there is any redundancy, conflict, contradiction, discrepancy or inconsistency between any portions of or criteria set forth in the Administrative Procedures and the other Contract Documents, the most restrictive or demanding of the criteria shall take precedence over any less restrictive or less demanding criteria as determined by the Department and/or the Department's designee.
- 4.3 **SEPARATE PRIME CONTRACTS**. The Department reserves the right to award other Contracts in connection with other portions of the Project (Prime Contracts) under these or similar conditions of the Contract. When separate Prime Contracts are awarded for different portions of the Project, the "Contractor" in the Contract Documents in each case is the Contractor which signs each separate Prime Contract. Each Contractor shall have an affirmative duty to cooperate with every other Prime Contractor on the Project.
- 4.4 **DEPARTMENT NOT RESPONSIBLE FOR CONTRACTOR MEANS/METHODS/TECHNIQUES**. The Department is not responsible for the construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work since these are solely the Contractor's responsibilities.

- 4.5 **DEPARTMENT IS NOT RESPONSIBLE FOR CONTRACTOR ACTS OR OMISSIONS.** The Department will not be responsible for the acts or omissions of any Contractor, or any of its subcontractors, or any of their agents or employees, or any other persons performing any of the Work for the Contractor.
- 4.6 **DEPARTMENT'S ACCESS TO THE WORK.** The Department will, at all times, be provided full access to any area the Department deems necessary in order to perform its responsibilities. The Contractor shall provide the facilities for such access so the Department may perform its functions under the Contract Documents.
- 4.7 **DEPARTMENT'S USE AND/OR OCCUPANCY OF THE WORK.** The Department may use or permit the Client Entity to use or occupy any completed or partially completed portions of the Work, whether or not the time may have expired for completing the entire Work or said portions of Work. Such use or occupancy shall not be deemed an acceptance of the portion of the Work so taken or used. Prior to such use or occupancy, an assessment of the Work to be occupied by the Client Entity shall be made by the Department and the Professional to determine if it is in conformity with the Contract Documents. Any damage subsequent to the inspection due solely to the use and occupancy of the completed portion is not the responsibility of the Contractor.

## **ARTICLE 5: THE CONSTRUCTION MANAGER**

### **This Article only applies if a Construction Manager is retained for the Project**

- 5.1 **INFORMATION AND SERVICES REQUIRED OF THE CONSTRUCTION MANAGER.**
- A. If the Department retains a Construction Manager on the Project, the Construction Manager shall carry out the duties specified in the Contract acting as an agent and authorized representative/designee of the Department.
1. The Construction Manager will determine in general that the Work is being performed in accordance with the requirements of the Contract Documents, will keep the Department informed of the progress of the Work, and will endeavor to guard the Department against defects and deficiencies in the Work.
  2. The Construction Manager will assist in the coordination of the activities of all Prime Contractors. Each Prime Contractor has an affirmative duty to coordinate Work with the other Prime Contractors. Nothing in this Article relieves the Contractors of their coordination responsibilities.
  3. The Construction Manager will not have control over or charge of and will not be responsible for construction means, methods, or techniques or for safety procedures and programs in connection with the Work, since these are solely the Contractor's responsibility.
  4. The Construction Manager will review, certify and recommend to the Department payment for all acceptable Applications for Payment from the Contractor, including final payment.
  5. The Construction Manager will review and advise the Department on Change Orders.
- B. At a point in time no later than the Initial Job Conference, the Construction Manager shall provide all Prime Contractors a list of its principal staff assignments, including the Site Representative and other personnel to be in attendance at the site, identify



individuals, their duties and responsibilities and list their addresses and telephone numbers.

- C. For purposes of this Contract, the Contractor shall consider and assume that any requisite approval shall be deemed to have been given by the Department for any such authority exercised by the Construction Manager.
- D. Except as expressly stated in the Contract, the Construction Manager shall have no authority and no liability to relieve the Contractor of any of its obligations under the Contract.
- E. It is not the intention of these Contract Documents to inhibit communications between the Professional, the Construction Manager and the Contractor as it relates to clarification, interpretation and other issues related to progressing of the Work. The Professional is available to discuss issues, provided such discussions or communications are coordinated with the Construction Manager.
- F. If, in the opinion of the Construction Manager, an emergency occurs affecting the Work or adjoining property, the Construction Manager may, without relieving the Contractor of any of its duties and responsibilities under the Contract, instruct the Contractor to execute all such Work or to do all such things as may, in the opinion of the Construction Manager, be necessary to abate or reduce the risk. The Contractor shall immediately comply, despite the absence of approval of the Department, with any such instruction of the Construction Manager.
- G. The Construction Manager's Site Representative will be responsible for the Construction Management of this Project and shall carry out all required duties and exercise such authority as may be required under the terms of this Contract, including but not limited to reviewing Change Orders, Applications for Payment and Extensions of Time.
- H. The Construction Manager's Site Representative will execute the duties and authorities vested in the Construction Manager. The Construction Manager's Site Representative has been fully vested with a level of authority that is adequate to execute the requirements of the Construction Management for this Project. The Contractor is expected to and allowed to rely upon the directions that may be provided from the Construction Manager's Site Representative.
- I. Any communication given by the Construction Manager's Site Representative to the Contractor in accordance with such delegation shall have the same effect as though given by the Construction Manager or the Department.
- J. The Construction Manager may appoint any number of persons from its staff to assist in the carrying out of the Construction Manager's duties. Such assistants shall have no authority to issue any instructions to the Contractor unless such instruction may be necessary to enable the Contractor to carry out their duties and to secure their acceptance of materials, equipment or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Construction Manager.
- K. Any notifications and/or instructions given by the Construction Manager to the Contractor shall be in writing. If the Construction Manager considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. The Construction Manager will, within 24 hours, reduce the oral instructions to a writing.

- L. In all cases of misunderstanding and disputes, verbal instructions that were not subsequently reduced to writing as discussed above in the preceding subparagraph will not be considered binding upon the Department. The Contractor must produce evidence in support of its contentions and shall advance no claim in the absence of such evidence, or use, or attempt to use any conversation with any parties against the Construction Manager, the Professional or the Department, or in prosecuting any claim against the Construction Manager, the Professional or the Department.
- M. Wherever, under the Contract, the Construction Manager is required to exercise its discretion by:
1. Giving decision, opinion or consent; or
  2. Expressing satisfaction or dissatisfaction; or
  3. Determining value; or
  4. Otherwise taking action which may affect the rights and obligations of the Department or the Contractor,

the Construction Manager shall exercise such discretion impartially within the terms and conditions of the Contract and having regard to all the circumstances. To the extent the Contractor disagrees with the Construction Manager's determination on an issue, any such decision, opinion, consent, expression of satisfaction, or dissatisfaction, determination of value or action may be subject to the Disputes Article of these General Conditions of the Contract.

- N. The Construction Manager's failure to insist on strict compliance with any term, condition or provision of this Contract or instruction under it, or to exercise any right, remedy, privilege or power provided under this Contract, or the Construction Manager's waiver of any breach, shall not relieve the Contractor of responsibility for compliance with the Contract requirements and shall neither waive nor prevent the Construction Manager or the Department from subsequently requiring strict compliance with that term, condition, provision, instruction, right, remedy, privilege or power.

- 5.2 **CONSTRUCTION MANAGER'S ACCESS TO THE WORK.** The Construction Manager or the authorized representative of the Construction Manager, will at all times be provided full access to any area it deems necessary in order to perform its responsibilities to assist coordination of the Work. The Contractor shall provide the facilities for such access so the Construction Manager may perform its functions under the Contract Documents.
- 5.3 **REPLACEMENT OF CONSTRUCTION MANAGER.** In case of the termination of the Agreement for Construction Management Services, the Department may appoint a new Construction Manager whose status under the Contract Documents shall be that of the former Construction Manager. The decision of whether or not to replace and/or appoint a new Construction Manager or to assume construction management responsibilities is solely within the Department's discretion.
- 5.4 **THE CONSTRUCTION MANAGER NOT RESPONSIBLE FOR CONTRACTOR ACTS OR OMISSIONS.** The Construction Manager is not responsible for the acts or omissions of any Contractor, or any of its subcontractors, or any of their agents or employees, or any other persons performing any of the Work for the Contractor.
- 5.5 **CONTRACTOR NOT AN INTENDED THIRD-PARTY BENEFICIARY OF THE CONSTRUCTION MANAGER'S AGREEMENT.** The Contractor is not an intended third-party beneficiary of the Agreement for Construction Management Services between the Department and the

Construction Manager. Nothing in the Contract Documents between the Department and the Contractor should be construed to authorize any person not a party to the Agreement for Construction Management Services to maintain any lawsuit involving that contract, unless otherwise provided by law.

## **ARTICLE 6: THE CONTRACTOR**

### **6.1 REVIEW OF CONTRACT DOCUMENTS AND SITE CONDITIONS.**

- A. PROCUREMENT STAGE INVESTIGATION AND DOCUMENT REVIEW: During the procurement stage, the Contractor had an affirmative duty to examine the nature and location of the Work, the soil and rock conditions and the character, quality and quantity of the materials that are required for the Work. Any geotechnical information available for review on the Project is provided for informational purposes only; it is not to be relied upon by the Contractor. The Contractor also has a duty to carefully study and compare the Contract Documents for consistency and to the physical conditions of the job site. If the Contractor did not request a clarification during the bid stage with regard to the site conditions or discrepancies within the Contract Documents, the Contractor may not submit a claim after award of contract alleging insufficient data, ambiguity in the documents, incorrectly assumed conditions or misunderstanding.
- B. POST-AWARD INVESTIGATION AND DOCUMENT REVIEW:
1. Site Conditions – If, after award, the Contractor finds any material change in the condition of the site since the time of bidding, the Contractor must immediately inform the Professional in writing of the changed site conditions. The Professional, after consulting with and obtaining the Department's approval, and within seven (7) days after receipt of Contractor's notification, will address the alleged material change in the site conditions and notify the Contractor of such review.
  2. Contract Documents – If, after award, the Contractor contends that there are discrepancies or errors in the drawings and/or the specifications, the Contractor must submit the contention as a Request for Information to the Professional and the Department within 10 days after discovering the alleged discrepancy.
    - a. If the Department determines that the discrepancy/error constitutes a patent condition that should have been discovered during the procurement stage (See, 6.1(A)) no additional time or compensation will be granted to the Contractor.
    - b. If the Department determines the discrepancy constitutes a latent condition that would not be reasonably susceptible of being discovered during the procurement stage, the Department will consider granting additional time and/or compensation to the Contractor, depending upon the specific nature of the condition.

### **6.2 DUTY TO COORDINATE THE WORK WITH OTHER PRIME CONTRACTORS.**

- A. The Contractor explicitly acknowledges that it has a contractual duty to coordinate the Work within their Contract with the Work to be performed on the Project by all other Prime Contractors.

- B. The Contractor agrees that this duty to coordinate exists between each Prime Contractor on the Project and that each Prime Contractor is an intended third-party beneficiary of each Contract between the Department and each Prime Contractor.
  - C. The Contractor agrees that their duty to coordinate the Work includes reviewing the other Prime Contractors' submittals in for coordination purposes.
  - D. The Contractor further agrees that the efforts of the Construction Manager (if one is used) and the Department to facilitate the coordination of the Work shall not release or in any way diminish the Contractors' duty to coordinate the Work.
  - E. If the Contractor sustains any damage as a result of any act or omission of any other Prime Contractor having a Contract with the Department or through an act or omission of a Subcontractor of such Prime Contractor, the Contractor shall have no claim against the Department, the Professional or the Construction Manager for such damage, but shall have a right to recover such damage from the other Prime Contractor.
  - F. If any other Prime Contractor on the Project sustains any damage through any act or omission of the Contractor or a Subcontractor of the Contractor, the Contractor agrees to reimburse such other Prime Contractor for all such damages and to indemnify and hold the Department, the Construction Manager and the Professional harmless from all such claims.
  - G. The Contractor shall indemnify and hold the Department, the Construction Manager and the Professional harmless from any and all claims or judgments for damages and from costs and expenses to which the Department may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with directions promptly.
  - H. The exercise of the right of the Construction Manager or the Department to permit or require others to perform Work in or about the construction site shall not relieve the Contractor from any liability for loss or damage, or from any of its obligations under this Contract. No agreement or arrangement between the Contractor and others as to a division or proportionate share of liability for loss or damage incurred, or of the cost of insurance shall in any way relieve the Contractor from any liability or damage, or from any of its obligations under this Contract.
  - I. Each Prime Contractor shall afford other Prime Contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work and shall properly connect and coordinate its Work with the Work awarded by the Department to other Contractors.
- 6.3 **PROJECT COORDINATION.** Project Coordination shall be facilitated among the Prime Contractors and professional conduct and adherence to the Contract Specifications and the General Conditions shall occur, including, but not limited to, the following subparagraphs, which shall not be construed to be the exclusive means of achieving a properly coordinated Project:
- A. Each Contractor acknowledges the complex nature of the Project, the sequential nature of the Work to be performed under all of the Prime Contracts and the concurrent operations of this Project.

- B. Each Contractor shall become thoroughly familiar with the requirements of the Contract Documents, including the General Conditions of the Contract, the Administrative Procedures of the Contract, the Project Schedule and the Scope of Work for the Project.
- C. Close coordination shall be required of each Contractor with the Construction Manager, other Prime Contractors, the Department and others having an interest in the Project to assure that Work on-site, access to and from the site and the general conduct of operations is maintained in a safe and efficient manner, and that disruption and inconvenience to existing streets and the surrounding community is minimized.
- D. Each Contractor is responsible for coordinating their Work with every Prime Contractor on this Project.
- E. The Contractor shall, whenever conditions permit, proceed without delay and maintain the Project Schedule. All operations shall be conducted so as to comply with all applicable laws, ordinances and regulations.
- F. The Contractor shall maintain free access to all buildings, gates and areas of the site for emergency vehicles, service vehicles and firefighting equipment and at no time shall block off or close roadways or fire lanes without providing auxiliary roadways and means of entrance acceptable to the Department.
- G. There may be limited parking at the site. Each Contractor and their sub-contractors must limit temporary parking of company vehicles and storage of materials as can be accommodated within the limits of the construction site and staging area as directed by the Department unless noted otherwise within the Contract Documents. All transportation to the site is the responsibility of each Prime Contractor. Contractors shall not park in spaces reserved for State employees. If more than one ticket is issued to an individual for parking violations, the Department has the authority to prohibit the owner of the vehicle(s) from continuing work at the site.
- H. Prime Contractors shall work similar hours in order to prosecute the Work under an orderly and systematic means. If there is a disagreement between Prime Contractors relative to the normal work hours, the Department shall establish the hours to be worked by all Prime Contractors. No claim of hardship shall be made by any Prime Contractor as a result of the Department's decision.
  - 1. Whenever the Contractor intends to depart from normal work hours, it shall notify the Department at least forty-eight (48) hours in advance, unless there is an emergency-type condition requiring immediate repair or attention. If such an emergency condition occurs, the Contractor shall provide immediate notification to the Department. Failure of the Contractor to give such timely notice may be cause for the Department to require the removal or uncovering of Work performed without the knowledge of the Department, at no additional costs or Extension of Time, regardless of whether or not the Work is deemed properly installed.
- I. The Contractor shall coordinate the Work with all other Contractors as outlined in the Coordination Drawings so that interference between mechanical, electrical, architectural and structural Work, including existing services, will be avoided. The Prime Contractors shall also coordinate the Work so as to provide the maximum practical space for operation, repair, removal, and testing of equipment. The Prime Contractors shall keep pipes, ducts, conduit and the like as close as possible to ceiling slab, walls, and columns to take up a minimum amount of space. The Prime

Contractors shall locate pipes, ducts, conduits and equipment so that they do not interfere with the intended use of eyebolts and other lifting devices.

- J. Particular attention shall be given to coordination and correlation of submittals as to the requirements of the Contract Documents regarding:
  - 1. Motor size;
  - 2. Motor service connections for size and type of materials;
  - 3. Equipment size and supports;
  - 4. Piping routing;
  - 5. Penetration of materials and fire stopping; and
  - 6. Connections to another Contractor's Work.
- K. Contractors shall coordinate Work to determine exact locations of outlets, pipes, diffusers and pieces of equipment to avoid interference with properly installed Work.
- L. The Contractor shall be responsible for a complete operating system as designated within the Contract Documents. Major items for Mechanical Work are specified in Division 15 and Electrical Work in Division 16. This may not be the complete extent of this Work, however, since requirements may appear in other locations within the Contract Documents. Mechanical and Electrical Work shall be verified with other sections. Contractors performing that Work shall supply sufficient information for completing the system.
- M. As various areas or parts of the site and building are complete, or otherwise suitable for the subsequent Contractors to commence Work, those Contractors shall be allowed to deliver materials and start Work. Such phased commencement shall be in accordance with the Project Schedule. Prior to commencing Work at any area or part, certain contract requirements shall be met for that area or part, such as verification of conditions as specified. Material lay down areas shall be coordinated with the Department and other Contractors.

6.4 **COORDINATION.** The Lead Contractor is principally responsible for the coordination of the Project Work. Each Contractor is to coordinate all of its Work with the Work of other Contractors for proper function and sequence to avoid construction delays. If necessary, in instances when the Lead Contractor and the other affected Prime Contractor(s), after due diligence, cannot agree on a coordination decision, the Department will upon request from one or more of the Prime Contractors, make a determination resolving the coordination issue and take whatever action(s) the Department deems necessary, including, but not limited to:

- 1. Withholding any payment otherwise due until the Contractor(s) comply with the Construction Manager's or the Department's direction; and/or
- 2. Directing others to perform portions of the Work and deducting the cost of the Work from the Contractor's Contract balance; and/or
- 3. Deleting through credit Change Orders any and all portions of the Work.

The Department's decision in no way releases the Prime Contractors from their continuing duty to coordinate the Work. The final coordination decision of the Department will be observed, accepted, and fully followed by all Contractors and their subcontractors on the Project, subject only to the disputes procedure set out in these General Conditions

of the Contract. The progress of the Work in accordance with the final coordination decisions of the Department shall not be delayed pending any such dispute proceeding.

6.5 **COORDINATION OF SUBCONTRACTORS.**

- A. The Contractor shall be responsible for all acts of its subcontractors utilized under this Contract, and for their compliance with all terms and provisions of the Contract applicable to their performance. The Contractor shall continuously coordinate the Work of all subcontractors to assure proper processing and progress of the Work. The Contractor shall require each Subcontractor to comply with the following:
1. Examine the technical submittals and the Work of other Prime Contractors and all sections of the specifications to the extent necessary for satisfactory installation of its Work, and connection between its Work and the Work of other Prime Contractors; and
  2. Coordinate its Work accordingly; and
  3. Cooperate with other Contractors and Subcontractors toward timely and satisfactory completion of the Project.
- B. Subcontractors proposed by the Contractor will not be acceptable to the Department if evidence exists or arises during the Work that the proposed subcontractors are unable or unwilling to comply with the requirements of the Contract Documents which govern the Work of the subcontractors involved, or if the Subcontractors have experience which is inconsistent with requirements for the Work of the Subcontractors. In these instances, the Contractor will not be entitled to a change in the Contract Sum or Contract Duration and shall propose substitute Subcontractors for unacceptable Subcontractors. Any delays to the Project due to the delay in proposing acceptable subcontractors is the responsibility of the Contractor.
- C. The failure of any Subcontractor to complete its portion of the Work in a satisfactory manner within the proper time will not relieve the Contractor of responsibility for the proper and satisfactory execution and completion of the entire Work.

6.6 **MEANS, METHODS AND TECHNIQUES OF CONSTRUCTION.** The Contractor is solely responsible for all construction means, methods, techniques, procedures, and safety programs in connection with the work under the Contract unless the contract documents require other and additional responsibilities from the Contractor. Neither the Professional nor the Department will be responsible for construction means, methods, techniques or procedures, or for safety precautions or programs in connection with the Work, since these are solely within the Contractor's responsibility.

6.7 **USE OF SITE.** The Contractor shall confine its apparatus, the storage of its equipment, tools and materials, and its operations and workers to the limits of contract as permitted by law, ordinances, permits, the Contract Documents and the Department. The Contractor shall not unreasonably encumber the site with any materials or equipment. The Lead Contractor shall have the authority to identify the lay down area based upon the Project Schedule.

6.8 **MOBILIZATION.** Mobilization limits shall be consistent with the description set forth in the Administrative Procedures. The following items are included as mobilization, and cannot be included separately on the breakdown:

Contractor's field office

Department's field office (unless otherwise specified in specifications)

Heating, lighting and telephone for the field offices  
Installation for the offices  
Installation of signs  
Site survey  
Construction fence, if required  
Sidewalk bridge, where required and built to all applicable OSHA requirements  
Safety and first aid equipment  
Temporary power setup  
Temporary power distribution  
Temporary water  
Temporary sanitary

- 6.9 **JOB CONFERENCES.** Job Conferences may be held as often as required, but shall normally be held bi-weekly and must be attended by all Contractors. **Regardless of the status of the Work, all Contractors must have a representative authorized to make all decisions and representations affecting the Contractor attend each Job Conference.** The names of the authorized representatives of the Contractor shall be provided to the Department at the Initial Job Conference. The Department and the Professional shall also attend every Job Conference. The Department shall schedule the dates and times of Job Conferences and notify the Contractors. Failure to attend Job Conferences or any other mandatory meeting (unless excused by the Department) constitutes a breach of this Contract.

Any delays or damages incurred by other Contractors due to the failure of a Contractor to attend the Job Conference may be deducted from the absent Contractor's balance if a Prime Contractor submits a request for such action to the Department in accordance with the Disputes Article of these General Conditions.

- 6.10 **CONTRACTOR'S STAFF AND PHONE NUMBERS.** Within ten (10) days of receipt of the Contract, the Contractor shall submit to the Department's Project Manager a maximum of three (3) proposed principal staff that will be assigned to the Project. This shall include the name, address, email address, and telephone numbers of the Contractor's Superintendent and other personnel assigned to the Project.

6.11 **DRAWINGS AND SPECIFICATIONS AT THE SITE.**

- A. The Contractor shall maintain in good order at the site, for the Department and the Professional, one (1) paper copy of all drawings and specifications. All addenda, contract modifications, change orders and requests for information shall be posted to these documents at the applicable locations. As appropriate, these documents will be updated daily to record accurately as-built conditions, selections and changes.
- B. The Contractor shall also maintain at the site one (1) paper copy of approved shop drawings, catalog data, operating and maintenance instructions, certificates, warranties, samples and similar submittals. These shall be available to the Department and Professional at all times, and they shall be delivered to the Professional as part of the Operation and Maintenance Instruction Manuals described in these General Conditions.



- C. The Contractor shall also maintain one (1) paper copy of approved coordination drawings, to include as-built conditions, selections and changes to be submitted to the Professional and included as part of the Operation and Maintenance Instruction Manuals. The Contractor shall include the value of the Record Drawings as a line item on its schedule of values, which shall be not less than 10% of the amount included for mobilization. The amount included is subject to the approval of the Department.
- 6.12 **PROVISION OF LABOR AND MATERIALS**. Unless otherwise specifically noted, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and all other facilities and services necessary for the proper execution and completion of the Work.
- 6.13 **RESPONSIBILITY FOR THOSE PERFORMING WORK**. The Contractor is responsible to the Professional, the Department and all other Prime Contractors for the acts and/or omissions of all of its employees and all subcontractors, their agents and employees, and all other persons performing any of the Work under a contract or purchase order with the Contractor.
- 6.14 **EQUIPMENT AND MATERIALS**. The Contractor shall furnish and deliver the necessary equipment and materials in ample quantities and as frequently as required to avoid delay in the progress of the Work. The Contractor's materials or equipment shall not interfere with the orderly progress of the Work, nor endanger the lives of any operators or persons within the vicinity of the stored equipment or materials, nor to cause damage to the adjacent property or highways. Any damage resulting from the operations of such equipment to any person or property is the responsibility of the Contractor in accordance with the Insurance paragraph of these General Conditions.
- 6.15 **SUPERVISION**. If a Contractor has more than one Contract on the Project, it must provide a separate Superintendent for each Prime Contract. The Contractor shall provide on-site supervision by an employee who shall act as the duly authorized and competent Superintendent. If the Contractor fails to comply with the provisions of this paragraph, the Department may: (1) withhold any payments which are or may become due to the Contractor; and/or (2) suspend the work at the expense of the Contractor, including the cost associated with the impact on the work of the other Prime Contractors; and/or (3) take a credit for each day the Contractor did not have the approved Superintendent on site.
- A. **ON SITE**: This Superintendent shall be on-site during the progress of the Work, including any time when any Work is being performed by any Prime Contractor or any subcontractor that will impact the Work of the Contractor. The Superintendent shall represent the Contractor, and all communications given to the Superintendent shall be binding as if given to the Contractor. The Superintendent must attend all Monthly Schedule Update Meetings and every bi-weekly job conference. The Monthly Schedule Update Meetings shall be scheduled and chaired by the Superintendent for the Lead Contractor.
- B. **QUALIFICATIONS**: At the Initial Job Conference, the Contractor shall submit to the Department the name and qualifications of its Superintendent. The Superintendent must meet the qualifications in the specifications and be acceptable to the Department. The Contractor shall not change its Superintendent at any time during the Project without the prior written approval of the Department, and must submit to the Department, in writing, justification for the change, along with the name and qualifications of the individual whom the Contractor proposes to be the new Superintendent. The Department reserves the right to require a change in the

Superintendent if the Superintendent's performance is deemed by the Department to be inadequate.

6.16 **GOOD ORDER AMONG EMPLOYEES.**

- A. The Contractor shall enforce good order and conduct among its employees at all times. Every employee shall be skilled in the performance of work assigned to that employee. All construction personnel shall be respectful of all Commonwealth employees and the general public.
- B. Any incidents of disrespect, verbal abuse, threatening statements, acts indicating a violation of the Contractor's Drug and Alcohol policy, unwelcome comments, unwelcome interaction or any form of harassment from any construction personnel toward any Commonwealth employee, designee employees, or the general public is strictly prohibited. Any such act shall constitute sufficient cause for the Department to demand that the Contractor dismiss the person(s) from the job site.
- C. If any Contractor's personnel ignores or refuses to take action on any requirements of the Contract Documents, ignores or refuses to take immediate action to correct any endangerment to the health and safety of the public, as solely determined by the Department then this action and/or inaction shall be sufficient cause for the Department to demand that the Contractor dismiss the person(s) from the job site.
- D. When, in the sole determination of the Department, it would be in the best interest of the Project and the Commonwealth to have a Contractor's personnel removed from the Project for the reasons described above, then the Department may demand that the Contractor dismiss from the job site. Any violation is sufficient cause for the Department to direct that the Contractor remove such person from employment on the Project, and direct that they shall not be re-employed on that Project without the consent of the Department. Such actions taken by the Department shall not constitute grounds for a delay claim. The Department will not be responsible for any delays caused to the Project due to any individual being removed from the Project.

6.17 **PERMITS AND FEES.** In compliance with the Pennsylvania Construction Code Act (PCCA), 35 P.S. §7210.101 to §7210-1103, as amended (a.k.a. Uniform Construction Code Statute or UCC), only the Department of Labor and Industry has jurisdiction for plan and specification review and inspection authority over all State-owned buildings and facilities. Consequently, Prime Contractors on Department projects shall not obtain any building permits from local authorities. The Contractor, shall, however, continue to obtain and pay all fees for all other necessary permits, licenses and certificates required by law or otherwise for the proper execution and completion of its Work. The Contractor shall furnish proof of payment for all such items, or proof that no such items are required. This proof must be furnished prior to the second Invoice. The Contractor will be reimbursed for the actual cost of such items by change order and the Contractor will not be entitled to any mark-up on the items unless otherwise authorized by the Department.

6.18 **PCCA/UCC INSPECTIONS & COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS, ETC.**

- A. The Contractor shall give all notices and comply with all applicable laws, ordinances, regulations, rules and orders of any public authority bearing on the performance of the Work. If the Contractor observes any of the Contract Documents conflicting with applicable laws, ordinances, regulations, rules and orders of any public authority in any respect, it shall promptly submit a Request for Information. Any conflicts will be addressed by the Professional and Department. If the Contractor performs any work knowing it to be contrary to such applicable laws, ordinances, regulations, rules or

orders of any public authority, and without such RFI to the Department, it assumes full responsibility for that action and shall bear all costs attributable thereto.

- B. This Project shall be subject to the Pennsylvania Construction Code Act (PCCA) and the Uniform Construction Code Statute. Each Prime Contractor shall become familiar, and is responsible for complying, with all aspects of the PCCA and the UCC, including but not limited to the site inspection procedure set forth in the Department of Labor & Industry's Inspection Procedures. For purposes of inspection, the Contractor shall be deemed the "owner" as described in the PCCA/UCC. The most recent list of inspections required by L&I can be found on L&I's website.
- C. Each Prime Contractor must include the PCCA/UCC inspections (to the extent they are applicable to their scope of Work on this Project) in the Project Schedule created pursuant to the applicable paragraph(s) in the General Conditions and Administrative Procedures.
- D. The L&I mandated advance notice, defined for each inspection activity, shall be considered and included as lead time in the development of the Project Schedule. Each Prime Contractor shall assume the responsibility of the permit applicant/permit holder as applicable. Each Prime Contractor shall be responsible to contact L&I to schedule the required inspections in accordance with the inspection procedures outlined in the Building Permit. Failure by any one Prime Contractor to do so shall not be cause for a delay claim against the Department. A copy of the Building Permit, which includes a list of the required inspections and the time frames for notifying the Department of Labor & Industry, is available from the Department.
- E. Contractors shall provide 48 hours prior notice to the Department for all L&I Inspections scheduled for any portion of their work. Results of the L&I Inspection with noted deficiencies and any required re-inspection shall be provided to the Department by commencement of work the following workday.

6.19 **SURVEYS, LAYING OUT AND EXECUTION OF THE WORK.**

- A. The Contract Drawings shall be used for all dimensions in laying out the Work under this Contract.
- B. Each Prime Contractor is responsible for laying out their work from the points established by the drawings.
- C. The Contractor shall utilize a competent licensed surveyor to lay out the Work from the initial points established on the drawings.
- D. The surveyor shall take as a basis the figures on the plans, and shall lay out all intersections, all building lines at corners and centers, test and check all elevations and levels, locate levels and plumb lines of floors, walls, beams and columns and other parts of the construction as the Work progresses.
- E. All Work of every description shall be laid out by the Contractor, who is solely responsible for its correctness. The Contractor shall pay for all expenses in connection with this Work.

- F. The Contractor shall furnish approved copies of all information (site plans, technical data, topographic surveys, Record Drawings, etc.) to other Prime Contractors as necessary for the purpose of coordination of the Work. The Contractor shall submit one copy of its survey notes to the Department for record keeping. Submission of the survey notes does not relieve the Contractor of its duty to identify discrepancies on the site or in the Contract Documents.
- G. All significant monuments and benchmarks identified by the Contractor shall be preserved for use by other Contractors. Receiving these monuments and benchmarks from another Contractor does not relieve each Contractor of the responsibility for its own layout, including specific layout required by applicable sections of the Contract Documents.

6.20 **DISCREPANCY OR INTERFERENCE WITH OR BY THE WORK OF OTHER CONTRACTORS.**

- A. Since the proper execution or results of any part of the Contractor's Work will depend upon the Work of other Prime Contractor(s) (or such other Prime Contractor's Subcontractor(s)) the Contractor shall inspect and promptly report in writing to the Professional, the Department and/or the Department's designee, and the Contractor(s) whose Work is allegedly incorrect describing any discrepancies, defects or delays in the Work done by other Prime Contractor(s) that render it unsuitable for such proper execution and results.
  - 1. If the Contractor begins physical work, the Department assumes that the Contractor has inspected and reported any of these discrepancies.
  - 2. In the event that any Prime Contractor commences Work, failure of the Contractor to so coordinate, inspect and report constitutes an acceptance of the other Prime Contractor's Work as fit and proper to receive its Work. This excludes defects that may develop in the other Prime Contractor's Work after the execution of the Contractor's Work. If such defects occur, the Contractor who installed the defective Work shall be responsible to correct its Work accordingly.
- B. The Contractor's Work shall be conducted so as to not interfere with the Work of any other Contractors. In the event that any Prime Contractor does not complete the various portions of the Work in cooperation with the other Prime Contractors, and as a result, causes damages or injury to any other Prime Contractor, the damaged or injured Prime Contractor may submit a request for the Department to withhold funds, or settle by contract or arbitration such claim or dispute in accordance with the provisions of the Dispute Article of these General Conditions.
- C. Each Contractor shall be liable for all damage or destruction caused directly or indirectly (including, but not limited to delay and inefficiency claims) by its operations to all parts of the Work, both temporary and permanent, and to all adjoining property.

6.21 **EXISTING UTILITIES AND SERVICES.**

- A. The Contractor shall comply with all notification requirements established by applicable law relative to protection of underground utilities and shall also check the location of existing utilities required to remain in place, including those overhead or underground, and take all necessary precautions to prevent injury or damage during the performance of the Work.

- B. Each Contractor doing excavation work is responsible for costs associated with locating all existing underground utilities prior to commencing excavation, including utilities that are owned and operated by the Department of Military and Veterans Affairs or the Client Entity.
- C. Each Contractor shall be responsible for the associated cost of any utility interruption and repair due to this excavation if the utility location was not requested, and/or proper location procedures were not performed and/or followed prior to commencing excavation.
- D. The Contractor responsible for damaging the utility shall immediately notify the utility company and the Department and assume the cost of restoring the service of any utility disrupted due to excavation, or any Contractor action, whatever the circumstance. The Department reserves the right to immediately restore the service of any utility disrupted due to actions of a Contractor and to deduct the cost of such restoration from the responsible Contractor's next Invoice.
- E. Utilities and/or other services, which are shown, or not shown but encountered, shall be protected by the Contractor from any damage from any Work and operations of the Contract, unless or until they are abandoned. If the utilities or services are not abandoned at time of damage, the Contractor shall immediately assume the cost of repairing any damage from its Work or operations and assume the cost of restoring the utilities and services to the condition that existed prior to the damage.
- F. The Contractor and Subcontractor of any tier shall be responsible for all damage to the Project including the existing building and grounds due to its operation under this Contract. Repair or replacement of damaged items shall be to the satisfaction of the Department.

6.22 **INTERRUPTION OF EXISTING SERVICES:** Whenever it becomes necessary to interrupt existing services in use by the Client Entity, such as sewer, water, gas and steam lines, and electric service, the Contractor responsible for working outside of normal working hours shall perform the Work during such hours, as required by the Department in coordination with Client Agencies or other tenants, so as to complete the work and restore all existing services with minimal interruption or disruption to the Department, Client Agencies or other tenant. The Contractor responsible for the Work shall continue its work on a twenty-four (24) hour basis until the Work is completed and the service restored, or at such alternate time required by the **Department, its designee, or the Client Entity or other tenants**. Before beginning such Work, the Contractor shall request and receive approval from the Department to establish a time when interruption of the service will cause a minimum of interference with the activities of the Client Entity. **The Contractor's request to interrupt ANY SERVICE must be submitted to the Department in writing at least FIFTEEN (15) CALENDAR DAYS PRIOR to the date of the desired interruption.**

6.23 **CONTRACTOR PERFORMING EXCAVATION OR DEMOLITION.** The Contractor performing excavation or demolition work shall fully comply with the requirements of the Pennsylvania One Call Act (Act 287-74, approved December 10, 1974, as amended) relative to protection of underground utilities, to the extent that this language conflicts with Act 287-74, the statutory language controls. Protection of underground utilities shall include, but not be limited to:

- A. Ascertaining the approximate location and type of utility lines adjacent to and within the contract limits by inspecting drawings or obtaining a list of utility companies' lines adjacent to and within the contract limits from the County Recorder of Deeds and then contacting the utility company.

- B. Three (3) business days before excavation or demolition, request information from the utility companies regarding the steps Contractors should take to avoid damage.
- C. Provide the Department and each equipment operator or blaster with information obtained in (A) and (B) above.
- D. Report to the Department and the utility company any damage to utility line made or discovered in the course of the work.
- E. Alert the Department and any occupants of premises as to emergency created or discovered.
- F. Provisions of (A), (B) and (C) do not apply in an emergency. An emergency is any condition constituting a clear and present danger to life or property caused by escaping gas, exposed wires or other utility line breaks or defects.
- G. Each Contractor shall be responsible for all dewatering as noted under Environmental Quality Control and per the specifications.

6.24 **OBSERVATION AND/OR INSPECTION OF THE WORK BY OTHERS.** Observation of the Work by the Department or observation/inspection of the Work by the Professional shall not relieve the Contractor of full responsibility for completing the Work in accordance with the Contract Documents. Work performed without direct observation by the Department or Professional shall not relieve the Contractor of full responsibility for completing the Work in accordance with the Contract Documents. The Contractor's responsibilities include, but are not limited to, performance, supervision, scheduling and coordination of the Contractor's Work.

6.25 **COORDINATION DRAWINGS FOR SLEEVES AND OPENINGS.**

- A. Contractors requiring sleeves and openings for their work in any deck, concrete slab or wall shall furnish to the Department and all other Prime Contractors involved a complete set of location sketch drawings showing size and shape of openings. Each Prime Contractor must complete these sketch drawings in accordance with the construction schedule. Each Prime Contractor is responsible for reviewing every other Prime Contractor's drawings so that there will be no interference and/or conflict with its portion of the Work. Any potential conflict or interference shall be reported in writing to the **Lead Contractor**, with copies to the Department and the Professional. The Lead Contractor is principally responsible for coordinating and resolving any interferences and/or conflicts identified by the Prime Contractors. Disputes arising out of this paragraph shall be resolved in accordance with the Coordination Disputes paragraph of these General Conditions.
- B. The responsibility for identifying and dimensioning floor, wall, and ceiling systems penetrations lies with the Contractor whose Work penetrates these systems. The location, elevation, and dimensions of the opening, as well as installation of sleeves, fire safing, escutcheons and inserts shall be the responsibility of the Contractor requiring the opening or penetration. All Prime Contractors whose Work encompasses concrete, masonry, and ceiling installation shall provide openings required by other Contractors as agreed to in the previous paragraph.
  - 1. The need for the opening or penetration, as well as the details, shall be given to the appropriate Contractor no later than seven (7) days prior to the wall, floor, or ceiling system being formed or installed, based on the current progress of the

Work. The Contractor will be responsible to maintain the coordination of all penetrations during the construction with each other Contractor.

2. Any Contractor who fails to provide adequate notification or details to the wall, floor or ceiling Contractor shall be responsible for providing the openings in accordance with the provisions of the Cutting and Patching paragraphs of these General Conditions.
3. Cutting and Patching of penetrations through existing systems or through systems completed earlier in the Project are the responsibility of the Contractor requiring the penetration.
4. Cutting of metal deck in floors and roof openings is the responsibility of the Contractor requiring the opening. Deck shall not be removed until the day the penetration is to be made. The Contractor shall verify that conduits, piping or structural components installed above or below the deck are clear of the opening prior to cutting and patching.
5. At all openings that create a potential safety concern, the Prime Contractor who created the opening shall be responsible to provide adequate and safe protection.

6.26 **CUTTING AND PATCHING OF NON-ROOF SYSTEM WORK.** The Contractor shall, at its own cost, do all cutting, fitting and/or patching of existing materials required for its Work to the minimal extent necessary in accordance with the Contract Documents or to make its several parts fit together properly, and fit it to receive or be received by work of other Contractors. Any cutting, patching or excavation by the Contractor shall be supervised and performed in a workmanlike manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of any other Prime Contractor. The Contractor making the cut shall be responsible for restoration of work or any adjacent repairs. Any cost incurred by another Prime Contractor or the Department due to non-conforming or improperly sequenced work shall be borne by the Prime Contractor responsible therefore. Any damages to the new or existing facility shall be borne by the Contractor responsible for the damage.

6.27 **CUTTING AND PATCHING OF ROOF SYSTEMS.** Unless otherwise specified, each Contractor is responsible for its own cutting and patching of existing roof systems necessitated by its Work. The cutting and patching must be performed by a qualified Contractor/Subcontractor. The cutting and patching must maintain any current warranty or bond on the roofing, and, whether under warranty or not, must be done in accordance with the manufacturer's written directions.

6.28 **CLEANING THE PROJECT.**

- A. Each Prime Contractor shall keep the building and grounds maintained free from accumulations of waste materials, rubbish and debris.
- B. The Contractor shall maintain a clean and safe passageway for the Department, the Professional and others utilizing the facility.
  1. Each Contractor shall insure that their Work shall not damage streets connecting to the Project, which shall be protected from mud, sand, and stones/gravel. Streets and adjacent property sites shall be kept free from run-off, litter, and/or debris in any form from the project site. Mud, litter, and/or debris from the construction site that appears on adjacent property sites shall be removed immediately. All mud collected on vehicle tires shall be removed by each Contractor before leaving the construction area. If any mud or debris from the project site collects on the streets, it shall be removed immediately by the

- responsible Contractor to prevent any hazards to vehicular or pedestrian traffic, as well as from entering the storm sewer system. All streets and property sites adjacent to the project site shall be cleaned of construction related debris, dust, litter, and mud daily.
2. Each Contractor is prohibited from discharging any waste products from concrete trucks or from concrete coring work, or any other unsuitable materials, fluids or other products on the site, or into the storm sewer system.
  3. If the responsible Prime Contractor fails to comply with these requirements, the Department reserves the right, with twenty-four (24) hours prior notice to the responsible Prime Contractor, to assign another Contractor to clean and/or remove mud, trash, litter, debris, or any unauthorized discharge from the project and/or the adjacent streets or properties. In such case, the cost of the cleaning and/or removal, or mobilization for cleaning and/or removal shall be deducted by the Department from the responsible Prime Contractor's next Application for Payment.
- C. The Contractor, and subcontractors of any tier, shall be responsible for and include in its bid, the cost for cleanup and removal from the site of its identifiable debris including, but not limited to, bulky debris, packaging containers, unused materials and equipment, and materials unsuitable for disposal by standard commercial procedures (i.e., masonry and concrete materials, crates, combustible items, etc.).
- D. If the Contractor(s) fails to maintain a satisfactory cleanup program, the Department will issue a twenty-four (24) hour notice of deficiency. If the Contractor does not respond to the notice from the Department, then the Department shall arrange for the performance of the cleanup and back charge the Contractor(s) for all costs associated with the cleanup.
- E. All construction salvage materials, not including items specified elsewhere to be returned to the Department, become the property of the Contractor and shall be taken from the premises. On-site storage of materials and equipment, other than for use in this Project, will not be permitted.
- F. No rubbish or debris shall be dropped from a height of more than six feet or thrown out of any window or opening without a chute.
- G. The following, which is not all-inclusive, lists the cleaning levels required by each Contractor as applicable to the scope of Work included in its Contract prior to Final Inspection:
1. Remove labels which are not required as permanent labels;
  2. Clean transparent materials, including mirrors and window/door glass, to a polished condition;
  3. Remove substances which are noticeable as vision-obscuring materials;
  4. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of dust, stains, paint splatters, films and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition;
  5. Clean concrete floors; in non-occupied spaces, broom clean; remove all stains, marks, paint, rust, etc. caused by construction activities.



6. Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure; and
  7. Clean mechanical and electrical equipment, ductwork and replace all filters.
- H. Prior to Final Inspection, in addition to the cleaning specified above, the site shall be prepared for occupancy by a thorough cleaning, including removal of all trash, rocks, wood and / or debris as required. Roadways and sidewalks shall be washed and swept clean. These activities shall be coordinated by the Lead Contractor.
- I. Before the acceptance of the Project by the Department at the Final Inspection, all visible finished surfaces and materials shall be thoroughly cleaned and/or retouched by the responsible Contractor at its own cost and shall be left in a clean and unblemished condition to the satisfaction of the Department. Surfaces that are to be finished shall have all plaster, mortar and other surplus materials removed before beginning painting, varnishing and other finishing.
- 6.29 **REPAIR OF DAMAGED WORK.** The Department shall coordinate the repair of all new Work as well as existing Work required remaining, but which becomes damaged during the course of the Work. This repair work shall include, but not be limited to, restoration of surfaces to the original condition, grading, landscaping or seeding, pavement markings and refinishing.
- 6.30 **CHASES AND OPENINGS.** The General Contractor (.1) or, if no General Contractor, the Contractor indicated in the Contract Documents will construct or have built into new walls, new partitions and new floors, all such chases and openings as are required for the Project. Each Prime Contractor will be responsible to confirm that the chases and openings affecting its Work are installed in accordance with the drawings submitted to the General Contractor.
- 6.31 **CHASES AND OPENINGS AFTER CONSTRUCTION OF WALLS.** If cutting of chases and openings is required after construction of walls, partitions or floors is completed, the Department may require the Work to be performed in such a manner as to result in unmarred Work, even to the extent of requiring the removal and rebuilding of walls and partitions, all of which shall be at the sole cost of the responsible Contractor.
- 6.32 **TESTS.** If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to be inspected, tested or approved, the Contractor shall give the Department timely notice of its readiness and of the date arranged, so the Department may observe such inspection, testing or approval. The Contractor shall be responsible for scheduling such inspections, tests and approvals and shall bear all costs of such inspections, tests and approvals, unless otherwise provided.
- A. All expenses incurred in the collection, packing and delivering of samples or materials or equipment to the Project site shall be paid for by the Contractor.
  - B. The Contractor shall pay the costs of transporting samples from the Project site to the laboratory and for the testing of same, except where otherwise noted in the General Conditions, specifications, or called for in the Contract drawings.
  - C. Approved samples to be incorporated in the building shall be returned to the Project site by the testing laboratory under the supervision of the Contractor.
  - D. The Contractor shall bear all costs of such inspections, tests and approvals, including such assistance, labor, electricity, fuels, storage, apparatus and instruments as are normally required for examining, measuring and testing any materials or Work and

shall supply samples of materials, before incorporation in the Work, for testing as may be selected and required by the Department or the Professional.

- E. Prior to testing, inspection or verification, the Department may require sign-off by the Contractor's representative affirming that the item of Work or installation is complete and ready for such testing, inspection or verification.
- F. Work requiring testing, inspection or verification of probable compliance of Work shall not proceed to be concealed, covered or closed up until approval is given by the Department. Examples of work to be reviewed before being concealed include but are not limited to: sub-grades prior to backfilling, verification of rebar and formwork prior to placing concrete, and installed Work in concealed spaces before the space is closed.
- G. The non-productive downtime or delay in an operation required to provide the reasonable opportunity for testing or verification by the Department constitutes a portion of the Contract Work and is included in the Contractor's contract price. No claim for additional compensation will be allowed related to establishment and timely observation of testing or verification of Work.
- H. Testing or verification by the Department shall in no way relieve the Contractor of its obligation to meet all the requirements of the Contract Documents.
- I. Contractor is responsible for all Quality Control testing as specified in the Contract Documents.

6.33 **SPECIAL TESTING.** If, after the commencement of the Work, the Department determines that any work requires special inspection, testing or approval not included in the Tests Paragraph of these General Conditions, the Department will direct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as in the Tests Paragraph of these General Conditions.

- A. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, or with respect to the performance of the Work, with laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, the Contractor shall bear all costs thereof, including the Professional's additional services made necessary by such failure.
- B. If the work is in compliance, the Department shall bear such costs and an appropriate change order shall be issued to the Contractor.

6.34 **CERTIFICATES OF INSPECTION.** The Contractor is responsible to secure any required certificates of inspection, testing or approval. Such required certificates of inspection, testing and approval include those required by the UCC. The Contractor shall deliver such certificates to the Professional and the Department within seven (7) days after the Contractor secures the certificate.

6.35 **OBSERVATION OF TESTING.** The Professional and, where required by the Uniform Construction Code, Labor and Industry, shall observe the inspections, tests or approvals required by the Tests and Special Testing Paragraphs of these General Conditions, and it shall be the Contractor's responsibility to serve sufficient notice to the Professional and where required by the UCC, to Labor and Industry, of such inspections, tests or approvals to enable the timely inspection of the Work without impacting the project schedule.

- A. **UCC REQUIRED TESTING OBSERVATION AND/OR INSPECTION.** When the UCC requires any special testing to be observed, inspected and approved by the Department of Labor and Industry, each respective Prime Contractor shall be responsible to contact Labor and Industry sufficiently in advance to allow Labor and Industry to schedule such observation, inspection and approval of such testing. Each Prime Contractor is responsible for determining whether the UCC requires the Department of Labor and Industry's approval of the testing. The Work shall remain accessible and exposed for inspection by Labor and Industry.
- 6.36 **EFFECT OF TESTS.** Neither the observations of the Professional nor inspections, tests or approvals by persons other than the Contractor relieve the Contractor from its obligations to perform the work in accordance with the Contract Documents.
- 6.37 **ENVIRONMENTAL QUALITY CONTROL.** The Contractor and its Subcontractors shall perform their work in a manner which minimizes the possibility of air, water, land and noise pollution.
- A. Each Contractor shall be responsible for all dewatering to prevent surface water and ground water from entering excavations (including foundations and drilled piers), from ponding on prepared subgrades and from flooding the Project site and surrounding areas.
- B. Each Contractor shall be responsible to protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. Each Contractor shall reroute surface water runoff away from excavated areas. No Contractor shall allow water to accumulate in excavations. No Contractor shall use excavated trenches as temporary drainage ditches.
- C. Each Contractor shall be responsible for installing a dewatering system to keep subgrades dry and convey ground water away from excavations. Each Contractor shall maintain the dewatering system until dewatering is no longer required.
- 6.38 **SOLID WASTE.** Storage, collection, transportation and final disposal of solid waste shall be in accordance with the Solid Waste Management Act regulations and standards of the Department of Environmental Protection (DEP). Immediately upon the effective date of the contract, the Contractor shall begin to obtain, at its cost, the necessary permit(s) from DEP and conduct waste disposal on site approved under this permit. A copy of this permit must be submitted to the Department before commencing waste disposal. A record of receipt of the waste material that is signed by the waste company certified to receive the waste material acknowledging receipt and proper disposal must be provided to the Department.
- 6.39 **COMPLIANCE WITH STATUTES & REGULATIONS ADMINISTERED BY DEP.** The Contractor shall comply with all statutes and regulations of the Commonwealth of Pennsylvania concerning environmental quality control administered by DEP. These statutes and regulations include those listed in the Environmental Statement set forth in the Instructions to Bidders (which is included as part of the Contract Documents ) and, but not limited to, the Clean Streams Law, the Clean Water Act, Pennsylvania Sewage Facilities Act, Air Pollution Control Act, Surface Mining Conservation and Reclamation Act, Bituminous Coal Open Pit Mining Conservation Act, Dams and Encroachments Act, Water Well Driller's Act, Water Works Act and Atomic Energy Act, all as amended to date. The Contractor is responsible for any violations and shall secure all required permits. Erosion control measures are shown on drawings and specifications and/or specified in the General Requirements. An erosion control permit, if required, will be obtained by the Professional.

- 6.40 **BURNING OF MATERIALS.** Burning of materials from clearing and grubbing operations, periodic and final clean-up, and all related construction, shall be governed by local codes and ordinances and/or DEP regulations. For each day that the Contractor may contemplate open burning, it shall secure approval from DEP. Failure to secure permission for open burning will require the Contractor to remove material from the project site and dispose of it in a manner acceptable to DEP.
- 6.41 **SUSPENSION FROM METAL ROOF DECKS – NEW AND EXISTING.** Ductwork, conduit, ceiling systems, lighting fixtures or any other miscellaneous equipment shall not be suspended from metal roof decks. These components shall only be suspended from the structural members or a suspension system supported by the structural members. All concentrated loads must be submitted for review by the Professional. If the concentrated loads are not approved, the Prime Contractor furnishing the equipment must provide an acceptable means of distributing the load.
- 6.42 **ASPHALT OR TAR KETTLES.** Asphalt or tar kettles shall not be used inside of or on the roof of any building. Fired kettles shall not be left unattended. There shall be at least one portable fire extinguisher with a minimum 20 B: C rating within thirty feet of each fired kettle and one additional portable fire extinguisher with the same rating by the work area.
- 6.43 **INSULATION.** All insulation incorporated into the project **must** contain the minimum percentage of post-consumer recovered paper or recovered material as shown below for the applicable product:

| <b><u>MATERIAL TYPE</u></b>                          | <b><u>PERCENT BY WEIGHT</u></b>   |
|--|-----------------------------------|
| Cellulose loose – fill and spray on                  | 75% post-consumer recovered paper |
| Perlite Composite Board                              | 23% post-consumer recovered paper |
| Plastic rigid foam,<br>polyisocyanurate/polyurethane |                                   |
| Rigid Foam   | 9% recovered material             |
| Foam-in-Place  | 5% recovered material             |
| Glass Rigid Foam                                     | 6% recovered material             |
| Phenolic Rigid Foam                                  | 5% recovered material             |
| Rock Wool  | 50% recovered material            |

- 6.44 **ENFORCEMENT OF INSULATION REQUIREMENT.** The Contractor may be required to provide the Commonwealth with documentary evidence that the insulation provided for the Project was produced with the required minimum percentage of post-consumer recovered paper or recovered material.
- 6.45 **LANDSCAPING PRODUCTS RECYCLED CONTENT.**

- A. **REQUIREMENT:** All landscaping products offered by the Contractor or included in the final product and sold to the Commonwealth **MUST** contain the minimum percentage of post-consumer and recovered material content as shown below for the applicable products:

| <b><u>LANDSCAPING PRODUCTS</u></b>      | <b><u>RECOVERED MATERIAL CONTENT</u></b> |
|---|--|
| Hydraulic Mulch:<br>Paper<br>Wood/Paper | 100% (post-consumer)<br>100% (total)     |

|  |   |
|--|---|
| Compost Made From Yard Trimmings and/or Food Waste   | Purchase or use compost made from yard trimmings, leaves, grass clippings and/or food wastes for applications such as landscaping, seeding of grass or other plants, as nutritious mulch under trees and shrubs, and in soil erosion control and soil reclamation. The Department further recommends implementing a composting system for these materials when agencies have an adequate volume and sufficient space. |
| Garden Hose:<br>Rubber and/or Plastic  | 60% (post-consumer)   |
| SOAKER HOSE<br>Rubber and/or Plastic   | 60% (post-consumer)   |
| Lawn and Garden Edging:<br>Rubber and/or Plastic   | 30% (post-consumer)/30-100% total   |
| <b>LANDSCAPING PRODUCTS</b>  | <b>RECOVERED MATERIAL CONTENT</b>   |
| Landscaping Timber and Posts:<br>HDPE<br>Mixed Plastics/Sawdust<br>HDPE/Fiberglass<br>Other Mixed Resins | 25% (post-consumer)+50% (recovered)<br>50% (post-consumer)+50% (recovered)<br>75% (post-consumer)+20% (recovered)<br>50% (post-consumer)+45% (recovered)  |

- B. POST-CONSUMER MATERIAL: Any product generated by a business or consumer that has served its intended end use, and that has been separated or diverted from solid waste for the purposes of collection, recycling and disposition.
- C. RECOVERED MATERIAL: Refers to waste materials and by-products which have been recovered or diverted from solid waste, but does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.
- D. CONTRACTOR'S CERTIFICATION: Contractor certifies that the landscaping product(s) which the Contractor is offering contains the required minimum percentage of post-consumer and recovered material content as shown in the above chart for the product.
- E. MANUFACTURER'S CERTIFICATION: In addition to the Contractor's Certification, a Manufacturer's Certification must be completed and signed by the manufacturer before payment will be made to the Contractor for the delivered items. A Manufacturer's Certification form identical to the form shown below must be used. Contractors are not required to submit the completed and signed Manufacturer's Certification form with their bid or proposal. **The Commonwealth shall have no obligation to pay for the item(s) until a properly completed and signed manufacturer's certification is submitted for the delivered item.**
- F. ENFORCEMENT: The Contractor may be required, after delivery of the landscaping product(s), to provide the Commonwealth with documentary evidence that the landscaping product(s) were in fact produced with the required minimum percentage of post-consumer and recovered material content.

**MANUFACTURER CERTIFICATION**

(To be submitted with invoice for each order)

**TO BE COMPLETED BY MANUFACTURER:**

NAME OF MANUFACTURER: \_\_\_\_\_

ADDRESS OF MANUFACTURER: \_\_\_\_\_

FEDERAL EMPLOYER I.D. NO.: \_\_\_\_\_

CONTRACT OR REQUISITION NO. \_\_\_\_\_

NAME OF CONTRACTOR: \_\_\_\_\_

ADDRESS OF CONTRACTOR: \_\_\_\_\_

Type of landscaping product(s) which the manufacturer furnished to the contractor: \_\_\_\_\_

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

**CERTIFICATION:** I, the undersigned officer of the above-named manufacturer, do hereby certify that I am authorized to provide this certification on behalf of the above-named manufacturer and that the type of construction product(s) listed above which my company furnished to the contractor named above for the referenced contract or purchase requisition, contained not less than \_\_\_\_\_% post-consumer materials and \_\_\_\_\_% recovered materials as those terms are defined in the invitation for bids. I understand that this document is subject to the provisions of the Unsworn Falsification of Authorities Act (18 Pa C.S. § 4904).

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name of Signatory

\_\_\_\_\_

TITLE

DATE

6.46 **CONSTRUCTION PRODUCTS RECYCLED CONTENT.**

- A. **REQUIREMENT:** All construction products offered by the Contractor or included in the final product offered by the Contractor and sold to the Commonwealth **must** contain the minimum percentage of postconsumer and recovered material content as shown in the chart below for the applicable products.
- B. **POST-CONSUMER MATERIAL:** Material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, having completed its life as a consumer item. Post-consumer material is part of the broader category of recovered material.
- C. **RECOVERED MATERIAL:** Refers to waste materials and by-products which have been recovered or diverted from solid waste but does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.
- D. **CONTRACTOR'S CERTIFICATION:** Contractor certifies that the construction product(s), which the Contractor is offering, contains the required minimum percentage of postconsumer and recovered material content as shown above for the product.
- E. **MANUFACTURER'S CERTIFICATION:** In addition to the Contractor's Certification, a Manufacturer's Certification must be completed and signed by the manufacturer before payment will be made to the Contractor for the delivered items. A Manufacturer's Certification form identical to the form shown below must be used. The Contractor is not required to submit the completed and signed Manufacturer Certification form with their proposal. **The Commonwealth shall have no obligation to pay for the item(s) until a properly completed and signed manufacturer's certification is submitted for the delivered item.**
- F. **ENFORCEMENT:** The Contractor may be required, after delivery of the construction product(s), to provide the Commonwealth with documentary evidence that the construction product(s) were in fact produced with the required minimum percentage of post-consumer and recovered material content.

| Construction Products  | MATERIAL   | % of Post-Consumer Materials | % of Total Recovered Materials |
|--|--|------------------------------|--------------------------------|
| Structural Fiberboard  | Recovered Materials                                  | -                            | 80                             |
| Laminated Paperboard   | Post-consumer Paper                                  | 100                          | -                              |
| Rock Wool Insulation   | Slag   | -                            | 75                             |
| Fiberglass Insulation  | Glass Cullet   | -                            | 20                             |
| Cellulose Insulation (loose-fill and spray-on)                               | Post-consumer Paper                                  | 75                           | -                              |
| Perlite Composite Board Insulation   | Post-consumer Paper                                  | 23                           | -                              |
| Plastic Rigid Foam, Polyisocyanurate/<br>Polyurethane: Rigid Foam Insulation | Recovered Material                                   | -                            | 9                              |
| Foam-in-Place Insulation   | Recovered Material                                   | -                            | 5                              |
| Glass Fiber Reinforced Insulation  | Recovered Material                                   | -                            | 6                              |
| Phenolic Rigid Foam Insulation   | Recovered Material                                   | -                            | 5                              |
| Floor Tiles (heavy duty/commercial use)                                      | Rubber<br>Plastic                                    | 90<br>-                      | -<br>90                        |
| Patio Blocks   | Rubber or Rubber Blends<br>Plastic or Plastic Blends | 90<br>-                      | -<br>90                        |

|   |  |     |     |
|---|--|-----|-----|
| Polyester Carpet Fiber Face   | Polyethylene terephthalate (PET) resin | 25  | -   |
| Latex Paint:<br>--Consolidated <sup>1</sup><br>--Reprocessed <sup>2</sup> | Recovered Material                     | 100 | -   |
| ----White, Off-White, Pastel Colors                                       | Recovered Material                     | 20  | -   |
| ----Grey, Brown, Earthtones, and Other Dark Colors                        | Recovered Material                     | 50  | -   |
| Shower and Restroom Dividers/Partitions:                                  | Plastic                                | 20  | -   |
|   | Steel <sup>4</sup>                     | 16  | 9   |
|   |  | 67  | 33  |
| Carpet Cushion:<br>--Bonded Polyurethane                                  | Old Carpet Cushion                     | 15  | -   |
| --Jute  | Burlap                                 | 40  | -   |
| --Synthetic Fibers  | Carpet Fabrication Scrap               | -   | 100 |
| --Rubber  | Tire Rubber                            | 60  | -   |
| Railroad Grade Crossing Surfaces  |  |     |     |
| --Concrete  | Coal Fly Ash                           | -   | 15  |
| --Rubber <sup>3</sup>   | Tire Rubber                            | -   | 85  |
| --Steel <sup>4</sup>  | Steel                                  | 16  | 9   |
|   |  | 67  | 33  |

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<sup>1</sup> Consolidated latex paint used for covering graffiti, where color and consistency of performance are not primary concerns.

<sup>2</sup> Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceiling, and trim; gutterboards; and concrete, stucco, masonry, wood, and metal surfaces.

<sup>3</sup> The recommended recovered materials content for rubber railroad grade crossing surfaces are based on the weight of the raw materials, exclusive of any additives such as binders or additives.

<sup>4</sup> The recommended recovered materials content levels for steel in this table reflect the fact that the designated items can be made from steel manufactured from either a Basic Oxygen Furnace (BOF) or an Electric Arc Furnace (EAF). Steel from the BOF process contains 25-30% total recovered materials, of which 16% is post-consumer steel. Steel from the EAF process contains a total of 100% recovered steel, of which 67% is post-consumer.



**MANUFACTURER CERTIFICATION**

(To be submitted with invoice for each order)

**TO BE COMPLETED BY MANUFACTURER:**

NAME OF MANUFACTURER: \_\_\_\_\_

ADDRESS OF MANUFACTURER: \_\_\_\_\_

FEDERAL EMPLOYER I.D. NO.: \_\_\_\_\_

CONTRACT OR REQUISITION NO. \_\_\_\_\_

NAME OF CONTRACTOR: \_\_\_\_\_

ADDRESS OF CONTRACTOR: \_\_\_\_\_

Type of construction product(s) which the manufacturer furnished to the contractor: \_\_\_\_\_

**CERTIFICATION:** I, the undersigned officer of the above-named manufacturer, do hereby certify that I am authorized to provide this certification on behalf of the above-named manufacturer and that the type of construction product(s) listed above which my company furnished to the contractor named above for the referenced contract or purchase requisition, contained not less than \_\_\_\_\_% post-consumer materials and \_\_\_\_\_% recovered materials as those terms are defined in the invitation for bids. I understand that this document is subject to the provisions of the Unsworn Falsification of Authorities Act (18 Pa C.S. § 4904).

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name of Signatory

\_\_\_\_\_  
TITLE     DATE

- 6.47 **STORAGE ENCLOSURE.** The Contractor shall provide, at its cost, a suitable, substantial and watertight storage enclosure in which it shall store all materials that might be damaged by the weather. A Mobile trailer type is acceptable. The Contractor is responsible for maintaining and removing this enclosure at its cost. All storage enclosures shall be of sufficient size to hold all the Contractor's subject materials on the site at one time and shall have floors raised at least six (6) inches above the ground on heavy joists or sleepers. Storage enclosures shall have sufficient natural ventilation to preclude condensation.
- 6.48 **NO STORAGE IN EXISTING BUILDINGS.** The Contractor shall not store any materials in any existing building or beyond the contract limits as defined by the drawings without prior authorization from the Department.
- 6.49 **OPERATION AND MAINTENANCE INSTRUCTION MANUALS.** The Contractor shall, for its scope of work, carefully compile during the progress of the work indexed operation and maintenance manuals to include methods of care and cleaning of all types of visible surface materials, both interior and exterior, and descriptions of all systems and equipment, methods of operations and all warranties thereof. Descriptions shall give pertinent diagrams, identifying charts, color coding, connections, lubricating instructions, and single line and detailed wiring diagrams, using manufacturers' printed information where possible. Where manufacturers' printed information is not available, the Contractor shall obtain written instructions prepared by subcontractors and sub-subcontractors. The Contractor shall include names, addresses and phone numbers of all subcontractors and sub-subcontractors, and of service firms of each mechanical item, for the Client Entity's use after expiration of the guarantee period. At the time of Final Inspection, the Contractor shall submit a rough draft of the manual through the Submittal Process in writing for approval by the Professional. After approval and before final payment, Contractor shall furnish the corrected and indexed Operation and Maintenance Instruction Manual in PDF electronic format to the Professional to be turned over to the Department for issuance to the Client Entity.
- 6.50 **RECORD DRAWINGS.** At the time of Final Inspection, the Contractor shall use the Submittal Process to submit to the Professional a complete set of contract color prints in PDF format, corrected with suitable markings to show all changes or variations from the original contract, including all items uncovered during the work and showing the details of the work as actually built, including but not limited to horizontal and vertical dimensional references of all concealed pipe, conduit and other lines and equipment.
- 6.51 **WARRANTY AND GUARANTEE.** In addition to the Contract Bond, the Contractor shall unconditionally warrant and guarantees equipment, materials and workmanship against patent or latent defects arising from faulty equipment, faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the date of Final Inspection of the Work or beneficial occupancy (whichever occurs first) unless other warranties found within the Contract Documents specify or indicate longer periods. The Contractor shall replace such defective equipment, materials or workmanship without cost to the Department. The Contractor shall warrant that such equipment, material or workmanship furnished under this Contractor shall be furnished in conformance with the Contract Documents. All work not conforming to these standards may be considered non-conforming.
- A. If items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The Contractor shall replace such defective equipment or materials, without cost to the Department, within the manufacturer's

warranty period. Nothing in this paragraph relieves the Contractor or surety of its obligations under the performance bond.

- B. The Contractor shall assign and deliver to the Professional through the Submittal Process all warranties for review as part of the Operations & Maintenance submission. The Professional will transfer the warranties to the Department. The warranty provided in this Paragraph shall be in addition to, and not in limitation of, any other warranty or remedy provided by Law or by the Contract Documents.
- C. If there is a substitution of material or equipment in accordance with the Substitution Paragraph, the Contractor warrants that such installation, construction, material or equipment will perform to the standard of the item originally specified. The Contractor explicitly warrants the merchantability, and the fitness for use and quality of all substituted items provided for or by it.
- D. The Department may bring an action for latent defects that were hidden or not readily apparent to the Department at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law and/or the Contract Bond.

This paragraph, "Warranty and Guarantee," in no way limits the applicability of the Contract Bond.

6.52 **TAXES.** The Contractor shall take full advantage of the Department of Revenue's "Pennsylvania Exemption Certificate" (REV-1220, as amended) for all "Building Machinery and Equipment" as defined and administered by the Department of Revenue, installed under the Contract. Otherwise, the Contractor shall pay all sales, consumer, use and other similar taxes required by law and have an affirmative duty to seek a refund or reimbursement of sales tax from Department of Revenue for costs that were included in the Contract. Once those savings are received by the Contractor, they shall be transferred back to the Department through a credit change order(s). Additional information is available on the Department of Revenue's web site. Credit changes orders for such tax refunds or reimbursements shall be equal to the actual tax refund or reimbursement amount(s) less ten percent (10%) for administrative costs.

6.53 **OFFSET OF AMOUNTS DUE TO COMMONWEALTH.** The Contractor, by execution of the Contract, certifies that it has no outstanding tax liability to Pennsylvania; authorizes the Department of Revenue to release information related to its tax liability to the Department; and authorizes the Commonwealth to offset the amount of any state tax or Contractor liability owed to the Commonwealth by the Contractor or its affiliates and subsidiaries, as well as any other amount due to the Commonwealth from the Contractor not being contested on appeal by the Contractor, against any payments due the Contractor under this or any other contract with the Commonwealth. The certification of no outstanding tax liability is a material representation of fact, which the Department relies upon in entering into the Contract. If it is later determined that the Contractor knowingly rendered an erroneous certification, the Department may find the Contractor in default and terminate the Contract. Such erroneous certification may also be grounds for initiation of civil, criminal and/or debarment proceedings.

6.54 **NONDISCRIMINATION AND SEXUAL HARASSMENT.** During the term of the Contract, the Contractor agrees as follows:

- A. In the hiring of any employee(s) for the manufacture of supplies, performance of work, or any other activity required under the contract or any subcontract, the Contractor, each subcontractor, or any person acting on behalf of the Contractor or subcontractor shall not discriminate by reason of race, gender, creed, color, sexual

orientation, gender identity or expression, or in violation of the *Pennsylvania Human Relations Act* (PHRA) and applicable federal laws, against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

- B. Neither the Contractor nor any subcontractor nor any person on their behalf shall in any manner discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, against or intimidate any employee involved in the manufacture of supplies, the performance of work, or any other activity required under the contract.
- C. The Contractor and each subcontractor shall establish and maintain a written nondiscrimination and sexual harassment policy and shall inform their employees in writing of the policy. The policy must contain a provision that sexual harassment will not be tolerated and employees who practice it will be disciplined. Posting this Nondiscrimination/Sexual Harassment Clause conspicuously in easily-accessible and well-lit places customarily frequented by employees and at or near where the contracted services are performed shall satisfy this requirement for employees with an established work site.
- D. The Contractor and each subcontractor shall not discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of PHRA and applicable federal laws, against any subcontractor or supplier who is qualified to perform the work to which the contract relates.
- E. The Contractor and each subcontractor represents that it is presently in compliance with and will maintain compliance with all applicable federal, state, and local laws, regulations and policies relating to nondiscrimination and sexual harassment. The Contractor and each subcontractor further represents that it has filed a Standard Form 100 Employer Information Report ("EEO-1") with the U.S. Equal Employment Opportunity Commission ("EEOC") and shall file an annual EEO-1 report with the EEOC as required for employers' subject to *Title VII of the Civil Rights Act of 1964*, as amended, that have 100 or more employees and employers that have federal government contracts or first-tier subcontracts and have 50 or more employees. The Contractor and each subcontractor shall, upon request and within the time periods requested by the Commonwealth, furnish all necessary employment documents and records, including EEO-1 reports, and permit access to their books, records, and accounts, including EEO-1 reports, and permit access to their books, records, and accounts by the contracting agency and the Bureau of Diversity, Inclusion and Small Business Opportunities for purpose of ascertaining compliance with provisions of this Nondiscrimination/Sexual Harassment Clause.
- F. The Contractor shall include the provisions of this Nondiscrimination/Sexual Harassment Clause in every subcontract so that those provisions applicable to subcontractors will be binding upon each subcontractor.
- G. The Contractor's and each subcontractor's obligations pursuant to these provisions are ongoing from and after the effective date of the contract through the termination date thereof. Accordingly, the Contractor and each subcontractor shall have an obligation to inform the Commonwealth if, at any time during the term of the contract, it becomes aware of any actions or occurrences that would result in violation of these provisions.

- H. The Commonwealth may cancel or terminate the contract and all money due or to become due under the contract may be forfeited for a violation of the terms and conditions of this Nondiscrimination/Sexual Harassment Clause. In addition, the agency may proceed with debarment or suspension and may place the Contractor in the Contractor Responsibility File.

6.55 **CONTRACTOR EVALUATIONS**

- A. The Contractor, by entering the Construction Contract, consents to the evaluation of its performance by the Department and/or the Department's designee and understands that any such evaluation may be used in future procurements to determine Contractor's responsibility. The Department and/or the Department's designee shall provide the Contractor with notice of any unsatisfactory evaluations and the reasons therefore. Contractor shall be entitled to submit a reply.

6.56 **BACKGROUND CHECKS**

- A. The Contractor must, at its expense, arrange for a background check for each of its employees, as well as the employees of any of its subcontractors, who will have access to Commonwealth facilities, either through on-site access or through remote access. Background checks are to be conducted via the Request for Criminal Record Check form and procedure found at <http://www.psp.state.pa.us/psp/lib/psp/sp4-164.pdf>. The background check must be conducted prior to initial access and on an annual basis thereafter.
- B. Before the Commonwealth will permit access to the Contractor, the Contractor must provide written confirmation that the background checks have been conducted. If, at any time, it is discovered that a Contractor employee has a criminal record that includes a felony or misdemeanor involving terroristic behavior, violence, use of a lethal weapon, or breach of trust/fiduciary responsibility or which raises concerns about building, system or personal security or is otherwise job-related, the Contractor shall not assign that employee to any Commonwealth facilities, shall remove any access privileges already given to the employee and shall not permit that employee remote access unless the commonwealth consents to the access, in writing, prior to the access. The commonwealth may withhold its consent in its sole discretion. Failure of the Contractor to comply with the terms of this Section on more than one occasion or Contractor's failure to appropriately address any single failure to the satisfaction of the Commonwealth may result in the Contractor being deemed in default of its Contract.
- C. The Commonwealth specifically reserves the right of the Commonwealth to conduct background checks over and above that described herein.
- D. Access to certain Capitol Complex buildings and other state office buildings is controlled by means of card readers and secured visitors' entrances. Commonwealth contracted personnel who have regular and routine business in Commonwealth worksites may be issued a photo identification or access badge subject to the requirements of the contracting agency and DGS set forth in [Enclosure 3 of Commonwealth Management Directive 625.10 \(Amended\) Card Reader and Emergency Response Access to Certain Capitol Complex Buildings and Other State Office Buildings](#). The requirements, policy and procedures include a processing fee payable by the Contractor for contracted personnel photo identification or access badges.

**ARTICLE 7: SUBCONTRACTORS/SUPPLIERS**

- 7.1 **CONTRACTOR'S INTEREST IN SUBCONTRACTOR/SUPPLIER.** Pursuant to the Contractor Integrity Provisions set forth in the Instructions to Bidders, a Contractor may not, except with the consent of the Commonwealth, have a financial interest in any other Contractor, Subcontractor, or Supplier providing services, labor, or material on this project. The Contractor is required to disclose the names of all Subcontractors and/or Suppliers in which the Contractor has a financial interest and which will be utilized in the Project. This information must be disclosed either with the bid (if known prior to bid opening) or when your subcontractor and/or supplier subcontracts are submitted. If the Department has any objection to the Subcontractors and/or Suppliers provided, the Contractor shall promptly propose another Subcontractor and/or Supplier to whom the Department does not have an objection. The Department's acceptance of the Subcontractors and/or Suppliers will be deemed to be consent for the purposes of the Contractor Integrity Provisions. Failure to disclose the names of such Subcontractors and/or Suppliers for which the Contractor has a financial interest is a violation of the Contractor Integrity Provisions. For violations of any of these Contractor Integrity Provisions, the Commonwealth may terminate this and any other contract with Contractor, claim liquidated damages in an amount equal to the value of anything received in breach of these provisions, claim damages for all additional costs and expenses incurred in obtaining another contractor to complete performance under this contract, and debar and suspend the Contractor from doing business with the Commonwealth. These rights and remedies are cumulative, and the use or non-use of any one shall not preclude the use of all or any other. These rights and remedies are in addition to those the Commonwealth may have under law, statute, regulation, or otherwise. The Contractor shall not replace any Subcontractor and/or Supplier previously selected and/or approved by the Department, without prior notification to the Department and receipt of the Department's approval for such substitution.
- 7.2 **SUBCONTRACTOR/SUPPLIER RESPONSIBILITY.** If the Contractor enters into any subcontracts or purchase orders under this Contract with Subcontractors or Suppliers currently suspended or debarred by the Commonwealth, or who become suspended or debarred by the Commonwealth during the term of this Contract or any extensions or renewals of it, the Department may require the Contractor to terminate such Contract.
- 7.3 **CONTRACTOR RESPONSIBILITY FOR ACTIONS AND COMPLIANCE.** The Contractor shall be responsible for all acts of its Subcontractors and Suppliers utilized under this Contract, and for their compliance with all terms and provisions of the Contract applicable to their performance. The Contractor shall continuously coordinate the Work of all Subcontractors to assure proper processing and progress of the Work.
- A. The Contractor shall require each Subcontractor to comply with the following:
1. Examine the shop drawings and the Work of other Prime Contractors and all sections of the specifications to the extent necessary for satisfactory installation of its Work, and connection between its Work and the Work of other Prime Contractors; and
  2. Coordinate its Work accordingly; and
  3. Cooperate with other Contractors and Subcontractors toward timely and satisfactory completion of the Project.
- B. The failure of any Subcontractor to complete its portion of the Work in a satisfactory manner within the proper time will not relieve the Contractor of responsibility for the proper and satisfactory execution and completion of the entire Work.
- 7.4 **ACTS AND OMISSIONS OF SUBCONTRACTORS.** The Contractor acknowledges its full responsibility to the Department for the actions, inactions, and omissions of its Subcontractors, and of the persons and firms either directly or indirectly employed by

them, equally to the extent that the Contractor is responsible for the actions, inactions, and omissions of persons and firms directly or indirectly employed by it. The Contractor acknowledges that it remains fully responsible for the proper performance of its Contract whether work is performed by the Contractor's own forces or by Subcontractors engaged by the Contractor.

7.5 **SUBCONTRACTS AND PURCHASE ORDERS.**

A. SUBCONTRACTORS:

1. All Work performed for the Contractor by a Subcontractor shall be done pursuant to a written subcontract between the Contractor and the Subcontractor.
2. The form of the written subcontract must be the same for all Subcontractors.
3. All subcontracts between the Contractor and each Subcontractor **must**:
  - a. Be signed by both parties;
  - b. Contain Provisions that:
    - i. Set forth the amount the Subcontractor is to be paid; and
    - ii. Describe the scope of Work to be performed by the Subcontractor; and
    - iii. Preserve and protect the rights of the Department and the Professional under the Contract with respect to the Work to be performed under the Subcontract, so that the subcontracting thereof will not prejudice such rights; and
    - iv. Require that such Work be performed in accordance with the requirements of the Contract Documents; and
    - v. Require submission to the Contractor of applications for payment under each Subcontract to which the Contractor is party, in reasonable time to enable the Contractor to apply for payment in accordance with the provisions of the Prompt Payment Schedule (62 Pa. C. S. §3931-§3939) and the provisions of these General Conditions governing payment by the Department; and
    - vi. Require that all claims for additional costs, extensions of time or otherwise with respect to subcontracted portions of the Work shall be submitted to the Contractor in the manner provided in the Contract Documents for like claims by the Contractor upon the Department; and
    - vii. Prior to commencing onsite or offsite work, require each Subcontractor to comply with the provisions of the Public Works Employment Verification Act (43 P.S. §§ 167.1 – 167.11), which requires subcontractors to utilize the Federal E-Verify program to verify the employment eligibility for every new employee hired after January 1, 2013 and to submit to the Department, using the Subcontractor Information Form, a Commonwealth Public Works Verification Form available on the Department of General Service's web site at [www.dgs.state.pa.gov](http://www.dgs.state.pa.gov).
    - viii. Require each Subcontractor to include provisions in each of its subcontracts regarding the applicability of the Public Works Employment Verification Act (43 P.S. §§ 167.1 – 167.11), information regarding the use of the Federal E-Verify program, and reference to

the Department's web site to obtain a downloadable copy of the Commonwealth Public Works Employment Verification Form required to be submitted to the Department by the Prime Contractor using the Subcontractor Information Form.

ix. Require acknowledgement by the Subcontractor that the Subcontractor is without privity of Contract with the Department and that the Subcontractor agrees by signing the Subcontract that it neither acquires or intends to acquire any rights against the Department on a third party beneficiary theory or any other theory; and

x. Require each Subcontractor to notify its Subcontractors, in writing, that their rights of recovery against the bond of the Contractor for failure of payment may not be exercised unless the Contractor is notified of the claim within ninety (90) days from the last performance of labor or provision of materials and/or equipment; and

xi. Obligate each Subcontractor to specifically consent to all provisions of this Article of the General Conditions of the Contract; and

xii. Contain the following certification language:

1. **Certification:** I, the undersigned officer of the Prime Contractor, do certify that, to the best of my knowledge, this subcontract complies with the provisions of the Subcontractor Article of the General Conditions of the Contract with the Department of Military and Veterans Affairs. I understand that by signing this document I certify that this document is subject to the provisions of the Unsworn Falsifications to Authorities (18 P.S. §4904). I acknowledge that if my company does not comply with the terms of the Subcontractor Article my firm may be subject to suspension for a period up to three (3) months and/or debarment from bidding on any Commonwealth of Pennsylvania Public Works Projects for a period of three (3) years.

xiii. The Contractor agrees that failure to incorporate these terms in its Subcontracts is a material breach of the terms of the Contract Documents. The Contractor will have five (5) days, as required by the Administrative Procedures, to provide proof in writing that such a deficiency in its subcontract documents has been remedied. Failure to provide proof within five (5) days shall constitute grounds for default of the Contractor by the Department.

4. The Contractor shall submit a copy of all subcontracts for Work to be performed on the Project to the Department for the Project **prior to the commencement of any Work by the Subcontractor.**
5. The Contractor shall also submit a copy of every subcontract with a Small Diverse Business/Small Business for the Department's Bureau of Diversity, Inclusion and Small Business Opportunities compliance requirements.
6. The Contractor shall identify the work to be subcontracted on a separate line item on the Schedule of Values, as described more completely in the Administrative Procedures.

B. MANUFACTURERS AND SUPPLIERS:



1. Manufacturers and Suppliers do not have to sign Purchase Orders.
2. For every purchase order with a Small Diverse Business/Small Business Supplier and Small Diverse Business/Small Business Manufacturer, the Contractor shall submit a copy of the purchase order for the Department's Bureau of Diversity, Inclusion and Small Business Opportunities compliance requirements. The purchase order for a Nonstocking Supplier must include the fee or commission paid to the Nonstocking Supplier.
3. The Contractor shall identify all material and/or equipment that will be supplied by a Small Diverse Business/Small Business Supplier or a Small Diverse Business/Small Business Manufacturer on a separate line item (per Supplier/Manufacturer, not per material and/or equipment) on the Schedule of Values.

7.6 **NO CONTRACTUAL RELATIONSHIP BETWEEN DEPARTMENT AND SUBCONTRACTOR.** Nothing contained in the Contract Documents creates any contractual relationship between the Department and any Subcontractor, Sub-Subcontractor or any of its authorized representatives. Nothing contained in the Contract Documents creates any contractual relation between the Professional and any Subcontractor, Sub-Subcontractor or any of its authorized representatives. Nothing contained in the Contract Documents creates any contractual relation between the Construction Manager (if there is one on the Project) and any Subcontractor, Sub-Subcontractor or any of its authorized representatives. The Contractor is not an intended third party beneficiary of the Professional Agreement or the Construction Manager's Contract. Nothing in the Contract Documents between the Department and the Contractor should be construed to authorize any person not a party to the Standard Construction Contract, the Professional Agreement or Construction Manager's Contract to maintain any lawsuit involving that contract, unless otherwise provided by law.

7.7 **NO CONTRACTUAL RELATIONSHIP BETWEEN DEPARTMENT AND SUPPLIER OR MANUFACTURER.** Nothing contained in the Contract Documents creates any contractual relationship between the Department and any Supplier/Manufacturer or its authorized representatives. Nothing contained in the Contract Documents creates any contractual relation between the Professional and any supplier/manufacturer or its authorized representatives. Nothing contained in the Contract Documents creates any contractual relation between the Construction Manager (if there is one on the Project) and any supplier/manufacturer. The supplier/manufacturer is not an intended third party beneficiary of the Professional Agreement or the Construction Manager's Contract. Nothing in the Contract Documents between the Department and the Contractor should be construed to authorize any person not a party to the Standard Construction Contract, the Professional Agreement or Construction Manager's Contract to maintain any lawsuit involving that contract, unless otherwise provided by law.

7.8 **PAYMENT OF SUBCONTRACTOR BY CONTRACTOR GOVERNED BY PROMPT PAYMENT SCHEDULE.** Payments to the Subcontractor are subject to the provisions of the Commonwealth Procurement Code (62 Pa. C. S. §3931 *et seq.*) also known as the "Prompt Payment Schedule". The general description set forth in the General Conditions does not relieve the Contractor from strict compliance with the requirements of the Prompt Payment Schedule. Nothing described in these General Conditions is intended to impose a duty greater than that imposed by the Prompt Payment Schedule. In the event of any discrepancy between this language and the language of the Schedule, the Schedule controls.

7.9 **FAILURE OF DEPARTMENT TO MAKE PROGRESS PAYMENT.** If the Department fails to pay some or all of an approved Invoice for any cause which is the fault of the Contractor and not the fault of a particular Subcontractor, the Contractor shall pay that Subcontractor,

upon demand made by the Subcontractor at any time after the approved Invoice should otherwise have been issued, for its Work to the extent completed, less the retained percentage.

- 7.10 **INSURANCE RECEIPTS.** The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor under the Insurance Article of these General Conditions of the Contract.
- 7.11 **PERCENTAGE OF COMPLETION.** The Department may, on request, furnish to any Subcontractor, if practicable, information regarding percentages of completion certified to the Contractor due to work done by such Subcontractor.
- 7.12 **NO OBLIGATION ON PART OF DEPARTMENT TO PAY SUBCONTRACTOR, SUPPLIER, OR MANUFACTURER.** Subcontractor, Supplier, or Manufacturer issues concerning delayed and non-payment should be addressed to the Contractor and the Contractor's payment bond surety. The Department shall have no obligation to pay or to ensure the payment of any moneys to any Subcontractor, Supplier, or Manufacturer except as may otherwise be required by law. Subcontractors, Suppliers, and Manufacturer acknowledge they have no direct cause of action (unless otherwise provided by law) against the Professional, the Construction Manager (if there is one on the Project) or the Department relating to any payment issues.
- 7.13 **SUBCONTRACTOR AND SUPPLIER CLAIMS.** The Contractor agrees to require the Subcontractor and/or Supplier to submit all claims for extras, extensions of time or for damages to the Contractor in the manner provided in the Contract Documents for claims by the Contractor against the Department in accordance with the Disputes Article of these General Conditions. Since neither Subcontractors nor Suppliers have privity of contract with the Department, they may not pursue a claim directly against the Department.

## **ARTICLE 8: PROJECT SCHEDULE**

- 8.1 **DEPARTMENT RESERVATION OF RIGHTS.** The Department reserves the right to accept the Project Schedule developed, signed and submitted by the Contractors, while preserving exceptions to any defects in the means, methods, sequences, durations and/or logic which the Department believes exist in the schedule. The acceptance of the updated Project Schedule by the Department in no way relieves the Prime Contractors from their duty to coordinate amongst themselves and shall not make the Department, its designee or the Professional a guarantor of the Project Schedule.

Upon request, the Lead Contractor shall provide to the Department, in hardcopy and electronic format (format to be determined by the Department), all the planning data used to develop the Project Schedule. This planning data shall include, but is not limited to:

1. Job Sequences;
2. Activity Logic;
3. Man loading;
4. Crew sizes;
5. Number of shifts planned per working day;
6. Number of crews per shift; and
7. Equipment loading.

- 8.2 **TIME OF THE ESSENCE.** All time limits stated in the Contract Documents are of the essence. The Contractor shall perform the Work expeditiously with adequate forces using all calendar days to complete the Work no later than the Contract Completion Date.
- 8.3 **IF LETTER OF INTENT ISSUED.** If the Department elects to issue a Letter of Intent pursuant to §906 of the Commonwealth Procurement Code, the Letter will list and describe the Work that can commence prior to the Effective Date of Contract.
- 8.4 **COMMENCEMENT OF OFF-SITE WORK IF LETTER OF INTENT NOT ISSUED.** If the Department does not issue a Letter of Intent, the date of commencement of Off-Site Work is the Effective Date of Contract.
- 8.5 **INITIAL JOB CONFERENCE.** The Initial Job Conference will be held within thirty (30) calendar days from the Effective Date of Contract.
- 8.6 **COMMENCEMENT OF ON-SITE WORK.** On-site work will commence within ten (10) calendar days after the Initial Job Conference.
- 8.7 **PROJECT SCHEDULE PREPARATION.**
- A. **CPM:** Unless directed otherwise by the Department in the specifications, the project management tool commonly called the Critical Path Method (CPM) scheduling system will be used on this Project for planning, scheduling implementation and reporting of all Work to be performed under this Contract, including all activities of Subcontractors, equipment vendors and Suppliers. Unless directed otherwise by the Department, the precedence diagramming method shall be used in preparing the Project Schedule and all related network diagrams. Primavera Project Planner P6 version 8.3 (or more current versions) shall be used by all Prime Contractors to maintain the Project Schedule, unless all Contractors agree upon and request the Department's permission to utilize alternate software. The Project Schedule network plan, including all appropriate milestone dates and the computer-produced reports shall be part of the Contract Documents. The following outline is provided to indicate to all Contractors the scope of the scheduling work and the responsibility of all Contractors to comply with this method. The CPM Schedule shall be developed, prepared, and submitted in accordance with this paragraph and the requirements of the Scheduling Administrative Procedure. **No Contractor shall assert any claim whatsoever for any delay or additional cost incurred in connection with the development of the CPM Schedule.**
  - B. **SCOPE:** The CPM will be used to establish and control the Project Schedule. This system will be implemented by the Lead Contractor using the services of a qualified Subcontractor or the Lead Contractor's own in-house staff.
  - C. **COOPERATION OF CONTRACTORS:** To the extent necessary for the Lead Contractor to reflect the Contractors' proposed plan for completion of its Work in a computerized CPM Project Schedule network diagram, the Contractors shall meet with and assist the Lead Contractor and furnish information as directed in a Letter of Intent or otherwise directed subsequent to award of Contract. All Work shall be done in accordance with accepted CPM planning and scheduling methods and it shall be the responsibility of all Contractors to cooperate fully with the Lead Contractor and with each other to create and update the CPM schedule as required. The Project Schedule, including all updates, will reflect the decisions of all Contractors as to sequences, durations, construction logic, and all means and methods of construction. Each Contractor must provide persons of sufficient skill and information of sufficient detail to enable the Lead Contractor to prepare and update the CPM Schedule. The Contractors shall allocate to home office and field office costs sufficient financial

resources to enable the Contractor to fulfill their responsibilities for coordinating and cooperating in the creation and maintenance of the CPM Schedule.

- D. DUE DATES: Each Contractor expressly acknowledges the duty to cooperate fully with these scheduling requirements.
1. If the Department issued a Letter of Intent authorizing the Contractors to commence scheduling activities, the Contractors shall commence scheduling within the scope as instructed in the Letter.
  2. **The Department will only review and pay (if the application is otherwise acceptable) the Contractor's Invoice #1 without an integrated Progress Schedule being submitted and accepted by the Department. If there is no Project Schedule submitted and accepted after Invoice #1, the Department will withhold payments from every Contractor until such time as there is an accepted Project Schedule.**
- E. PRELIMINARY PROJECT SCHEDULE: The CPM Project Schedule will be developed by the Lead Contractor in the form of a CPM arrow network or CPM precedence diagram from the information provided by the Contractors.
1. Unless a Letter of Intent was issued directing otherwise, within seven (7) calendar days of the Effective Date of Contract, the Lead Contractor shall furnish each Contractor a draft progress schedule of the proposed prosecution of the Work under that Contractor's Contract.
  2. Within seven (7) calendar days of receipt of the Lead Contractor's draft progress schedule, each separate Contractor shall submit to the Lead Contractor a schedule of the proposed prosecution of its Work, which the Contractor has integrated with the Lead Contractor's Work. The information provided by the Contractors to the Lead Contractor shall include all proposed sequences of operation, time estimates to complete operations, man loading, data from subcontractors, material supplies, and vendors required for the preparation of the Project Schedule. Each Contractor shall cooperate with the Lead Contractor to aid in the preparation of the draft Project Schedule. The Lead Contractor may conduct a meeting with each of the other Contractors to discuss details and inclusion of all of their Work in the draft Project Schedule.
  3. The Lead Contractor shall prepare and submit to the Professional and the Department within thirty (30) calendar days of the Effective Date of Contract, the completely integrated Project Schedule in CPM format, signed by all Contractors, indicating their approval, and showing in detail, to the acceptance of the Department, the proposed coordinated dates for the performance of each part of the Work under each Contract on the Project. The submission of the Project Schedule, and all subsequent updates, shall be done in PDF format and by hard copy (including all requested sorts and arrangements; utilizing color print). The start date on the schedule shall be the Initial Job Conference and end with the Contract Completion Date.
  4. Seasonal weather conditions shall be considered by the Contractors in the planning and scheduling of all Work influenced by high or low ambient temperatures to insure the completion of all Contract Work within the allotted Contract Time and milestone completion dates.
  5. The accepted Project Schedule must meet the specified Project duration as indicated in the Contract.
  6. The accepted Project Schedule shall consider and include all time durations associated with UCC Inspection criteria by the PA Department of Labor and

Industry, along with all other testing and inspections required by contract. It must take into account the advance notice needed for L&I Inspectors as defined by the UCC Building Permit criteria.

F. MILESTONES:

1. The Project Schedule shall identify Construction Progress Milestones for the Project. A Milestone is to signify the start and/or completion date of a specific activity that is significant to completing the Project on schedule. The Lead Contractor is to fully consider the sequence of operations, time estimates and other scheduling influences of all the Contractors when establishing the Milestones. By signing off on the Progress Schedule, the Contractors are also agreeing to the Milestones set forth on the schedule. Any and all milestones that are not completed on schedule will require a Recovery Plan from the Contractors.
2. Selected Milestones shall be taken from activities that are found within the Critical Path of the Project Schedule.
3. **Failure to provide full cooperation in the preparation of the CPM Schedule and any Updated Schedules will be sufficient reason for declaring the Contractor in default.**

G. SCHEDULING INFORMATION: The following information/data for the Project Schedule will be submitted to the Lead Contractor. The information to be supplied by each Prime Contractor to the Lead Contractor shall include, but is not limited to:

1. The Prime Contractor's means and methods of construction; and
2. Job sequences; and
3. Activity durations in calendar days (excluding material deliveries and approval of shop drawings);
  - a. one (1) calendar day shall be the minimum duration.
  - b. thirty (30) calendar days shall be the maximum duration.
4. Construction activities for display of all salient features of the Work of each Contractor, including but not limited to:
  - a. placing of orders for materials; and
  - b. submission of shop drawings for approval; and
  - c. approval of shop drawings; and
  - d. delivery of material; and
  - e. all work activities to be performed by each Contractor; and
  - f. priority submittal schedule.

H. FORMATION OF FINAL PROJECT SCHEDULE: Once the Project Schedule information has been compiled, the Lead Contractor will generate a fully integrated Project Schedule for the Project in draft form. If the completion date indicated on the schedule exceeds the Contract Completion Date or if there appears to be a defect in the construction sequences, duration, or logic, the information used to develop the arrow network diagram or precedence diagram will be reviewed by the Lead Contractor and all other Prime Contractors. After discussion and revisions of the information and data, the Lead Contractor will utilize this revised data to produce a revised fully integrated Project Schedule. The procedure will be repeated as necessary to obtain a final

Project Schedule that meets the Contract Completion Date as set forth in the Contract documents. This final Project Schedule is to be submitted to the Department within 30 days of the Effective Date of the contract or sooner if required by a Letter of Intent. The hard copy of the completed final Project Schedule will show:

1. Activity identification;
2. Activity description;
3. Activity percentage completed;
4. Calendar dates for early start of each activity;
5. Calendar dates for early finish of each activity;
6. Calendar dates for late start of each activity;
7. Calendar dates for late finish of each activity;
8. Individual activity float;
9. Activities critical to completion (i.e., identify all items on the critical path) of the project on schedule;
10. Milestones; and
11. That the Schedule is within the contract completion duration.

All Prime Contractors will approve the Project Schedule and each update to the schedule. The Lead Contractor will upload the approved Project Schedule for access by all other Prime Contractors, the Professional, and the Department's Regional Office for review.

- 8.8 **WORK DURING FORMATION OF PROJECT SCHEDULE.** Until the final Project Schedule is signed by all Prime Contractors and accepted by the Department, each Prime Contractor must proceed with the Work utilizing all the information available to them, including but not limited to coordination meetings with other Prime Contractors, attendance at Job Conferences, two week look ahead activities, weekly superintendent's meetings, draft CPM schedules used in the development of the final Project Schedule, and any other means necessary to maintain work progress until such time as the Project Schedule is complete and accepted. As such, no Contractor shall assert any claim whatsoever for any delay or additional cost incurred with the development of the Project Schedule.
- 8.9 **THE DEPARTMENT SHALL OWN THE FLOAT.** No float shall be used by the Contractor without a request from the Contractor and subsequent directive from the Department. Total float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, for each and every activity in the Project Schedule. Extensions of time to interim milestone dates or the Contract Completion Date under this Contract will be granted only to the extent that equitable time adjustments to the activity or activities affected by the contract modification or delay exceeds the total float of the affected or subsequent paths and extends any interim milestone date or the Contract Completion Date. Such determination shall be made at the sole discretion of the Department.
- 8.10 **SCHEDULING DISPUTES:** The Lead Contractor and other Prime Contractors are responsible for coordination of the Work. Disputes between the Lead Contractor and one (1) or more other Prime Contractors or disputes between two (2) or more Prime Contractors pertaining to the creation of the Project Schedule, Schedule Updates or any Recovery Schedule, the furnishing of additional resources to meet the project schedule and/or the administration of the construction shall be submitted promptly to the Department for a

decision. The decision of the Department will be observed, accepted, and fully followed by all Prime Contractors and their subcontractors on the Project, subject only to the commencement of a dispute or arbitration proceeding pursuant to Disputes Article of these General Conditions. The progress of the Work, as determined by the decision, shall not be delayed while awaiting the outcome of any such dispute proceeding.

8.11 **MAINTAINING THE PROJECT SCHEDULE.**

- A. Each Prime Contractor shall ensure that such manpower, materials, facilities, and equipment is applied to the Work, and shall work such hours as approved, including night shifts, overtime operations, Sundays, and holidays, as may be necessary, to maintain its progress in accordance with the Project Schedule so that no delays are caused to other Prime Contractors engaged in the Project and to insure the progress and completion of the Work within the time allowed by the Contract and as permitted by the Department.
- B. If any Prime Contractor fails to maintain progress according to the schedule or causes delay to another Prime Contractor, the delaying Prime Contractor shall furnish such additional manpower, equipment, additional shifts or other measures that are necessary, or as the Lead Contractor directs, to bring its operations up to schedule without any additional cost or expense to the Department.
- C. If the Prime Contractor refuses or fails to keep up with the Project Schedule or fails to proceed as directed by the Department, the Department will note this refusal/failure in the Contractor Responsibility Program and will consider suspension of the Contractor in accordance with Section 531 of the Commonwealth Procurement Code. The Department may also, in its sole discretion, find the Prime Contractor in breach of its Contract and/or declare the Contractor in default of its Contract in accordance with the Termination Article of these General Conditions.

8.12 **PROJECT SCHEDULE UPDATING.** The Project Schedule will be updated and issued at least once per month by the Lead Contractor.

- A. **MANDATORY MONTHLY SCHEDULE UPDATE MEETING.** The Lead Contractor will, at least once per month, provide updates of the Project Schedule. All Prime Contractors shall attend a Monthly Schedule Update Meeting. It is mandatory that all Prime Contractors provide their updated information to the Lead Contractor seven (7) calendar days prior to the Monthly Update Meeting. The Department reserves the right to request additional updates, at no cost to the Department, from any Contractor. The Lead Contractor shall provide documentation confirming the Monthly Update Meetings, stating the date, time, and attendance. At sole discretion of the Department, the Lead Contractor shall be required to hold the mandatory monthly schedule update meeting at a suitable location approved by the Department with necessary provisions to accommodate all required attendees of the Prime Contractors, the Department and Professional. All necessary computer hardware and software (to include but not limited to laptop, projector and other necessary peripheral devices, and scheduling software etc.) shall be provided by the Lead Contractor so that the CPM schedule update can be projected for all meeting attendees to view. Lead Contractor shall have the approved scheduler attend the meeting to produce real time updates to the schedule based upon input from meeting attendees. The schedule file utilized during the meeting shall have all schedule update information provided to the Lead Contractor by the other Prime Contracts already incorporated.
- B. At the conclusion of the Monthly Schedule Update Meeting, all information collected will be checked by the Lead Contractor against the current Project Schedule. After all

revisions in logic and time estimates have been noted, the schedule (including all drafts necessary to reach agreement) will be generated, reviewed, and approved by all Prime Contractors to indicate their concurrence. The Updated Project Schedule will be provided by the Lead Contractor within three (3) calendar days after the Monthly Update Meeting for the other Prime Contractors, the Professional, and the Department to view. The submission of Updated Project Schedule to the Department, Professional, and Construction Manager shall be done by hard copy (including all requested sorts and arrangements; utilizing color print), and in electronic format (computer disk or file) used to develop the schedule.

- C. Upon request, the Lead Contractor shall provide to the Department, in hardcopy and electronic format (format to be determined by the Department), its planning data used to develop the updates of the Schedule. This planning data includes, but is not limited to:
  - 1. Job Sequences;
  - 2. Activity Logic;
  - 3. Man loading;
  - 4. Crew sizes;
  - 5. Number of shifts planned per working day;
  - 6. Number of crews per shift; and
  - 7. Equipment loading.
- D. As part of the Job Conference, all activities scheduled to begin in the projected work for the next two weeks will be reviewed in a schedule look-ahead.
- E. The Department reserves the right to reject Invoices or Applications for Payment from those Prime Contractors not complying with this Section.

8.13 **RECOVERY PLAN.**

- A. EVENTS THAT TRIGGER THE NEED FOR A RECOVERY PLAN: The Department may issue a Recovery Notice demanding that the Lead Contractor, after coordinating with the other Prime Contractors, submit a Progress Recovery Plan (narrative) upon the occurrence of any of the following events:
  - 1. The progress of the Work or a single activity falls behind the contract time as shown in a currently updated and approved Project Schedule by more than fifteen (15) calendar days; or
  - 2. A missed milestone; or
  - 3. When an updated Project Schedule provides a completion date past the Contract Completion Date; or
  - 4. When a late start or late finish for any activity does not come within the time allowed by the current Project Schedule.
  - 5. When, in the sole opinion of the Department, it appears likely that the Work will not be completed within the Contract Time.
- B. The Prime Contractor(s) responsible for the occurrence will work with the Lead Contractor to prepare a Recovery Plan indicating that all future activities, Project completion and occupancy dates will be met within the Contract Time. The Recovery



Plan shall be developed and received by the Department within three (3) calendar days of receipt of the Recovery Notice. The Recovery Plan shall be implemented immediately unless otherwise directed by the Department.

- C. In order to create and maintain the Recovery Plan, the Prime Contractor(s) agree(s) to undertake, but not be limited to, some or all of the following actions at no additional cost to the Department: increase the manpower, the number of working hours per shift, the number of shifts per day, the number of working days per week, the quantity of equipment, or any combination of the foregoing, and reschedule such activities to bring the project back on schedule.
- D. Failure of any Prime Contractor to comply with these requirements shall be considered grounds for a determination by the Department that the Prime Contractor is failing to prosecute the Work with sufficient diligence to ensure its completion within the Contract Time and is failing to comply with the Contract Time provisions of the Contract. Such determination may result in default and/or suspension and/or debarment of the Contractor.
- E. The Department's acceptance of the Recovery Plan does not relieve the Prime Contractors of the responsibility for the accuracy of the schedule and for the Prime Contractors' obligations to meet the Contract Completion Date. The Department's acceptance of the Recovery Plan does not constitute approval or warranty of the Prime Contractors' means, methods, and techniques of construction. The Department reserves the right to review any Recovery Plan to determine if it satisfies the Project Schedule. If the Recovery Plan does not satisfy the Project Schedule, the Department may elect to prepare a Recovery Plan, to which the Prime Contractors must adhere. The costs incurred by the Department in preparing the Recovery Plan will be assessed against the Prime Contractors on a *pro rata* basis (based upon individual contract price/all contracts awarded on the Project) by credit change order.
- F. If an updated monthly Project schedule provides a completion date past the Contract Completion Date, then a Recovery Plan is required, not an Extension of Time. The Recovery Plan will be attached to the Project Schedule Update.

8.14 **REQUESTS FOR EXTENSIONS OF TIME CHANGE ORDER.** All requests for Extensions of Time shall be submitted to the Department through the change order process in writing as discussed in the Administrative Procedures. Reasons clearly substantiating the request shall be included or the request may be denied. All such requests must be filed within ten (10) calendar days of the end of the event or issue that caused the alleged delay.

8.15 **EFFECT OF GRANT OF EXTENSIONS OF TIME CHANGE ORDER TO OTHER CONTRACTORS.** Activity time delays shall not automatically merit an extension of the Contract Completion Date of this or any other Contract. The granting of an Extension of Time Change Order to one Prime Contractor does not automatically entitle any other Prime Contractor to an Extension of Time Change Order.

8.16 **EXTENSIONS OF TIME CHANGE ORDER AND IMPACT ON SCHEDULE.**

- A. A change order, field order (i.e., a no cost change order) or delay may not affect existing critical activities or cause non-critical activities to become critical. Change orders, field orders or delays may result in the Department giving the Contractor part of or the entire available total float that may exist within an activity chain on the Network, thereby not causing any effect on any interim milestone date or the Contract Completion Date of this Contract. The Project Schedule shall not excuse the performance of the Contractor from activities not indicated on the Project Schedule.

- B. If the Department, for any period after the commencement of On-Site Work, approves an Extension of Time Change Order to any Prime Contractor, the Lead Contractor is required to prepare a revised Project Schedule and provide copies to all Prime Contractors. All Prime Contractors are required to provide the Lead Contractor with information necessary to create the revised Project Schedule within seven (7) calendar days upon notice of approval of an Extension of Time Change Order. If a revised Project Schedule is requested, the Lead Contractor must send the revised Project Schedule, approved by all Prime Contractors, to the Professional and the Department within fourteen (14) calendar days of the approval of the Extension of Time Change Order. If the time limits set out in this Paragraph are not met, or the Prime Contractors are unable to reach agreement on the Project Schedule, the Department reserves the right to prepare the schedule which will be adhered to by all Prime Contractors. All costs incurred by the Department in preparing the schedule will be assessed to the Prime Contractors on a *pro rata* share (based upon individual Contract price/all Contracts awarded on the Project) by credit change order or at the Department's discretion.
- C. Upon approving an Extension of Time Change Order, the monthly updating of the Project Schedule may result in changes in the dates on which activities and the Project itself are expected to be completed. The process of updating the Project Schedule does not constitute Department approval of requests for Extensions of Time and does not replace the process of seeking extensions in accordance with both the applicable provisions of the General Conditions of the Contract and the Administrative Procedures, both of which will be strictly enforced. To substantiate and support any timely filed requests for Extensions of Time Change Order, the Prime Contractor(s) must submit, through the Lead Contractor, CPM Schedules (based upon the current Project Schedule in effect at the time the Extension of Time Change Order is submitted) with and without the asserted delay. The Prime Contractor(s) must also establish that the delay is justifiable in accordance with the Requests for Extensions of Time Change Order paragraph of these General Conditions. Data drawn from the Project Schedule will also be used by the Department in assessing responsibility for liquidated damages if any Prime Contractor causes an unjustified delay.
- D. The Milestones shall be updated and adjusted within ten (10) calendar days of the Department approving any Prime Contractor an Extension of Time Change Order. If a Recovery Plan that was accepted by the Department requires modification of any future Milestone, the Project Schedule and Milestones must be revised accordingly. The Milestones shall be updated and adjusted each time the Project Schedule is revised so that the two instruments remain coordinated.
- E. Adjusting the Project Schedule through the use of a Recovery Plan does not constitute approval by the Department of any request for an Extension of Time Change Order and does not replace the process of seeking extensions of time in accordance with the Extension of Time Change Order paragraph in this Article of these General Conditions and the Administrative Procedures, which provisions will be strictly enforced. If a Prime Contractor submits a timely filed request for an Extension of Time Change Order, that Prime Contractor must also submit, through the Lead Contractor, a proposed Milestone schedule with and without the asserted delay.

8.17 **DELAYS AND EXTENSIONS OF TIME.** If the Contractor is delayed by:

1. A Critical Activity on the current Progress Schedule that is beyond the control or responsibility of the Contractor; or
2. Labor disputes; or

3. Fire; or
4. Unavoidable casualties; or
5. Delay due to suspension of work, as provided in Article 15 of these General Conditions; or
6. Any cause that the Department determines may justify the delay;

then the Contract Time may be extended by the approval of the Department, through an Extension of Time Change Order, for such reasonable time as the Department may determine. The Department will respond to a Contractor's timely request for extension of time Change Order within thirty (30) calendar days of the Department's receipt of such request.

- 8.18 **UNFAVORABLE WEATHER.** Unfavorable weather, including but not limited to rain, snow, and cold or freezing weather, is not an excuse for stopping Work under the Contract. The Prime Contractor shall use such methods of protection as may be necessary to continue the Work throughout the period of unfavorable weather. If, after using such methods of protection, the Prime Contractor cannot continue, a Request for an Extension of Time Change Order may be submitted in writing for the Department's consideration and if approved it will be excusable and non-compensable.
- 8.19 **EXTENSIONS OF TIME NOT AN ADMISSION OF LIABILITY FOR DELAY.** The approval of an Extension of Time only constitutes a release by the Department of the Department's ability to assess liquidated damages against the Contractor for the number of days granted by the Extension of Time. The Department's approval of an Extension of Time **shall not** be construed or interpreted by any Contractor as an admission that the Department is liable for delay damages. The Contractor agrees that the Department's grant of an Extension of Time will not be used as an admission by the Department of any liability for delay in any subsequent dispute regarding delays. This Paragraph does not preclude either the Contractor's rights or the Department's rights to pursue a claim for damages under other provisions of the Contract Documents.

## **ARTICLE 9: SUBMITTALS and COORDINATION DRAWINGS**

- 9.1 **SUBMITTALS.**
- A. A Submittal Register, which is a listing of the submittals needed for the Project, will be created by the Professional for the Contractor's use. The Contractor will use this Submittal Register when creating their Submittal Schedule. The Professional's Submittal Register shall serve as the basis of the Prime Contractor's Submittal Schedule and is not by any means an all-inclusive list of submittals required for the project. The Contractors are responsible for reviewing all Contract Documents to fully develop an all-inclusive list of required submittals for the project and utilizing that list when creating the Submittal Schedule.
  - B. The Contractor shall review the Professional's Submittal Register and submit all necessary submittals, whether or not listed on the Submittal Register, through the Submittal Process to the Professional for review and approval. The Professional shall then forward all approved submittals to the Department and consultants with the Submittal Schedule
  - C. Submittals shall be in accordance with the Contract Documents and include, but not be limited to, such items as:
    1. Contractor's, Subcontractor's, manufacturer's or fabricator's shop drawings.

2. Descriptive literature including, but not limited to:
    - a. Catalog cuts
    - b. Diagrams
    - c. Operation charts or curves
    - d. Test reports
    - e. Samples
    - f. Operations and maintenance manual, including parts lists
    - g. Certifications
    - h. Warranties
    - i. Manufacturer
  3. Coordination Drawings as required.
- D. The Professional's approval of submittals does not relieve the Contractor of the responsibility for any deviation from the requirements of the Contract Documents, unless:
1. The Contractor has informed the Professional of such deviation in an attachment to their submittal at the time of submission; and
  2. The Contractor has noted the deviation on the shop drawings; and
  3. The Professional has given approval of the specific deviation. The Professional's approval also does not relieve the Contractor from responsibility for errors or omissions in the submittals.
- If each of these three steps is not performed, the Contractor will not be relieved of the responsibility for executing the Work in complete conformity with the Contract Documents, even though the submittals have been approved.**
- Failure to mention a deviation shall be construed as a non-conformance with the Contract Documents. The Contractor shall be responsible for all costs associated with bringing the Work back into conformance with the Contract Documents, including costs incurred by any other Prime Contractor, the Professional and the Department as a result of such non-conformance.**
- E. The Contractor shall review, approve and submit all submittals required by the Contract Documents or required subsequently by the Department or the Professional in accordance with the Submittal Schedule in an orderly sequence so as to cause no delay in its Work or in the Work of any other Prime Contractor. Submittals shall be properly identified as specified in the Administrative Procedures and in such manner as the Department may require.
- F. By approving and submitting submittals, the Contractor represents that such submittals are sufficient for review purposes and that it has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that it has checked and coordinated each submittal with the requirements of the Work and of the Contract Documents. Where field measurements and field construction criteria are not verifiable at the date of the submittal, the Contractor shall ensure that dimensions will be held when constructed.

- G. Submittals will be reviewed and approved within fourteen (14) calendar days of the submission dates established by the Submittal Schedule, unless the Department and the Professional approve a different period of time. The fourteen calendar days span the time from upload of the submittal by the Contractor to the date the Professional transmits the return submittal. The Submittal Schedule shall take transmittal times into account when time periods are reviewed. Review and approval is only for conformance with the design concept of the Project and with the information given in the Contract Documents. Approval of a separate item does not indicate approval of an assembly in which the item functions. Approval of submittals shall be carried out on the Project in accordance with the Administrative Procedures. All submittals must be complete and meet the requirements of the entire specification. The Prime Contractor shall be responsible for all costs associated with delays of the Project incurred as a result of submittal incompleteness and/or disapprovals.
- H. The Contractor shall make any corrections required and shall resubmit submittals until approved. The resubmission shall be acted upon within ten (10) calendar days of its receipt, unless the Department and the Professional approve a different period of time. The ten (10) day period begins on the first full day after the Contractor uploads the resubmission and ends on the date the Professional sends the resubmission to the Contractor. Submittals uploaded earlier than the date established by the Submittal Schedule are not required to be returned until ten (10) days after the date established for the submittal by the Submittal Schedule.
- I. When resubmitting submittals, the Contractor shall direct specific attention to any revisions made, other than the corrections requested by the Professional on previous submissions, by noting such revisions on the resubmissions.
- J. The Professional's approval of shop drawings or samples does not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, unless the Contractor has informed the Professional of such deviation at the time of submission, has noted the deviation on the submittals, and the Professional has given approval of the specific deviation. The Professional's approval also does not relieve the Contractor from responsibility for errors or omissions in the submittals. Failure to mention a variation shall be construed as a non-conformance with the Contract Documents. The Contractor shall be responsible for all costs associated with bringing the Work back into conformance with the Contract Documents, including costs incurred by any other Prime Contractor, the Professional and the Department as a result of such non-conformance.
- K. No portion of the Work requiring a submittal shall be commenced until the submittal has been approved. Any Work commenced by the Contractor prior to final approval of the submittal is performed by the Contractor at its own risk.
- L. Each Contractor shall be responsible for reviewing every other Prime Contractors' approved submittals for consistency and interface with its Work. Any exception taken to the content of another Contractor's approved submittal must be coordinated/resolved between the Contractors within five (5) calendar days of the Contractor's submittal being approved. If the exception cannot be coordinated/resolved, it must be presented to the Professional through the RFI process within ten (10) calendar days of the Contractor's submittal being approved.

9.2 **SUBMITTAL SCHEDULE.**

- A. Each Contractor shall, within seven (7) days of the Effective Date of the Contract review the Professional's Submittal Register and prepare and submit a Submittal Schedule with all necessary submittals, whether or not listed on the Submittal

Register, to the Lead Contractor, organized by related specification section number sequences, showing all items requiring submission.

- B. The Contractor's initial Submittal Schedule shall include the following, at a minimum:
  - 1. Submittal breakdown by Specification Section number and division; and
  - 2. Scheduled date for initial submittal of item; and
  - 3. Days required after return of an approved submittal to order, fabricate and deliver the specific item to the site.
- C. **The Submittal Schedule shall be integrated and tied to the logic of activities in the Project Schedule by the Lead Contractor to ensure adequate review time is included in the activity durations for all items on the Submittal Schedule.**
- D. Each Contractor shall comply with the Submittal Schedule and submit items within the order and dates established therein. Each Contractor shall not be permitted to stack the submittals in a manner that would inundate the Professional in such a manner that the submittals cannot be reviewed and decided upon in a timely manner.
- E. Submittals relating to materials and equipment that require advanced approval shall be scheduled and submitted before the Contractor issues a purchase order or otherwise acquires the materials or equipment.
- F. Drawings of component items forming a system or that are interrelated shall be organized and submitted concurrently. Certifications to be submitted with the drawings shall be so scheduled. The Submittal Schedule shall be coordinated with the Schedule of Values to ensure delivery and payment requests are projected accurately.
- G. Neither the Department, its designee, nor the Professional will be responsible for the failure of the Contractor to properly schedule the process of material/product design, submittal, review, fabrication, delivery and storage/installation.
- H. The Department may require the Contractor to add and/or delete items on the Submittal Schedule at any time.
- I. The approved Submittal Schedule will become a part of the Contract and the Contractors must comply with it. The Contractor shall provide to the Lead Contractor sufficient information to permit the Lead Contractor to revise and/or update the Submittal Schedule monthly to take into account all changes and coordinate this Submittal Schedule with the Project Schedule. Each such revised edition and/or revision to the Submittal Schedule shall be resubmitted to the Department for approval. This Submittal Schedule shall be coordinated with related submittals of all Prime Contractors.

9.3 **COORDINATION AND SEQUENCING OF SUBMITTALS.**

- A. The Contractor shall coordinate preparation and processing of submittals with the performance of the Work and the Project Schedule so the Work will not be delayed by the submittal process.
- B. The Contractor shall coordinate and sequence different categories of submittals for the same Work and for interfacing units of Work, so that one will not be delayed by the coordination of the Professional's review with another.

- C. No delay damages or time extensions will be granted for time lost due to late, inadequate or uncoordinated submittals or for the time required to resubmit late, inadequate or uncoordinated submittals.
- D. The Contractor shall be responsible to determine items that will require long lead time to procure. Adequate time shall be allowed for long lead items that require submittals to be made early during the course of the Work in the Submittal Schedule and Project Schedule.
- E. No delay damages or time extensions will be granted for lack of consideration being given to long lead items.

9.4 **COORDINATION DRAWINGS.**

- A. **All Contractors are required to participate in the creation and updating of one complete composite set of Coordination Drawings to pre-plan the installation of General, HVAC, Electrical, Fire Protection, Plumbing and other Work as required.**
- B. **The Department may consider the completion of Coordination Drawings for each Contract as a condition of approval for any Invoice involving any material or equipment delivered or for any Work by these Contractors.**
- C. The purpose of these Coordination Drawings is to identify coordination problems and interferences prior to installation. The Contractors shall prepare and submit Coordination Drawings for any Work where close coordination is required for installation of products and materials fabricated off-site by separate Contractors, and where limited space availability necessitates maximum utilization of space for efficient installation of different components. Coordination Drawings are required for all equipment rooms, floors, spaces and other areas in which the Work of two or more trades or Contractors is to be installed and in which the potential for conflict or interference exists, or as determined by the Department.
- D. **The HVAC Contractor will be the Lead Contractor for purposes of the Coordination Drawings and shall facilitate the Coordination Drawing Process between Prime Contractors.**
- E. The HVAC Contractor will prepare background drawings that will be distributed to all of the other Contractors for them to mark-up and return to the HVAC Contractor.
- F. The Coordination Drawings shall:
  - 1. Show the Work of all Contractors impacted; and
  - 2. Be drawn to a scale not smaller than 1/4" = 1'-0" (30" x 42" sheet size); and
  - 3. Show clearly in both plan and elevation that all Work can be installed without interference; and
  - 4. Show the interrelationship of equipment and systems to indicate coordination among trades; and
  - 5. Indicate required installation sequences; and
  - 6. Be based on submitted shop drawings and Contract Documents, and include equipment foundations, all equipment, piping, conduit, ductwork, panels, control centers and related appurtenances.

- G. The Department may assist, if requested, in the resolution of conflicts or disputes with locations of Work items found by the Contractors during the preparation of the Coordination Drawings.
- H. The HVAC Contractor will incorporate items indicated on the marked-up drawings onto the background drawings and provide these final Coordination Drawings for other Contractors use. One paper set and one PDF electronic format, in its native software of the Coordination Drawings are to be provided to the Department.
- I. **Since the preparation of Coordination Drawings acceptable to the Department is a contract requirement, the cost is to be included in each Contractor's bid.**

**Any Work installed prior to approval of Coordination Drawings shall be at the Contractor's risk. Subsequent relocation required to avoid interferences shall be made without additional expense or time extensions to the Department.**

- 9.5 **STANDARDS OF QUALITY.** Where trade names, catalog number and manufacturers of material or equipment are specified, they are mentioned for the purpose of establishing a standard of quality, performance, and appearance, and for establishing a standard for competitive bidding. If the Contractor wishes to utilize material or equipment that they believe is of the same type, but manufactured by others than those named in the specifications, the Contractor shall certify that the material or the equipment is equal in quality, performance and appearance to that mentioned in the specifications. The Contractor shall submit to the Professional and the Department, subsequent to the Award of Contract, a request to install such material or equipment. The Contractor's request shall include a comprehensive description of the material or equipment proposed to be utilized as an equal, including engineering, construction, and dimension and performance data. Within thirty (30) days after receipt of the Contractor's request, the Professional will render a determination to the Contractor, which is final. If the Contractor refuses or fails to proceed in accordance with the Professional's determination, the Department may issue cure or non-conformance notices and/or declare the Contractor in default.
- 9.6 **SUBSTITUTION OF MATERIALS.** If the Contractor desires to furnish materials or equipment other than that which is specified, the Contractor shall submit to the Professional a comprehensive description of the material or equipment proposed for substitution, including engineering, construction, dimension, performance and appearance data, along with a statement of the cost involved. The Professional, with the approval of the Department, shall render a determination to the Contractor. If the substituted material or equipment is approved, the Contractor is responsible for any and all costs incurred to implement the substitution and for eliminating any additional time that may be needed as a result of implementing the substitution. If the cost of the substituted item is less than the specified item, the Department is entitled to a credit for the difference between the cost of the substituted item and the item specified.

## **ARTICLE 10: PROTECTION OF PERSON & PROPERTY AND INSURANCE AND INDEMNIFICATION**

- 10.1 **SAFETY PRECAUTIONS AND PROGRAMS.** The Contractor shall recognize that it is important to business to prevent the occurrence of incidents that lead to occupational injuries or illnesses. The Contractor is responsible for initiating, maintaining and supervising all safety precautions and programs required under its portion of the Work.
- 10.2 **SAFETY OVERVIEW.** The Contractor and its subcontractors of all tiers will be responsible for the safety and security of its employees under their control and as to its area of Work.



- A. The Contractor and its Subcontractor(s) of any tier shall be required to have its company Safety Program in place and implemented throughout the duration of the project.
- B. The Contractor will have a Site Safety Program, maintain injury records as required by OSHA. Upon request by the Department, the Contractor shall make available the Site Safety Program, information on injury logs, safety meetings and their topics, inspection reports and other items concerning Project safety.
- C. The Contractor will inform the Department of any Federal or State inspection, and the Department will receive copies of all Federal and State inspection reports, citations, penalties, abatement dates, etc.
- D. All Contractors will give full cooperation to all authorized Inspectors, who may periodically inspect the Project without notice.

10.3 **SAFETY OF PERSONS AND PROPERTY.** The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to:

- A. All employees involved in the Work and all other persons who may be affected thereby; and
- B. All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of its subcontractors of any tier; and
- C. Other property within the Contract Limits or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- D. All areas of the Project site where unauthorized entry or presence would present a potential hazard to the health and safety of trespassers shall be adequately posted to prevent access by unauthorized personnel.

10.4 **COMPLIANCE WITH SAFETY LAWS.** The Contractor shall comply at all times with all applicable Federal, Commonwealth, and local laws, ordinances, rules, regulations and orders of any public authority having jurisdiction for the safety of persons or property and to protect them from damage, injury or loss. The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities until the acceptance of all on-site physical work, change order work, and/or demobilization. All areas of the Project shall be hardhat areas. All persons within the Contract Limits are required to be protected by protective helmets in compliance with Occupational Safety & Health Administration (OSHA) requirements.

10.5 **EMPLOYEE SAFETY ORIENTATION AND SAFETY MEETINGS.**

- A. Each Contractor and its Subcontractor(s) of any tier shall follow OSHA requirements regarding the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment.

- B. The Contractor and each Subcontractor shall also provide a company-specific basic site and safety orientation to each individual before they begin Work on the Project. This orientation shall cover general safety rules, potential hazards, site work rules, wearing of protective equipment, etc. The Contractor and each Subcontractor shall keep a record of all attendees and topics discussed.
- C. The Contractor and each of its subcontractors shall hold weekly Toolbox Talks Meetings at the Project site.

10.6 **FIRST AID TREATMENT.**

- A. The Contractor shall keep on site a first aid kit supplied according to current regulations and shall have a certified person trained in first aid and CPR to cover those periods outside of normal project working hours.

10.7 **PROJECT EQUIPMENT.**

- A. Each Contractor and its Subcontractor(s) of any tier will supply all necessary equipment and take the required precautions to maintain the equipment according to the current regulations and Contract Documents. The Contractor shall accept the responsibility to assure that all of the necessary safety equipment is supplied and used as required.
- B. Each Contractor shall clearly mark its name on each and every piece of its equipment on-site. The name shall be marked in a place on the equipment that is clearly visible.
- C. All tools, saws and mechanical equipment utilized by the Contractor shall have protective safety devices in operating order when using the equipment.

10.8 **EMPLOYEE AND VISITOR DRESS REQUIREMENTS.**

- A. This Project shall be a hardhat Project and, all supervisors, employees and visitors shall be required to wear a suitable hardhat while on the Project site.
- B. Other appropriate personal protective equipment shall be provided and worn as required for personal safety and protection.

10.9 **EMERGENCY NOTIFICATION.** A procedure will be established by each Contractor to provide emergency communications to all individuals on the site. This procedure will not be used to handle routine calls to individuals.

10.10 **COMPLIANCE WITH SAFETY REGULATIONS.**

- A. The Contractor's failure to comply with the safety requirements will be considered as non-compliance with the Contract and may result in remedial action as provided by the Contract.
- B. Even though the Department has no duty regarding the Contractor's compliance with safety regulations, if the Department notifies any Contractor of any safety issue, the Contractor shall make all reasonable efforts to correct the condition or act.

If a Contractor or Subcontractor refuses to correct the safety issue, condition or act, the Department, in its sole discretion, may take any other action it deems appropriate.

All costs incurred due to correcting the Contractor's safety issue, condition, or act shall be borne by the Contractor which created the safety issue, condition or act and costs will be back-charged to this Contractor.

C. Each Contractor shall be responsible for payment of all fines and/or claims for damages levied for deficiencies relating to conduct of Contractor's Work.

- 10.11 **EXPLOSIVES.** Unless permitted in the specifications, the use of explosives and other hazardous materials or equipment is not permitted for the execution of the Work. If explosives are permitted, the Contractor shall observe the utmost care, performing such Work with experienced personnel and in accordance with all Federal, Commonwealth, local, Departmental, and institutional regulations, so as not to endanger life or property. Rock encountered within five (5) feet of pipelines or buildings shall be removed without blasting. All explosives shall be stored in a secure and safe manner, in strict conformity with all Federal, Commonwealth and municipal regulations and all such storage shall be clearly marked "Dangerous-Explosives" and shall be in the care of competent watchmen at all times. The Contractor shall provide insurance in accordance with the special insurance provision in these General Conditions relating to "Blasting". The Contractor shall be responsible for all damages caused by the use of explosives, hazardous materials and/or equipment, and blasting and shall notify the Department of any claims of damage associated with this Paragraph at the time of claim.
- 10.12 **REMEDIATION OF DAMAGES.** The Contractor shall remedy all damages or loss to any property caused in whole or in part by the Contractor, any Subcontractor, any sub-subcontractor, or anyone directly or indirectly employed by any of them. If damage or loss is attributable to faulty drawings or specifications or to the acts or omissions of the Department or Professional, and the damage or loss is not attributable to any fault or negligence of the Contractor, then the Contractor shall not provide remediation.
- 10.13 **LOADS.** The Contractor shall not load or permit any part of the Work to be loaded so as to endanger the safety of persons or property.
- 10.14 **CONTRACTOR'S LIABILITY INSURANCE.** The Contractor, during the progress of the Work and until the acceptance of all on-site physical work, change order work, and/or demobilization, shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations are performed by itself or by any Subcontractor:
1. Claims under Worker's Compensation Disability Benefit and other similar employee benefit Acts; and
  2. Claims for damages because of bodily injury, occupational sickness or disease, or death of its employees, and claims insured by usual personal injury liability coverage; and
  3. Claims for damages because of bodily injury, sickness or disease, or death, of any person other than its employees, and claims insured by usual personal injury liability coverage; and
  4. Claims for damages because of injury to or destruction of tangible property including loss of use resulting therefrom.
- 10.15 **INSURANCE LIMITS.** The insurance required by this Article shall be written for not less than any limits of liability specified in this Article, or required by Law.
- 10.16 **CERTIFICATES OF INSURANCE.** Certificates of Insurance complying to this Article and acceptable to the Department shall be filed with the Department prior to the

commencement of on-site work. These certificates shall contain a provision that coverages afforded under the policies shall not be canceled or changed until at least thirty (30) calendar days notice has been given to the Department. Renewal certificates must be provided to the Department prior to the expiration of the prior policy as stated on the certificate. The insurance certificate shall also name the Commonwealth of Pennsylvania, the Construction Manager, if there is one on the project, and the Professional as additional insureds.

10.17 **COMMERCIAL GENERAL LIABILITY AND PROPERTY DAMAGE LIABILITY INSURANCES.** The Contractor's commercial general liability insurance shall be in an amount not less than \$1,000,000 per occurrence, including accidental death, to any person and subject to the same limit for each occurrence, and in an amount not less than \$2,000,000 in the aggregate. This policy must list general aggregate and completed operations aggregate. This policy shall not have any exclusion for explosion, underground, or collapse (XC&U). The Contractor's property damage liability insurance shall be in an amount not less than \$2,000,000 for each occurrence.

A. For Subcontractors, the Contractor shall either:

1. Require each of its Subcontractors to procure and to maintain Subcontractors' commercial general liability, automobile liability, and property damage liability insurance of the type and in the same amounts as specified in this subsection for the life of its subcontract and/or until the acceptance of all of its on-site physical work, change order work, and/or demobilization;

**OR**

2. Insure the activity of its Subcontractors in its own policy.

B. If required by a Special Condition, by law, or the Contractor deems necessary, the Contractor's and its Subcontractors' liability insurance shall include additional riders providing for adequate protection against the indicated special hazards (e.g., blasting, flooding, underpinnings, pollution, etc.).

C. The Contractor must submit to the Department, within ten (10) calendar days from the Initial Job Conference, and prior to the beginning of on-site work, the subcontractor's and sub-subcontractor's certificates of insurance which name the Commonwealth of Pennsylvania and Commonwealth Agency as an additional insured.

10.18 **PROPERTY INSURANCE.** The Contractor shall, until all physical on-site work is complete, including change order work, punch list work, demobilization or seasonal work, maintain insurance on all insurable work included in the Contract against loss or damage by fire and lightning and those perils covered by the extended coverage endorsement. Insurable work includes work both interior and exterior of any building being constructed. The property insurance must include a Builder's Risk Policy or an installation floater that covers all risks and must have policy limits which meet the full insurable value of the interests of the Commonwealth of Pennsylvania and the Department. The Contractor and all subcontractors are required to produce certificates of insurance, naming the Commonwealth of Pennsylvania and Commonwealth Agency as an additional insured.

10.19 **COMMERCIAL AUTOMOBILE LIABILITY INSURANCE.** The Contractor's Commercial Automobile Liability Insurance shall be in an amount not less than a \$1,000,000 Combined Single Limit (CSL) or in the alternative, provided that there is not Commercial Automobile Policy, then a separate limit under the General Liability Policy providing for \$1,000,000 Non-Owned and Hired liability.

- 10.20 **UNMANNED AIRCRAFT SYSTEMS/UNMANNED AERIAL VEHICLES/DRONES INSURANCE.** The Contractor, if it chooses to use such a drone device, shall have, or its Subcontractor shall have, specific UAS/UAV/Drone insurance and shall adhere to all Federal Aviation Administration (FAA) regulations and all Federal, State, and Local laws, ordinances, and regulations regarding their use on the Project site. The Contractor shall notify the Department of its intended use of this device and provide the insurance certificate to the Department prior to its use. The Contractor shall be responsible for all damages caused by the use of these devices and shall notify the Department of any claims of damage associated with this Paragraph at the time of claim.
- 10.21 **RISK TO CONSTRUCTION WORK.** The risk of damage to the construction work is that of the Contractor and surety. No claims for such loss or damage will be recognized by the Department, nor will such loss or damage excuse the complete and satisfactory performance of the Contract by the Contractor.
- 10.22 **UNACCEPTABLE SURETY OR INSURANCE COMPANY.** If the surety on the bonds or the insurance company providing the required coverage becomes unsatisfactory to the Department, the Contractor must promptly furnish such additional security or insurance coverage as may be required to protect the interest of the Department. The Contractor shall furnish the Department, when requested, satisfactory proof of coverage of each type of Bond and/or insurance required. Failure to comply with this provision shall result in the cessation of the Work, and shall be sufficient grounds to withhold any further payments due the Contractor and/or to declare the Contractor in default. The Department will not consider any claim for an Extension of Time, costs, or damages because of time lost due to such instance brought by the noncompliant Contractor. The noncompliant Contractor shall be responsible for damages incurred by other Prime Contractors in accordance with these General Conditions.
- 10.23 **INDEMNIFICATION.** The Contractor shall indemnify and hold harmless the Commonwealth, Department, and the Professional and their agents and employees from and against all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense is:
- A. Attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property, including the loss of use resulting therefrom; and
  - B. Caused in whole or in part by any negligent act or omission of the Contractor or any Subcontractor, regardless of whether or not it is caused in part by a party indemnified hereunder.
- 10.24 **INDEMNIFICATION NOT LIMITED BY EMPLOYEE BENEFITS ACTS.** In any and all claims against the Commonwealth, Department, or the Professional or any of their agents or employees, by any employee of the Contractor or any Subcontractor, the indemnification obligations under this Article shall not be limited on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under Worker's Compensation Acts, Disability Benefit Acts, or other employee benefit Acts.
- 10.25 **INDEMNIFICATION DOES NOT COVER THE CONSTRUCTION MANAGER'S OR THE PROFESSIONAL'S ACTIONS.** The obligations of the Contractor under this Article shall not extend to the liability of the Construction Manager (if retained for the Project) or the Professional, the Professional's consultants, agents, or employees arising out of:
- A. The preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or

- B. The giving of, or the failure to give, directions or instructions by the Professional, its agents or employees, provided such giving, or failure to give, is the primary cause of the injury or damages.

10.26 **WORKPLACE DRUG AND ALCOHOL POLICY.** The Department is committed to providing a safe workplace for the workers assigned to the Project, promoting high standards of employee health and fostering productivity. Contractor shall establish a drug and alcohol policy for the project with the goal of maintaining a work environment that is free from the effects of the use of illegal drugs and alcohol. Anyone employed at the Project site will comply with the contractor's drug and alcohol policy.

The Department reserves the right to amend this procedure upon notice to the Prime Contractor.

- A. **COMPLIANCE PROCEDURE:** The Department reserves the right to audit any drug and alcohol policy program required by this specification to verify compliance results within twenty-four (24) hours of the Department's notification of intent to audit. The Department shall have free right of access to all relevant records of the Prime Contractor and their subcontractors for this purpose, provided such record disclosures are within the scope of the Commonwealth of Pennsylvania's Department of Health and Human Services guidelines pertaining to confidentiality of employee records.

The Contractor's pre-engagement employees who receive a positive test result shall immediately leave the project site. Transportation of employees receiving a positive test result is the direct responsibility of the employing Prime Contractor. Furthermore, pre-engagement employees receiving a positive test result shall not be permitted to return to the project site earlier than ninety (90) days from the date of the positive test. At that time, the employee must be tested again.

## **ARTICLE 11: CHANGES IN THE WORK**

11.1 **CHANGES.** The Department, without invalidating the Contract, may direct changes in the Work within the general scope of the Contract, consisting of additions, deletions or other revisions. All such changes in the Work will be authorized by Change Order or Field Order.

- A. **The Contractor agrees that payment under any method noted within this Article will be the exclusive compensation for such addition, deletion, or other revision to the original Contract, including any and all costs associated with acceleration, stacking and re-sequencing of forces required by the change in order to maintain the Project Schedule.**
- B. If it is not possible to complete the Work in accordance with the Project Schedule by acceleration, stacking or re-sequencing, the Contractor may request an Extension of Time. Adequate information and proper form submission must be provided to validate this request. The Department reserves the right to deny requests not accompanied by adequate information and proper form submissions.
- C. The language in this Article must be construed in conjunction with the detailed language of the Administrative Procedures.

11.2 **COST OF CHANGE ORDER.** The debit or credit cost to the Department resulting from a change in the Work shall be determined in accordance with the Change Order Administrative Procedure as determined by the Department.

- 11.3 **DISAGREEMENT AS TO COST OR CREDIT FOR CHANGE ORDER.** If the Department and the Contractor cannot agree as to the cost or credit to the Department resulting from a change in the Work, the Department shall determine the cost or credit. The Contractor **must** proceed with the Change Order work under this Article if directed to do so by the Department. The Contractor may submit any dispute for cost to the Department in accordance with the Dispute Resolution Article of these General Conditions. The Department may, in the Department's sole discretion, monitor any or all disputed cost work on a time and material force account basis. If the Department approves the change as a force account Change Order, the Contractor would be required to show proof of incurred cost as stipulated under the provisions of Change Order Administrative Procedure.
- 11.4 **UNIT PRICES SET OUT IN BID OR PROPOSAL.** This paragraph shall not be invoked without the Department's approval. If unit prices were required in the Contract Documents and subsequently agreed upon, and, if the quantities originally contemplated increased in excess of 125% or decreased below 75% of the original contract quantity, the applicable unit prices may be equitably adjusted by Change Order to prevent such hardship, at the sole discretion of the Department. The Contractor must provide evidence that is acceptable to the Department that a hardship exists before an adjustment will be made.
- 11.5 **UNCLASSIFIED EXCAVATION.**
- A. Excavation, if required for this Project, will be unclassified and will include all types of earth and soil, any pebbles, boulders, and bedrock, municipal trash, rubbish and garbage, and all types of debris of the construction industry such as wood, stone, concrete, plaster, brick, mortar, steel and iron shapes, pipe, wire asphaltic materials, paper and glass. Unclassified excavation does not include unforeseen concrete foundations, walls, or slabs.
  - B. All materials encountered which are identified as described in the previous paragraph as unclassified shall be removed to the required widths and depths to create a finished product as shown and/or noted on the drawings and as written in the specifications. No additional compensation or time shall be given to the Contractor for this unclassified excavation.
  - C. Any unclassified items described in paragraphs B and C above that are discovered during any excavation are not concealed conditions or unknown physical conditions below the surface for purposes of the Concealed Conditions paragraph of these General Conditions.
- 11.6 **CONCEALED CONDITIONS.**
- A. The Department recognizes two types of concealed conditions which might be encountered during the performance of the Work, namely:
    - 1. Concealed conditions which are unascertainable from the plans, Contract Documents, visits to the site, or reasonable investigation, and which are at variance with the conditions indicated by the Contract Documents; or
    - 2. Unknown physical conditions below the surface of the ground of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract.

- B. The Contractor has twenty-four (24) hours after the first observance of the concealed condition to provide notice to the Department.
  - C. If the Department decides that either of the two concealed conditions described above in (A) has occurred during construction, then the Contract Sum shall be equitably adjusted by Change Order. No adjustment shall be made to the Contract Sum under this paragraph, however, for concealed conditions encountered during cutting and patching of Work.
  - D. In the event that concealed or unknown conditions described above in (A) preclude either the Contractor or the Department from establishing either a methodology or a quantity of work to be priced into a Change Order before commencement and performance of Work, the Department reserves the right to do any of the following:
    - 1. If only the quantity of Work is unknown, the Department may issue a Change Order to perform work in a quantity established by the Department. The Department will monitor the actual quantities and, upon completion of the Work, issue a second Change Order to adjust the original quantity.
    - 2. If the Department deems that either the methodology and/or scope of the Change Order are indeterminable, the Department may issue an exploratory Change Order to determine the appropriate methodology and scope before issuing a follow-up Change Order to complete the Work. If the Department determines, after review of the results of the exploratory Change Order, that this Change Order was not successful in establishing the methodology or scope of work, the Department may opt for performing and monitoring the entire Change Order Work on a time and material force account basis. If the Department decides to proceed in this manner, the Contractor will be required to show proof of incurred cost as stipulated under the provisions of Change Order Administrative Procedure.
- 11.7 **NO CLAIMS FOR ADDITIONAL COST OR TIME.** No claims for increased costs, charges, expenses, or damages of any kind, except as provided in the General Conditions, shall be made by the Contractor against the Department for any delays or hindrances from any cause whatsoever, including, but not limited to, strikes, walkouts or work stoppages during the progress of any portion of the Work. The Department may, however, address such non-compensable delays by extending the time for completion of the Work, as provided in the Contract, which extensions shall constitute the exclusive remedy between the parties.
- 11.8 **MINOR CHANGES IN THE WORK.** The Department may direct minor changes in the Work (such as minor relocations or field revisions) that the Department and the Contractor mutually agree do not involve an adjustment in the Contract Sum or an extension of the Contract time and which are not inconsistent with the intent of the Contract Documents. Such changes may only be enacted by no cost Change Order, or by other order. Such changes are binding on the Department and the Contractor. The Contractor shall carry out such no cost Change Orders promptly.
- 11.9 **DIRECTIVE TO COMMENCE CHANGE ORDER WORK.** The Department may direct the Contractor to commence Change Order Work prior to a fully executed Change Order. Such direction will not be given until the Department generates the scope and confirms that funding is available to complete the Change Order Work. The Contractor shall proceed immediately upon the Department's notification of the directive to the Contractor.

## **ARTICLE 12: NON-CONFORMING WORK AND CORRECTIONS**



- 12.1 **WORK COVERED CONTRARY TO REQUEST.** If any Work is covered contrary to the request of the Department or the Professional, the Work must, if required by the Department or the Professional, be uncovered for observation and replaced, at the Contractor's expense with no Extension of Time.
- 12.2 **UNCOVERING OF WORK.** If any Work has been covered which the Department, its designee or the Professional has not specifically requested to observe prior to being covered, the Department or Professional may request to see such Work and the Work shall be promptly uncovered by the Contractor.
- A. If such Work is found to be in accordance with the Contract Documents, the cost of uncovering and replacement shall be charged to the Department by appropriate Change Order.
- B. If such Work is found to be not in accordance with the Contract Documents, the Contractor shall pay costs to make the Work conform and the cost of replacement, unless it is found that this condition was caused by another Prime Contractor. In that event, the Department shall pay the Contractor for such costs and will issue a credit Change Order for such costs from the responsible Prime Contractor(s).
- 12.3 **CORRECTION OF WORK REJECTED BY THE DEPARTMENT.** The Contractor shall promptly correct all Work rejected by the Department, its designee or the Professional as defective or as failing to conform to the Contract Documents. The correction must be implemented regardless of when such Work is observed and whether or not the Work was fabricated, installed or completed or whether such Work had been paid for by the Department. The Contractor shall bear all costs of correcting such rejected Work, including the cost of the Professional's additional services and any additional cost incurred by the Department and/or any other agency.
- 12.4 **CORRECTION OF WORK AFTER ACCEPTANCE.** If, after the date of Final Inspection and acceptance of all Work performed under the Contract, any of the Work is found to be defective or nonconforming, the Contractor shall correct such Work promptly after receipt of a notice from the Department, unless the Department has previously given the Contractor an acceptance of this specific condition. The Department should give such notice of rejection promptly after discovery of the condition. Approval or payment of an Invoice by the Department shall not constitute acceptance.
- 12.5 **CORRECTION AT NO COST TO THE DEPARTMENT.** All defective or nonconforming Work shall be promptly removed from the site, and the Work shall be corrected to comply with the Contract Documents without cost to the Department.
- 12.6 **COST OF DAMAGE TO OTHER CONTRACTORS' WORK.** The Contractor shall bear the cost of replacing all Work of any other Prime Contractor that is destroyed or damaged by the removal and/or correction of the Contractor's defective or non-conforming Work.
- 12.7 **FAILURE TO CORRECT DEFECTIVE OR NON-CONFORMING WORK.** If the Contractor does not remove such defective or nonconforming Work within the time set forth by the Department, the Department may have the defective or nonconforming Work removed, implement any corrective work by any means necessary, and issue a credit change order to the offending Contractor for all costs associated with the correction. Failure to correct defective or non-conforming work as directed by the Department may be cause for default and/or breach of contract.
- 12.8 **INVESTIGATION BY THE DEPARTMENT.** The Department reserves the right, upon investigation of installation of defective and/or nonconforming Work, to note this situation

in the Contractor Responsibility Program and may consider suspension of the Contractor in accordance with Section 531 of the Commonwealth Procurement Code. The Department may also, in its sole discretion, find the Prime Contractor in breach of its Contract and/or declare the Contractor in default of its Contract in accordance with the Termination Article of these General Conditions.

- 12.9 **ACCEPTANCE OF NONCONFORMING WORK.** If the Department knowingly elects to accept nonconforming work, it may do so instead of requiring its removal and correction. If nonconforming work is accepted, a credit Change Order shall be issued to reflect an appropriate reduction in the Contract Sum, or, if the amount is determined after final payment, it shall be paid by the Contractor and/or the Contractor's surety.
- 12.10 **DEPARTMENT'S RIGHT TO CARRY OUT THE WORK.** If the Contractor fails to carry out the Work in accordance with the Contract Documents or fails to perform any provision of the Contract, the Department may, after **three (3) days** notice to the Contractor and without prejudice to any other remedy, carry out the Work in accordance with the Contract Documents, or correct such failures, defects, or non-conforming work. In such case, an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of carrying out the Work or correcting such failures, including the cost of the Department's designee and the Professional's additional services made necessary by such failure. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor and/or the Contractor's Surety shall pay the difference to the Department.
- 12.11 **OBLIGATIONS OF CONTRACTOR NOT LIMITED BY THIS ARTICLE.** The obligations of the Contractor under this Article are in addition to, and not in limitation of, any obligations imposed upon the Contractor by the Contract Documents or otherwise prescribed by Law.

## **ARTICLE 13: PAYMENTS AND COMPLETION**

- 13.1 **SCHEDULE OF VALUES.**
- A. The language in this Article must be construed in conjunction with the detailed language of the applicable Administrative Procedure.
- B. Within forty five (45) days of the Effective Date of the Contract and prior to the first Invoice, the Contractor shall submit for the Department's and the Professional's approval, a detailed Schedule of Values, indicating values for line-items of the Work. The Schedule of Values must provide the aggregate total Contract sum, divided to facilitate payments to Subcontractors. The Schedule of Values shall be prepared and supported by such data required by the Department to substantiate its correctness in accordance with the following:
1. Each item in the Schedule of Values shall include its proper share of overhead and profit.
  2. When more than one building or structure is included in the Contract, the Contractor shall submit a Schedule of Values, indicating Unit Prices for all items of Work within the separate buildings, separate floor levels, site work and/or structures, or as deemed acceptable by the Department.
- C. This Schedule of Values, when accepted by the Department, will be used as a basis for the Contractor's invoices. This breakdown may also be used by the Department to

determine the cost or credit to the Department resulting from the changes in the Work.

13.2 **INVOICE FOR PROGRESS PAYMENTS.**

- A. During the progress of the Work, the Contractor shall submit invoices of the value of the Work performed to the Department. All invoices shall be supported by data, as required by the Department, substantiating the Contractor's right to payment. The Professional and the Department will review and accept the invoice for validity.
- B. **STORED MATERIALS:** If upon the determination of the Department as to reasonableness, payments for stored material which is scheduled to be installed more than forty-five (45) days from request for payment are to be made to the Contractor on account of materials or equipment which are not yet incorporated in the Work, but are delivered and suitably stored in an appropriate facility or at the site. Such payments shall be conditioned upon submission by the Contractor of Bills of Sale forms provided by the Department to establish the Department's title to such materials or equipment. The Contractor shall remain responsible for all losses of materials and equipment that remain under its custody and control, regardless of the exclusions in insurance policies. Warranties do not begin until the date of final acceptance.

13.3 **CONTRACTOR WARRANTS TITLE TO ALL WORK PASSES FREE OF LIENS.** The Contractor warrants and guarantees that title to all work, materials and equipment covered by an Invoice, whether incorporated in the Project or not, will pass to the Department upon final acceptance by the Department. The title shall be free and clear of all liens, claims, security interests or encumbrances (hereinafter referred to in this Article as "liens"). The Contractor further guarantees that no work, materials or equipment covered by an Invoice was acquired by the Contractor, its employees, its Suppliers or its Subcontractors subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor, its employees, its Suppliers or its Subcontractors.

13.4 **NEITHER PAYMENT NOR OCCUPANCY CONSTITUTES ACCEPTANCE OF WORK NOT IN CONFORMANCE WITH CONTRACT DOCUMENTS.** Under no circumstances will any of the following occurrences constitute an acceptance of any Work not in accordance with the Contract Documents:

- 1. An approval of an application for a progress payment; or
- 2. Full or partial payment to the Contractor of any progress payment; or
- 3. Partial or entire use or occupancy of the Project by the Client Entity.

13.5 **PAYMENTS WITHHELD.**

- A. The Department may decline to approve an Invoice in whole or in part if the Work has not progressed to the point indicated, or the quality and quantity of the Work is not in accordance with the Contract Documents. The Department and Professional may also decline to approve any Invoice, because of subsequently discovered evidence or subsequent inspections, which may nullify the whole or any part of any Invoice previously issued to such extent as may be necessary in their opinion to protect the Department from loss because of deficiency items, including but not limited to:
  - 1. Defective/non-conforming work not remedied; or

2. Third party claims filed with reasonable evidence and costs by other Prime Contractors; or
  3. Damages to another Prime Contractor; or
  4. Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Sum; or
  5. Reasonable indication that the Work will not be completed within the contract time; or
  6. Unsatisfactory prosecution of the Work by the Contractor, or
  7. Failure of the Contractor to maintain insurance, or
  8. Failure of the Contractor to properly submit the required administrative submittals.
- B. If the Department withholds payment from the Contractor for any of the aforementioned reasons, the Department will provide notification to the Contractor of the reason for withholding payment within fifteen (15) days of the Department's receipt of the Invoice.

The Contractor may withhold payment from a Subcontractor, Supplier, or Manufacturer responsible for the defective/non-conforming item. If payment is withheld from the Subcontractor, Supplier, or Manufacturer for such defective/non-conforming item, the Contractor must notify the Subcontractor, Supplier, or Manufacturer and the Department (including the Construction Manager if applicable) of the reason for the withholding within 15 days of the date after the Contractor receives the notice of defective/non-conforming item from the Department.

- 13.6 **PAYMENT MADE WHEN GROUNDS ARE RESOLVED.** When issues for withholding payments are resolved to the Department's satisfaction, payment shall resume or be made to the Contractor for the amounts withheld. The grounds for withholding payment shall be considered resolved upon the Department's issuance of a notice indicating that the issue has been resolved.
- 13.7 **RETAINAGE.** The Department may retain a portion of the amount due the Contractor to ensure the proper performance of the Contract. In computing the amount payable in accordance with this Article on any current Invoice:
- A. **The Department may deduct and retain up to six percent (6%) of the then total invoices until fifty percent (50%) of the Work has been satisfactorily physically completed as determined by the Department. Satisfactory completion includes compliance with the Contract Documents, and meeting all Contract obligations.**
  - B. After fifty percent of the Contractor's Work is physically complete, the sum withheld by the Department shall not exceed three percent (3%) of the original Contract Sum. All money retained by the Department may be withheld from the Contractor until Substantial Completion of its Work.
  - C. In the absence of sufficient reason, within 20 days of the receipt of retainage payment to the Contractor, the Contractor shall pay all subcontractors with which it has contracted their earned share of the payment the Contractor received.
- 13.8 **MONEY WITHHELD DUE TO CLAIMS OF ONE PRIME BASED ON DELAY OF ANOTHER CONTRACTOR.** In the event a dispute arises between Prime Contractors based upon increased costs claimed by one Prime Contractor occasioned by delays or other actions

of another Prime Contractor, the Department may, upon receipt of evidence of actual or imminent damages, withhold the amount of such damages from the Prime Contractor causing the claim. This amount shall be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless the Prime Contractor causing the additional claim furnishes a Bond satisfactory to the Department to indemnify the Department against the claim.

13.9 **DEPARTMENT DOES NOT MAKE PAYMENT.** If the Department fails to make payment to the Contractor within forty-five (45) days after receipt of an acceptable Invoice, the Contractor may file a claim for interest. No interest penalty payment shall be paid, however, if payment is made on or before the fifteenth (15<sup>th</sup>) calendar day after the payment due date. The Contractor is not entitled to stop work in any event, unless the Department exercises its right to suspend the work, as provided in these General Conditions. According to 62 Pa. C.S. §3938, as amended, this failure to pay provision shall not apply if:

- A. The General Assembly failed to enact a budget for the fiscal year of payment; or
- B. The General Assembly failed to enact an operating budget for the fiscal year of payment or a capital budget for the capital project; or
- C. The Federal, State, or local government failed to pay funds designated or to be designated for the specific project.

13.10 **WORK CANNOT BE COMPLETED THROUGH NO FAULT OF CONTRACTOR.** If, after Final Inspection, items of Work cannot be completed because of any of the following conditions:

- A. Unseasonable considerations, such as bituminous paving, landscaping, etc.; or
- B. The Department agrees that particular items need not be completed until a subsequent date; or
- C. The Department delays the approval of the Final Invoice for any unreasonable length of time, (reasonableness shall be determined by the Professional and the Department)

the Department may agree to release partial payment of the remaining Contract balance to the Contractor. This payment shall be calculated by deducting one and one-half (1-1/2) times the dollar value of items on the punch list from the remaining Contract balance.

13.11 **Final Payment Not Due Until Conditions Met.** Neither the final payment nor the remaining retained percentage (if any) becomes due until the Contractor submits to the Department:

- A. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the Department might in any way be responsible, have been paid or otherwise satisfied by the Contractor; and
- B. Statements from the Contractor's Surety Company and the Contractor's certificate on forms satisfactory to the Department as to Contractor's payment of all claims for labor, materials, equipment rentals and public utility services; and

- C. If required by the Department, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as is designated by the Department.

If any Subcontractor refuses to furnish a release or waiver, as required by the Department, the Contractor may furnish a Bond satisfactory to the Department to indemnify the Department against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Department all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees.

- 13.12 **RELEASE OF FUNDS IF DELAY IN FINAL INSPECTION NOT DUE TO THE CONTRACTOR'S FAULT.** If Final Inspection is materially delayed through no fault of the Contractor, the Department shall, upon certification by the Professional, make payment of the balance due for that portion of the Work fully completed and accepted by the Department. Such payment will not terminate the contract. If the remaining balance of Work not fully completed or corrected is less than the retainage, and, if performance and payment bonds have been furnished as required, the Contractor must submit to the Department, prior to certification of the payment, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted by the Department. Such payment shall be made under the terms and conditions governing final payment, except that it does not constitute a waiver of any of the Department's claims against the Contractor.
- 13.13 **FINAL PAYMENT AS WAIVER OF CLAIMS.** The making of final payment constitutes a waiver of all claims by the Department, **except** those arising from:
  - A. Unsettled claims;
  - B. Faulty, nonconforming or defective work or material;
  - C. Failure of the work or material to comply with the requirements of the Contract Documents; or
  - D. Terms of any special warranties and/or special guarantees required by the Contract Documents.
- 13.14 **ACCEPTANCE OF FINAL PAYMENT AS WAIVER OF CLAIMS.** The acceptance of final payment by the Contractor constitutes a waiver of all claims by the Contractor against the Department.

## **ARTICLE 14: PROJECT CLOSEOUT**

- 14.1. **CLOSEOUT GENERALLY.** Project closeout consists of a Final Inspection which is deemed to be a significant activity considered to be a Project Milestone. During the Final Inspection, a Punch List of incomplete Work will be generated as discussed below. The Contractor must complete all Punch List items within 30 calendar days after Final Inspection. It is the Contractor's responsibility to request Final Inspection and the Professional's and Department's responsibility to determine if the Work is substantially complete for Final Inspection to occur.
- 14.2. **FINAL INSPECTION.**
  - A. A determination of substantial completion will occur within five (5) days from the request by the Contractor to the Department for a Final Inspection and an application for final payment. If the work is determined to be at substantial completion, the Final

Inspection shall be conducted within ten (10) days by the Department and the Professional. The Contractor or its authorized representative must be present throughout the duration of the Final Inspection.

1. The Department has the sole authority, in light of the Project's Scope of Work, to determine whether parts or the whole of the Project are ready for a Final Inspection.
- B. If the Work is determined to be at substantial completion, the Professional shall issue a certificate of completion and a final certificate for payment. In such case, the Professional shall produce and deliver to the Contractor, at Final Inspection, a list of uncompleted items and a reasonable cost of completion (Punch List).
1. The Contractor shall complete all Punch List items within thirty (30) calendar days of Final Inspection or show just cause to the satisfaction of the Professional and the Department why they cannot be completed. If satisfactory just cause is not shown, the Department may proceed under Article 12.10 Department's Right To Carry Out The Work.
  2. The Department will make payment in full within 45 days of the submission of the accepted final application except as set out in this Article, less one and one-half times the amount required to complete any then-remaining uncompleted minor items, which amount shall be certified by the Professional. Payment of any amount withheld for the completion of the Punch List shall be paid upon completion of the items in the Certificate.

## **ARTICLE 15: SUSPENSION**

- 15.1. **SUSPENSION OF WORK DUE TO UNFAVORABLE CONDITIONS OR WEATHER.** If, in the judgment of the Department, the Contractor takes undue risk of damage to any part of the Project, including, but not limited to, soil compaction, foundation excavation, concrete placement or any exterior building construction by proceeding with the Work during unfavorable weather or other conditions (not relating to the fault of the Contractor or the convenience of the Department), the Department may issue a notice of a temporary suspension of the Work for either the whole Contract or any part of the Contract, for such temporary period as the Department deems necessary. If the temporary suspension is due to unfavorable weather, the suspension may span the time period (days, weeks or months) encompassed by the unfavorable weather. In case of such suspension under this paragraph, a proper Extension of Time will be allowed for this excusable, non-compensatory delay, and the Contractor may not submit any claim for any expense or damages resulting from the suspension. The failure of the Department to suspend the Work does not relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents.
- 15.2. **SUSPENSION OF WORK DUE TO FAULT OF CONTRACTOR.** If the Contractor fails to comply with the orders of the Department, the Professional or the Construction Manager relative to any particular parts of the Work, the Department may issue a notice of a temporary suspension of the Work for either the whole Contract or any part of the Contract until the orders respecting the particular parts are complied with by the Contractor. In case of this type of suspension, which shall be considered due to the fault of the Contractor, no Extension of Time shall be given and the Contractor may not submit any claim for any expenses incurred by the Contractor during the suspension period. Further, the

Contractor may be liable for any and all damages incurred by other Prime Contractors due to the Contractor's actions.

- 15.3. **SUSPENSION OF WORK FOR THE CONVENIENCE OF THE DEPARTMENT.** The Department, may issue a notice of a temporary suspension of the Work for the convenience of the Department for either the whole Contract or any part of the Contract for such period of time as the Department may determine to be appropriate. This Paragraph does not apply to suspensions due to unfavorable weather or to suspensions due to Contractor's fault.
- A. If the performance of all or any part of the Work is suspended by the Department, for an excessive period of time under this paragraph, an adjustment shall be made for any increase in the cost of performance of this Contract (excluding profit) necessarily caused by such excessive suspension. The Contract Sum shall be modified accordingly. The Department will not pay any costs under this paragraph to the extent:
1. Performance would have been concurrently suspended by any other cause, including weather, or the fault or negligence of the Contractor; or
  2. An equitable adjustment for the time period encompassed within the suspension has been provided for or excluded under any other provision of this Contract.
- B. No claim for damages allegedly incurred under this paragraph shall be submitted under the Dispute Resolution Article unless the claim, in an amount stated, is asserted within six months after the date of the Department's letter terminating the suspension.
- 15.4. **RESUMPTION OF WORK.** When the Department directs resumption of the Work under this Article, the Contractor shall resume full operations within ten (10) days after the date of the Department's letter terminating the suspension. The Department is not liable for any damages or anticipated profits on account of the Work being suspended, except as described in the Paragraph entitled Suspension of Work for Convenience of the Department. Suspensions of Work as outlined in this Article shall not automatically extend the Contract Completion Date. A request for an Extension of Time may be submitted by the Contractor, setting forth its reasons for the extension, which the Department will review in accordance with the Administrative Procedures governing Extensions of Time.

## **ARTICLE 16: TERMINATION OF CONTRACT**

- 16.1. **TERMINATION FOR THE CONVENIENCE OF THE DEPARTMENT.** The Department, may, at any time and for any reason, terminate this Contract. In such case, the Contractor shall be paid (and shall accept payment) for that portion of the entire Contract actually performed satisfactorily as of the date of termination. Termination costs shall not include any loss of anticipated profits. Disputes as to the sum payable to the Contractor shall be settled in accordance with the provisions of the Dispute Article of these General Conditions of the Contract.
- 16.2. **EFFECT OF TERMINATION FOR THE CONVENIENCE OF THE DEPARTMENT.** A termination for the convenience of the Department, shall be effective in the manner and at the time specified in such notice and shall be without prejudice to any claims which the Department may have against the Contractor. Upon receipt of such notice from the Department, the Contractor shall immediately discontinue all Work and the placing of all orders for materials and equipment, facilities and supplies in connection with the performance of this Contract. The Contractor shall promptly cancel all existing orders and terminate Work under all subcontracts so far as such orders and Work are chargeable to this Contract.



The Contractor shall take such measures for the protection of the property of the Department, as may be directed by the Department. Upon termination of this Contract, as provided by this paragraph, full and complete adjustment and payment of all amounts due the Contractor arising out of this Contract as determined by an audit conducted by or for the Department, as soon as practicable after such termination shall be made as follows:

- A. The Department shall reimburse the Contractor for all costs incurred to date of termination, including reasonable overhead and expense for plant, made in the performance of this Contract, less amounts previously paid.
- B. The Department shall also reimburse the Contractor for all costs to which the Contractor has been subjected or is legally liable due to the termination of this Contract, including reasonable costs related to cancellation of orders, termination of subcontracts, etc.
- C. The Department shall also reimburse the Contractor for the reasonable cost of providing protection of the property of the Department as directed by the termination letter.
- D. The sum total of the payments made under this paragraph shall not exceed the total amount of the Contract, less payment previously made.
- E. Title to all property accruing to the Department, by reason of the termination of this Contract shall immediately vest in the Department and the Contractor will execute and deliver all papers necessary to transfer title to the Department.
- F. Coincident with making final payment, the Contractor shall furnish the Department, with a final release as provided in the Contract.
- G. The Department shall be afforded full access to all books, correspondence, data and papers of the Contractor relating to this Contract in order to determine the amount due.

16.3. **CONTRACTOR'S DEFAULT.** If the Contractor:

- A. Persistently or repeatedly refuses or fails to supply sufficient properly skilled workmen or proper materials;
- B. Persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction over the Project;
- C. Fails to proceed as directed by the Department;
- D. Performs the Work unsuitably;
- E. Refuses or fails to remove materials or replace rejected or non-conforming Work;
- F. Discontinues the prosecution of the Work without approval of the Department; or
- G. Otherwise breaches any material provision of this Contract,

then the Department, may, without prejudice to any of its other rights or remedies, give the Contractor and its Surety notice that the Contractor has seven (7) days from the date of the Department's letter to cure the default. If the Contractor fails to cure the default

within the specified time, the Department may terminate the Contract between the Department and the Contractor and may take possession of the site and of all materials and equipment, which has been paid for by the Department as of the date of termination. The Department may finish the Work by whatever method the Department may deem expedient. Upon termination, the Contractor is not entitled to receive any further payment until the Work is finished, at which time the Contractor shall be paid any excess remaining, in accordance with the Unpaid Contract Balance Paragraph below. The discretion to declare the Contractor in default rests solely with the Department. No party, whether bound by Contract to the Department or attempting to raise a third party relationship, which this Contract specifically precludes, may state a cause of action against the Department alleging the failure of the Department to exercise its discretion to terminate the Contractor.

- 16.4. **UNPAID CONTRACT BALANCE.** If after the Department defaults/terminates the Contractor, the unpaid balance of the Contract sum exceeds the cost of finishing the Work, including compensation for any Construction Manager's or Professional's Additional Services and any other damages that the Department has incurred in accordance with the Contract, such excess shall be paid to the Surety. If such costs exceed the unpaid balance, the Contractor or the surety or both shall pay the difference to the Department.
- 16.5. **SURETY REPLACEMENT OF CONTRACTOR.** If the Department defaults/terminates the Contractor, the surety will have thirty (30) days from the date of the termination letter to replace the terminated Contractor with a Completion Contractor that is acceptable to the Department. Any delay or other claims attributable to the termination of the Contractor by other prime contractors will be the responsibility of the Surety to pay.
- 16.6. **SURETY'S FAILURE TO PROVIDE REPLACEMENT CONTRACTOR.** If the surety fails to provide an acceptable Contractor within thirty (30) days from the date of the termination letter, the Department may contract with a Contractor to complete the Work in accordance with the Contract Documents.
- 16.7. **DEPARTMENT'S RIGHT OF RECOVERY.** The Department will hold the Surety responsible for any additional cost incurred by the Department as a result of the Contractor's termination, including but not limited to, delay cost, acceleration cost, direct cost and consequential and incidental cost incurred by the Department or any other Prime Contractor.

## **ARTICLE 17: DISPUTES**

- 17.1. **CONTRACTOR MUST CARRY ON WORK DURING THE DISPUTE PROCESS.** The Contractor may note that they are performing the Work under protest and may keep records of costs during the dispute resolution process but the Contractor shall not refuse to perform as directed by the Department. The Contractor must maintain the Project Schedule unless otherwise agreed to by the Department. If the Contractor fails or refuses to perform as directed, this action will constitute a breach of contract and the Department may default the Contractor and/or proceed to suspend and/or debar the Contractor.
- 17.2. **CONTRACTOR REQUEST FOR DEPARTMENT TO WITHHOLD FUNDS DUE TO DAMAGE BY OTHER CONTRACTOR(S).** With regard to any Work performed on the Project:
- A. If the Contractor, either itself or by its Subcontractor or Sub-subcontractors causes damage or injury to the property or Work of any Prime Contractor or Prime Contractors, or by failing to perform its Work (including Work of its Subcontractor or sub-subcontractors) with due diligence, delays any Prime Contractor or Prime Contractors, who suffer additional expense or damage as a result, the Department may, upon the receipt of a request from the Prime Contractor who has suffered

additional expense or damage, withhold from the Contractor sufficient funds to cover the damages which have been incurred by the other Prime Contractor in accordance with these General Conditions of the Contract.

- B. If the Department determines that the Prime Contractor submitting the claim is entitled to payment, the Department will process a credit change order for the amount of the damages due to the other Prime Contractor, and the Department will process a credit change order to the other Prime Contractor in that amount.
- C. If the Contractor disputes the amount of the damages or that it is responsible for them, the Contractor may present the issue to the dispute resolution process commencing with a FDR Meeting described in this Article.
- D. It is agreed by all parties that disputes or actions between Prime Contractors concerning the additional expense or damage will not delay completion of the Work, which shall be continued by the parties, subject to the rights provided in these General Conditions.
- E. It is agreed by the parties to this Contract (the Department as promisee and the Contractor as promisor) that the intent of this Article is to benefit the other Prime Contractors on the Project or related projects and to serve as an indication of the mutual intent of the Department and the Contractor that this clause raise such other Prime Contractors to the status of intended third party beneficiaries of this Contract.

17.3. **ARBITRATION OF DISPUTES BETWEEN CONTRACTORS.** Contractors who have claims, disputes or other matters which arise out of, or are related to this Contract, or the breach which are between themselves and do not involve the Department may, at their option, submit such claims, disputes or other matters to arbitration, in accordance with the construction industry arbitration rules of the American Arbitration Association then in effect, unless the parties mutually agree otherwise. This agreement to arbitrate is in consideration of the fact that all other Prime Contractors agree to this same arbitration provision, as provided in each separate Prime Contract required for the construction of this project, and is specifically enforceable under the Prevailing Arbitration Law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

- A. Notice of the demand for arbitration shall be filed in writing with the other Prime Contractors and with the Philadelphia or Pittsburgh, Pennsylvania, Regional Office of the American Arbitration Association. A copy of the demand shall be provided to the Department. The demand for arbitration shall be made within a reasonable time after the claim; dispute or other matter in question has arisen. The Department shall not be a party to the claim, dispute or other matter in question, but will be a witness in any arbitration at the request of any party to the arbitration.
- B. If the Contractors choose to submit the claim to arbitration, the Department shall not be a party to this arbitration nor shall such claim or dispute be subject to a Board of Claims proceeding.

17.4. **DISPUTE RESOLUTION IS A 3-STEP PROCESS.** The Contractor and the Department agree that any and all disputes arising out of this Contract are subject to a 3-step resolution process described in this Article. The Contractor and the Department agree that participation in each preceding step is a condition precedent to the Contractor's right to pursue any and all unresolved disputes to the next step.

- 17.5. **STEP 1: FIELD DISPUTE REVIEW MEETING.** The Field Dispute Review Meeting is the initial step in identifying and attempting to reach a timely and equitable resolution of the variety of issues that arise on any construction project. The nature and structure of each Field Dispute Review Meeting shall be flexible and consist of an informal, good-faith discussion of the current status of the Project, and identification of potential and actual disputes.
- A. **PROJECT INTERVALS:** A Field Dispute Review Meeting (“FDR Meeting”) will be scheduled by the Department to discuss issues arising as of the following intervals of the Project:
1. 50% of the Contract Duration has elapsed; and
  2. 75% of the Contract Duration has elapsed; and
  3. 100% of the Contract Duration has elapsed; or
  4. At any time deemed necessary by the Department.
- B. **LOCATION:** The Department will schedule a mutually convenient date and time for each FDR Meeting. If possible, the FDR Meeting should be convened at the Project site.
- C. **ATTENDEES:** All Prime Contractors shall attend each Field Dispute Review Meeting. The Professional shall attend each Field Dispute Review Meeting. The Department shall also attend the Field Dispute Review Meeting. The Department’s Designated Representative will chair the Meeting.
- D. **PROCEDURE:** As the Project progresses and the time for a FDR Meeting approaches, the Department should establish the date for the meeting during the discussion at a Job Conference.
1. The Contractor must start the Field Dispute Review Process by notifying the Department in writing. This information submitted will be available to the Department representatives, the other Prime Contractors, and the Professional. The information should provide sufficient information to allow attendees to research potential disputes, review the Contract Documents, review the Project Schedule and examine site conditions prior to the Meeting. In all cases of misunderstanding and disputes, allegations that verbal instruction was given will not be considered. The Contractor must produce documentation in support of its contentions and shall advance no claim in the absence of such documentation or use or attempt to use any conversation with any parties against the Professional or the Department, or in prosecuting any claim against the Professional or the Department.
  2. The Department shall convene the Field Dispute Review Meeting and, if necessary, ensure that attendees are introduced to each other.
    - a. The FDR Meeting shall not be subject to 2 Pa. C.S. (relating to administrative law and procedure).
    - b. Neither audio recording nor videotaping will be allowed during the FDR Meeting.
    - c. No transcripts will be taken but attendees are free to take their own notes.
    - d. The Meeting may be moved out to the field for visual inspection of the condition if necessary to understand and resolve the issue.

- e. The Department will allow all parties a reasonable time to present and discuss the disputes raised in the Prime Contractors' FDR Meeting Forms.
3. The Contractor's representative (an employee in the field familiar with the day-to-day work on this Contract) shall present a description of:
  - a. The Work performed since the last Field Dispute Review Meeting; and
  - b. The Work to be performed in the near future; and
  - c. The status of disputes raised at the previous FDR Meeting; and
  - d. New disputes that have arisen since the previous FDR Meeting. For each new dispute:
    - i. Set forth the schedule impacts, which may only be presented using the current Project Schedule; and
    - ii. Set forth a proposed solution to the dispute, including:
      1. Days needed in any Extension of Time; and/or
      2. Damages attributed to the dispute; and
      3. Identify the party the Contractor believes is responsible for creating the dispute.
4. The Department's representative and/or another Prime Contractor if so identified in 3(d)(ii)(3) above shall present a description of:
  - a. their understanding of the Work performed since the last FDR Meetings; and
  - b. the Work to be performed in the near future; and
  - c. status of disputes raised at the previous FDR Meeting; and
  - d. a response to the new dispute(s) raised by the Contractor, including:
    - i. the Department's and/or the Contractor's view of the schedule impact, which may only be presented using the current Project Schedule; and
    - ii. the Department's and/or the Contractor's response to the original Contractor's proposed solution; and
    - iii. the identity of the party the Department and or the Contractor believes is responsible for creating the dispute.
5. Within two weeks of the FDR Meeting, the Department will render a decision on the issues raised during the FDR Meeting. The decision will be available to all attendees. The decision is not binding upon any party.
6. If any party is dissatisfied with the decision reached at the FDR Meeting, they may appeal the decision to the second step in the dispute process.
7. **Any issue or dispute arising on the Project must be presented at the first FDR Meeting after the dispute arose. If a Contractor fails to raise an issue at the appropriate FDR Meeting then the Contractor is deemed to have waived the issue (e.g., an issue arising during the first 50% of contract duration must be presented at the 50% FDR Meeting and may not be presented at any subsequent FDR Meeting).**
8. **Only claims raised during an FDR Meeting may be appealed to the Claim Settlement Conference stage.**

- 17.6. **STEP 2: CLAIM SETTLEMENT CONFERENCE.** The second step in the dispute resolution process is a Claim Settlement Conference, which is a more formal step in the process and is described in general in §1712.1 of the Commonwealth Procurement Code. To the extent that this language conflicts with §1712.1, the statutory language controls.
- A. **TIME TO FILE A CLAIM:** Under this second step of the process, a Contractor may appeal the FDR Meeting decision by submitting a written claim to the Deputy for Facilities and Engineering, Building 11-64, Fort Indiantown Gap, Annville, PA 17003.
1. **Any issue or dispute arising on the Project that is not mutually resolved at the FDR Meeting stage may only be appealed to the Claim Settlement Conference stage. If the Contractor fails to pursue any unresolved FDR Meeting issue to a Claim Settlement Conference within the 6-month time frame set forth below, then the Contractor is deemed to have waived the issue.**
  2. **A claim accrues upon the date of the Department's written decision in Step 1. If the Contractor decides to appeal the decision reached at the FDR Meeting, the Contractor must file an appeal of the decision to the Deputy for Facilities and Engineering within six months of the date of the Department's written decision. If the Contractor fails to file a written request within this time period, the Contractor is deemed to have waived its right to assert the claim in any forum. The Deputy for Facilities and Engineering will disregard untimely claims.**
- B. **CONTENTS OF THE CLAIM:** The claim filed by the Contractor with the Deputy for Facilities and Engineering shall state **all grounds** upon which the Contractor asserts a controversy exists. The claim must contain, at a minimum:
1. The documentation submitted by the Contractor to the Department during the FDR Meeting to substantiate the Contractor's view of the issue; and
  2. The Department's decision.
- C. **DATE OF THE CLAIM SETTLEMENT CONFERENCE:** The Deputy for Facilities and Engineering or a designee may schedule a mutually convenient date and time for the Claim Settlement Conference.
- D. **ATTENDEES:** All parties identified in the Claim Packet or deemed necessary by the Department shall attend the Claim Settlement Conference. At a minimum, the Contractor, the Professional, and a representative from Department's Bureau of Construction shall attend the Claim Settlement Conference.
- E. **PROCEDURE:** If the Deputy for Facilities and Engineering deems the Claim Settlement Conference is necessary, the Deputy for Facilities and Engineering or a designee will convene the Claim Settlement Conference.
1. The Claim Settlement Conference shall not be subject to 2 Pa. C.S. (relating to administrative law and procedure).
  2. Neither audio recording nor videotaping will be allowed during the Claim Settlement Conference.
  3. No transcripts will be taken but attendees are free to take their own notes.
  4. The Deputy for Facilities and Engineering or a designee will allow all parties a reasonable time to present and discuss the issues.

5. The Contractor's representative shall present a description of the issue, including:
  - a. the factual background of the issue;
  - b. the schedule impacts, which may only be presented using the current Project Schedule; and
  - c. the proposed solution to the dispute, including:
    - i. days needed in any Extension of Time; and/or
    - ii. damages attributed to the dispute; and
    - iii. identify the party the Contractor believes is responsible for creating the dispute.
6. The Department's representative (or other Prime Contractor if so identified in 5c(iii) above) shall present a description of:
  - a. a response to the dispute(s) raised by the Contractor, including:
    - i. the Department's and/or the Contractor's view of the schedule impact, which may only be presented using the current Project Schedule; and
    - ii. the Department's and/or the Contractor's response to the Contractor's proposed solution; and
    - iii. the identity of the party the Department and/or the Contractor believes is responsible for creating the dispute.
7. The Deputy for Facilities and Engineering may render a final determination on the contents of the Claim within 120 days of the receipt of the claim by the Deputy for Facilities and Engineering. The parties may, during the 120 day period, mutually agree to extend the 120-day deadline. The Department will confirm all agreements to extend the 120-day deadline in writing. If no decision is rendered within the 120 days of the receipt of the claim by the Deputy for Facilities and Engineering, and the Department has not confirmed in writing the parties agreement to extend the 120-day deadline, the claim is deemed to be denied on the 120<sup>th</sup> day. The determination of the Deputy for Facilities and Engineering shall be the final order of the Department with regard to the contents of the Claim.

17.7. **STEP 3: FILING A CLAIM AT THE BOARD OF CLAIMS.** The third step in the dispute resolution process is filing a Statement of Claim with the Board of Claims, which is a more formal step in the process and is described in general in §1712.1 and §1721 *et seq.* of the Commonwealth Procurement Code. To the extent that this language conflicts with §1712.1, the statutory language controls.

A. **TIME TO FILE A STATEMENT OF CLAIM.**

1. Within fifteen (15) days of the mailing date of the Deputy for Facilities and Engineering's final determination denying a claim; or
2. Within 135 days of the date the Contractor files a claim with the Deputy for Facilities and Engineering if no final determination has been rendered and no extension has been agreed to;

whichever occurs first, the Contractor may proceed to the third stage of the dispute resolution process by filing a claim with the Board of Claims in Harrisburg.

**Only claims that were raised during a Claim Settlement Conference may proceed to the Board of Claims.**

**ARTICLE 18: COMMISSIONING**

- 18.1. **SCOPE OF WORK.** If deemed necessary by the Department during design, commissioning shall consist of the coordination of activities to verify that all building systems (mechanical, electrical, security, fire alarm, etc.) have been installed and are operating in accordance with the requirements specified in the Contract Documents. This scope shall also include approved installation, start-up training, testing and performance of all building equipment and systems.
- 18.2. **PROCEDURE.**
- A. The specifications contain the commissioning specifications for each Contract.
  - B. Within 30 days after the Initial Job Conference, the Department's Commissioning Agent will provide the Commissioning Plan to all Prime Contractors. This plan shall clarify in detail the schedule and responsibilities for Work to be completed during commissioning of the Project.
  - C. The schedule set forth in the Commissioning Plan shall then be integrated into the Project Schedule by the first monthly update,
  - D. Final commissioning will begin upon notice from any Prime Contractor to the Commissioning Agent (with a copy sent to the Department) that the system to be commissioned has been completed and is operational.
- 18.3. **PAYMENT FOR COMMISSIONING.**
- A. The HVAC (.2) Prime Contractor shall have a lump sum of 2% of the awarded contract value (or other percentage set forth by the Department in the specifications or during the bidding stage) retained as a distinct line item on the Schedule of Values for Final Commissioning. If applicable, other Prime Contractors' commissioning retainage shall be as indicated in the specification.
  - B. Progress payments can be submitted for systems that have been commissioned and approved by the Commissioning Agent. The total of these progress payments shall not exceed ½ of the total percentage retained for Final Commissioning.
  - C. Progress payments for commissioning shall be apportioned *pro rata* based on the scheduled values of the systems or equipment to be commissioned. All Applications for Payment that request release of any amount of the total percentage retainage for Final Commissioning must be submitted for review by the Commissioning Agent.
  - D. The remaining ½ of the total percentage for the Final Commissioning retainage is payable upon completion of seasonal testing results approved by the Commissioning Agent. Seasonal testing will span two seasons, to assure that commissioning addresses peak heating and cooling operation.

**ARTICLE 19: MISCELLANEOUS CONDITIONS**

- 19.1. **PROJECT SIGN.** On or before the date of the first regularly scheduled Job Conference (after the Initial Job Conference), the Lead Contractor shall erect, at a prominent location (selected by the Department) a six-foot high by eight-foot wide (6'X 8') sign, well braced,



and supported by 4"X 4" posts, identifying the Project under construction. The sign board may be constructed from weatherproof plywood, hardboard, or other smooth face material that will weather and remain intact throughout the Project. A three-inch (3") wood border shall frame the sign. The sign shall be placed with the eight-foot (8') dimension horizontal. The base color of the sign shall be white weatherproof flat paint with red border. Lettering shall be in fast blue block letters and shall conform to the following:

COMMONWEALTH OF PENNSYLVANIA (4" LETTERS MIN.)  
THE DEPARTMENT OF MILITARY AND VETERANS AFFAIRS (4" LETTERS MIN.)

PROJECT NO. [number] (3" LETTERS MIN.)  
[building name] (4" LETTERS MIN.)  
[facility name] (3" LETTERS MIN.)

[name]....GENERAL CONTRACTOR (3" LETTERS MIN.)  
[name]....HEATING CONTRACTOR (3" LETTERS MIN.)  
[name].. PLUMBING CONTRACTOR (3" LETTERS MIN.)  
[name]... ELECTRICAL CONTRACTOR (3" LETTERS MIN.)

**NOTE:** For information shown in brackets Contractor shall check with the Department for proper data.

Upon Completion of the work, or when directed by the Department, the Lead Contractor shall remove the sign.

The Contractor shall change the names provided on the sign should the individual names change during the course of the project. This shall be done at no additional cost to the Department.

- 19.2. **FOUNDATIONS FOR MECHANICAL EQUIPMENT.** The HVAC, Plumbing and Electrical Contractors shall furnish and install foundations and supports for all equipment installed under their respective Contracts. Foundations and supports shall include isolation mounting for noisy and vibrating equipment. Each Contractor shall provide sufficient dowels or anchors in bases as required for equipment supplied under its Contract. Such foundations and supports shall not be those concrete slabs or that integral concrete construction noted and dimensioned on the architectural and structural drawings, which are considered the responsibility of the Contractor for General Construction.
- 19.3. **SANITARY FACILITIES.** The Lead Contractor shall, at its cost, provide and maintain in a clean and sanitary condition, adequate and approved sanitary facilities in accordance with O.S.H.A. requirements. All facilities shall be screened against insects. When directed by the Department, the Contractor shall dismantle and remove these facilities and disinfect as required. Portable chemical toilets approved by the Pennsylvania Department of Health are acceptable. Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.
- 19.4. **SANITARY FACILITIES AFTER LINES INSTALLED.** As soon as soil lines and water lines have been installed inside the building and tested successfully by the Plumbing Contractor, the Plumbing Contractor shall, at its cost, install two (2) lavatories and sufficient number of toilets according to the following table:

| NUMBER OF WORKERS  | MINIMUM NUMBER OF FACILITIES |
|--------------------|------------------------------|
| 20 or Less Workers | 1                            |

|                     |                                   |
|---------------------|-----------------------------------|
| 21 or More Workers  | 1 toilet seat and 1 urinal per 40 |
| 200 or More Workers | 1 toilet seat and 1 urinal per 50 |

These shall be kept in working order by the Plumbing Contractor and in a clean and sanitary condition by the Lead Contractor. All supplies for these facilities shall be provided and restocked by the Lead Contractor.

- 19.5. **HOISTING FACILITIES.** The Contractor for General Construction shall erect, maintain and operate at its cost, hoisting facilities. In the event the hoisting facilities provided by the General Contractor are not available or are unable to accommodate the needs of other Prime Contractors, each Prime Contractor must provide hoisting facilities for its own work. All hoisting facilities must comply with the safety regulations of the Department of Labor and Industry.
- 19.6. **TEMPORARY VENTILATION.** The Contractor shall provide temporary ventilation to remove from the structure any excessive heat and/or humidity in enclosed portions of the Work, resulting from its construction operations so that the Work may be carried on without interruption and under correct conditions, including required dryness for installation of the various materials. Removing any dangerous or noxious fumes or particles suspended in the air is the responsibility of the Contractor whose construction operations caused these conditions to exist. Temporary equipment used for this temporary ventilation shall produce no hazard to the Work or to any person in or near it. The Contractor shall furnish all such temporary equipment; pay all costs for it and for its operation, including fuel and power supplies during operation both in and out of normal working hours. The Contractor shall remove the equipment when it is no longer required, or when so directed by the Department.
- 19.7. **WORK BEYOND LIMIT OF CONTRACT.** For purposes of performing the Work, the site is defined by the Limit of Contract lines shown on the drawings. The Contractor is responsible for any work performed beyond the limit of Contract.
- 19.8. **ADVERTISING.** No advertising is permitted within the Work area or adjacent area. This does not apply to corporate vehicles or attire.
- 19.9. **FEDERAL AND A.S.T.M. AND OTHER SPECIFICATIONS.** Reference to Federal, A.S.T.M. and other standard specifications, references and designations means those in effect at the date of bid. Basic codes and regulations incorporated by reference, standard regulations and codes refer to editions in effect at the date of proposals, including current addenda or errata. The most stringent section of each code applies.
- 19.10. **STORAGE AND STOCKPILING ON ROOFS.** No materials of any type may be stored or stockpiled overnight on roofs.
- 19.11. **AUDIT OF RECORDS.** The Department may, at reasonable times and places, audit the books and records of the Contractor. The Contractor shall maintain books and records related to the Contract for a period of three (3) years from the date of final payment. The Contractor shall include a requirement in contracts with subcontractors or suppliers that requires the Subcontractor or Supplier to maintain its records for the same length of time.
- 19.12. **TEMPORARY TRAFFIC CONTROL.** The Project site may have active pedestrian, bike or automobile traffic adjacent to site for the entire duration of the Project. If applicable, the Contractors shall incorporate, furnish and implement the following work as part of this Project.

- A. TRAFFIC CONTROL – TEMPORARY TRAFFIC CONTROL GUIDELINES (PENNDOT PUBLICATION 213): The needs and control of all road users (motorists, bicyclists, and pedestrians) within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130 and Temporary Traffic Control Guidelines (PennDOT Publication 213) through a Temporary Traffic Control (TTC) zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.

Publication 213 applies to Contractors; utilities; Federal, State, County, township and municipal governments; and others performing applicable construction, maintenance, emergency or utility/permit work on highways or so closely adjacent to a highway that workers, equipment or materials encroach on the highway or interfere with the normal movement of traffic.

- 19.13. **REDUCTION OF NOISE**. The Contractor must take reasonable steps to minimize noise and shall perform work in accordance with local noise ordinances. The Contractor shall perform noise-producing work in less sensitive hours of the day or week as directed by the Department. The Contractor shall maintain noise-producing work at or below the decibel levels and within the time periods specified and shall perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m. unless otherwise permitted by the Department and permissible by local ordinance.
- 19.14. **VISIBLE DUST EMISSIONS**. No person shall perform any construction, demolition, excavation, extraction, or other earthmoving activities unless appropriate measures are sufficiently implemented to limit Visible Dust Emissions (VDE) to 20% opacity and comply with the conditions for a stabilized surface area when applicable. The Contractor shall apply sufficient water to building exterior surfaces, and/or unpaved surface areas where equipment will operate to limit VDE to 20% opacity throughout the duration of razing and demolition activities or handling, storage, and transport of bulk materials on-site or off-site. The Contractor shall apply sufficient dust suppressants to unpaved surface areas within 100 feet where materials from razing or demolition activities will fall in order to limit VDE to 20% opacity. The Contractor shall also apply sufficient dust suppressants to unpaved surface areas where wrecking or hauling equipment will be operated in order to limit VDE to 20% opacity.

## **ARTICLE 20: LEGAL MATTERS**

- 20.1 **NO ESTOPPEL OR WAIVER OF LEGAL RIGHTS**. Neither the Department, its designee nor the Professional is precluded or estopped by the measurements or approved Applications for Payment made or given by the Department or the Professional or by any of their agents or employees, from showing the true and correct amount and character of the Work performed and materials and equipment furnished by the Contractor. The Department may show, at any time, that any such measurements or approved Applications for Payment are untrue or incorrectly made in any particular, or that the Work or materials, equipment or any parts thereof do not conform to the specifications and the Contract. The Department may reject the whole or any part of the aforesaid Work or materials and equipment if the measurements or approved Applications for Payment are found or become known to be inconsistent with the terms of the Contract, or otherwise improperly given. The Department may, notwithstanding any such measurements or approved Applications for Payment, demand and recover from the Contractor, its surety, or both, such damages as the Department may sustain by reason of the Contractor's failure to comply with the terms of the specifications and the Contract, or on account of any overpayments made on any approved Applications for Payment. Neither the acceptance by the Department or the Professional or any of their agents or employees, nor any

certificate approved for payment of money, nor any payments for, nor acceptance of the whole or any part of the Work by the Department or the Professional, nor any Extension of Time, nor any position taken by the Department or the Professional or its employees, operates as a waiver of any portion of the Contract or any power herein reserved by the Department or any right to damages. A waiver of any breach of the Contract will not be held to be a waiver of any other or subsequent breach.

- 20.2** **LAW OF THE PLACE.** The Contract shall be governed by the Laws of the Commonwealth of Pennsylvania.
- 20.3** **SUCCESSORS AND ASSIGNS.** This Contract shall be binding on the parties hereto, their heirs, executors, administrators, successors and assigns. **No part of this Contract may be assigned by the Contractor without the prior consent of the Department.**
- 20.4** **CLAIMS FOR DAMAGES: LEGAL RELATIONS AND RESPONSIBILITIES.** Contracts covered by these General Conditions are not to be construed as being made for the benefit of any person or political subdivision not a party to this Contract, nor shall this Contract be construed to authorize any person or political subdivision, not a party to this Contract, to maintain any lawsuit hereunder, nor shall this Contract be construed to constitute the basis for the maintenance of any lawsuit by any person, or political subdivision not a party hereto.
- 20.5** **ROYALTIES AND PATENTS.** The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any patent rights and shall hold the Department harmless from loss on account thereof.
- 20.6** **PERSONAL RESPONSIBILITY AND WORK OPPORTUNITY RECONCILIATION ACT.** Pursuant to the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (Act 58 of 1997, as amended), all employers are required to report information on newly-hired employees to a designated state agency. The Commonwealth of Pennsylvania has designated the Department of Labor and Industry as that agency. For information concerning this requirement call 1-888-PAHIRES.
- 20.7** **Public Works Employment Verification Act.** If applicable to this Contract, the Contractor is hereby notified that this contract is for a public work and the Contractor is therefore subject to the provisions, duties, obligations, remedies and penalties of the Public Works Employment Verification Act, 43 P.S. §§167.1-167.11, which is incorporated herein by reference as if fully set forth herein. Contractors subject to said Public Works Employment Verification Act are required to utilize the Federal E-Verify program to verify the employment eligibility of each new employee hired after January 1, 2013 and to submit to the Department a Commonwealth Public Works Employment Verification Form available on the Department's web site at [www.dgs.state.pa.gov](http://www.dgs.state.pa.gov).
- 20.8** **Steel Products Procurement Act.** The Contractor is hereby notified that this contract is for a public work and the Contractor is therefore subject to the provisions, duties, obligations, remedies and penalties of the Steel Product Procurement Act, 73 P.S. §§1881-1887, as amended, which is incorporated herein by reference as if fully set forth herein. The Contractor must refer to the Department's web site at [www.dgs.pa.gov](http://www.dgs.pa.gov) for information regarding the Steel Products Procurement Act and the current list of exempt machinery and equipment steel products.
- 20.9** **PREVAILING MINIMUM WAGE PREDETERMINATION.** If applicable to this Contract, the Contractor is hereby notified that this Contract is subject to the provisions, duties, obligations, remedies and penalties of the Pennsylvania Prevailing Wage Act, 43 P.S. §165-1 et seq., as amended, which is incorporated herein by reference as if fully set forth herein. In compliance with said Pennsylvania Prevailing Wage Act, the Prevailing

Minimum Wage Predetermination is hereto attached and made part hereof as approved by the Secretary of Labor and Industry. If a job classification is not covered by the Prevailing Wage Predetermination, the Contractor may not pay individuals in that classification less than the lowest rate for laborers, as set out in the predetermination.

**20.10 TOBACCO USE ON PROJECT SITE.** Use of tobacco products (smoke and smokeless) shall be restricted on site after the building has been enclosed (with permanent or temporary enclosures). Personnel found in noncompliance with this directive may be removed from the site upon discovery of this noncompliance.

**20.11 RIGHT-TO-KNOW LAW.**

A. The Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104, (“RTKL”) applies to this Contract. For the purpose of these provisions, the term “the Commonwealth” shall refer to the contracting Commonwealth agency.

B. If the Commonwealth needs the Contractor’s assistance in any matter arising out of the RTKL related to this Contract, it shall notify the Contractor using the legal contact information provided in this Contract. The Contractor, at any time, may designate a different contact for such purpose upon reasonable prior written notice to the Commonwealth.

C. Upon written notification from the Commonwealth that it requires the Contractor’s assistance in responding to a request under the RTKL for information related to this Contract that may be in the Contractor’s possession, constituting, or alleged to constitute, a public record in accordance with the RTKL (“Requested Information”), the Contractor shall:

1. Provide the Commonwealth, within ten (10) calendar days after receipt of written notification, access to, and copies of, any document or information in the Contractor’s possession arising out of this Contract that the Commonwealth reasonably believes is Requested Information and may be a public record under the RTKL; and
2. Provide such other assistance as the Commonwealth may reasonably request, in order to comply with the RTKL with respect to this Contract.

D. If the Contractor considers the Requested Information to include a request for a Trade Secret or Confidential Proprietary Information, as those terms are defined by the RTKL, or other information that the Contractor considers exempt from production under the RTKL, the Contractor must notify the Commonwealth and provide, within seven (7) calendar days of receiving the written notification, a written statement signed by a representative of the Contractor explaining why the requested material is exempt from public disclosure under the RTKL.

E. The Commonwealth will rely upon the written statement from the Contractor in denying a RTKL request for the Requested Information unless the Commonwealth determines that the Requested Information is clearly not protected from disclosure under the RTKL. Should the Commonwealth determine that the Requested Information is clearly not exempt from disclosure, the Contractor shall provide the Requested Information within five (5) business days of receipt of written notification of the Commonwealth’s determination.

F. If the Contractor fails to provide the Requested Information within the time period required by these provisions, the Contractor shall indemnify and hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth

may incur as a result of the Contractor's failure, including any statutory damages assessed against the Commonwealth.

G. The Commonwealth will reimburse the Contractor for any costs associated with complying with these provisions only to the extent allowed under the fee schedule established by the Office of Open Records or as otherwise provided by the RTKL if the fee schedule is inapplicable.

H. The Contractor may file a legal challenge to any Commonwealth decision to release a record to the public with the Office of Open Records, or in the Pennsylvania Courts, however, the Contractor shall indemnify the Commonwealth for any legal expenses incurred by the Commonwealth as a result of such a challenge and shall hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of the Contractor's failure, including any statutory damages assessed against the Commonwealth, regardless of the outcome of such legal challenge. As between the parties, the Contractor agrees to waive all rights or remedies that may be available to it as a result of the Commonwealth's disclosure of Requested Information pursuant to the RTKL.

I. The Contractor's duties relating to the RTKL are continuing duties that survive the expiration of this Contract and shall continue as long as the Contractor has Requested Information in its possession.

**20.12 Non-Appropriation Clause.** The Commonwealth's obligations to make payments during any Commonwealth fiscal year succeeding the current fiscal year shall be subject to availability and appropriation of funds. When funds (state and/or federal) are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal year period, the Commonwealth shall have the right to terminate the Contract or a Purchase Order. The Contractor shall be reimbursed for the reasonable value of any nonrecurring costs incurred but not amortized in the price of the supplies or services delivered under the Contract. Such reimbursement shall not include loss of profit, loss of use of money, or administrative or overhead costs. The reimbursement amount may be paid for any appropriations available for that purpose.

**20.13 COMPLIANCE WITH LAW.** The Contractor shall comply with all applicable federal and state laws and regulations and local ordinances in the performance of the Contract.

**20.14 CONTRACTOR RESPONSIBILITY PROVISIONS.**

A. For the purpose of these provisions, the term contractor is defined as any person, including, but not limited to, a bidder, offeror, loan recipient, grantee or lessor, who has furnished or performed or seeks to furnish or perform, goods, supplies, services, leased space, construction or other activity, under a contract, grant, lease, purchase order or reimbursement agreement with the Commonwealth of Pennsylvania (Commonwealth). The term contractor includes a permittee, licensee, or any agency, political subdivision, instrumentality, public authority, or other public entity in the Commonwealth.

1. The Contractor certifies, in writing, for itself and its subcontractors required to be disclosed or approved by the Commonwealth, that as of the date of its execution of this Bid/Contract, that neither the Contractor, nor any such subcontractors, are under suspension or debarment by the Commonwealth or any governmental entity, instrumentality, or authority and, if the Contractor cannot so certify,

then it agrees to submit, along with its Bid/Contract, a written explanation of why such certification cannot be made.

2. The Contractor also certifies, in writing, that as of the date of its execution of this Bid/Contract it has no tax liabilities or other Commonwealth obligations, or has filed a timely administrative or judicial appeal if such liabilities or obligations exist, or is subject to a duly approved deferred payment plan if such liabilities exist.
3. The Contractor's obligations pursuant to these provisions are ongoing from and after the effective date of the Contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to inform the Commonwealth if, at any time during the term of the Contract, it becomes delinquent in the payment of taxes, or other Commonwealth obligations, or if it or, to the best knowledge of the Contractor, any of its subcontractors are suspended or debarred by the Commonwealth, the federal government, or any other state or governmental entity. Such notification shall be made within 15 days of the date of suspension or debarment.
4. The failure of the Contractor to notify the Commonwealth of its suspension or debarment by the Commonwealth, any other state, or the federal government shall constitute an event of default of the Contract with the Commonwealth.
5. The Contractor agrees to reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of State Inspector General for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the Commonwealth that results in the suspension or debarment of the contractor. Such costs shall include, but shall not be limited to, salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Contractor shall not be responsible for investigative costs for investigations that do not result in the Contractor's suspension or debarment.
6. The Contractor may obtain a current list of suspended and debarred Commonwealth contractors by either searching the Internet at <http://www.dgs.state.pa.us/> or contacting the:

Department of General Services  
Office of Chief Counsel  
603 North Office Building  
Harrisburg, PA 17125  
Telephone No: (717) 783-6472  
FAX No: (717) 787-9138

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF MILITARY AND  
VETERANS AFFAIRS (08/2019)

Bond No. \_\_\_\_\_

CONSTRUCTION BID BOND  
(Please Complete All Blanks)

KNOW ALL MEN BY PRESENTS, that we, \_\_\_\_\_

\_\_\_\_\_

(hereinafter called the "Principal") as Principal and \_\_\_\_\_

\_\_\_\_\_

a corporation duly organized under the laws of the State of \_\_\_\_\_  
(hereinafter called the "Surety") as Surety, are held and firmly bound unto The Department of Military and Veterans  
Affairs, Annville, Pennsylvania (hereinafter called the "Obligee"), in the sum of **Ten (10) Percent of the amount of the  
highest base bid**  
for the payment of which sum, well and truly to be made, we, the said Principal, and the said Surety, bind ourselves,  
our heirs, our administrators, successors, and assigns, jointly and severally firmly by these presents.  
Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_ A.D.  
Two thousand and \_\_\_\_\_.

WHEREAS the Principal has submitted a bid upon Contract No. \_\_\_\_\_

for \_\_\_\_\_

\_\_\_\_\_

NOW, THEREFORE, the conditions of these obligations are such that if the Principal shall not withdraw its bid prior to the  
expiration of the award period after the opening of the bids; and shall comply with all requirements set forth in the  
"Proposal" and the "Instructions to Bidders;" and if the said contract be awarded to the Principal and the Principal shall,  
within such time as may be specified, enter into the contract in writing, and give bond, with Surety acceptable to the Obligee,  
covering the faithful performance of the said contract and payment of claims for labor, material, and equipment rental, all of  
which shall be supplied on the forms as specified by said Obligee; or if the Principal shall fail to do so, pay to the Obligee the  
lesser of the following amounts: 1) the amount of this bond as herein above set forth, or 2) the difference between the  
amount specified in the Principals bid and such larger amount for which the Obligee may in good faith contract with another  
party to perform the work covered by said bid, then this obligation shall be void; otherwise to remain in full force and effect.

WITNESS (OR ATTEST IF A CORPORATION)

PRINCIPAL

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

CORPORATE SEAL

SURETY

\_\_\_\_\_

\_\_\_\_\_



## INSTRUCTIONS FOR CONSTRUCTION BID BOND

- (1) If Bid Bond is submitted, it must be submitted on this Construction Bid Bond form without alteration. If the principal is a corporation, the President or Vice President and Secretary or Treasurer of the corporation should sign; if a partnership, the partners should sign; if an individual, the individual should sign.
- (2) The Bid Bond must be from a surety approved by the Commonwealth's Department of Insurance to do business in Pennsylvania. For information on approved sureties, contact the PA Department of Insurance, Division of Companies, at (717) 787-5890 or go to [www.ins.state.pa.us](http://www.ins.state.pa.us)
- (3) The Surety must sign the Bid Bond. The Surety must attach to the Bid Bond a Power-of-Attorney, which must be dated the same date as the Bid Bond, showing that the person signing the Bid Bond for the Surety has authority to do so.
- (4) Any alterations to the pre-printed portions of the bid bond (e.g., erasures, write-ins, white outs, etc.) are prohibited and will be rejected as not responsive. Any alterations to the filled in spaces/lines on the Bid Bond (e.g., erasures, write-ins, white outs, etc.), are not acceptable, unless initialed by an authorized representative of the surety, preferably the agent signing the bond. Such unauthorized alterations will result in the bid being rejected as not responsive.
- (5) All signatures by the Surety on the Bid Bond must be original and hand-scripted. Faxed or copied signatures are unacceptable.

## LOBBYING CERTIFICATION FORM

### Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, Disclosure of Lobbying Activities, which can be found at:

<http://www.whitehouse.gov/sites/default/files/omb/assets/omb/grants/sflllin.pdf>

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed under *Section 1352, Title 31, U. S. Code*. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than **\$100,000** for such failure.

SIGNATURE: \_\_\_\_\_

TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_

## RECIPROCAL LIMITATIONS ACT REQUIREMENTS

Please Complete Applicable Portion of Pages 3 & 4 and Return with Bid.

**NOTE:** These Requirements Do Not Apply To Bids Under \$10,000.00

### I. REQUIREMENTS

**A.** The Reciprocal Limitations Act requires the Commonwealth to give preference to those bidders offering supplies produced, manufactured, mined or grown in Pennsylvania as against those bidders offering supplies produced, manufactured, mined or grown in any state that gives or requires a preference to supplies produced, manufactured, mined or grown in that state. The amount of the preference shall be equal to the amount of the preference applied by the other state for that particular supply.

The following is a list of states which have been found by the Department of General Services to have applied a preference for in-state supplies and the amount of the preference:

| STATE          | PREFERENCE   |
|----------------|--|
| 1. Alaska      | 7% (applies only to timber, lumber, and manufactured lumber products originating in the state) |
| 2. Arizona     | 5% (construction materials produced or manufactured in the state only)                         |
| 3. Hawaii      | 10%  |
| 4. Illinois    | 10% for coal only  |
| 5. Iowa        | 5% for coal only   |
| 6. Louisiana   | 4% meat and meat products  |
|                | 4% catfish   |
|                | 10% milk & dairy products  |
|                | 10% steel rolled in Louisiana  |
|                | 7% all other products  |
| 7. Montana     | 5% for residents *   |
|                | 3% for non-residents*  |
|                | *offering in-state goods, supplies, equipment and materials                                    |
| 8. New Mexico  | 5%   |
| 9. New York    | 3% for purchase of food only   |
| 10. Oklahoma   | 5%   |
| 11. Virginia   | 4% for coal only   |
| 12. Washington | 5% (fuels mined or produced in the state only)   |
| 13. Wyoming    | 5%   |

**B.** The Reciprocal Limitations Act requires the Commonwealth to give preference to those bidders offering printing performed in Pennsylvania as against those bidders offering printing performed in any state that gives or requires a preference to printing performed in that state. The amount of the preference shall be equal to the amount of the preference applied by the other state for that particular category of printing.

The following is a list of states which have been found by the Department of General Services to have applied a preference for in-state printing and the amount of the preference:

| STATE         | PREFERENCE |
|---------------|------------|
| 1. Hawaii     | 15%        |
| 2. Idaho      | 10%        |
| 3. Louisiana  | 3%         |
| 4. Montana    | 8%         |
| 5. New Mexico | 5%         |
| 6. Wyoming    | 10%        |

**C.** The Reciprocal Limitations Act, also requires the Commonwealth to give resident bidders a preference against a nonresident bidder from any state that gives or requires a preference to bidders from that state or exclude bidders from states that exclude nonresident bidders. The amount of the preference shall be equal to the amount of the preference applied by the state of the nonresident bidder. The following is a list of the states which have been found by the Department of General Services to have applied a preference for in-state bidders and the amount of the preference:

| STATE         | PREFERENCE  |
|---------------|---|
| 1. Alaska     | 5%(supplies only)   |
| 2. Arizona    | 5%(construction materials from Arizona resident dealers only) |
| 3. California | 5%(for supply contracts only in excess of \$100,000.00)       |

- |                   |   |
|-------------------|---|
| 4. Connecticut    | 10%(for supplies only)  |
| 5. Montana        | 3%  |
| 6. New Mexico     | 5%(for supplies only)   |
| 7. South Carolina | 2%(under \$2,500,000.00)<br>1%(over \$2,500,000.00)   |
|                   | This preference does not apply to construction contracts nor where the price of a single unit exceeds \$10,000. |
| 8. West Virginia  | 2.5%(for the construction, repair or improvement of any buildings   |
| 9. Wyoming        | 5%  |

**STATE PROHIBITION**

- |               |  |
|---------------|--|
| 1. New Jersey | For supply procurements or construction projects restricted to Department of General Services Certified Small Businesses, New Jersey bidders shall be excluded from award even if they themselves are Department of General Services Certified Small Businesses. |
|---------------|--|

D. The Reciprocal Limitations Act also requires the Commonwealth not to specify, use or purchase supplies which are produced, manufactured, mined or grown in any state that prohibits the specification for, use, or purchase of such items in or on its public buildings or other works, when such items are not produced, manufactured, mined or grown in such state. The following is a list of the states which have been found by the Department of General Services to have prohibited the use of out-of-state supplies:

**STATE PROHIBITION**

- |                 |  |
|-----------------|--|
| 1. Alabama      | Only for printing and binding involving "messages of the Governor to the Legislature", all bills, documents and reports ordered by and for the use of the Legislature or either house thereof while in session; all blanks, circulars, notices and forms used in the office of or ordered by the Governor, or by any state official, board, commission, bureau or department, or by the clerks of the supreme court . . . /and other appellate courts/; and all blanks and forms ordered by and for the use of the Senate and Clerk or the House of Representatives, and binding the original records and opinions of the Supreme Court . . . /and other appellate courts/ |
| 2. Georgia      | Forest products only   |
| 3. Indiana      | Coal   |
| 4. Michigan     | Printing   |
| 5. New Mexico   | Construction   |
| 6. Ohio         | Only for House and Senate bills, general and local laws, and joint resolutions; the journals and bulletins of the Senate and house of Representatives and reports, communications, and other documents which form part of the journals; reports, communications, and other documents ordered by the General Assembly, or either House, or by the executive department or elective state officers; blanks, circulars, and other work for the use of the executive departments, and elective state officers; and opinions of the Attorney General.   |
| 7. Rhode Island | Only for food for state institutions.  |

\*If the bid discloses that the bidder is offering to supply one of the above-listed products that is manufactured, mined, or grown in the listed state, it shall be rejected. Contractors are prohibited from supplying these items from these states.

**II. CALCULATION OF PREFERENCE**

In calculating the preference, the amount of a bid submitted by a Pennsylvania bidder shall be reduced by the percentage preference which would be given to a nonresident bidder by its state of residency (as found by the Department of General Services in Paragraph C above). Similarly, the amount of a bid offering Pennsylvania goods, supplies, equipment or materials shall be reduced by the percentage preference which would be given to another bidder by the state where the goods, supplies, equipment or materials are produced, manufactured, mined or grown (as found by the Department of General Services in Paragraphs A and B above).

THIS FORM MUST BE COMPLETED AND RETURNED WITH THE BID

**III. STATE OF MANUFACTURE**

All bidders must complete the following chart by listing the name of the manufacturer and the state (or foreign country) of manufacture for each item. If the item is domestically produced, the bidder must indicate the state in the United States where the item will be manufactured. **This chart must be completed and submitted with the bid or no later than two (2) business days after notification from the Issuing Office to furnish the information. Failure to complete this chart and provide the required information prior to the expiration of the second business day after notification shall result in the rejection of the bid.**

| ITEM NUMBER | NAME OF MANUFACTURER | STATE (OR FOREIGN COUNTRY) OF MANUFACTURE |
|-------------|----------------------|---|
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |
|             |                      |   |

**IV. BIDDER'S RESIDENCY**

A. In determining whether the bidder is a nonresident bidder from a state that gives or requires a preference to bidders from that state, the address given on the first page of this invitation to bid shall be used by the Commonwealth. If that address is incorrect, or if no address is given, the correct address should be provided in the space below:

Correct Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

B. In order to claim the preference provided under Section I.B., Pennsylvania resident bidders must complete the following or have such information on file with the Issuing Office:

1. Address of bidder's bona fide establishment in Pennsylvania at which it was transacting business on the date when bids for this contract/requisition were first solicited: \_\_\_\_\_

2. a. If the bidder is a corporation:

(1) The corporation  is or  is not incorporated under the laws of the Commonwealth of Pennsylvania.

(a) If the bidder is incorporated under the laws of the Commonwealth of Pennsylvania, provide date of incorporation: \_\_\_\_\_

(b) If the bidder is not incorporated under the laws of the Commonwealth of Pennsylvania, it must have a certificate of authority to do business in the Commonwealth of Pennsylvania from the Pennsylvania Department of State as required by the Pennsylvania Business Corporation Law (15 P.S. §2001). Provide date of issuance of certificate of authority: \_\_\_\_\_

(2) The corporation  is or  is not conducting business in Pennsylvania under an assumed or fictitious name. If the bidder is conducting business under an assumed or fictitious name, it must register the fictitious name with the Secretary of the Commonwealth and the office of the prothonotary of the county wherein the registered office of such corporation is located as required by the Fictitious Corporate Name Act, as amended 15 P.S. §51 et seq. Corporate bidders conducting business under an assumed or fictitious name must provide date of registry of the assumed or fictitious name: \_\_\_\_\_

b. If the bidder is a partnership:

(1) The partnership  is or  is not conducting business in Pennsylvania under an assumed or fictitious name. If the bidder is conducting business under an assumed or fictitious name, it must file with the Secretary of the Commonwealth and the office of the prothonotary the county wherein the principal place of business is located as required by the Fictitious Name Act of May 24, 1945, P.L. 967, as amended 54 P.S. §28.1. Partnerships conducting business under an assumed or fictitious name must provide the date of filing of the assumed or fictitious name with the Secretary of the Commonwealth: \_\_\_\_\_

(2) The partnership  is or  is not a limited partnership formed under the laws of any jurisdiction other than the Commonwealth of Pennsylvania. If the bidder is an Out-of-state limited partnership, it must register with the Pennsylvania Department of State as required by the Act of July 10, 1981, P.L. 237, as amended, 59 Pa. C.S.A. §503. Out-of-state limited partnerships must provide the date of registry with the Pennsylvania Department of State: \_\_\_\_\_

c. If the bidder is an individual:

He or she  is or  is not conducting business under an assumed or fictitious name. If the bidder is conducting business under an assumed or fictitious name, he or she must file with the Secretary of the Commonwealth and the office of the prothonotary in the county wherein the principal place of business is located as required by the Fictitious Name Act of May 24, 1945, P.L. 967, as amended, 54 P.S. §28.1. Individuals conducting business under an assumed or fictitious name must provide the date of filing of the assumed or fictitious name with the Secretary of the Commonwealth: \_\_\_\_\_



COMMONWEALTH OF PENNSYLVANIA

**PUBLIC WORKS EMPLOYMENT VERIFICATION FORM**

Date \_\_\_\_\_

Business or Organization Name (Employer) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Contractor      Subcontractor      (circle one)

Contracting Public Body \_\_\_\_\_

Contract/Project No \_\_\_\_\_

Project Description \_\_\_\_\_

Project Location \_\_\_\_\_

As a contractor/subcontractor for the above referenced public works contract, I hereby affirm that as of the above date, our company is in compliance with the Public Works Employment Verification Act ('the Act') through utilization of the federal E-Verify Program (EVP) operated by the United States Department of Homeland Security. To the best of my/our knowledge, all employees hired post January 1, 2013 are authorized to work in the United States.

It is also agreed to that all public works contractors/subcontractors will utilize the federal EVP to verify the employment eligibility of each new hire within five (5) business days of the employee start date throughout the duration of the public works contract. Documentation confirming the use of the federal EVP upon each new hire shall be maintained in the event of an investigation or audit.

I, \_\_\_\_\_, authorized representative of the company above, attest that the information contained in this verification form is true and correct and understand that the submission of false or misleading information in connection with the above verification shall be subject to sanctions provided by law.

\_\_\_\_\_  
Authorized Representative Signature

## SITE VISITATION

Solicitation Number: 42080032 – CSMS New Calibration Laboratory  
Location: Area 10 – Fort Indiantown Gap, Annville PA.

---

**Company Name**

---

**Date**

---

**Authorized Company Representative**

---

**Date**

---

**DMVA Facility Representative**

---

**Title**

---

**Date**

**SITE VISIT IS OPTIONAL AND WILL BE CONDUCTED ON  
MAY 19<sup>TH</sup> 2020 10:00 AT THE FORT INDIANTOWN GAP COMMUNITY CLUB  
PARKING LOT - MAP ATTACHED TO THE BID**

**PLEASE CONTACT TINA REBUCK AT (717)861-8794 OR [TREBUCK@PA.GOV](mailto:TREBUCK@PA.GOV)  
TO CONFIRM ATTENDANCE AT THE SITE VISIT.**