



COLLETON COUNTY  
SOUTH CAROLINA

**Purchasing Department  
113 Mable T. Willis Blvd.  
Walterboro, SC 29488  
843.782.0504**

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**BID: FR-24  
ISLANDTON FIRE STATION 15 EXPANSION**

**Due: Wednesday, March 25, 2020 at 11:00am**

**MAIL OR DELIVER RESPONSE TO:**

**Purchasing Department  
Attn: Kaye B Syfrett  
113 Mable T. Willis Blvd.  
Walterboro, SC 29488**

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END OF SECTION

## Advertisement for Bid

Owner: Colleton County, 109 Benson Street, Walterboro, South Carolina

Sealed Bid: **FR-24** Colleton Fire-Rescue, Islandton Fire Station, Station 15 Expansion, 547 Ashton Rd. Islandton SC 29929 will be received at the Purchasing Office located at 113 Mable T. Willis Boulevard until **11:00am, Wednesday, March 25, 2020** and publicly opened and read aloud. The work to be completed as a part of this project consists of providing all required materials, equipment and labor necessary to complete the Expansion of the facility located at, 547 Ashton Rd., Islandton, South Carolina, with the following approximate quantities:

**Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

The Instructions to Bidders, bid packet, Contract, Plans, Specifications, and other contract documents may be examined at the following location:

Colleton County website: <http://www.colletoncounty.org/bids-and-proposal-requests>

Bidders must deposit security with all bids. Security shall be in the form of a certified check or bid bond made payable to Colleton County, and shall be for an amount equal to not less than five percent (5%) of the amount of the bid. Provisions of the security shall be as described in the Information for Bidders. No bid will be considered unless the bidder is legally qualified under the provisions of the South Carolina Sections 40-11-10 through 40-11-428).

### NOTICE TO BIDDERS:

Each bidder shall fully acquaint himself with conditions of this Bid. The failure or omission of a bidder to acquaint him/herself with existing conditions shall in no way relieve him/herself of any obligation with respect to this Bid or to the Contract.

BIDS WILL NOT BE CONSIDERED FROM ANY VENDOR THAT OWES DELINQUENT PROPERTY TAXES TO THE COUNTY OF COLLETON.

NOTICE TO BIDDERS: All amendments to and interpretations of this solicitation shall be in writing and issued by the Colleton County Purchasing office. Colleton County shall not be legally bound by any amendment or interpretation that is not in writing. Award of the project is contingent on funding approval by Colleton County Council.

The Owner reserves the right to waive any informality or to reject any or all bids.

Architect  
Glick Boehm Architecture  
493 King Street  
Charleston SC 29403  
Shawn Mellin, AIA, LEED AP

Owner  
Colleton County  
109 Benson Street  
Walterboro, SC 29488

## Information for Bidders

### ARTICLE 1 - DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the 001, General Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. **Issuing Office** - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.
  - B. **Architect, Engineer, Owner** - The person or firm in charge of the design of the project. In some instances, the owner will self-perform, acting as the Architect.
  - C. **Construction Coordinator**- The person or company acting on behalf of the owner and in some instances, the owner will self-perform, acting as the Construction Coordinator.
  - D. **Owner**- Colleton County
  - E. **Official Time**. The time as noted on the Atomic Clock located in the Purchasing office lobby. All times are Eastern Standard Time.
  - F. **Substantial Completion** – The point of construction whereas the owner can fully occupy the facility, perform all aspects of the work and not be inhibited with final punch list items. Certificate of occupancy does not constitute substantial completion. The owner must agree that the project is substantially complete.

### ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents can be found at <http://www.colletoncounty.org/bids-and-proposal-requests>.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer or Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer or Architect, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

### ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01 Bidders must be licensed as a General Contractor in the State of South Carolina and will hold all Trade Contracts and the Building Permit on the project.
- 3.02 To demonstrate Bidder's qualifications to perform the Work, within five (5) days of Owner's request, Bidder shall submit written evidence such as financial data; previous experience, present commitments.

### ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

- 4.00 **Pre-bid Conference.** **No** scheduled Conference or tours will be conducted. Sub-contractors are encouraged to inspect the site location at their convenience.
- 4.01 Subsurface and Physical Conditions
- A. The General Conditions identify:



Reports of explorations and tests of conditions at or contiguous to the Site that the Owner, Engineer or Architect has used in preparing the Bidding Documents has been completed for the project by ECS Southeast LLP. dated October 21, 2019

- B. Copies of reports and drawings referenced in Paragraph 4.01.A are included herein. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

#### 4.02 Underground Facilities

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer or Architect by owners of such Underground Facilities, including Owner, or others.

#### 4.03 Hazardous Environmental Condition

- A. The General Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that Engineer or Architect has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A are included herein. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in Paragraph 4.06 of the General Conditions.

4.05 The Owner will provide Bidder access to the Site to conduct examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. Owner shall be notified that the Bidder request to explore the site in further detail to include any site digging.

4.06 Reference is made to Article 7 of the General Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

- a. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda.

- b. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- c. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- d. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities), which have been identified in Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in Paragraph 4.06 of the General Conditions.
- e. Obtain and carefully study (or accept consequences of not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site, which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
- f. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- g. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- h. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- i. Promptly give Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Owner is acceptable to Bidder.
- j. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- k. No plea of ignorance of conditions that exist or may hereafter exist on the site of the work, or difficulties that may be encountered in the execution of the work, as a result of failure to make necessary investigations and examinations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all the requirements of the contract documents and to complete the work for the consideration set forth therein, or as basis for any claim whatsoever.
- l. Apparent omission of a detailed description concerning any point, shall be regarded as meaning the best commercial practice is to prevail and that only material and workmanship of the finest quality is to be used.
- m. Bidders may refer to Sections 2-67, 2-73, and 2-74 of Ordinance #2008-09, also known as the Colleton County, South Carolina Purchasing Policy to determine their remedies concerning this competitive process. The failure to be awarded a bid shall not be valid grounds for protest.

- n. The Bidder further agrees that the performance time specified is a reasonable time, having carefully considered the nature and scope of the project as aforesaid.
- 4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Owner written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Owner are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

#### **ARTICLE 5 - SITE AND OTHER AREAS**

- 5.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional land and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

#### **ARTICLE 6 - INTERPRETATIONS AND ADDENDA**

- 6.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing and submitted by email to; [jstieglitz@colletoncounty.org](mailto:jstieglitz@colletoncounty.org). Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda. Questions received less than seven (7) days prior to the date for opening of Bids will not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 6.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by the Owner. Addenda will be posted on the Colleton County website. It is the responsibility of the bidder to monitor this website for addendums.
- 6.03 Division 000 and Division 001 shall have authority over all other documents contained within the project manual. Where duplication of titles, articles, standards, requirements and such are found, division 000 and Division 001 govern.

#### **ARTICLE 7 - BID SECURITY**

- 7.01 A Bid must be accompanied by Bid security made payable to Colleton County in an amount of five percent (5%) of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 7.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within ten (10) days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders Whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven (7) days after the Effective Date of the Agreement or sixty (60) days after the Bid opening. Bidders not receiving a contract for will be issued a copy of the Notice of Award to send to their issuing Surety so that the Bid Bond can be canceled. Bidders Bid Bond documents will not be returned. All Certified Checks will be returned to the Bidders.

## ARTICLE 8 - CONTRACT TIMES

- 8.01 Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) bay apparatus facility to be completed within One Hundred Eighty (180) calendar days after the Notice to Proceed has been issued.

## ARTICLE 9 – LIQUIDATED DAMAGES

### 9.01 Document Execution

- A. The successful Bidder, upon failure or refusal to execute and deliver the contract and bonds within ten (10) days after they have received the notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages, the security deposited with the bid.

### 9.02 Project Execution

- A. Bidder must agree to commence work on or before a date to be specified in a written “Notice to Proceed” by the Owner and to fully complete the project within the dates specified in the Bid Form, Article 6; Paragraph 6.01. Bidder must agree also to pay as liquidated damages the sum as indicated in the Bid Form, Article 6; Paragraph 6.02 for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

## ARTICLE 10 - SUBSTITUTE AND “OR-EQUAL” ITEMS

- 10.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to the Construction Coordinator, application for such acceptance will not be considered by the Owner until after the Effective Date of the Agreement.

- (a) The use of a “**Brand Name Only**” specification is for the purpose of describing the sole item that will satisfy the county’s requirements. Bids offering alternate products will be declared non-responsive.
- (b) The use of a “**Brand Name or Equal**” specification is for the purpose of describing the standard of quality, performance and characteristics desired and is not intended to limit or restrict competition. An item shall be considered to be substantially equivalent, or “equal” to the specified brand in the opinion of the Purchasing Director, the County can reasonably anticipate sufficiently similar quality, capacity, durability, performance, utility and productivity as provided by the specified brand.

## ARTICLE 11 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 The General Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner with the bid packet. The bidder shall submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Construction Coordinator, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost

occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

- 11.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Construction Coordinator makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Construction Coordinator subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 11.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 11.04 Each bidder shall fully acquaint himself with conditions of this Bid. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this Bid or to the Contract.
- 11.05 Failure of a sub-contractor to fully acquaint himself with the conditions of this bid when working on behalf of the General Contractor or contract holder shall in no way relieve himself of any obligation with respect to this Bid or to the Contract.

#### **ARTICLE 12 - PREPARATION OF BID**

- 12.01 Should a bidder need any reasonable accommodations for any type of disability in order to participate in this procurement, you are asked to contact the Colleton County Purchasing office.
- 12.02 The Bid Form is included with the Bidding Documents located on the Owners Web Site.
- 12.03 All blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. When required a Bid price shall be indicated for each unit price item listed therein, or the words "No Bid," "No Charge," or "Not Applicable" entered. When a unit price is not required, the bid price shall be submitted in words and numbers as indicated on the bid form.
- 12.04 A Bid by an individual shall show the Bidder's name and official address.
- 12.05 A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid Form. The official address of the joint venture shall be shown below the signature.
- 12.06 All names shall be typed or printed in ink below the signatures.
- 12.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.08 The address and telephone number for communications regarding the Bid shall be shown.
- 12.09 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.
- 12.10 Any reports, studies, photographs, negatives or other documents prepared by vendor in the performance of its obligations shall be the exclusive property of the procurer and all such material shall be remitted to the procurer by the vendor upon completion, termination or cancellation of this order. Vendor shall not use, willingly allow or cause to have such material used for any purpose

other than performance of its obligations under this order without the prior written consent of the procurer.

- 12.11 The contractor will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of age, race, color, religion, sex, national origin or physical handicap. The following are incorporated herein by reference: 41 C.F.R. 60-1.4, 60-250.4 and 60-741.4.
- 12.12 All construction contracts over \$2,000.00 must include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3). This act provides that each Contractor shall be prohibited from inducing, by any means, persons employed in the construction, completion, or repaid of public work to give up any part of their compensation.
- 12.13 The contractor certifies that the vendor(s) will provide a "drug-free workplace" as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107
- 12.14 The federally-assisted construction contractor certifies that he will not maintain or provide, for his employees, segregated facilities at any of his establishments and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause and that he will retain such certifications in his files.
- 12.15 By signing this bid or proposal, Contractor certifies that it will (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractor's language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14. (An overview is available at [www.procurement.sc.gov](http://www.procurement.sc.gov))
- 12.16 Bidders must clearly mark as "confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under section 30-4-40, Code of Laws of South Carolina 1976, as amended (Freedom of Information Act). If any part is designated as confidential, there must be attached to that part an explanation of how this information fits within one or more categories listed in section 30-4-40. The County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the County or its agents for its determination in this regard.
- 12.17 Nothing herein is intended to exclude any responsible vendor, his product or service or in any way restrain or restrict competition. On the contrary, all responsible vendors are encouraged to bid and their bids are solicited.
- 12.18 The successful Bidder must be responsible for obtaining all necessary city, county, and state permits/licenses and must comply with all State and local codes and ordinances. Copies of such permits/licenses shall be made available to Colleton County upon request. Work within the Walterboro City Limits may require a City Business License.

- 12.19 This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina, U.S.A.
- 12.20 All claims, disputes and other matters in question between parties arising out of, or relating to, this Agreement, or the breach thereof, shall be decided in the Circuit Court of the Fourteenth Judicial Circuit in Colleton County, South Carolina. By executing this Agreement, all parties specifically consent to venue and jurisdiction in Colleton County, South Carolina and waive any right to contest jurisdiction and venue in said Court.
- 12.21 Colleton County reserves the right to reject all or any part of any bid, waive informalities and award the contract to the lowest responsive and responsible bidder to best serve the interest of Colleton County.
- 12.22 By submitting a bid, the Bidder certifies to the best of its knowledge and belief, that it and its principals, sub-contractors and assigns are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency. A copy of the County's debarment procedure in accordance with Section 2-68 of Ordinance #2008-09, also known as the Colleton County, South Carolina Purchasing Policy is available upon request.
- 12.23 Federal guidelines require grant recipients to obtain sufficient assurance that bidders are not suspended or debarred from participating in federal programs when contracts exceed \$25,000. By signing the bid submittal form you verify that no party to this agreement is excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Non-procurement suspension and debarment. **[See <https://www.epls.gov/> for additional information.]**

## **ARTICLE 13 - BASIS OF BID; COMPARISON OF BIDS**

### **13.01 Base Bid and Unit Price Schedule**

- A. Bidders shall submit a base bid for the project, as listed in the Specifications, General Conditions, Drawings and any Addendums. Failure for the Contractor or Subcontractor(s) to properly perform takeoffs for the project does not relieve the bidder of their obligation to provide a complete, finished product, for the submitted base bid amount. The base bid shall include any owner listed Allowances or contingencies.
- B. Bidders shall submit a Base Bid as a lump sum.
- C. Within 48 hours of the apparent lowest responsive bidder being notified by Colleton County, the bidder shall submit to Colleton County for **review and approval**, the attached unit price schedule for each item of work listed. All quantity take offs shall be listed in the form as requested. All requested unit pricing shall have a figure entered into the form. Lumping of unit prices and or divisions will not be allowed. Unit prices shall be totaled to match the lump sum bid. Failure for the bidder to provide this information in the allotted time will result in the bidder being disqualified and shall forfeit their Bid Bond.
- D. The total of all unit prices will be the sum of the products of the quantity of each item and the corresponding unit price.
- E. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

- 13.02 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit and any account of cash allowances, if any, named in the Contract Documents as provided in Paragraph 11.02 of the General Conditions.
- 13.03 Bid prices will be compared after adjusting for differences in the time designated by Bidders for Substantial Completion. The adjusting amount will be determined at the rate set forth in the Contract Documents for liquidated damages for failing to achieve Substantial Completion for each day before or after the desired date appearing in Article 9.
- 13.04 The contents of the successful IFB/RFP are included as if fully reproduced herein. Therefore, the selected contractor must be prepared to be bound by his/her proposal as submitted.
- 13.05 Whereas the Colleton County Purchasing Ordinance Chapter 3.08 has provisions for Local Vendor preference. Bidders are encouraged to review section 3.08.185 of Chapter 3.08 for their rights under the Local Vendor Preference as this preference could be used in determining the lowest responsible bidder.

#### **ARTICLE 14 - SUBMITTAL OF BID**

- 14.01 **A Bidder shall furnish one (1) original separate unbound copy of the "Bid Forms". Two (2) additional bound copies are to be submitted with the original. The Original Bid Forms shall contain the Bid security.**
- 14.02 A Bid shall be submitted no later than the date and the official time prescribed and at the place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, Contractor's License Number, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "**FR-24**". A mailed Bid shall be addressed to:
- Colleton County Purchasing Department  
Kaye B. Syfrett, Procurement Manager  
113 Mable T. Willis Boulevard  
Walterboro, SC 29488
- 14.03 In the case of Inclement Weather/Closure of Colleton County offices; If the Colleton County office is closed for business at the time scheduled for bid opening, for whatever reason, sealed bids will be accepted and opened on the next scheduled business day, at the originally scheduled official time.
- 14.04 The Bid shall be submitted on the Bid Form provided; no other form is acceptable.
- 14.05 The successful Bidder will be required to provide verified unit breakdown of costs of all services and work in a manner acceptable to the Owner.
- 14.06 All blanks on the Bid Forms shall be filled in, either typed or printed in ink. The person signing the bid shall initial all corrections or erasures.
- 14.07 Where so indicated on the Bid Form, the Bid Sum shall be expressed in both words and figures; in case of a discrepancy between the two, the Sums expressed in words shall govern.
- 14.08 List unit price on by bidder take offs - extend and show total. In case of errors in extension, unit prices shall govern. Unit pricing shall include all applicable overhead, administrative, profit and other associated cost.



- 14.09 Bidder shall quote all Alternates in the Bidding Documents. If Bidder fails to bid on all Alternates, then his/her Bid may be considered irregular, non-responsive and may be disqualified.
- 14.10 Bids containing qualifications will be considered irregular, non-responsive and may be disqualified.
- 14.11 A Bid submitted by a partnership shall list the names of all partners and shall be signed in the partnership name by one of the members of the partnership who is authorized to sign for the partnership.
- 14.12 A Bid submitted by a corporation shall be executed in the legal name of the corporation, followed by the state of incorporation and signed by the President or Vice President or another authorized officer. The name of each person signing the Bid Form shall be typed or printed below the signature.
- 14.13 When the person signing for a corporation is other than the President or Vice President and when requested by the Owner, a resolution or other satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished for the Owner's records. The name of each person signing the Bid Form shall be typed or printed below the signature.

#### **ARTICLE 15 - MODIFICATION OF BID-CLAIM OF ERROR**

- 15.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 15.02 A bidder may request to have their submitted bid withdrawn due to an error. The claim of error must be submitted within 24 hours of the bid submittal deadline. The description of the nature of the error shall accompany the request. The description shall include all original worksheets, demonstrating the error. If a withdrawal request is approved, the bidders Bid Bond will not be forfeited.

#### **ARTICLE 16 - OPENING OF BIDS**

- 16.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids in the form of a Bid Tabulation and Bid Comparison to be posted on the County web page.

#### **ARTICLE 17 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

#### **ARTICLE 18 - EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also, reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 18.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

- 18.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 18.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the General Conditions.
- 18.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.
- 18.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.
- 18.07 The Owner reserves the right not to Award the Project.
- 18.08 **The Owner shall have the right to accept Alternates in any order or combination, and to determine the low bidder on the basis of the sum of the Base Bid and alternates accepted.**

#### **ARTICLE 19 - CONTRACT SECURITY AND INSURANCE**

- 19.01 Article 5 of the General Conditions sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

#### **ARTICLE 20 - SIGNING OF AGREEMENT**

- 20.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within ten (10) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten (10) days thereafter, Owner shall deliver one (1) fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

#### **ARTICLE 21 - RETAINAGE**

- 21.01 Retainage from progress payments to the Contractor shall be **ten percent (10%)** of each payment for work completed and stored materials on site. Upon substantial completion, contractor may request in a payment application, five percent 5% of the held retainage.

#### **ARTICLE 22 – INSURANCE**

- 22.01 The successful bidder shall procure, maintain, and provide proof of, insurance coverage for injuries to persons and/or property damage as may arise from or in conjunction with, the work performed on behalf of the County by the bidder, his agents, representatives, employees or subcontractors. Proof of coverage as contained herein shall be submitted fifteen (15) days prior to the commencement of work and such coverage shall be maintained by the bidder for the duration of the contract period; for occurrence policies.

a. General Liability

Coverage shall be as broad as: Comprehensive General Liability endorsed to include Broad Form, Commercial General Liability form including Products/Completed Operations.

Minimum Limits

General Liability:

\$2,000,000 General Aggregate

\$2,000,000 Products & Completed Operations Aggregate

\$1,000,000 Personal and Advertising Injury

\$1,000,000 Each Occurrence (Bodily Injury and Property Damage)

\$50,000 Fire Damage Limit

\$5,000 Medical Expense Limit

b. Automobile Liability

Coverage sufficient to cover all vehicles owned, used, or hired by the bidder, his agents, representatives, employees or subcontractors.

Minimum Limits

Automobile Liability:

\$1,000,000 Combined Single Limit

\$1,000,000 Each Occurrence

Limit \$5,000 Medical Expense

c. Workers' Compensation

Limits as required by the Workers' Compensation Act of SC. Employers

Liability, \$1,000,000

d. Owners' & Contractors' Protective Liability

Policy will be in name of Colleton County.

Minimum limits required are \$1,000,000

e. Excess or Umbrella Liability

General Aggregate \$2,000,000

Each Occurrence \$2,000,000

f. Contractual Liability

Bodily Injury:

Each Accident \$2,000,000

Annual Aggregate \$2,000,000

Property Damage:

Each Accident \$2,000,000

Annual Aggregate \$2,000,000

g. Coverage Provisions

1. All deductibles or self-insured retention shall appear on the certificate(s).
2. The County of Colleton, its officers/ officials, employees, agents and volunteers shall be added as "additional insured" as their interest's may appear. This provision does not apply to Professional Liability or Workers' Compensation/ Employers' Liability.
3. The bidder's insurance shall be primary over any applicable insurance or self-insurance maintained by Colleton County.
4. Shall provide 30 days' written notice to Colleton County before any cancellation, suspension, or void of coverage in whole or part, where such provision is reasonable.

5. All coverage for subcontractors of the bidder shall be subject to all of the requirements stated herein.
6. All deductibles or self-insured retention shall appear on the certificate(s) and shall be subject to approval by the County. At the option of Colleton County, either; the insurer shall reduce or eliminate such deductible or self-insured retention; or the bidder shall be required to procure a bond guaranteeing payment of losses and related claims expenses.
7. Failure to comply with any reporting provisions of the policy(s) shall not affect coverage provided Colleton County, its officers/officials, agents, employees and volunteers.
8. The insurer shall agree to waive all rights of subrogation against Colleton County, its' officers/officials, agents, employees or volunteers for any act, omission or condition of premises which the parties may be held liable by reason of negligence.
9. The bidder shall furnish Colleton County certificates of insurance including endorsement affecting coverage. The certificates are to be signed by a person authorized by the insurance company(s) to bind coverage on its' behalf, if executed by a broker, notarized copy of authorization to bind, or certify coverage must be attached.
10. All insurance shall be placed with insurers maintaining an A.M. Best rating of no less than an A: VII. If A.M. Best rating is less than A: VII, approval must be received from Colleton County's Risk Officer.

22.02 Colleton County, SC will require each contractor and service provider to maintain on file with the Procurement Manager, a current Certificate of Insurance showing limits as required by the Workers' Compensation Act of SC:

Employers Liability, \$1,000,000.

The law also recognizes "statutory employees." These are employees who work for a subcontractor who may be working for a business or another contractor. Employers should inquire whether or not a subcontractor working for them has workers' compensation insurance, regardless of the number of employees employed by the subcontractor. If the subcontractor does not, the subcontractor's injured employees would be covered under the employer's workers' compensation insurance. If the subcontractor does not carry workers' compensation insurance, then the owner or the principal contractor would be liable just as if the subcontractor's employee was one of their employees. For answers to additional questions, visit the SC Worker's Compensation Commission website at: <http://www.wcc.state.sc.us/Frequently%20Asked%20Questions/FAQ.htm>

22.03 Contractor shall provide and maintain, during the progress of the work and until execution of the Certificate of Contract Completion, a *Builder's Risk Insurance policy* to cover all work in the course of construction including false work, temporary buildings, scaffolding, and materials used in the construction process (including materials designated for the project but stored off site or in transit). The coverage shall equal the total completed value of the work and shall provide recovery at replacement cost.

- a) Such insurance shall be on a special cause of loss form, providing coverage on an open perils basis insuring against the direct physical loss of or damage to covered property, including but not limited to theft, vandalism, malicious mischief, earthquake, tornado, lightning, explosion, breakage of glass, collapse, water damage, and testing/startup.
- b) Coverage shall include coverage for "soft costs" (costs other than replacement of building materials) including, but not limited to, the reasonable extra costs of the architect/engineer and reasonable Contractor extension or acceleration costs. This

coverage shall also include the reasonable extra costs of expediting temporary and permanent repairs to, or permanent replacement of, damaged property. This shall include overtime wages and the extra cost of express or other means for rapidly transporting materials and supplies necessary to the repair or replacement.

- c) The policy shall specifically permit and allow for partial occupancy by the owner prior To execution of the final Certification of Contract Completion, and coverage shall remain in effect until all punch list items are completed.
- d) The Builder's Risk deductible may not exceed \$5,000. The Contractor or subcontractor experiencing any loss claimed under the Builder's Risk policy shall be responsible for that loss up to the amount of the deductible.
- e) If Contractor is involved solely in the installation of material and equipment and not in New building construction, the Contractor shall provide an Installation Floater policy in lieu of a Builder's Risk policy. The policy must comply with the provisions of this paragraph.

### **ARTICLE 23 – WARRANTY**

- 23.01 Warranty of workmanship and products shall be covered for **730 days** from the date of the issuance of the Certificate of Substantial Completion. During the 730-day warranty period, all product warranties or workmanship repairs are the sole responsibility of the Contract holder and shall include all parts and labor associated with the repair.
- 23.02 All items repaired or replaced during the initial Warranty period due to workmanship or product failure shall be warranted for 365 days from the date of the repair and or replacement.
- 23.03 All Surety Bonds shall cover the warranty period listed in 23.01 and 23.02. The surety shall be updated to reconcile the date of the warranty period as needed.
- 23.04 Should a product installed during the construction process not have a manufactures warranty period that extends out to one year, it is the responsibility of the Contract holder to cover the product and any resulting expenses related to that product for one year.

**Remainder of this page intentionally left blank**

## CONTRACT

THIS AGREEMENT is by and between **Colleton County, 109 Benson Street,  
Walterboro, South Carolina**

(hereinafter called "Owner") and \_\_\_\_\_

doing business as an **individual/partnership/corporation/joint venture** (strike out inapplicable terms), with its primary office in the City of \_\_\_\_\_, County of \_\_\_\_\_, State of \_\_\_\_\_.

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

### ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

**Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

### ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

**Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

### ARTICLE 3 - DESIGN

3.01 The Project has been designed by: Glick, Boehm Architecture Inc., Doug Clark, will act as the Construction Coordinator as the Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to the Construction Coordinator in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

### ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Dates for Substantial Completion and Final Payment

**Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility to be completed within One Hundred Eighty (180) calendar days after the Notice to Proceed has been issued.**

4.03 Liquidated Damages

- A. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$500 for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.
- B. Liquidated damages can and will be assessed against the final payment request and any retainage held by Colleton County. Should funding for Liquidated damages exceed the amount held by Colleton County in the form of Payments or Retainage, work shall stop until such time as the Liquidated Damages issue is resolved.
- C. Substantial Completion does not constitute compliance with the allotted time as outlined in the bid packet or within the Contract Documents.

**ARTICLE 5 - CONTRACT PRICE**

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A below:

- A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work, times the estimated quantity of that item as indicated in the Bid Form attached hereto as part of these Contract Documents.
- B. Allowances to be used at the owner’s discretion shall be included in Base Bid Proposal. Allowances will be listed separately in the submitted schedule of values and unit price sheet. All unused allowances shall be credited back to the owner at the completion of the project in the form of a change order.

Unfounded issues	LS	1	\$ 50,000.00
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D. The sum of unit price work to be completed as noted in 5.01(A) and 5.01(B) is, \_\_\_\_\_ \$ \_\_\_\_\_

**ARTICLE 6 - PAYMENT PROCEDURES**

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by the Construction Coordinator as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment on or about the 15th day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as the Construction Coordinator may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:
  - a. **90%** of Work completed (with the balance being Retainage).
  - b. **90%** of cost of materials and equipment not incorporated in the Work (with the balance being Retainage).
2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **95%** of the Work completed, less such amounts as the Construction Coordinator shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less **10%** of the Construction Coordinator estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

#### 6.03 Final Payment

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by the Construction Coordinator as provided in said Paragraph 14.07.

### **ARTICLE 7 – CONTRACTOR’S REPRESENTATIONS**

7.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
- B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in Paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in Paragraph 4.06 of the General Conditions.
- E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
- F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the



Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- I. Contractor has given the Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by the Owner is acceptable to Contractor.
- J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

## **ARTICLE 8 - CONTRACT DOCUMENTS**

8.01 A. The Contract Documents shall consist of all sections in the following divisions;

DIVISION 000 - BIDDING AND CONTRACT REQUIREMENTS  
DIVISION 001 - GENERAL CONDITIONS  
DIVISION 00 - INTRODUCTORY INFORMATION  
DIVISION 02 - SITE CONSTRUCTION  
DIVISION 06 - WOOD AND PLASTICS  
DIVISION 07 - THERMAL AND MOISTURE PROTECTION  
DIVISION 08 - DOORS AND WINDOWS  
DIVISION 09 - FINISHES  
DIVISION 10 - SPECIALTIES  
DIVISION 13 - SPECIAL CONSTRUCTION  
DIVISION 22 - PLUMBING  
DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING  
DIVISION 26 - ELECTRICAL  
EXHIBIT "A" - PLANS  
EXHIBIT "B" - SPECIFICATIONS

All information contained within these Divisions, and the requirements thereof are of the sole responsibility of the bidder.

- B. There are no Contract Documents other than those listed above in this Article 8.
- C. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

## **ARTICLE 9 - MISCELLANEOUS**

9.01 Terms

- A. Terms used in this Agreement will have the meanings stated in the 001, General Conditions.

9.02 Assignment of Contract

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this

restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.03 Successors and Assigns

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9.04 Severability

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

9.05 Waiver or Forbearance

Any delay or failure of Colleton County to insist upon strict performance of any obligation under this Agreement or to exercise any right or remedy provided under this Agreement shall not be a waiver of Colleton County's right to demand strict compliance, irrespective of the number or duration of any delay(s) or failure(s). No term or condition imposed on Contractor under this Agreement shall be waived and no breach by Contractor shall be excused unless that waiver or excuse of a breach has been put in writing and signed by both parties. No waiver in any instance of any right or remedy shall constitute waiver of any other right or remedy under this Agreement. No consent to or forbearance of any breach or substandard performance of any obligation under this Agreement shall constitute consent to modification or reduction of the other obligations or forbearance of any other breach.

9.06 Subject to the provisions below, the contract may be terminated by Colleton County upon fifteen (15) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then this contract may be extended upon written approval of the County until said work or services are completed and accepted.

a. Termination for Convenience

In the event that this contract is terminated or canceled upon request and for the convenience of the County, without the required fifteen (15) days advance written notice, then the County shall negotiate reasonable termination costs, if applicable.

b. Termination for Cause

Termination by the County for cause, default or negligence on the part of the contractor shall be excluded from the foregoing provision; termination costs, if any, shall not apply. The fifteen (15) days advance notice requirement is waived in the event of Termination for Cause.

c. Non-Appropriation:

It is understood and agreed by the parties that in the event funds are not appropriated in the current fiscal year or any subsequent fiscal years, this contract will become null and void and the County will only be required to pay for services completed to the satisfaction of the County.

IN WITNESS, WHEREOF, Owner and Contractor have signed this Agreement. One counterpart each has been delivered to Owner, Contractor, Construction Coordinator and provided to the Contractor for his Bonding Agency. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on this \_\_\_\_ day of \_\_\_\_\_, 2020 (which is the Effective Date of the Agreement).

OWNER:

CONTRACTOR:

**Colleton County**

By:

**J. Kevin Griffin**

Title:

**County Administrator**

Attest:

Title:

Address for giving notices:

**Colleton County Purchasing Department**

**Attn: Kaye Syfrett, Procurement Manager**

**113 Mable T. Willis Boulevard**

**Walterboro, SC, 29488**

By:

Title:

Attest:

Title:

Address for giving notices:

License No.:

(Where applicable)

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## REFERENCE FORMS

### 1- BOND FORMS

#### Bond Requirements

- 1.01 All Bonds shall be placed with insurers maintaining an A.M. Best rating of no less than an A: VII. If A.M. Best rating is less than A: VII, approval must be received from Colleton County's Risk or Finance Officer before issuance.
- 1.02 Bonding Companies shall submit as proof of good standing, a copy of the A.M Rating along with the Bond.
- 1.03 Bonding/Surety Companies shall use the Bonds provided in the Bid/Proposal Packet CPST-11.
- 1.04 Bonding/Surety Companies shall issue a new Performance Bond and Payment Bond at such time that the contract has been altered by a change order adjusting the compensation of the contract.
- 1.05 Bonding companies shall note the warranty periods as outlined in the Proposal Document CPST-11 and listed on the reverse side of the bond itself. Should the warranty period be extended past the initial contract period due to a warranty claim, then the bond shall will be re-issued to match the new warranty period as outlined in the proposal documents.

**Remainder of this page intentionally left blank**

**PERFORMANCE BOND**

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR:

SURETY:

OWNER: Colleton County  
109 Benson Street  
Walterboro, SC 29488

CONTRACT: FR-24

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

Amount: \_\_\_\_\_

Description (Name and Location): **Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

**BOND**

Bond Number: \_\_\_\_\_

Date (Not earlier than Contract Date): \_\_\_\_\_

Amount: \_\_\_\_\_

Modifications to this Bond Form: \_\_\_\_\_

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company: \_\_\_\_\_

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

Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

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

Signature and Title  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_

Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company: \_\_\_\_\_

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

\_\_\_\_\_  
Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

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

Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_

Signature and Title:

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:

4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or

2. Deny liability in whole or in part and notify Owner citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

8. Surety hereby waives notice of any change, including changes of time, to Contract, Contract amount or to related subcontracts, purchase orders, and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. The Surety will be obligated until such time as the Contractor has faithfully performed all terms of the Contract, which includes a two (2) year warranty coverage period.

12.1 The standard two-year warranty period starts on the date of issuance of the Substantial Completion Certification.

12.2 The standard warranty covers the full cost of Labor, Parts, Shipping, Sales Tax and any and all other associated cost for the warranty repair.

12.3 The surety agrees that should a warranty issue arise within the allotted standard two (2) year warranty period, the item repaired during the warranty period shall be covered for an addition year (365 days) from the completed repair of the warranty issue.

13. Definitions

13.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.

13.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

13.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

13.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

**PAYMENT BOND**

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR:

SURETY:

OWNER: Colleton County  
109 Benson Street  
Walterboro, SC 29488

CONTRACT FR-24

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

Amount: \_\_\_\_\_

Description (Name and Location): **Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

**BOND**

Bond Number: \_\_\_\_\_

Date (Not earlier than Contract Date): \_\_\_\_\_

Amount: \_\_\_\_\_

Modifications to this Bond Form: \_\_\_\_\_

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company: \_\_\_\_\_

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

Name and Title: \_\_\_\_\_

\_\_\_\_\_  
Surety's Name and Corporate Seal

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

\_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_

\_\_\_\_\_  
Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company: \_\_\_\_\_

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

Name and Title: \_\_\_\_\_

\_\_\_\_\_  
Surety's Name and Corporate Seal

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

\_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
  - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
  - 2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
  - 4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2. Claimants who do not have a direct contract with Contractor:
    1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
  - 6.1. Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2. Pay or arrange for payment of any undisputed amounts.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.
14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.
15. The Surety will be obligated until such time as the Contractor has faithfully performed all terms of the Contract, which includes a two (2) year warranty coverage period.
  - 15.1 The standard two-year warranty period starts on the date of issuance of the Substantial Completion Certification.
  - 15.2 The standard warranty covers the full cost of Labor, Parts, Shipping, Sales Tax and any and all other associated cost for the warranty repair.
  - 15.3 The surety agrees that should a warranty issue arise within the allotted standard two (2) year warranty period, the item repaired during the warranty period shall be covered for an addition year (365 days) from the completed repair of the warranty issue.
16. DEFINITIONS
  - 16.1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
  - 16.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
  - 16.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.



## Substantial Completion

<b>Project: <u>Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</u></b>	<b>Project Owner: Colleton County, 113 Mable T. Willis Blvd., Walterboro, South Carolina</b>	Architects Project No.: 1928 Owner Project Number: FR-24
<b>Contract: <u>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</u></b>		Date of Contract:
Contractor:		

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents:
  The following specified portions:

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Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer and or Architect, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:**

- Amended Responsibilities
  Not Amended

Owner's Amended Responsibilities:

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Contractor's Amended Responsibilities:

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The following documents are attached to and made part of this Certificate:

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This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

\_\_\_\_\_  
 Executed by Construction Coordinator: Glick, Boehm Architecture Inc.

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Accepted by Contractor:

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Accepted by Owner: John T. Stieglitz III, Capital Projects Director

\_\_\_\_\_  
 Date

**CONTRACTOR'S AFFIDAVIT**

The State of \_\_\_\_\_ Date \_\_\_\_\_

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

The City/Town of \_\_\_\_\_

\_\_\_\_\_  
(Officer's Name)

\_\_\_\_\_  
(Officer's Title)

being duly sworn, deposes and says that \_\_\_\_\_  
(Contractor's Name)

has furnished all labor and material entering into the: **Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus Facility.** called for in the Contract Documents dated \_\_\_\_\_ with **Colleton County**

states further that this officer has full knowledge of all obligations for such labor and materials, which have entered into and become part of that certain project known and designated above, and that this officer further deposes and says that all debts and other obligations for such labor and materials have been fully and completely paid for in good and lawful money of the United States of America and that there are no suits for damages against them proceeding, prospective and/or that there are no suits for damages against them proceeding, prospective, or otherwise, in consequence of their operations on the above said project.

The said \_\_\_\_\_ will hold the Owners,  
(Contractor's Name)

**Colleton County, South Carolina** blameless of any and all mechanic's liens that may be hereafter entered or filed for record, so as to constitute charge against said premises for work or labor done or materials furnished by them.

IN WITNESS HEREOF, this officer has heretofore put his hand and seal: \_\_\_\_\_ (Seal)  
(Officer's Name)

I, \_\_\_\_\_, Notary Public in and for the above-named County and State do hereby certify that \_\_\_\_\_ personally known to me to be the affiant in the  
(Officer's Name)

foregoing Affidavit, personally appeared before me this day and, having been duly sworn, deposes and says that the facts set forth in the above Affidavit are true and correct.

WITNESS my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 2020  
\_\_\_\_\_  
(Seal)

Notary Public for the State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

# FIELD ORDER

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

Date of Issuance: \_\_\_\_\_

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

<b>Project: Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</b>	<b>Project Director: Colleton County, 113 Mable T. Willis Blvd., Walterboro, SC 29488</b>	Architects Project No.: 1928 Owner Project Number: FR-24
Contract: <b><u>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</u></b>		Date of Contract:
Contractor:		

**Attention:**

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.05A., for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Construction Coordinator immediately and before proceeding with this Work.

Reference: \_\_\_\_\_ (Specification Section(s))      \_\_\_\_\_ (Drawing(s) / Detail(s))

Description:

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Attachments:

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Construction Coordinator: Doug Clark, Glick Boehm Architecture Inc.

Receipt Acknowledged by (Contractor):	Date:
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# WORK CHANGE DIRECTIVE

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

Date of Issuance: \_\_\_\_\_

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

<b>Project: Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</b>	<b>Project Director: Colleton County, 113 Mable T. Willis Blvd., Walterboro, SC 29488</b>	Architects Project No.: 1928 Owner Project Number: FR-24
Contract: <b>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</b>		Date of Contract:
Contractor:		

**You are directed to proceed promptly with the following change(s):**

Item No.	Description

**Attachments (list documents supporting change):**

**Purpose for Work Change Directive:**

- Authorization for Work described herein to proceed on the basis of Cost of the Work due to:
  - Non-agreement on pricing of proposed change.
  - Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

**Estimated change in Contract Price and Contract Times:**

Contract Price \$ \_\_\_\_\_ (increase/decrease)      Contract Time \_\_\_\_\_ days (increase/decrease)

If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Construction Coordinator: <b>Doug Clark, Glick Boehm Architecture Inc.</b>	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

**CHANGE ORDER No. \_\_\_\_\_**

Date of Issuance: \_\_\_\_\_

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

<b>Project Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</b>	<b>Project Director: Colleton County, 113 Mable T. Willis Blvd., Walterboro, SC 29488</b>	Architects Project No.: 1928 Owner Project Number: FR-24
Contract: <b>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</b>		Date of Contract:
Contractor:		

**The Contract Documents are modified as follows upon execution of this Change Order:**

Description:

Attachments: (List documents supporting change):

**CHANGE IN CONTRACT PRICE:**

Original Contract Price:

\$ \_\_\_\_\_

[Increase] [Decrease] from previously approved Change Orders No. \_\_\_\_\_ to No. \_\_\_\_\_:

\$ \_\_\_\_\_

Contract Price prior to this Change Order:

\$ \_\_\_\_\_

[Increase] [Decrease] of this Change Order:

\$ \_\_\_\_\_

Contract Price incorporating this Change Order:

\$ \_\_\_\_\_

**CHANGE IN CONTRACT TIMES:**

Original Contract Times:  Working days  Calendar days

Substantial completion (days or date): \_\_\_\_\_

Ready for final payment (days or date): \_\_\_\_\_

[Increase] [Decrease] from previously approved Change Orders No. \_\_\_\_\_ to No. \_\_\_\_\_:

Substantial completion (days): \_\_\_\_\_

Ready for final payment (days): \_\_\_\_\_

Contract Times prior to this Change Order:

Substantial completion (days or date): \_\_\_\_\_

Ready for final payment (days or date): \_\_\_\_\_

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): \_\_\_\_\_

Ready for final payment (days or date): \_\_\_\_\_

Contract Times with all approved Change Orders:

Substantial completion (days or date): \_\_\_\_\_

Ready for final payment (days or date): \_\_\_\_\_

RECOMMENDED:

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

Contractor (Authorized Signature)

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

Approved by Funding Agency (if applicable): \_\_\_\_\_

APPROVED:

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

Colleton County Administrator, J. Kevin Griffin

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

APPROVED:

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

Colleton County Project Director: John T Stieglitz III

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

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

## MATERIAL/PRODUCT SUBSTITUTION REQUEST

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

We hereby submit for your review, the following PRODUCT SUBSTITUTION of the specified material for the above listed project.

Section: \_\_\_\_\_

Paragraph: \_\_\_\_\_

Specified Material: \_\_\_\_\_

Attached is complete technical data of the PRODUCT SUBSTITUTION. Included is complete information on changes to the Project Manual Documents required by the proposed PRODUCT SUBSTITUTION for its proper installation.

A request constitutes a representation that Trade Contractor:

- Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
- Will provide same warranty for Substitution as for specified product.
- Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.
- Waives claims for additional costs or time extension which may subsequently become apparent.
- Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction or additional time expended by Architect/Engineer to review information.

**It is understood that if the Architect or Engineer approves an approved substitution prior to receipt of bids in accordance with the project timeline, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner. If substitution requests are not addressed in the addendum, the substitution request shall be considered not approved. Architect's or Engineers decision of approval or disapproval of proposed substitution shall be final without dispute.**

THE UNDERSIGNED Trade Contractor states that the function, appearance, and quality of the PRODUCT SUBSTITUTION are equivalent or superior to the specified item. In addition, I, as the Trade Contractor will assume all responsibility for any impact or delay the review and evaluation of the alternate product may cause. Your approval of the Substitute Product in no way will relieve me as the Trade Contractor of my responsibilities to conform with all requirements of the Contract Documents.

Submitted by: \_\_\_\_\_

**NOTICE OF AWARD**

Dated \_\_\_\_\_

<b>Project: Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</b>	<b>Project Director: Colleton County, 113 Mable T. Willis Blvd., Walterboro, SC 29488</b>	Architects Project No.: 1928 Owner Project Number: FR-24
<b>Contract: FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</b>		
Bidder:		
Bidder's Address: (send Certified Mail, Return Receipt Requested):		

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the Renovation and Expansion of the Colleton – Walterboro Lowcountry Regional Airport Terminal located at 537 Aviation Way, Walterboro South Carolina

The Contract Price of your Contract is \_\_\_\_\_ (\$ \_\_\_\_\_).

- \_\_\_\_ copies of each of the Contract Documents (except Drawings) accompany this Notice of Award.
- \_\_\_\_ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within ten (0) days of the date you receive this Notice of Award.

1. Deliver to the Owner four (4) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified.
3. Other conditions precedent:  
None

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award and declare your Bid security forfeited.

Within seven (7) days after you comply with the above conditions, Owner will return to you one (1) fully executed counterpart of the Contract Documents.

\_\_\_\_\_  
Colleton County  
Owner

By: \_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Title

**Acceptance of Notice**

Receipt of the above Notice of Award is hereby acknowledged by \_\_\_\_\_

On this \_\_\_\_\_ day of \_\_\_\_\_, 2020.

\_\_\_\_\_  
Contractor

By: \_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Title

**NOTICE TO PROCEED**

Dated \_\_\_\_\_

<p><b>Project: <u>Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.</u></b></p>	<p><b>Project Director: Colleton County, 113 Mable T. Willis Blvd., Walterboro, SC 29488</b></p>	<p>Architects Project No.: 1928  Owner Project Number: FR-24</p>
<p>Contract: <b><u>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</u></b></p>		
<p>Contractor:</p>		
<p>Contractor's Address: [send Certified Mail, Return Receipt Requested]</p> <p>_____</p> <p>_____</p> <p>_____</p>		

You are notified that the Contract Times under the above contract will commence to run on \_\_\_\_\_ or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is \_\_\_\_\_ and the date of readiness for final payment is \_\_\_\_\_.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to the Construction Coordinator and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

<p>_____</p> <p>Contractor</p>	<p>_____</p> <p><b>Colleton County</b> Owner</p>
<p>by: _____</p> <p>Authorized Signature</p>	<p>Given by: _____</p> <p>John T. Stieglitz</p>
<p>_____</p> <p>Title</p>	<p>_____</p> <p>Capital Projects Director Title</p>
<p>_____</p> <p>Date</p>	<p>_____</p> <p>Date</p>





**Progress Estimate**

**Contractor's Application**

**For (contract):** FR-24 Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.

Application Number:

Application Period:

Application Date:

A Item		B	Work Completed		E	F		G
Specification Section No.	Description	Scheduled Value	C From Previous Application (C + D)	D This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (E) / B	Balance to Finish (B - F)
Totals								

# Progress Estimate

# Contractor's Application

For (contract): <u>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</u>							Application Number:					
Application Period:							Application Date:					
A				B	C	D	E	F		G	H	
Bid Item No.	Description		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (E) B	Balance to Finish (B - F)	Retainage
Totals												

# Stored Material Summary

# Contractor's Application

For (contract <u>FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.</u>							Application Number:		
Application Period:						Application Date:			
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)	
		Totals							

## CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

### PART 1 - GENERAL

**1.01** The following information and completed forms may be requested by the Owner of the three (3) lowest bidders. The request will be made the day of the Bid Opening or within five (5) days following the Bid Opening. If requested, this data must be submitted to the Construction Coordinator or Owner within five (5) days of the request. Failure to provide the data in this section, upon request, will subject bidder to disqualification.

### 1.02 DESCRIPTION

- A. Information provided will be used by the Construction Coordinator or Owner to determine the competency and ability of the Contractor and/or Subcontractor to perform the scheduled work in a manner that is satisfactory to the Construction Coordinator or Owner. The Construction Coordinator or Owner's decision shall be final.
- B. Any Subcontractor being used by the General Contractor, whose portion of the project exceeds 5% of the total bid price amount, will be required to provide the same information as the General Contractor.
- C. The Contractor and Subcontractor shall include with this section a detailed financial statement indicating the Contractor's or Subcontractor's financial resources. The information on that statement shall be certified by a Certified Public Accountant and shall be submitted on the Associated General Contractors of America form "Standard Questionnaires and Financial Statement for Bidders".
- D. The Contractor and Subcontractor shall certify by attaching his signature to this Section as provided that all information contained herein is complete and all statements and answers are accurate and true. Providing misinformation, incomplete information, inaccurate information, or failure to certify the information, will subject bidder to disqualification.

### 1.03 QUALIFICATIONS

A. Complete the following for General Contractor and any Subcontractors (attach additional sheets as required):

- 1. Name: \_\_\_\_\_
- 2. Address: \_\_\_\_\_
- 3. City, State, Zip: \_\_\_\_\_
- 4. Principle: \_\_\_\_\_

B. Number of years the company has been in business: \_\_\_\_\_

C. List and describe at least five (5) projects that have been completed, that are similar in size and type, and that has been completed within the last ten (10) years:

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_
- 3. \_\_\_\_\_  
\_\_\_\_\_

- 4. \_\_\_\_\_  
\_\_\_\_\_
- 5. \_\_\_\_\_  
\_\_\_\_\_

D. For the projects listed above provide the following:

- 1. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 2. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 3. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 4. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 5. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_

E. For each of the projects listed in Items C & D provide the following:

- 1. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
- 2. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_

3. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
4. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
5. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_

F. Provide the following for any portion of the work that is being subcontracted (5% or more of the Bid Amount):

1. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
2. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
3. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
4. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
5. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_

G. Provide a list of equipment that is owned by the Contractor and is available for this project.

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

H. Provide a list of equipment that will be purchased, leased or rented for this project.

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

I. Provide a list of the superintendent(s) or others that will be in charge of this project (Provide resumes and qualifications):

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

J. Provide the following for current projects being completed:

1. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

2. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

3. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

4. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

5. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_



K. Provide a list of the last five (5) projects that has been completed with the Owner over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
3. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
4. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
5. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

L. Provide a list of last five (5) projects that Bid with the Owner over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
3. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
4. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

5. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

M. Provide a list of projects completed with the Construction Coordinator over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

2. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

3. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

4. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

- 5. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

N. Provide a list of projects involved with litigation, arbitration and/or mediation over the past twenty (20) years:

- 1. Project Name: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Explanation: \_\_\_\_\_
- 2. Project Name: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Explanation: \_\_\_\_\_
- 3. Project Name: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Explanation: \_\_\_\_\_
- 4. Project Name: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Explanation: \_\_\_\_\_
- 5. Project Name: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Explanation: \_\_\_\_\_

O. Attach a rate schedule associated with equipment that includes labor, overhead and profit.

\_\_\_\_\_Rate Schedule Attached.

P. Additional information if necessary.

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

**I HEREBY CERTIFY that as a duly authorized representative of \_\_\_\_\_  
\_\_\_\_\_(bidder), the information provided is to the  
best of my knowledge accurate and that failure to provide accurate information will result in  
disqualification of my bid.**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name (Please Print)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

Notary Public for South Carolina

My Commission Expires: \_\_\_\_\_

**Unit Prices – FR-24 Expansion of the Islandton Fire Station located at 547 Ashton Rd. Islandton SC 29929.**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Unit Price</i>	<i>Bid Price</i>
<b>General</b>					
	Mobilization	LS		\$	\$
	Bonds	%		\$	\$
	Insurance	LS		\$	\$
	Permitting	LS		\$	\$
	Utilities	LS		\$	\$
	Rental Equipment	LS		\$	\$
	Site Superintendent/Supervision	HR		\$	\$
	Overhead and Profit	%		\$	\$
	Temporary Facility Rental and Set Up	LS		\$	\$
	Temporary Power	LS		\$	\$
	Special Testing	LS		\$	\$
	Warranties	LS		\$	\$
<b>Demolition-General Cost</b>					
	Temporary partitions	SF		\$	\$
	Barricades / signs	LS		\$	\$
	Haul and dump	CY		\$	\$
	Dump charges	CY		\$	\$
<b>Concrete Prices Include Finishing</b>					
	Footings	SF		\$	\$
	Slab on Grade	SF		\$	\$
	Porches	SF		\$	\$
	Lines and Batters	LF		\$	\$
	Wire Fabric	SF		\$	\$
	Rebar	LF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXXXX
<b>Arch</b>					
	Standing Seam Metal Roof and Underlayment	SF		\$	\$
	Gutters	LF		\$	\$
	Downspouts	LF		\$	\$
	Wooden Base Board	LF		\$	\$
	Plywood Walls	SF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXXXX
<b>Doors and Windows</b>					
	Exterior Entry Doors, Complete	EA		\$	\$
	Wood Interior Doors, Complete	EA		\$	\$
<b>Door Hardware Includes installation</b>					
	Acme Doors	LS		\$	\$
	Hardware Set 1	EA		\$	\$

	Hardware Set 2	EA		\$	\$
	Hardware Set 3	EA		\$	\$
	Hourly Rate	HR	1		XXXXXXXXXXXXXXXXXXXX
	<b>Finishes</b>				
	Paint Flat surface	SF		\$	\$
	Paint Doors	SF		\$	\$
	Floors-	SF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	<b>Specialties</b>				
	Fire Extinguisher w/cabinet, complete	EA		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	<b>Plumbing</b>				
	Water Supply-Complete	LS		\$	\$
	Sanitary sewer supply, Complete	LS		\$	\$
	Interior Domestic Water, Complete	LS		\$	\$
	Interior Wastewater, Complete	LS		\$	\$
	Floor Drain	EA		\$	\$
	Shock Absorber - Allowance	EA		\$	\$
	Wall/ Floor Cleanout	EA		\$	\$
	Plumbing Demo	LS		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	<b>HVAC</b>				
	LP Heaters	EA		\$	\$
	LP Piping	LF		\$	\$
	Controls	LS		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	<b>Electrical</b>				
	Generator Conduit	LF		\$	\$
	225A MLO 120/208V Panelboard	EA		\$	\$
	CATV Empty Raceway System	LS		\$	\$
	Outlet Empty	EA		\$	\$
	3/4" EMT	LF		\$	\$
	Pull String	LF		\$	\$
	3" PVC	LF		\$	\$
	Pull String	LF		\$	\$
	Telephone/Data Outlet Empty	EA		\$	\$
	J Hook	LF		\$	\$
	Ceiling Fan	EA		\$	\$
	Switch	EA		\$	\$
	Switch 3 way	EA		\$	\$
	Branch Circuit	EA		\$	\$
	Grounding System	EA		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	<b>Site Work</b>				

Unsuitable Soil Removal	CY		\$	\$
Fillable Soil	CY		\$	\$
Concrete Paving Sidewalks	CY		\$	\$
Silt Fencing	LF		\$	\$
Top Soil strip and store	CY		\$	\$
Site Survey-Layout & Elevations	LS		\$	\$
Fine Grading	LS		\$	\$
Hydro Seeding	SF		\$	\$
Conduit Sleeves under Sidewalk	LF		\$	\$
<b>Storm drain system</b>				
8" h.d.p.e.	LF		\$	\$
<b>Site Electrical Systems</b>				
Demo not listed in a division	LS		\$	\$
Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXXXXX

<b>Owners Allowances at Owners Discretion</b>				
Unfounded issues	LS	1	\$50,000.00	\$50,000.00
<i>* Total should match the bid price*</i>			<b>Total:</b>	\$

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**FR-24 BID SUBMITTAL**

**Bids are to be mailed or delivered to:**

**Colleton County Purchasing Department  
Kaye B. Syfrett, Procurement Manager  
113 Mable T. Willis Boulevard  
Walterboro, SC 29488**

=====

**Bidder/Proposer**

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

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone Number:(    ) \_\_\_\_\_

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

Print name: \_\_\_\_\_

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

Email: \_\_\_\_\_

Federal Tax ID number: \_\_\_\_\_

Contractor's license number: \_\_\_\_\_



**ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP**

State of: ( \_\_\_\_\_ )

County of: ( \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ , before me personally, came and appeared \_\_\_\_\_ to me known and known to me to described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

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

**ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL**

State of: ( \_\_\_\_\_ )

County of: ( \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ , before me personally, came and appeared \_\_\_\_\_ to me known and known to me to be the person described in and who executed the forgoing instrument and acknowledged that he executed the same.

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

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**ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION**

State of: ( \_\_\_\_\_ )

County of: ( \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_, before me personally came and appeared \_\_\_\_\_ to me Known, who, being by me duly sworn, did depose and say to me that he resides at \_\_\_\_\_, that he/she is the \_\_\_\_\_ of \_\_\_\_\_ the corporation described in and which executed the foregoing instrument is an impression of such seal; that it was so affixed by the order of the directors of said corporation, and that he signed his name thereto by like order.

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

**ADDENDA ACKNOWLEDGMENT FR-24**

The vendor has examined and carefully studied the Request for Bids and the following Addenda, receipt of all of which is hereby acknowledged:

Addendum No. \_\_\_\_\_

Addendum No \_\_\_\_\_

Addendum No. \_\_\_\_\_

Addendum No. \_\_\_\_\_

**By signing the Bid Submittal Form the Contractor(s) acknowledges any and all issued addenda. Bids which fail to acknowledge the contractor's receipt of any addendum will result in the rejection of the offer if the addendum contained information which substantively changes the Owner's requirements or pricing.**

**REFERENCES**

*The contractor must list a minimum of three (3) references along with pictures of the completed work.*

1. Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Contact: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Email address: \_\_\_\_\_

Services provided: \_\_\_\_\_

Years of Service: \_\_\_\_\_

2. Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Contact: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Email address: \_\_\_\_\_

Services provided: \_\_\_\_\_

Years of Service: \_\_\_\_\_

3. Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Contact: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Email address: \_\_\_\_\_

Services provided: \_\_\_\_\_

Years of Service: \_\_\_\_\_

**DEBARMENT**

The undersigned Bidder/Proposer is certifying that they are not currently debarred from responding to any request for qualifications by any agency or subdivision of the State of South Carolina or the United States Federal Government, nor are they an agent of any person or entity that is currently debarred from submitting qualifications on contracts by any agency or subdivision of the State of South Carolina or the United States Federal Government.

SAM's No. \_\_\_\_\_

Cage Code. \_\_\_\_\_

DUN's No. \_\_\_\_\_

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**MINORITY BUSINESS CERTIFICATE:**

The undersigned, having fully familiarized him/her with the information contained within this entire solicitation and applicable amendments, submits the attached response, and other applicable information to the County, which I verify to be true and correct to the best of my knowledge. I further certify that this response is made without prior understanding, agreement, or connection with any corporation, Offeror or person submitting a response for the same materials, supplies or equipment, and is in all respects, fair and without collusion or fraud. I agree to abide by all conditions set forth in this solicitation and certify that I have signature authority to bind the company listed herein.

Are you a minority business?

▶ **Yes** \_\_\_\_\_ (Women-owner \_\_\_\_\_/ \_\_\_\_\_Disadvantaged) If yes, please submit a copy of your certificate with your response.

▶ **No** \_\_\_\_\_

\_\_\_\_\_  
Authorized Representative (Signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Authorized Representative/Title (Print or Type)

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**INDEMNIFICATION**

The undersigned Bidder/Proposer will indemnify and hold harmless the Owner, Colleton County and their agents and employees from and against all claims, damages, losses and expenses, including attorney’s fees, arising out of or resulting from the performance of the Work provided that any such claims, damages, loss, or expense is attributable to bodily injury, sickness, disease or death, injury to or destruction of tangible property, including the loss of use resulting there from, and is caused by any negligent or willful act or omission of the Bidder/Proposer, and anyone directly or indirectly employed by him/her or anyone for whose acts any of them may be liable.

In any and all claims against the Owner, Colleton County or any of their agents and / or employees by an employee of the Bidder/Proposer, and anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way to the amount or type of damages, compensation or benefits payable by or for the Bidder / Proposer under the Worker’s Compensation Acts, Disability Benefit Acts, or other employee benefit acts.

The obligation of the Bidder/Proposer under this paragraph shall not extend to the liability of Colleton County or its agents and/or employees arising out of the reports, surveys, Change Orders, designs or Technical Specifications.

**LIST OF PRIME AND SUBCONTRACTORS**

***The undersigned Bidder/Proposer states that the following is a full and complete list of proposed prime contractors and subcontractors on this Project and the class of work to be performed by each, and that such list will not be added to nor altered without the written consent of the Owner.***

	<b>Class of Work to be Performed</b>	<b>Subcontractor</b>
1)	<b>Site Work</b>	_____
2)	<b>Electrical</b>	_____
3)	<b>Mechanical</b>	_____
4)	<b>Plumbing</b>	_____
5)	<b>Architectural</b>	_____
6)	<b>Roofing</b>	_____
7)	<b>Metal Erection</b>	_____
8)	<b>Cement</b>	_____
9)	<b>Painting</b>	_____

***Listed subcontractors must meet all qualifications including documented experience set forth in specifications, including those sections specifying single source contractor requirements.***

**BID BOND**

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SURETY (Name and Address of Principal Place of Business): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

OWNER (Name and Address): Colleton County  
109 Benson Street  
Walterboro, SC 29488

Bid Number: **FR-24**

Bid Due Date: **Wednesday, March 25, 2020 at 11:00am**

Project (Brief Description Including Location): **Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility.**

Bond Number: \_\_\_\_\_

Date (Not later than Bid due date): \_\_\_\_\_

Penal sum \_\_\_\_\_ (Words) \_\_\_\_\_ (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each because this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

\_\_\_\_\_  
Bidder's Name and Corporate Seal

\_\_\_\_\_  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2. All Bids are rejected by Owner, or
  - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.



## 1 - BIDDER'S ACKNOWLEDGEMENTS

- 1.01 The undersigned Bidder/Proposer, proposes and agrees, if this Bid is accepted, to enter into an Agreement/Contract with Owner as stated in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.
- 1.02 The undersigned Bidder/Proposer, having fully familiarized him/her with the information contained within this entire solicitation and applicable amendments, submits the attached response, and other applicable information to the County, which I verify to be true and correct to the best of my knowledge. I further certify that this response is made without prior understanding, agreement, or connection with any corporation, Offeror or person submitting a response for the same materials, supplies or equipment, and is in all respects, fair and without collusion or fraud. I agree to abide by all conditions set forth in this solicitation and certify that I have signature authority to bind the company listed herein.
- 1.03 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for **ninety (90) days** after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.
- 1.04 For additional work authorized after signing the Contract, the amount of overhead and the amount of profit to be added to base costs of labor and materials as noted in the unit price sheet shall be (10%) total for overhead and profit on work performed by the General Contractor's own forces and (15%) total on work by Subcontractors. Request of additional charges for site supervision, utilities, rentals, or administrative services will not be approved unless the additional requested work warrants adding additional days to the contract term. All request for additional work authorization shall have as an attachment, an **itemized breakdown** of the subcontractor and/or General Contractors work to be performed to include the actual quote for supplies from the general contractor or sub-contractor's suppliers. The General Contractor and sub-contractors itemized list shall have the Labor Hours, Rates, Overhead and Profit itemized. The Sub-contractor shall list as an itemized unit cost any additional labor to include the labor hours and rates associated with the requested work. The itemized list shall be shown on the subcontractor or General Contractors letter head and signed by the head officer or owner of the said company.
- 1.05 Bidder acknowledges the requirements of the Performance Bonds and Payment Bonds.

## 2 - BIDDER'S REPRESENTATIONS

- 2.01 In submitting this Bid, Bidder represents that:
  - A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the any issued Addenda, which is hereby acknowledged with the attached Addendum form.
  - B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.
  - D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities), which have been identified in Paragraph 4.02 of General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions that have been identified in Paragraph 4.06 of General Conditions.

- E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site, which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific
- F. Means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- G. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- H. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- I. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- J. Bidder has given the Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by the Owner is acceptable to Bidder.
- K. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- L. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

### **3 - FURTHER REPRESENTATIONS**

#### **3.01 Bidder further represents that:**

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation.
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding.
- D. The bidder affirms that in making such Bid, neither he/she nor any company that they may represent, nor anyone in behalf of him/her or their company, directly or indirectly, has entered into any combination, collusion, undertaking or agreement with any other Bidder or Bidders to maintain the prices of said work, or any compact to prevent any other Bidder or Bidders from Bidding on said Contract or work and further affirms that such bid is made without regard or reference to any other Bidder or Proposer and without any agreement or understanding or combination either directly or indirectly with any other person or persons with reference to such Bidding in any way or manner whatsoever.
- E. Any attempt by the vendor to influence the opinion of Colleton County Staff or Colleton County Council by discussion, promotion, advertising, or misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor's submittal to be declared null and void.

**4 - TIME OF COMPLETION**

4.01 **Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility is to be completed within One Hundred Eighty (180) calendar days after the Notice to Proceed has been issued.**

4.02 Bidder accepts the provisions of the Agreement as to liquidated damages, in the event of failure to complete the Work within the Contract dates in the amount of \$500 per day for each calendar day required to complete the work in the manner and within the dates as stated in Paragraph 4.01 above.

**5 - BID SUBMITTAL**

5.01 This Bid submitted by:

An Individual

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_ (SEAL)

*(Individual's signature)*

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

Doing business as: \_\_\_\_\_

A Partnership

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_ (SEAL)

*(Signature of general partner -- attach evidence of authority to sign)*

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

Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

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

*(Signature -- attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_ (CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Authorization to do business in [South Carolina] is \_\_\_\_/\_\_\_\_/\_\_\_\_.

A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Ventures Name: \_\_\_\_\_ (SEAL)

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

*(Signature of first joint venture partner -- attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

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

Second Joint Ventures Name: \_\_\_\_\_ (SEAL)

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

*(Signature of second joint venture partner -- attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

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

(Each joint venture must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address \_\_\_\_\_  
\_\_\_\_\_

Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 2020.

State Contractor License No. \_\_\_\_\_

**Remainder of this page intentionally left blank**

## 6 – BASIS OF BID

### **BASE BID & ALTERNATE BID UNIT PRICE**

Base Bid price and Alternate Bid Prices shall be for the Work as specified, and shall include all labor, supervision, administrative support, materials, equipment, accessories, shipping, preparation, insurance, testing, overhead, profit, applicable taxes, permits, fees, supervision, warranties and all other associated costs for the finished and completed Work. Bid shall include the prices for undercut soils shall include material in place, surveyed and compacted pursuant to the Contract Documents.

Contractor shall make quantity take-offs using drawings and specifications to determine quantities to his satisfaction, reporting promptly any discrepancies which may affect bidding.

**The Owner shall have the right to accept Alternates in any order or combination, and to determine the low bidder on the basis of the sum of the Base Bid and Alternates accepted.**

6.01 Bidder will complete the Work in accordance with the Contract Documents and the following allowances are established for this project.

<b><u>Owner's Allowances— Expansion of the facility located at 547 Ashton Rd. Islandton SC 29929. Approximately ± 2,880 sf of new construction consisting of a three (3) Bay apparatus facility. to be included in the base bid</u></b>			
Unfounded issues	LS	1	\$ 50,000.00

## 7 - BASE BID ALTERNATES

7.01 Not Used.

**Remainder of this page intentionally left blank**

**8 - Base Bid**

8.01 BASE BID PROPOSAL: Bidder/Proposer agrees to perform all of the work described in the solicitation document FR-24 to include the Specifications, General Conditions, including allowances, and items shown on the drawings, for the sum of:

\_\_\_\_\_ \$ \_\_\_\_\_  
(amount in words) (numerical)

Submitted by: \_\_\_\_\_  
Name (print) Signature

\_\_\_\_\_  
Company Date

**End of Base Bid**

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## **DIVISION 001 – GENERAL CONDITIONS**

### **STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT**

#### **PART 1 - DEFINITIONS AND TERMINOLOGY**

##### **1.01 Defined Terms**

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified Parts and paragraphs, and the titles of other documents or forms.
1. Addenda – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. Agreement – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. Application for Payment – The form acceptable to the Construction Coordinator which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. Asbestos – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. Bid – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. Bidder – The individual or entity who submits a Bid directly to Owner.
  7. Bidding Documents – The Bidding Requirements, Contract Documents and the General Conditions (including all Addenda).
  8. Bidding Requirements – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. Change Order – A document recommended by the Construction Coordinator which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. Claim – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. Construction Coordinator - The person or firm in charge of the project. The person or firm will be selected by the owner and in some instances, the owner will self-perform, acting as the Construction Coordinator. The firm could be an Architectural Firm, Engineering Firm, or third party as so designated by the owner.

12. Contract – The entire and integrated written agreement between the Owner and Contractor including the General Conditions concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
13. Contract Documents – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement Are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
14. Contract Price – The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
15. Contract Times – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
16. Contractor – The individual or entity with whom Owner has entered into the Agreement.
17. Cost of the Work – See Paragraph 11.01.A for definition.
18. Drawings – That part of the Contract Documents prepared or approved by the Construction Coordinator which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
19. Effective Date of the Agreement – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
20. Field Order – A written order issued by the Construction Coordinator which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. General Requirements – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
22. Hazardous Environmental Condition – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
23. Hazardous Waste – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. Laws and Regulations; Laws or Regulations – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. Liens – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. Milestone – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. Notice of Award – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. Notice to Proceed – A written notice given by Owner or Construction Coordinator to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. Owner – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. PCBs – Polychlorinated biphenyls.
31. Petroleum – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. Progress Schedule – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. Project – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. Project Manual – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. Radioactive Material – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. Related Entity – An officer, director, partner, employee, agent, consultant, or subcontractor.
37. Resident Project Representative – The authorized representative of the Construction Coordinator who may be assigned to the Site or any part thereof.
38. Samples – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
39. Schedule of Submittals – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
40. Schedule of Values – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
41. Shop Drawings – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
42. Site – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for

access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. Specifications – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
44. Subcontractor – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
45. Substantial Completion – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Owner, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
46. Successful Bidder – The Bidder submitting a responsive Bid to whom Owner makes an award.
47. Supplementary Conditions – That part of the Contract Documents which amends or supplements these General Conditions.
48. Supplier – A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.
49. Underground Facilities – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
50. Unit Price Work – Work to be paid for on the basis of unit prices.
51. Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
52. Work Change Directive – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by the Construction Coordinator ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.
53. Warranty- Such time period as stated in the contract, which shall cover all workmanship and products installed under the contract requirements.

## 1.02 Terminology

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. Intent of Certain Terms or Adjectives
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by the Construction Coordinator. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of the Construction Coordinator as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to the Construction Coordinator any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. Day
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
  2. The wording “business day” means any day Monday thru Friday.
- D. Defective
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
    - a. does not conform to the Contract Documents, or
    - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
    - c. has been damaged prior to the Construction Coordinator recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).
- E. Furnish, Install, Perform, Provide
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## **PART 2 - PRELIMINARY MATTERS**

### **2.01 Delivery of Bonds and Evidence of Insurance**

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. Evidence of Insurance: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the General Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Part 5.

### **2.02 Copies of Documents**

- A. Owner shall furnish to Contractor up to two (2) printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### **2.03 Commencement of Contract Times; Notice to Proceed**

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event, will the Contract Times commence to run later than the thirtieth day after the Effective Date of the Agreement.

### **2.04 Starting the Work**

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

### **2.05 Before Starting Construction**

- A. *Preliminary Schedules:* Within ten (10) days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to the Construction Coordinator for timely review:

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
2. a preliminary Schedule of Submittals; and
3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

## **2.06 Preconstruction Conference**

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, the Construction Coordinator, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

## **2.07 Initial Acceptance of Schedules**

- A. At least ten (10) days before submission of the first Application for Payment a conference attended by Contractor, the Construction Coordinator, and others as appropriate will be held to review for acceptability to the Construction Coordinator as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to the Construction Coordinator.
  1. The Progress Schedule will be acceptable to the Construction Coordinator if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on the Construction Coordinator responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  2. Contractor's Schedule of Submittals will be acceptable to the Construction Coordinator if it provides a workable arrangement for reviewing and processing the required submittals.
  3. Contractor's Schedule of Values will be acceptable to the Construction Coordinator as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

## **PART 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

### **3.01 Intent**

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.



- C. Clarifications and interpretations of the Contract Documents shall be issued by the Construction Coordinator as provided in Part 9.

### 3.02 Reference Standards

- A. Standards, Specifications, Codes, Laws, and Regulations
1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or the Construction Coordinator, or any of their subcontractors, consultants, agents, employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or the Construction Coordinator, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 Reporting and Resolving Discrepancies

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to the Construction Coordinator any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from the Construction Coordinator before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to the Construction Coordinator in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or the Construction Coordinator for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

- b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### **3.04 Amending and Supplementing Contract Documents**

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  - 1. A Field Order;
  - 2. Construction Coordinator approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or
  - 3. Construction Coordinator written interpretation or clarification.

### **3.05 Reuse of Documents**

- A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:
  - 1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Architects, Engineer or Architects and or Engineer's consultants, including electronic media editions; or
  - 2. Reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Architect or Engineer and specific written verification or adaption by Architect or Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### **3.06 Electronic Data**

- A. Copies of data furnished by Owner or the Construction Coordinator to Contractor or Contractor to Owner or the Construction Coordinator that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

## **PART 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

### **4.01 Availability of Lands**

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

### **4.02 Subsurface and Physical Conditions**

- A. Reports and Drawings: Reports of explorations and tests of subsurface conditions at or contiguous to the Site if conducted will be supplied with the specifications documents. The contractor should insure that capable soils are found for any and all compacted surfaces.

### **4.03 Differing Subsurface or Physical Conditions**

- A. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:
  - 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
  - 2. is of such a nature as to require a change in the Contract Documents; or
  - 3. differs materially from that shown or indicated in the Contract Documents; or
  - 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and the Construction Coordinator in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.
- B. Construction Coordinator Review: After receipt of written notice as required by Paragraph 4.03.A, Construction Coordinator will promptly review the pertinent condition, determine the

necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of the Construction Coordinator findings and conclusions.

**C. Possible Price and Times Adjustments**

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
  - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and the Construction Coordinator, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

**4.04 Underground Facilities**

- A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or the Construction Coordinator by the owners of such Underground Facilities, including Owner, or by others:
  1. Owner and Construction Coordinator shall not be responsible for the accuracy or completeness of any such information or data; and
  2. The cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. reviewing and checking all such information and data,
    - b. locating all Underground Facilities shown or indicated in the Contract Documents,

- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

**B. Not Shown or Indicated**

- 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and the Construction Coordinator. Construction Coordinator will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- 2. If the Construction Coordinator concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

**4.05 Reference Points**

- A. Owner shall provide engineering surveys to establish reference points for construction which in the Construction Coordinator judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to the Construction Coordinator whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

**4.06 Hazardous Environmental Condition at Site**

- A. Reports: None.

**PART 5 - BONDS AND INSURANCE**

**5.01 Performance, Payment, and Other Bonds**

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period

specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and the Construction Coordinator and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

#### **5.02 Licensed Sureties and Insurers**

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications.

#### **5.03 Certificates of Insurance**

- A. Contractor shall deliver to Owner, with copies to each additional insured, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. By requiring such insurance and insurance limits herein, Owner does not represent that coverage and limits will necessarily be adequate to protect contractor and such coverage and limits shall not be deemed as a limitation on Contractor's liability or the indemnities granted to Owner in the Contract Documents.

#### **5.04 Contractor's Liability Insurance**

- A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
    - b. by any other person for any other reason;
  5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Construction Coordinator, and any other individuals or entities, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
  2. include at least the specific coverages and be written for not less than the limits of liability provided or required by Laws or Regulations, whichever is greater;
  3. include completed operations insurance;
  4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
  5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days' prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
  6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
  7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
    - a. Contractor shall furnish Owner and each other additional insured to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any

such additional insured of continuation of such insurance at final payment and one year thereafter.

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

- a. State: South Carolina  
Statutory Benefits
- b. Applicable Federal (e.g., Longshoreman's): Statutory
- c. Employer's Liability:

Each Accident	\$1,000,000
Disease-Policy Limit	\$500,000
Disease-Each Employee	\$500,000

2. Contractor's General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor and for this project only:

- a. General Aggregate \$2,000,000
- b. Products - Completed Operations Aggregate \$2,000,000
- c. Personal and Advertising Injury \$1,000,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
- e. Fire Damage (any one (1) fire) \$50,000
- f. Medical Expense (any one (1) person) \$5,000
- g. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
- h. Excess or Umbrella Liability
  - 1) General Aggregate \$2,000,000
  - 2) Each Occurrence \$2,000,000

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

- a. Include coverage for all owned, hired and non-owned automobiles.
- b. Combined Single Limit of \$1,000,000
- c. Each Occurrence \$1,000,000
- d. Limits Medical Expense \$5,000



4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
  - a. Bodily Injury:
 

Each Accident	\$2,000,000
Annual Aggregate	\$2,000,000
  - b. Property Damage:
 

Each Accident	\$2,000,000
Annual Aggregate	\$2,000,000
5. Flood Insurance: The Contractor is required to carry flood insurance for projects located in designated flood hazard areas in which Federal Flood Insurance is available.

**5.05 Owner’s Liability Insurance**

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner’s option, may purchase and maintain at Owner’s expense Owner’s own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

**5.06 Property Insurance**

- A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof.
  1. This insurance shall:
    - a. includes the interests of Owner, Contractor, Subcontractors, Construction Coordinator and any other individuals or entities identified herein, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
    - b. in addition to the individuals and entities specified, include as additional insureds, the following:
    - c. be written on a Builder’s Risk “all-risk” or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required;
    - d. includes expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
    - e. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by the Construction Coordinator;
    - f. allows for partial utilization of the Work by Owner;
    - g. includes testing and startup; and



- B. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or the Construction Coordinator, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

#### **5.08 Receipt and Application of Insurance Proceeds**

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

#### **5.09 Acceptance of Bonds and Insurance; Option to Replace**

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Part 5 on the basis of nonconformance with the Contract Documents, the objecting party shall so notify the other party in writing within ten (10) days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

#### **5.10 Partial Utilization, Acknowledgment of Property Insurer**

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

### **PART 6 - CONTRACTOR'S RESPONSIBILITIES**

#### **6.01 Supervision and Superintendence**

- A. **When working is being performed on site the superintendent must be present, without exception.**
- B. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or the Construction Coordinator in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- C. **At all times during the progress of the Work, Contractor shall assign a competent resident superintendent** who shall not be replaced without written notice to Owner and the Construction Coordinator except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

#### **6.02 Labor; Working Hours**

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed on business days during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to the Construction Coordinator.

#### **6.03 Services, Materials, and Equipment**

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, startup, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by the Construction Coordinator, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### **6.04 Progress Schedule**

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to the Construction Coordinator for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Part 12. Adjustments in Contract Times may only be made by a Change Order.
3. The Project Schedule shall be updated and submitted with each Application for Payment. Applications for payment will not be processed without the updated Project Schedule.

#### **6.05 Substitutes and “Or-Equals”**

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Construction Coordinator for review under the circumstances described below.

1. “Or-Equal” Items: If in the Construction Coordinators sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

- 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,
- 3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

- 1) there will be no increase in cost to the Owner or increase in Contract Times, and
- 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

#### **2. Substitute Items**

a. If in the Construction Coordinators sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow the Construction Coordinator to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute

therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by the Construction Coordinator from anyone other than Contractor.

- c. The requirements for review by the Construction Coordinator will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as the Construction Coordinator may decide is appropriate under the circumstances.
  - d. Contractor shall make written application to the Construction Coordinator for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - 1) shall certify that the proposed substitute item will:
      - a) perform adequately the functions and achieve the results called for by the general design,
      - b) be similar in substance to that specified, and
      - c) be suited to the same use as that specified;
    - 2) will state:
      - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;
      - b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
      - c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
    - 3) will identify:
      - a) all variations of the proposed substitute item from that specified, and
      - b) available engineering, sales, maintenance, repair, and replacement services;
    - 4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,
- B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by the Construction Coordinator. Contractor shall submit sufficient information to allow the Construction Coordinator, in the Construction Coordinator's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by the Construction Coordinator will be similar to those provided in Paragraph 6.05.A 2.
- C. Construction Coordinator Evaluation: The Construction Coordinator will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. The Construction Coordinator may require Contractor to furnish additional data about the proposed substitute item. The Construction Coordinator will

be the sole judge of acceptability. No “or equal” or substitute will be ordered, installed or utilized until the Construction Coordinator’s review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an “or-equal.” The Construction Coordinator will advise Contractor in writing of any negative determination.

- D. Special Guarantee: Owner may require Contractor to furnish at Contractor’s expense a special performance guarantee or other surety with respect to any substitute.
- E. Cost Reimbursement: The Construction Coordinator will record the Architect or Engineer’s costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B Whether or not the Construction Coordinator approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of the Architect or Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of the Architect or Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. Contractor’s Expense: Contractor shall provide all data in support of any proposed substitute or “or-equal” at Contractor’s expense.

#### **6.06 Concerning Subcontractors, Suppliers, and Others**

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. The identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof, Owner’s acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or the Construction Coordinator to reject defective Work.
- C. Contractor shall be fully responsible to Owner and the Construction Coordinator for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor’s own acts and omissions. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or the Construction Coordinator and any such Subcontractor, Supplier or other individual or entity, nor
  - 2. shall anything in the Contract Documents create any obligation on the part of Owner or the Construction Coordinator to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with the Construction Coordinator through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Construction Coordinator. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Construction Coordinator, and all other individuals or entities to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.
- H. Owner or Construction Coordinator may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

#### **6.07 Patent Fees and Royalties**

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Construction Coordinator its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Construction Coordinator, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### **6.08 Permits**

- A. Contractor shall obtain and pay for all construction permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement.



## **6.09 Laws and Regulations**

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Construction Coordinator shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

## **6.10 Taxes**

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

## **6.11 Use of Site and Other Areas**

- A. Limitation on Use of Site and Other Areas
  - 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
  - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
  - 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Construction Coordinator, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by party against Owner, Construction Coordinator, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials,

rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning*: Prior to Substantial Completion of the Work, Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work, Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

## **6.12 Record Documents**

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Construction Coordinator for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Construction Coordinator for Owner in digital format as an as-built file.

## **6.13 Safety and Protection**

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Construction Coordinator or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Construction Coordinator has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### **6.14 Safety Representative**

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

#### **6.15 Hazard Communication Programs**

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations. All MSDS Sheets shall be kept on site in good order as outlined in OSHA, laws, rules and regulations.

#### **6.16 Emergencies**

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Construction Coordinator prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### **6.17 Shop Drawings and Samples**

- A. Contractor shall submit Shop Drawings and Samples to Construction Coordinator for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Construction Coordinator may require.

- 1. Shop Drawings

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Construction Coordinator the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

- 2. Samples: Contractor shall also submit Samples to Construction Coordinator for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Construction Coordinator may require to enable Construction Coordinator to review the submittal for the limited purposes required by Paragraph 6.17.D.

- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Construction Coordinator's review and

approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

#### C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
  - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
  - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
  - d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Construction Coordinator specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separated from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Construction Coordinator for review and approval of each such variation.

#### D. Construction Coordinator's Review

1. Construction Coordinator will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Construction Coordinator. Construction Coordinator's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Construction Coordinator's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Construction Coordinator's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Construction Coordinator has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Construction

Coordinator's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C 1.

**E. Resubmittal Procedures**

1. Contractor shall make corrections required by Construction Coordinator and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Construction Coordinator on previous submittals.
- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three (3) submittals. Construction Coordinator will record the Architect or Engineer's time for reviewing subsequent submittals of Shop Drawings, samples or other items requiring approval and Contractor shall reimburse Owner for the Architect or Engineer's charges for such time.
- G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for the Architect or Engineer's charges for such time unless the need for such substitution is beyond the control of Contractor.

**6.18 Continuing the Work**

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

**6.19 Contractor's General Warranty and Guarantee**

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Construction Coordinator and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. observations by Construction Coordinator;
  2. recommendation by Construction Coordinator or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Construction Coordinator or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Construction Coordinator;
  6. any inspection, test, or approval by others; or
  7. any correction of defective Work by Owner.
- D. The Contractor's General Warranty and Guarantee shall be for a period of one (1) year after work has been accepted and final payment made to the Contractor. In the case of Water and Wastewater lines, the warranty period will start after acceptance of these lines into the utility provider's system for ownership, operation, and maintenance. The Contractor accepts the transference of all warranties and guarantees to the utility provider owning and operating the new lines.

## **6.20 Indemnification**

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Construction Coordinator, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Construction Coordinator or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Construction Coordinator and Construction Coordinator's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

## **6.21 Delegation of Professional Design Services**

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Construction Coordinator will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Construction Coordinator.
- C. Owner and Construction Coordinator shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Construction Coordinator have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Construction Coordinator's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Construction Coordinator's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D 1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **PART 7 - OTHER WORK AT THE SITE**

### **7.01 Related Work at Site**

- A. Owner may perform other work related to the Project at the Site with Owner's employees or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Construction Coordinator and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Part 7, Contractor shall inspect such other work and promptly report to Construction Coordinator in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

## **7.02 Coordination**

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Owner shall have sole authority and responsibility for such coordination.

## **7.03 Legal Relationships**

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

## **7.04 Claims Between Contractors**

- A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Construction Coordinator, or Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law.
- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, the Construction Coordinator and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any other contractor against Owner, Construction Coordinator, Construction Coordinator's Consultants to the extent said claim is based on or arises out of Contractor's performance of the Work. Should another contractor cause damage to the Work or property of Contractor or should the performance of work by any other contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, or the Construction Coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, or the Construction Coordinator on account of any such damage or Claim.
- C. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Part 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, or construction coordinator for activities that are their



respective responsibilities.

## **PART 8 - OWNER'S RESPONSIBILITIES**

### **8.01 Communications to Contractor**

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through the Construction Coordinator.

### **8.02 Replacement of Construction Coordinator**

- A. In case of termination of the employment of the Construction Coordinator, Owner shall appoint a Construction Coordinator to whose status under the Contract Documents shall be that of the former Construction Coordinator.

### **8.03 Furnish Data**

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### **8.04 Pay When Due**

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

### **8.05 Lands and Easements; Reports and Tests**

- A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by the Architect or Engineer in preparing the Contract Documents.

### **8.06 Insurance**

- A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Part 5.

### **8.07 Change Orders**

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

### **8.08 Inspections, Tests, and Approvals**

- A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

### **8.09 Limitations on Owner's Responsibilities**

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

#### **8.10 Undisclosed Hazardous Environmental Condition**

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

#### **8.11 Evidence of Financial Arrangements**

- A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth.

### **PART 9 - Construction Coordinator's STATUS DURING CONSTRUCTION**

#### **9.01 Owner's Representative**

- A. Construction Coordinator will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Construction Coordinator as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Construction Coordinator.

#### **9.02 Visits to Site**

- A. Construction Coordinator will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Construction Coordinator, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Construction Coordinator will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Construction Coordinator's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Construction Coordinator will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Construction Coordinator's visits and observations are subject to all the limitations on Construction Coordinator's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Construction Coordinator's visits or observations of Contractor's Work Construction Coordinator will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

#### **9.03 Project Representative**

- A. If Owner and Construction Coordinator agree; Construction Coordinator will furnish a Resident Project Representative to assist Construction Coordinator in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Construction Coordinator's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in Paragraph 9.09.

#### **9.04 Authorized Variations in Work**

- A. Construction Coordinator may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### **9.05 Rejecting Defective Work**

- A. Construction Coordinator will have authority to reject Work, which Construction Coordinator believes to be defective, or that Construction Coordinator believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Construction Coordinator will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

#### **9.06 Shop Drawings, Change Orders and Payments**

- A. In connection with Construction Coordinator's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Construction Coordinator's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Construction Coordinator's authority as to Change Orders, see Parts 10, 11, and 12.
- D. In connection with Construction Coordinator's authority as to Applications for Payment, see Part 14.

#### **9.07 Determinations for Unit Price Work**

- A. Construction Coordinator will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Construction Coordinator will review with Contractor the Construction Coordinator's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Construction Coordinator's written decision thereon will be final and binding (except as modified by Construction Coordinator to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

#### **9.08 Decisions on Requirements of Contract Documents and Acceptability of Work**

- A. Construction Coordinator will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to the Construction Coordinator in writing within 30 days of the event giving rise to the question

- B. Construction Coordinator will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Construction Coordinator's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Construction Coordinator's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Construction Coordinator will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

**9.09 Limitations on Construction Coordinator's Authority and Responsibilities**

- A. Neither Construction Coordinator's authority or responsibility under this Part 9 or under any other provision of the Contract Documents nor any decision made by Construction Coordinator in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Construction Coordinator shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Construction Coordinator to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Construction Coordinator will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Construction Coordinator will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Construction Coordinator will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Construction Coordinator's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

**PART 10 - CHANGES IN THE WORK; CLAIMS**

**10.01 Authorized Changes in the Work**

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed

as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

#### **10.02 Unauthorized Changes in the Work**

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

#### **10.03 Execution of Change Orders**

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Construction Coordinator covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Construction Coordinator pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### **10.04 Notification to Surety**

- A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times and Warranty Requirements) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### **10.05 Claims**

- A. Construction Coordinator's Decision Required: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Construction Coordinator for decision. A decision by Construction Coordinator shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Construction Coordinator and the other party to the Contract promptly (but in no event, later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Construction Coordinator and the other party to the Contract within 60 days after the start of such event (unless Construction Coordinator allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B.

Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Construction Coordinator and the claimant within 30 days after receipt of the claimant's last submittal (unless Construction Coordinator allows additional time).

- C. Construction Coordinator's Action: Construction Coordinator will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part,
  - 2. approve the Claim, or
  - 3. notify the parties that the Construction Coordinator is unable to resolve the Claim if, in the Construction Coordinator's sole discretion, it would be inappropriate for the Construction Coordinator to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Construction Coordinator does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Non-withstanding anything herein final approval rests with the Owner.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **PART 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### **11.01 Cost of the Work**

- A. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
  - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner

deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Construction Coordinator, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to Engineers, Architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Construction Coordinator, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.

- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. Costs Excluded: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## **11.02 Allowances**

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Construction Coordinator.

B. Cash Allowances

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and



- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. Contingency Allowance
  - 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Construction Coordinator to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

### **11.03 Unit Price Work**

- A. Initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by the Owner subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  - 2. there is no corresponding adjustment with respect any other item of Work; and
  - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

## **PART 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

### **12.01 Change of Contract Price**

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Construction Coordinator and the other party to the Contract in accordance with the provisions of Paragraph 10.05. Final approval of all change orders rests with the owner.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
  2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
    - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
    - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

## **12.02 Change of Contract Times**

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Construction Coordinator and the other party to the Contract in accordance with the provisions of Paragraph 10.05. Final approval of all change orders rests with the owner.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Part 12.

### **12.03 Delays**

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Part 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Construction Coordinator, or other contractors or utility owners performing other work for Owner as contemplated by Part 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Construction Coordinator and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.
- F. All claims for delays shall be submitted at the submission of any application for payment or within fifteen (15) days of the event causing the delay. Any claims made after the allowable time shall be denied.

## **PART 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### **13.01 Notice of Defects**

- A. Prompt notice of all defective Work of which Owner or Construction Coordinator has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Part 13.

### **13.02 Access to Work**

- A. Owner, Construction Coordinator, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

### **13.03 Tests and Inspections**

- A. Contractor shall give Construction Coordinator timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Contractor shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Construction Coordinator the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Construction Coordinator's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by third party organizations acceptable to Owner and Construction Coordinator.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Construction Coordinator, it must, if requested by Construction Coordinator, be uncovered for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Construction Coordinator timely notice of Contractor's intention to cover the same and Construction Coordinator has not acted with reasonable promptness in response to such notice.

### **13.04 Uncovering Work**

- A. If any Work is covered contrary to the written request of Construction Coordinator, it must, if requested by Construction Coordinator, be uncovered for Construction Coordinator's observation and replaced at Contractor's expense.
- B. If Construction Coordinator considers it necessary or advisable that covered Work be observed by Construction Coordinator or inspected or tested by others, Contractor, at Construction Coordinator's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Construction Coordinator may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Construction Coordinator, Engineers, Architects, Attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to

such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

### **13.05 Owner May Stop the Work**

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

### **13.06 Correction or Removal of Defective Work**

- A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Construction Coordinator, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of construction coordinator, engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

### **13.07 Correction Period**

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of construction coordinator, engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

### **13.08 Acceptance of Defective Work**

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Construction Coordinator's recommendation of final payment, Construction Coordinator) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of construction coordinator, engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Construction Coordinator as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Construction Coordinator's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

### **13.09 Owner May Correct Defective Work**

- A. If Contractor fails within a reasonable time after written notice from Construction Coordinator to correct defective Work or to remove and replace rejected Work as required by Construction Coordinator in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven (7) days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Construction Coordinator and Construction Coordinator's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of construction coordinator, engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in

exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **PART 14 - PAYMENTS TO CONTRACTOR AND COMPLETION**

### **14.01 Schedule of Values**

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Construction Coordinator. Progress payments on account of Unit Price Work will be based on the number of units completed.

### **14.02 Progress Payments**

#### **A. Applications for Payments**

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to the Construction Coordinator for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. The date of the pay application must be the last day of the month. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### **B. Review of Applications**

1. Construction Coordinator will, within fifteen (15) days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Construction Coordinator's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Construction Coordinator's recommendation of any payment requested in an Application for Payment will constitute a representation by Construction Coordinator to Owner, based on Construction Coordinator's observations on the Site of the executed Work as an experienced and qualified design professional and on Construction Coordinator's review of the Application for Payment and the accompanying data and schedules, that to the best of Construction Coordinator's knowledge, information and belief:
  - a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Construction Coordinator's responsibility to observe the Work.
3. By recommending any such payment Construction Coordinator will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Construction Coordinator in the Contract Documents; or
  - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Construction Coordinator's review of Contractor's Work for the purposes of recommending payments nor Construction Coordinator's recommendation of any payment, including final payment, will impose responsibility on Construction Coordinator:
  - a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.



5. Construction Coordinator may refuse to recommend the whole or any part of any payment if, in Construction Coordinator's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B 2. Construction Coordinator may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Construction Coordinator's opinion to protect Owner from loss because:
  - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
  - b. the Contract Price has been reduced by Change Orders;
  - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
  - d. Construction Coordinator has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

1. Fifteen (15) days after presentation of the Application for Payment to Owner with Construction Coordinator's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment

1. Owner may refuse to make payment of the full amount recommended by Construction Coordinator because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended;  
or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Construction Coordinator, Owner will give Contractor immediate written notice (with a copy to Construction Coordinator) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.
3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C 1.

#### **14.03 Contractor's Warranty of Title**

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

#### **14.04 Substantial Completion**

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Construction Coordinator in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Construction Coordinator issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Construction Coordinator shall make an inspection of the Work to determine the status of completion. If Construction Coordinator does not consider the Work substantially complete, Construction Coordinator will notify Contractor in writing giving the reasons therefor.
- C. If Construction Coordinator considers the Work substantially complete, the Construction Coordinator will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven (7) days after receipt of the tentative certificate during which to make written objection to Construction Coordinator as to any provisions of the certificate or attached list. If, after considering such objections, Construction Coordinator concludes that the Work is not substantially complete, Construction Coordinator will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, the Construction Coordinator considers the Work substantially complete, the Construction Coordinator will within be said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Construction Coordinator believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Construction Coordinator will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so informs the Construction Coordinator in writing prior to Construction Coordinator's issuing the definitive certificate of Substantial Completion, Construction Coordinator's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

#### **14.05 Partial Utilization**

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Construction Coordinator, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
  - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work Which Owner believes to be ready for its intended use and

substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Construction Coordinator that such part of the Work is substantially complete and request Construction Coordinator to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Construction Coordinator in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Construction Coordinator to issue a certificate of Substantial Completion for that part of the Work. Said work should have, at a minimum, a temporary Certificate of Occupancy from the authority having jurisdiction.
3. Within a reasonable time after either such request, Owner, Contractor, and Construction Coordinator shall make an inspection of that part of the Work to determine its status of completion. If Construction Coordinator does not consider that part of the Work to be substantially complete, Construction Coordinator will notify Owner and Contractor in writing giving the reasons therefor. If Construction Coordinator considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### **14.06 Final Inspection**

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Construction Coordinator will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### **14.07 Final Payment**

- A. Application for Payment
  1. After Contractor has, in the opinion of Construction Coordinator, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance, training and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents to include digital as-buids of the project (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
  2. The final Application for Payment shall be accompanied (except as previously delivered) by:
    - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
    - b. consent of the surety, if any, to final payment;
    - c. a list of all Claims against Owner that Contractor believes are unsettled; and
    - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

**B. Construction Coordinator's Review of Application and Acceptance**

1. If, on the basis of Construction Coordinator's observation of the Work during construction and final inspection, and Construction Coordinator's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Construction Coordinator is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Construction Coordinator will, within ten (10) days after receipt of the final Application for Payment, indicate in writing Construction Coordinator's recommendation of payment and present the Application for Payment to Owner for payment. At the same time, Construction Coordinator will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Construction Coordinator will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

**C. Payment Becomes Due**

1. Thirty (30) days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Construction Coordinator, less any sum Owner is entitled to set off against Construction Coordinator's recommendation, including but not limited to liquidated damages, will become due and, will be paid by Owner to Contractor.

**14.08 Final Completion Delayed**

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Construction Coordinator so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Construction Coordinator, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to the Construction Coordinator with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

**14.09 Waiver of Claims**

- A. The making and acceptance of final payment will constitute:
  1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special

guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

## **PART 15 - SUSPENSION OF WORK AND TERMINATION**

### **15.01 Owner May Suspend Work**

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Construction Coordinator which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

### **15.02 Owner May Terminate for Cause**

- A. The occurrence of any one or more of the following events will justify termination for cause:
  1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
  2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. Contractor's disregard of the authority of the Construction Coordinator; or
  4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven (7) days written notice of its intent to terminate the services of Contractor:
  1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
  2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of construction coordinator, engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by the Construction Coordinator as to their reasonableness and, when so approved by the

Construction Coordinator, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven (7) days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

### **15.03 Owner May Terminate for Convenience**

- A. Upon fifteen (15) days written notice to Contractor and Construction Coordinator, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

### **15.04 Contractor May Stop Work or Terminate**

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Construction Coordinator fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven (7) days written notice to Owner and Construction Coordinator, and provided Owner or Construction Coordinator do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Construction Coordinator has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined

to be due, Contractor may, seven (7) days after written notice to Owner and Construction Coordinator, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## **PART 16 - DISPUTE RESOLUTION**

### **16.01 Methods and Procedures**

- A. Either Owner or Contractor may request mediation of any Claim submitted to Construction Coordinator for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Mediation Rules of the South Carolina Supreme Court in effect as of the Effective Date of the Agreement. The request for mediation shall stay the effect of paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of the request.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
  - 1. agrees with the other party to submit the Claim to another dispute resolution process, or
  - 2. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

## **PART 17 - MISCELLANEOUS**

### **17.01 Giving Notice**

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or
  - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### **17.02 Computation of Times**

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### **17.03 Cumulative Remedies**

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as

effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

**17.04 Survival of Obligations**

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

**17.05 Controlling Law**

- A. This Contract is to be governed by the law of the State of South Carolina.

**17.06 Headings**

- A. Part and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.



# ISLANDTON FIRE STATION #15 ADDITION

547 ASHTON RD. ISLANDTON, SC 29929

FOR

## COLLETON COUNTY

TMS# - 156 - 00 - 00 - 056.00



**MECHANICAL / ELECTRICAL /  
PLUMBING ENGINEER**

**DWG CONSULTING ENGINEERS**  
1009 ANNA KNAPP BLVD., STE. 202  
MOUNT PLEASANT, SC 29464  
843.849.1141

**ARCHITECT**

**GLICK/BOEHM & ASSOCIATES**  
493 KING STREET, SUITE 100  
CHARLESTON, SOUTH CAROLINA 29403  
843.577.6377

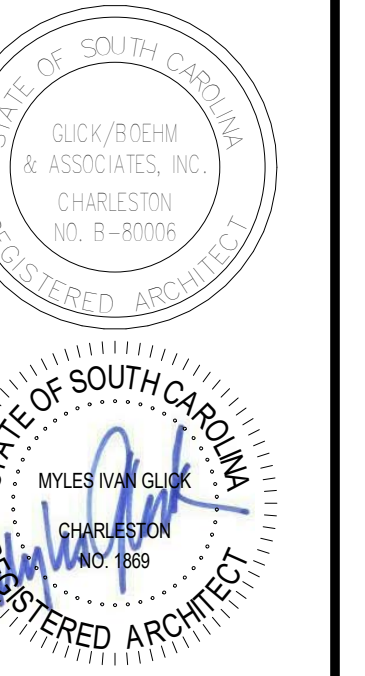
**STRUCTURAL  
ENGINEER**

**ATLANTIC ENGINEERING**  
875 LOWCOUNTRY BLVD, STE. 210  
MOUNT PLEASANT, SC 29464  
843.906.1337

**CIVIL  
ENGINEER**

**FORSBERG ENGINEERING**  
1587 SAVANNAH HIGHWAY, SUITE B  
P.O. BOX 30575  
CHARLESTON, SC 29417  
843.571.2622

REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

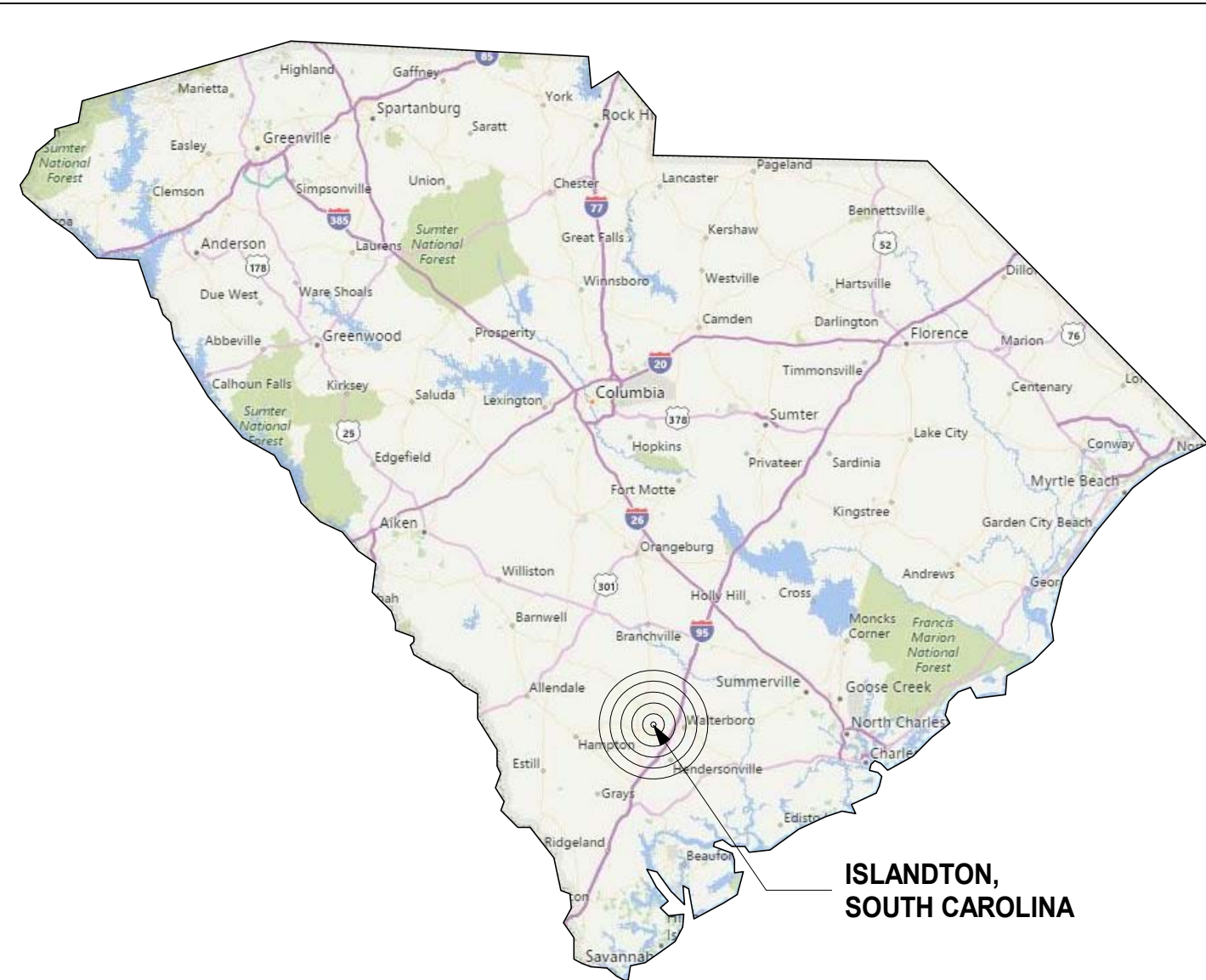
COPYRIGHT © 2020  
GLICK/BOEHM & ASSOCIATES, INC.  
JOB NUMBER: 1928  
PROJECT MGR.: MCM  
DRAWN BY: MCM  
CHECKED BY: SM  
APPROVED BY: MIG  
DATE ISSUED FOR:  
CONSTRUCTION DOCUMENTS 01/10/2020

COVER SHEET

# G000

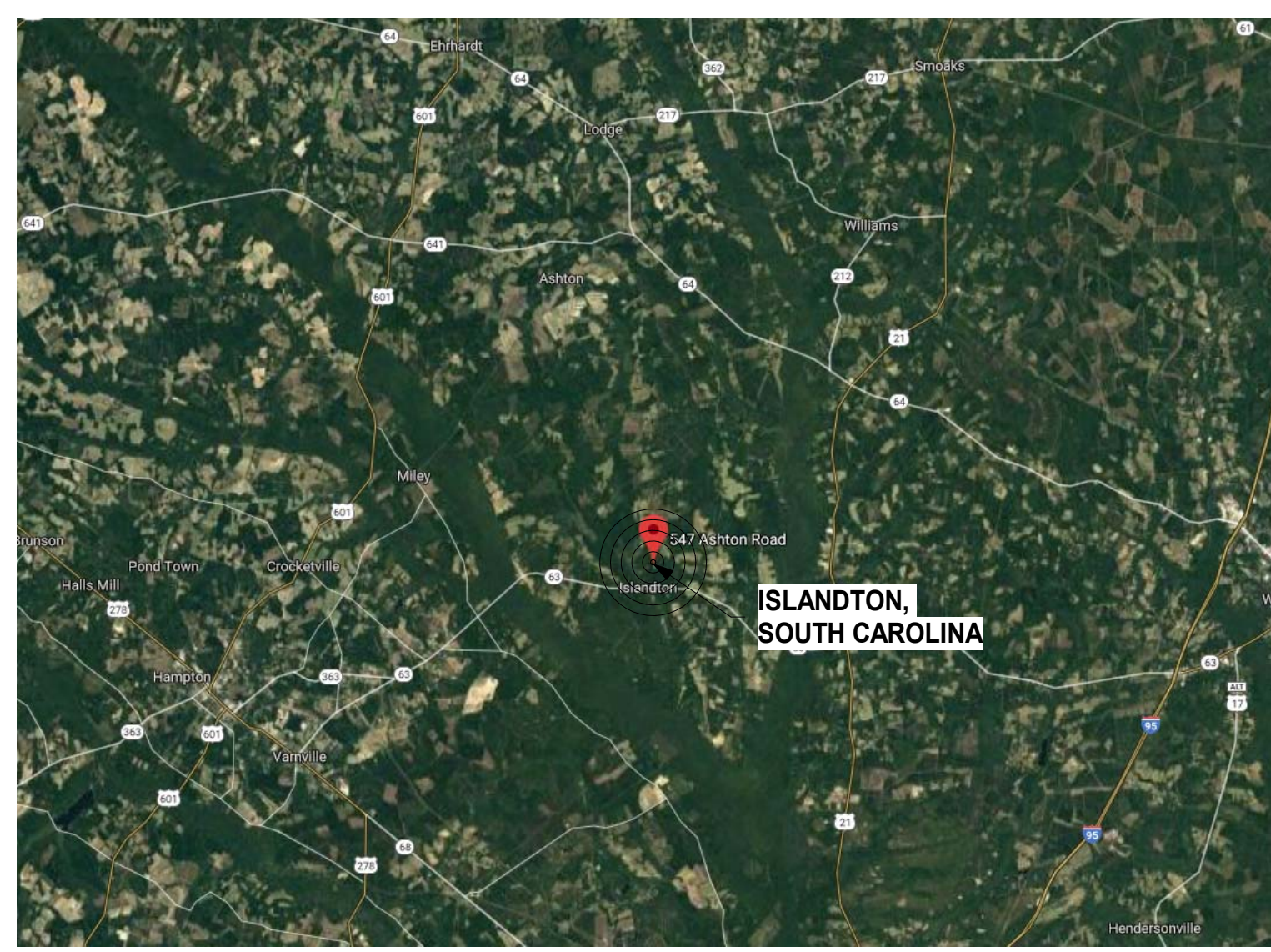


### SOUTH CAROLINA MAP



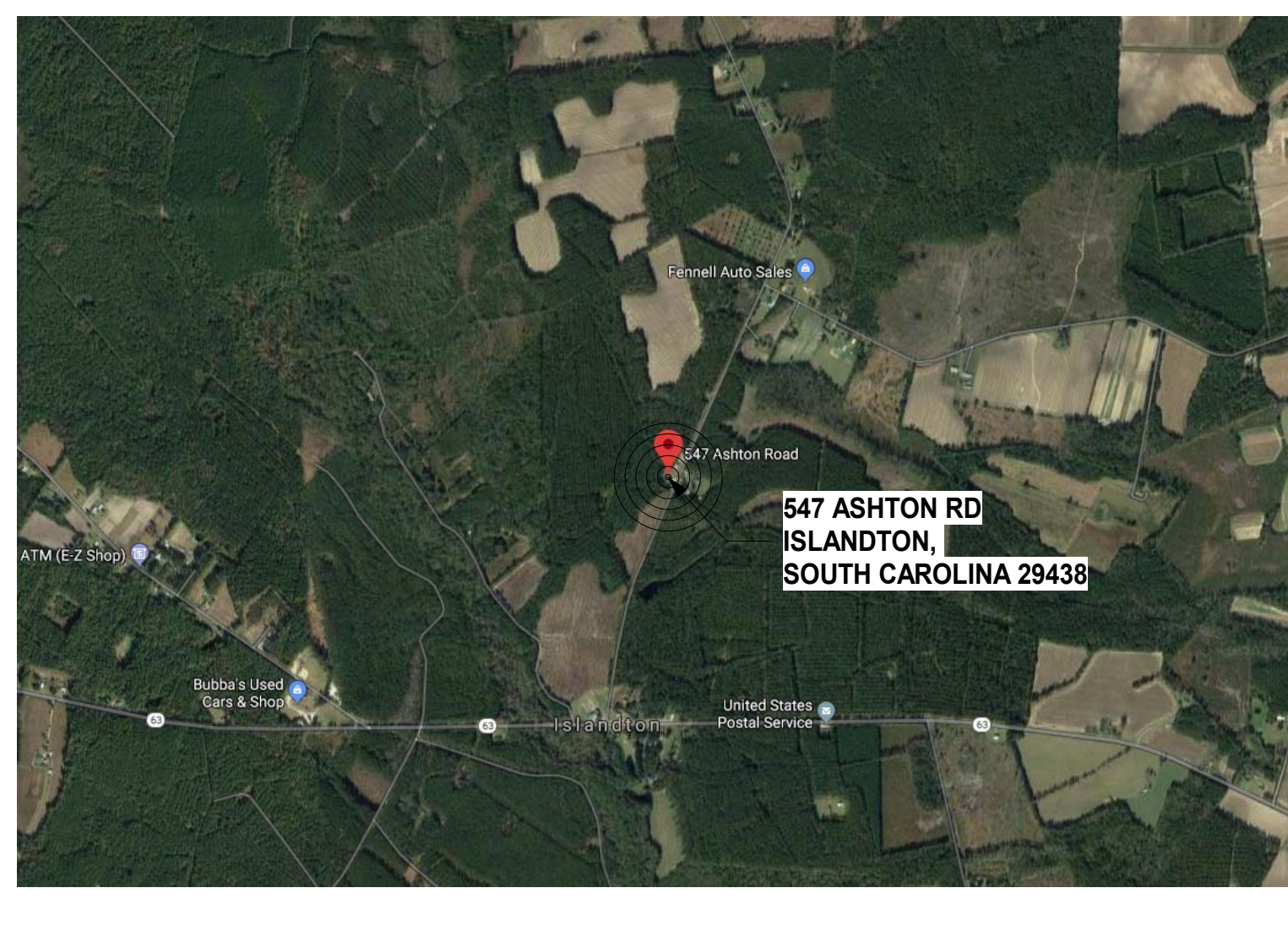
ISLANDTON, SOUTH CAROLINA

### LOWCOUNTRY AREA MAP



ISLANDTON, SOUTH CAROLINA

### PROJECT LOCATION MAP



547 ASHTON RD  
ISLANDTON  
SOUTH CAROLINA 29438

### BASIC BUILDING CODE INFORMATION

CONSTRUCTION CLASSIFICATION	Type <b>II-B</b>	(IBC 602)
OCCUPANCY GROUP	<b>B</b> <u>S-2</u>	(IBC 502)
OCCUPANCY GROUP	<b>B</b>	(IBC Table 503)
Does building require Incidental Use Area Separation?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	(IBC 509)
Does building have Accessory Occupancy (ies)? What percent of story is accessory occupancy?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	(IBC 508.3.1) <b>N/A</b> SF <b>N/A</b> %
Mixed Occupancy	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	(IBC 508)
Non separated	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	(IBC 508.3)
Separated	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	(IBC 508.4) (IBC506.4.1)
OTHER FIRE PROTECTION SYSTEMS, DEVICES or FEATURES		
If the building has any special or notable fire protection or safety feature or hazard the designers should list them here, describe the performance characteristics and refer to locations in construction documents (e.g. fire extinguishers, smoke-evacuation-control-compartments. Note IBC §414.1.3.)		

### BUILDING DESIGN OCCUPANT LOAD

Stories & Levels	Function of Space (1)	Floor Area (2) (specify NSF or GSF)	Max Area per Occupant (3) (specify NSF or GSF)	Persons on floor for this Function (4)	Design Occupant Load
1	STORAGE	3102 GSF	300 GSF	11	
(Add additional rows as needed for each Function Type on this story)					
Subtotal Design Occupant Load for this Story: (5)					11
Add or delete rows as needed for each story & level of building (including mezzanine)					
Total Building Design Occupant Load: (6)					11
Footnotes:					
1. Provide the complete name of the Function of space using the left column of Table 1004.1.2 of the IBC.					
2. Design Area per each occupant of this floor in either Gross or Net square footage.					
3. Allowed Floor Areas in SF per Occupant per right column in Table 1004.1.2 of the IBC.					
4. Divide Column A (2) by Column B (3) for each function and enter the result, rounded up to the nearest whole person.					
5. Subtotal all Column C values for this floor to yield the Design Occupant Load.					
6. Total Building Design Occupant Load—sum of all Column D value					

### DRAWING LIST

SHEET NO.	SHEET TITLE
<b>GENERAL</b>	
G000	COVER SHEET
G100	DRAWING LIST & PROJECT LOCATION
<b>CIVIL</b>	
C101	EXISTING CONDITIONS
C201	DEMOLITION & EROSION CONTROL PLAN
C301	NEW SITE PLAN
C401	GRADING, DRAINAGE & UTILITY PLAN
C500	CONSTRUCTION DETAILS
C501	CONSTRUCTION DETAILS
C502	CONSTRUCTION DETAILS
C503	CONSTRUCTION DETAILS
C504	CONSTRUCTION DETAILS
<b>STRUCTURAL</b>	
S010	GENERAL NOTES & DETAILS
S101	FOUNDATION PLAN
S201	DETAILS
<b>ARCHITECTURAL</b>	
A100	FLOOR PLANS
A101	FLOOR PLANS
A200	EXTERIOR ELEVATIONS
A300	BUILDING & WALL SECTIONS
A301	WALL SECTIONS & WALL TYPES
A500	DETAILS
A501	DETAILS
A600	SCHEDULES & FINISHES
<b>MECHANICAL</b>	
M001	MECHANICAL NOTES & LEGENDS
M101	MECHANICAL FLOOR PLAN
<b>PLUMBING</b>	
P001	PLUMBING PLAN
<b>ELECTRICAL</b>	
E001	ELECTRICAL NOTES
E002	ELECTRICAL SCHEDULES AND DETAILS
E100	ELECTRICAL SITE PLAN AND ONE LINE
E101	ELECTRICAL PLANS

### GENERAL PROJECT NOTES

- PROVIDE ACCESS PANELS WHERE NEEDED TO ACCESS VALVES, EQUIPMENT, FILTERS, ETC EVEN IF NOT NOTED IN THE DRAWINGS.
- DETAILS ARE SHOWN TO DESCRIBE DESIGN INTENT, COORDINATE COMPLETE SHOP DRAWINGS, SHOWING ALL CONSTRUCTION DETAILS AND LAYOUTS AS REQUIRED FOR A COMPLETE JOB, ADHERING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, WARRANTIES AND GOVERNING CODES.
- THE CONSTRUCTION SUBSYSTEMS AND PARTITION TYPES SHOWN INDICATE THE GENERAL CONSTRUCTION FEATURES OF THE WORK TO BE COMPLETED. THEY ARE NOT INTENDED TO REPRESENT THE ENTIRE CONSTRUCTION PROCESS AND ACCESSORIES USED. THE CONTRACTOR AND SUBCONTRACTORS ARE RESPONSIBLE FOR COMPLETED SYSTEMS AND TO BE IN COMPLIANCE WITH GOVERNING CODES AND THE INTENT OF THE DRAWINGS.
- CONSTRUCTION MATERIALS OR PROCESSES WHICH ARE HAZARDOUS TO WORKERS OR FUTURE OCCUPANTS ARE NOT PERMITTED.
- REFER TO STRUCTURAL MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS FOR ADDITIONAL NOTES AND REFERENCES.
- GENERAL CONTRACTOR AND APPLICABLE SUB CONTRACTORS SHALL VERIFY ALL DIMENSIONS IN FIELD PRIOR TO COMMENCING DEMOLITION AND NEW CONSTRUCTION. DO NOT SCALE DRAWINGS.
- GENERAL CONTRACTOR TO COORDINATE WITH OWNER ON ALL OWNER PROVIDED EQUIPMENT AND FURNISHINGS.
- THE DETAILS ON THE DRAWINGS REPRESENT GENERIC DETAILS AND THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS OF ALL DETAILS THAT ARE IN ACCORDANCE WITH THE BUILDING CODE AND THE BUILDING SYSTEM MANUFACTURER SELECTED.
- THE CONTRACTOR SHALL PROVIDE KICK-OUT FLASHING SHOP DRAWINGS AND KICK-OUT FLASHING AT ALL SLOPED ROOF INTERSECTIONS WITH VERTICAL WALLS AT THE LOWEST POINT ON THE SLOPE.
- THE CONTRACTOR SHALL PROVIDE A COMPLETE AND INTEGRATED BUILDING SYSTEM THAT RESPONDS TO THE ANTICIPATED EXPANSION AND CONTRACTION OF THE METAL BUILDING AND ITS COMPONENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR GRASSING OF ALL DISTURBED AREAS AFTER COMPLETION OF SITE WORK VIA HYDRO SEEDING.
- THE CONTRACTOR IS TO KEEP AND MAINTAIN AS-BUILTS TO BE DELIVERED TO OWNER IN PAPER AND ELECTRONIC FORM UPON COMPLETION OF THE PROJECT.

### BASIC PROJECT INFO

PROJECT NAME: FIRE STATION #15 - ISLANDTON ADDITION  
 PROJECT ADDRESS: 547 ASHTON RD. ISLANDTON, SC 29929  
 OWNER REPRESENTATIVE: JOHN T. STIEGLITZ III  
 REPRS. ADDRESS: 31 KLEIN ST. WALTERBORO, SC 29488 843.782.0508  
 OWNER: COLLETON COUNTY  
 OWNER ADDRESS: 31 KLEIN ST. WALTERBORO, SC 29488 843.782.0508

**PRIMARY CODES AND ORDINANCES USED:**

- 2018 INTERNATIONAL BUILDING CODE W/ SC MODIFICATIONS
- 2018 INTERNATIONAL FIRE CODE W/ SC MODIFICATIONS
- 2018 INTERNATIONAL MECHANICAL CODE
- 2018 INTERNATIONAL PLUMBING CODE
- 2018 INTERNATIONAL FUEL GAS CODE W/ SC MODIFICATIONS
- 2018 INTERNATIONAL ENERGY CONSERVATION CODE
- 2012 NATIONAL ELECTRIC CODE
- 1992 AMERICANS WITH DISABILITY ACT
- ICC/ANSI A117.1 ACCESSIBLE AND USEABLE BUILDINGS AND FACILITIES, LATEST ED.
- SC ENERGY EFFICIENCY STANDARDS ACT
- ASHRAE 90.1-2004, ENERGY EFFICIENT DESIGN OF NEW BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS
- STATE FIRE MARSHAL REGULATIONS

### SCOPE OF WORK

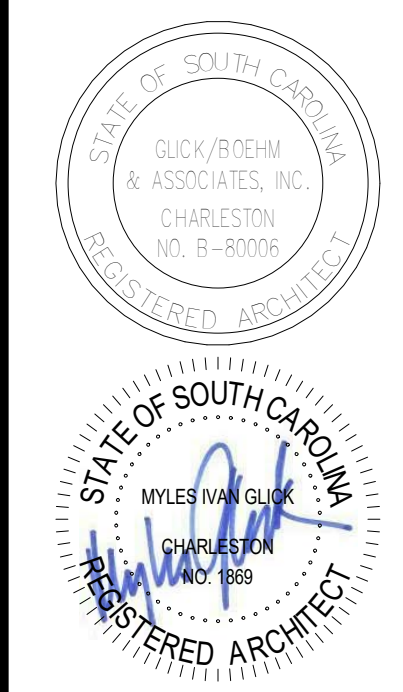
- FIRE STATION - ADDITION**  
DEMOLITION OF PORTIONS OF EXISTING CONSTRUCTION AND CONSTRUCTION OF NEW ONE STORY PRE-ENGINEERED METAL BUILDING ADDITION AND CONCRETE SLAB.

### GENERAL DEMOLITION NOTES

- ELEMENTS OR PORTIONS OF ELEMENTS TO BE REMOVED ARE SHOWN DASHED. REFER TO KEY NOTES FOR ADDITIONAL CLARIFICATION FOR PARTIALLY REMOVED OR REUSED ELEMENTS. RETURN UN-USED DOORS, HARDWARE, AND ACCESSORIES TO OWNER.
- VERIFY EXISTING CONDITIONS OF SPACE PRIOR TO DEMOLITION WORK.
- AREAS OF DEMOLITION ARE APPROXIMATE. GENERAL CONTRACTOR TO COORDINATE TO COORDINATE DEMOLITION WITH EXISTING CONDITIONS, NEW CONSTRUCTION, AND ADDITIONAL SCOPE OF WORK INCLUDED IN MECHANICAL, PLUMBING, AND ELECTRICAL DOCUMENTS.
- WALL DEMOLITION TO INCLUDE FRAMING, SHEATHING, FINISHES AND ALL APPURTENANCES.
- ANY HIDDEN STRUCTURAL COLUMNS OR SUPPORT IS TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO REMOVAL. ANY BUILDING SUPPORT WHICH DEVIATES FROM THAT SHOWN OR IS IN QUESTION IS TO BE BROUGHT TO ARCHITECT'S ATTENTION IMMEDIATELY.
- REFER TO MECHANICAL, PLUMBING, AND ELECTRICAL DOCUMENTS FOR REMOVAL AND CAPPING OF SERVICES FOR ITEMS SHOWN TO BE REMOVED.
- CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT EXISTING FLOORING AND FINISHES TO REMAIN.
- REMOVE ALL ABANDONED ACCESSORIES AND DEVICES NOT OTHERWISE NOTED. PATCH DRYWALL AND PREP FOR NEW FINISHES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR SECURITY OF BUILDING CONTENTS AS WELL AS BUILDING MATERIALS STORED ON SITE DURING CONSTRUCTION.
- REFER TO STRUCTURAL, PLUMBING, MECHANICAL, ELECTRICAL FOR OTHER DEMOLITION. CONTRACTOR TO COORDINATE DEMOLITION REQUIRED BY OTHER DISCIPLINES AND COMPLETE PREPARATION FOR NEW WORK.
- EXISTING CONSTRUCTION TO REMAIN SHALL BE PROTECTED DURING DEMOLITION AND NEW WORK CONSTRUCTION ACTIVITIES.
- THE EXTENT OF DEMOLITION INDICATED IS BASED ON AS BUILT DRAWING PROVIDED BY THE OWNER AND FIELD OBSERVATIONS. ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND THOSE INDICATED ARE TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AS SOON AS DISCREPANCIES ARE DISCOVERED.
- DEMOLITION PLANS AND ELEVATIONS SHOW THE INTENT OF DEMOLITION TO BE PERFORMED. ALL DASHED ITEMS ARE TO BE DEMOLISHED COMPLETE. CONTRACTOR SHALL INCLUDE ALL DEMOLITION, CUTTING AND PATCHING REQUIRED FOR NEW CONSTRUCTION. REFER TO OTHER DISCIPLINES (STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING) DEMOLITION DRAWINGS FOR ADDITIONAL ITEMS TO BE DEMOLISHED. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN DISCIPLINES DEMOLITION AND NEW WORK TO THE ARCHITECT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SHORE, BRACE AND/OR SECURE MATERIALS AND STRUCTURE TO REMAIN.
- WHERE EXISTING WALL, CEILING, ROOF OR FLOOR SYSTEMS ARE TO REMAIN AND ARE DISTURBED BY DEMOLITION, THEY SHALL BE REPAIRED AS REQUIRED TO MATCH ORIGINAL INTEGRITY AND ADJACENT CONSTRUCTION.
- CONTRACTOR TO REMOVE ALL ABANDONED OR UNNECESSARY PIPING, DUCT, WIRING CONDUIT AND/OR ANCHORS COMPLETE.
- REFER TO PLUMBING FOR LOCATIONS OF NEW FIXTURES AND ADDITIONAL SLAB DEMOLITION.



REV. NO.	DATE	DESCRIPTION



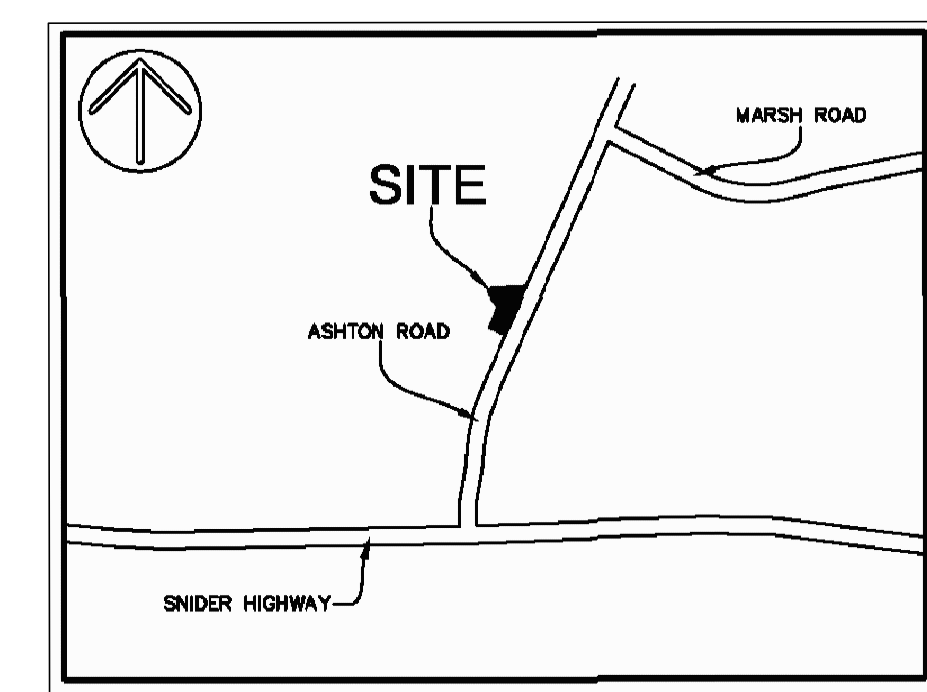
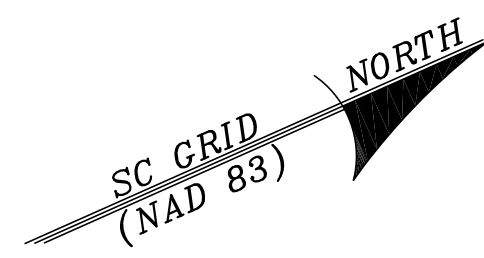
**ISLANDTON FIRE STATION #15**  
 COLLETON COUNTY  
 547 ASHTON RD.  
 ISLANDTON, SC 29929

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 GLICK/BOEHM & ASSOCIATES, INC.  
 JOB NUMBER: 1928  
 PROJECT MGR.: MCM  
 DRAWN BY: MCM  
 CHECKED BY: SM  
 APPROVED BY: MIG  
 DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/10/2020

DRAWING LIST & PROJECT LOCATION

# G100





VICINITY MAP NOT TO SCALE

- LEGEND
- RFB ● IRON REBAR FOUND
  - RBS ○ IRON REBAR SET
  - PKS ○ PK NAIL SET
  - Rbfd ● IRON REBAR FOUND DISTURBED
  - BSL BUILDING SETBACK LINE
  - FFE FINISHED FLOOR ELEVATION
  - ▽ FIRE HYDRANT
  - GUY WIRE
  - HANDICAP PARKING
  - MCP METAL CORRUGATED PIPE
  - GEN POWER GENERATOR
  - POWER POLE
  - PH PUMP HOUSE
  - RCP REINFORCED CONCRETE PIPE
  - x12.9 SPOT ELEVATION
  - SIGN
  - TELEPHONE JUNCTION BOX
  - UNDERGROUND FIBER OPTICS MARKER
  - CONTOUR LINE
  - OHP OVERHEAD POWER LINE
  - BB BOTTOM OF BANK
  - TB TOP OF BANK
  - SD UNDERGROUND DRAINAGE LINE
  - CONCRETE

NOTES

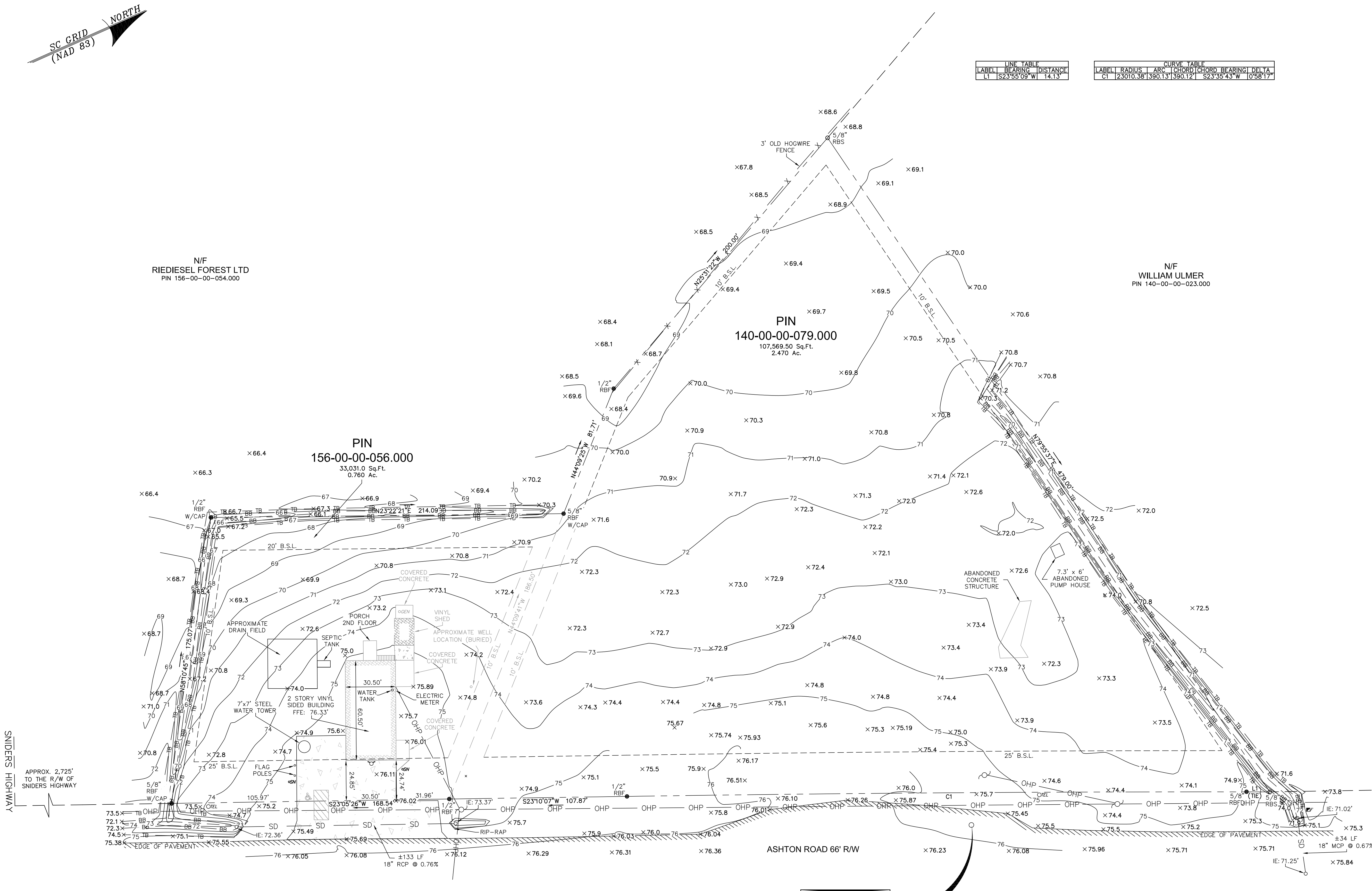
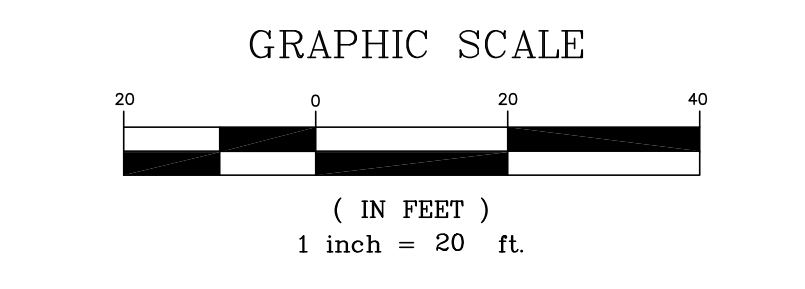
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- CONTOURS ARE IN ONE FOOT INTERVALS.
- VERTICAL DATUM USED: NAVD 88. HORIZONTAL DATUM USED: NAD 83.
- BUILDING SETBACKS ARE PER PHONE CALL TO COLLETON COUNTY ZONING ADMINISTRATION ON 07/22/2019 AND MUST BE VERIFIED PRIOR TO CONSTRUCTION.

REFERENCES

- PB: 21 PG: 103
- PB: 660 PG: 8
- DB: 251 PG: 123
- DB: 2044 PG: 97

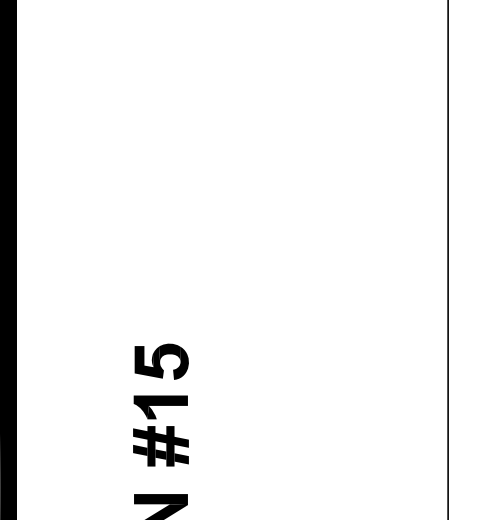
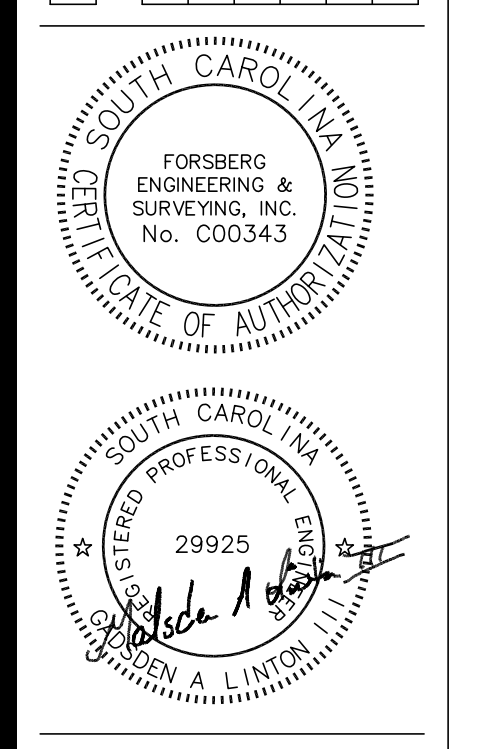
PREPARED FOR:  
**COLLETON COUNTY**  
 A BOUNDARY AND TOPOGRAPHIC SURVEY OF  
**#547 ASHTON ROAD**  
 PARCEL ID No.  
 140-00-00-079.000  
 156-00-00-056.000  
**ISLANDTON**  
 COLLETON COUNTY, SOUTH CAROLINA  
 FIELD WORK: PV  
 FIELD CHECK: JWR  
 DRAWN BY: TCU  
 DATE: 07-25-2019  
 SCALE: 1" = 30'  
 PROJECT No.: BFT-19175  
 FILE: BFT-19175 ATL.DWG

EXISTING CONDITIONS DRAWING ONLY.  
 SURVEY WORK PERFORMED BY ATLAS  
 SURVEYING. INFORMATION ON THIS SHEET  
 TAKEN FROM ATLAS SURVEY.



LINE TABLE			CURVE TABLE					
LABEL	BEARING	DISTANCE	LABEL	RADIUS	ARC LENGTH	CHORD	CHORD BEARING	DELTA
L1	S24°55'09\" W	14.13'	CI	123010.38	1390.13	1390.12	S23°35'43\" W	10981.7'

C:\Users\Michael\Documents\1028 - Colleton County Fire Station #15 (R-20) -  
 Colleton County Fire Station #15 (R-20).dwg, 14/10/2019, 4:45:05 PM



**ISLANDTON FIRE STATION #15**  
 COLLETON COUNTY  
 547 ASHTON RD.  
 ISLANDTON, SC 29929

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 JOB NUMBER: 1928  
 PROJECT MGR.: MCM  
 DRAWN BY: MCM  
 CHECKED BY: SM  
 APPROVED BY: MIG  
 DATE ISSUED FOR: 01/30/2020  
 CONSTRUCTION DOCUMENTS

**C101**



SCDHEC NPDES STANDARD NOTES (2012 CGP)

- IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
- STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.
  - WHERE STABILIZATION BY THE 14th DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS
  - STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.
  - WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.
- ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE CALENDAR EVERY WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY, OR INCORRECTLY MAINTAINED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.
- PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE SEDIMENT BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.
- ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
- THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.
- RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C. REG. 72-300 ET SEQ. AND SCR100000.
- TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

- ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CANT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.
- LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.
- A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.
- INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.
- MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.
- MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.
- MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPs (SEDIMENT BASIN, FILTER BAG, ETC.).
- THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:
  - WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;
  - WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;
  - FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND
  - SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.
- AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.
- IF EXISTING BMPs NEED TO BE MODIFIED OR IF ADDITIONAL BMPs ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SCS WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPs MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.
- A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

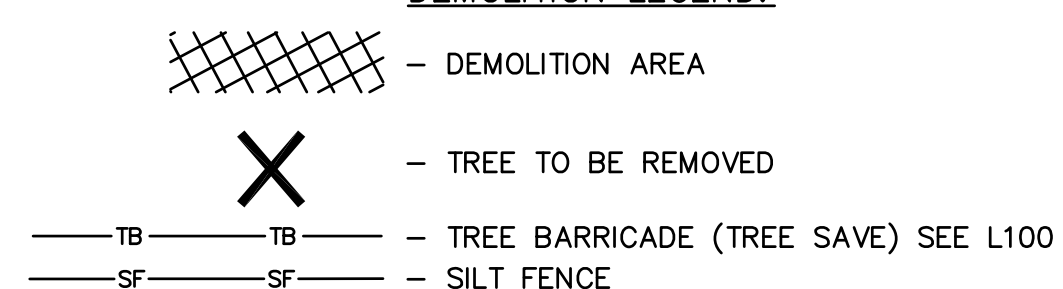
DEMOLITION NOTES:

- THE CONTRACTOR TO INSTALL ALL SILT FENCING & TREE BARRICADES BEFORE STARTING ANY WORK. CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL MEASURES. SEE EROSION CONTROL NOTES.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL SWPPP INSPECTIONS, REPORTS, AS-BUILT DRAWINGS, MEETINGS, CERTIFICATIONS, AND NOTICE OF TERMINATION AS REQUIRED BY THE APPROVED NPDES PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES SCR100000 (2012 CGP) AND AS REQUIRED BY CITY OF CHARLESTON MS4.
- CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS OR LOCATIONS MARKED IN THE FIELD BY THE VARIOUS UTILITY COMPANIES. THIS SURVEY DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. CALL PALMETTO UTILITY PROTECTION SERVICE (P.U.P.S.) AT 811 A MINIMUM OF 3 WORKING DAYS BEFORE DIGGING.
- ACCESS TO THE CONSTRUCTION SITE SHALL BE MAINTAINED DURING CONSTRUCTION.
- CONTRACTOR SHALL ENSURE THAT SITE DISTANCE VISIBILITY IS MAINTAINED IN ACCORDANCE WITH SCDOT ARMS MANUAL AT ALL INTERSECTIONS AND CONSTRUCTION DRIVEWAYS DURING DEMOLITION. ALL CONSTRUCTION EGRESS/INGRESS POINTS SHALL PROVIDE PROPER TRAFFIC CONTROL FOR CONSTRUCTION DRIVEWAYS AT ALL TIMES DURING DEMOLITION.
- SEE SPECIFICATION SECTION 024113 FOR ADDITIONAL DEMOLITION NOTES.

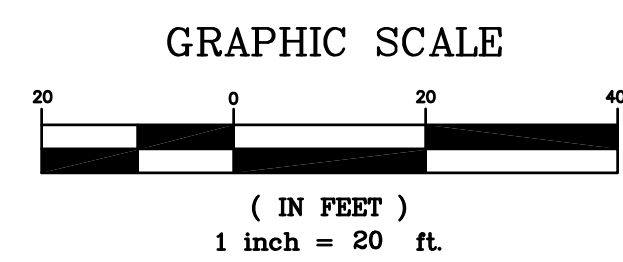
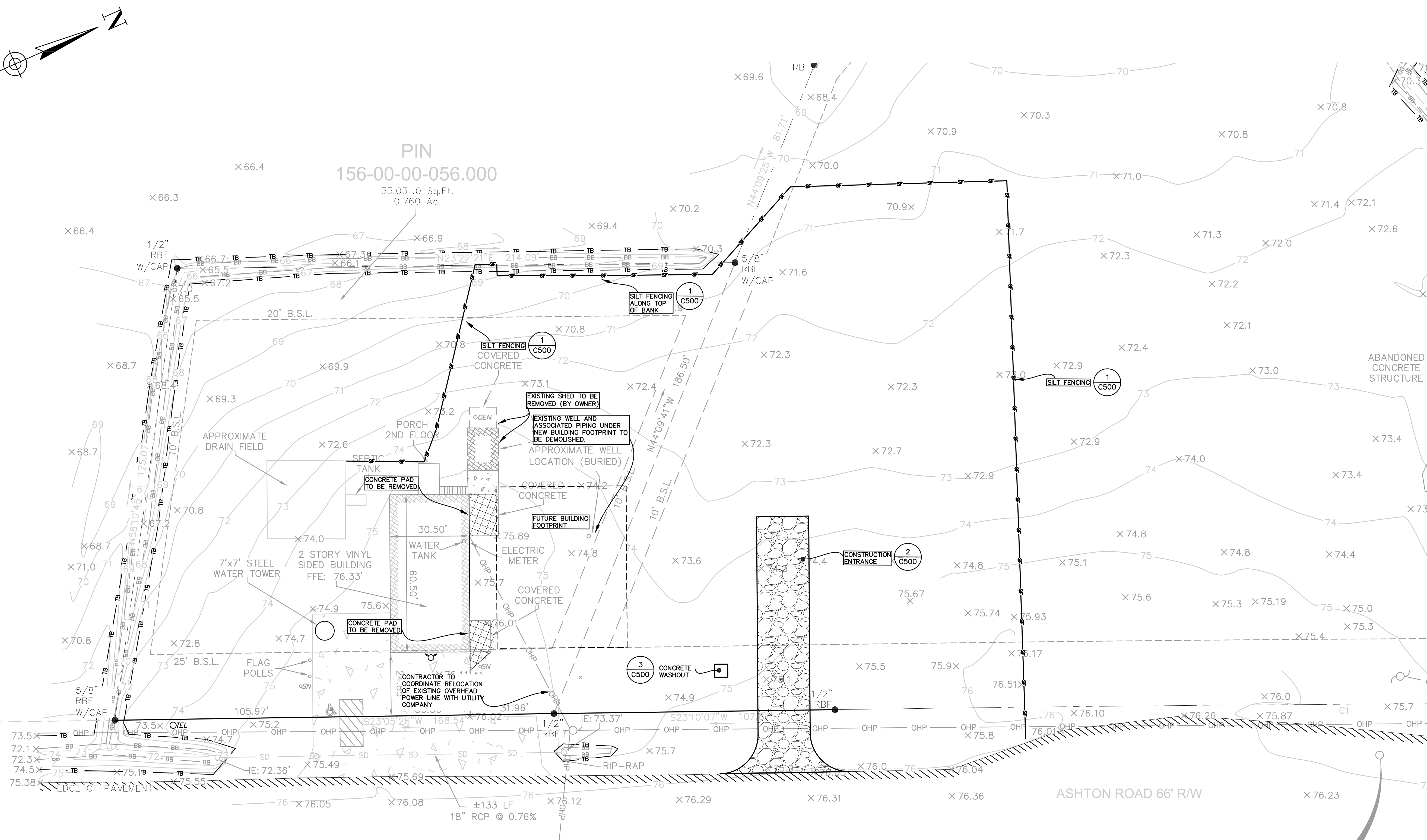
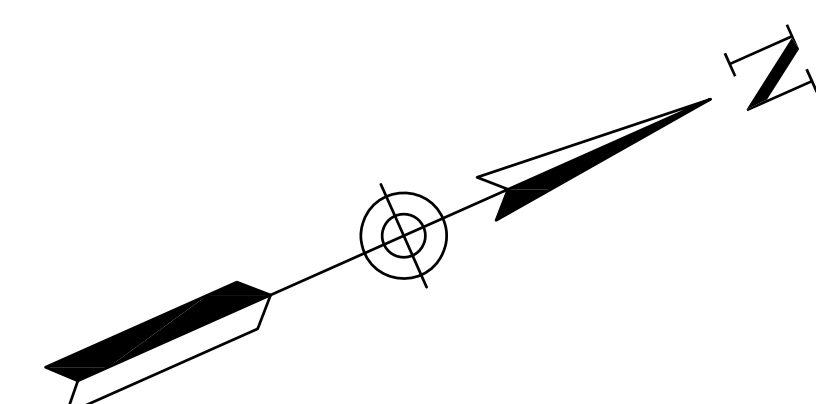
CONSTRUCTION SEQUENCE

- CONTRACTOR TO INSTALL PERIMETER CONTROLS AND CONSTRUCTION ACCESS POINTS. CONTRACTOR TO ENSURE EXISTING EROSION CONTROL DEVICES REMAIN INTACT DURING PROJECT DURATION.
- CLEARING, GRUBBING, AND DEMOLITION.
- ROUGH GRADING AND INSTALLATION OF STORM DRAINAGE LINES AND STRUCTURES.
- INSTALL SEDIMENT CONTROLS AT ALL STRUCTURES WITHIN 5 DAYS OF STRUCTURE INSTALLATION.
- PAVING AND FINAL SITE GRADING.
- LANDSCAPE PLANTING, SODDING, AND GRASSING.
- REMOVE ALL TEMPORARY EROSION & SEDIMENT CONTROL BMP FOLLOWING FINAL INSPECTIONS.
- SUBMIT AS-BUILT SURVEY TO PROJECT ENGINEER AS REQUIRED.
- PERMANENT MAINTENANCE COVENANTS AND AS-BUILT DRAWINGS FOR STORMWATER FACILITIES IN ACCORDANCE WITH CITY OF CHARLESTON SPECIFICATIONS NEEDS TO BE SUBMITTED AND ACCEPTED BY CITY BEFORE N.O.T. IS ISSUED.

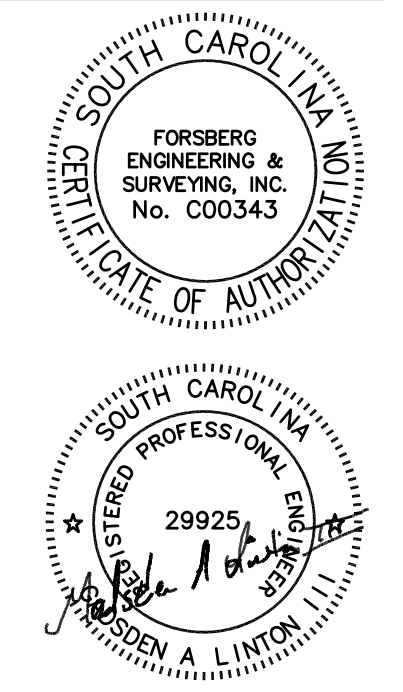
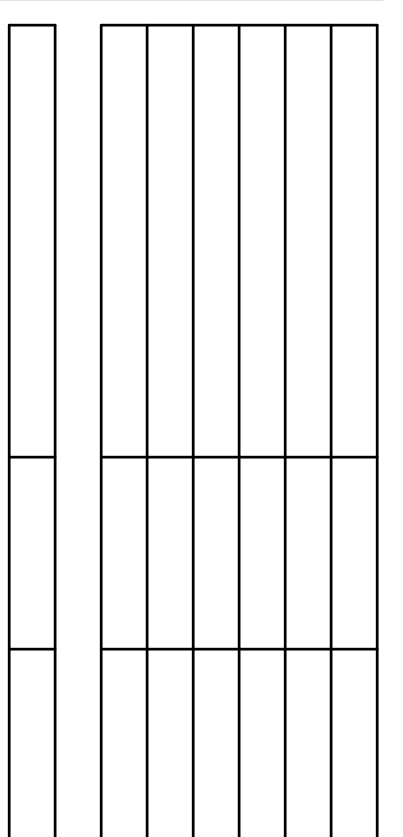
DEMOLITION LEGEND:



TREE PROTECTION NOTE:  
NO PROTECTED TREES TO BE REMOVED DURING CONSTRUCTION.



**BENCHMARK**  
PK SET  
EL.: 75.80'  
DATUM: NAVD 88



**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

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GLICK/BOEHM & ASSOCIATES, INC.  
JOB NUMBER: 1928  
PROJECT MGR.: MCM  
DRAWN BY: MCM  
CHECKED BY: SM  
APPROVED BY: MIG  
DATE ISSUED FOR: 01/30/2020  
CONSTRUCTION DOCUMENTS

**DEMOLITION & EROSION CONTROL PLAN**

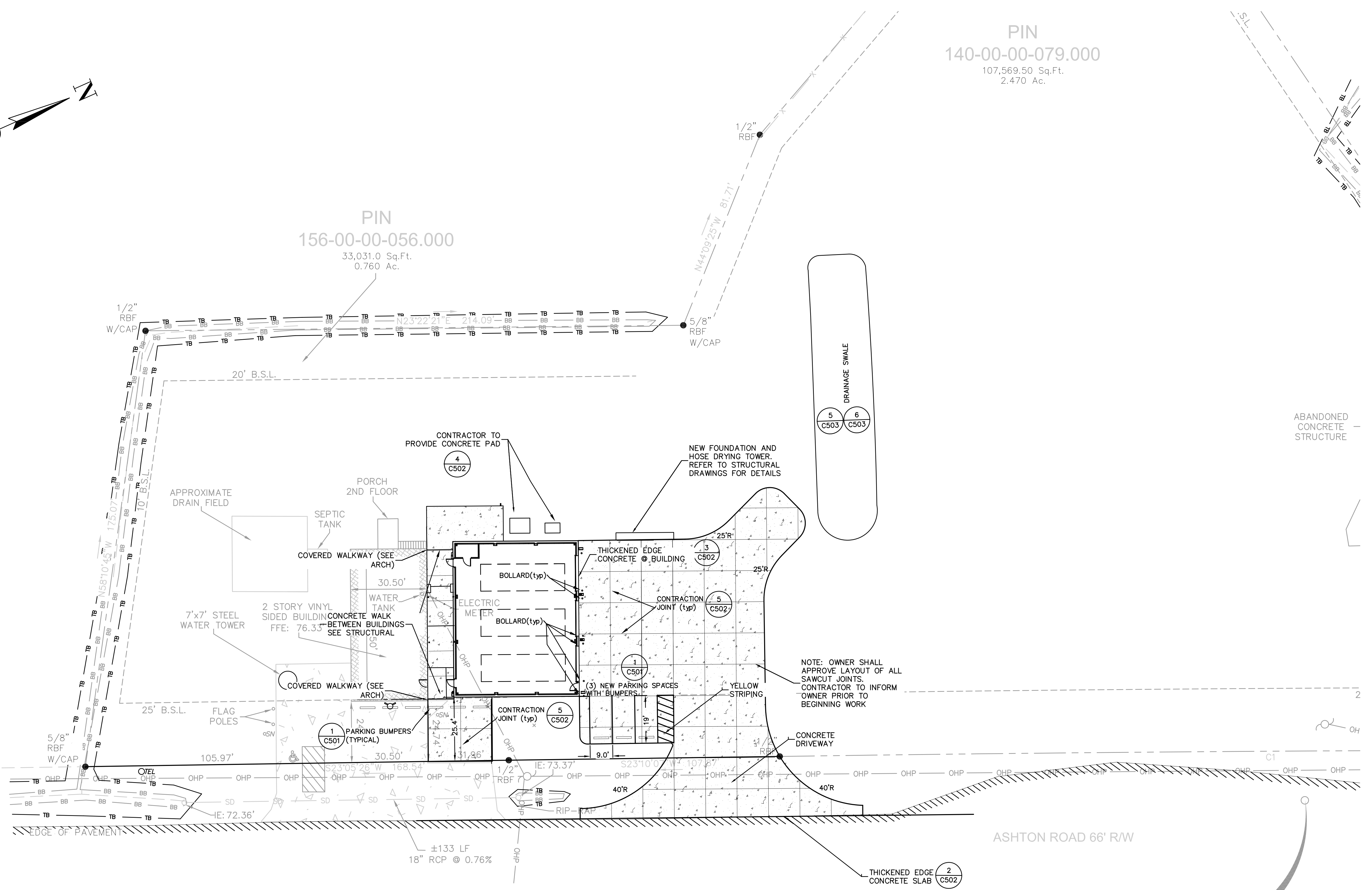
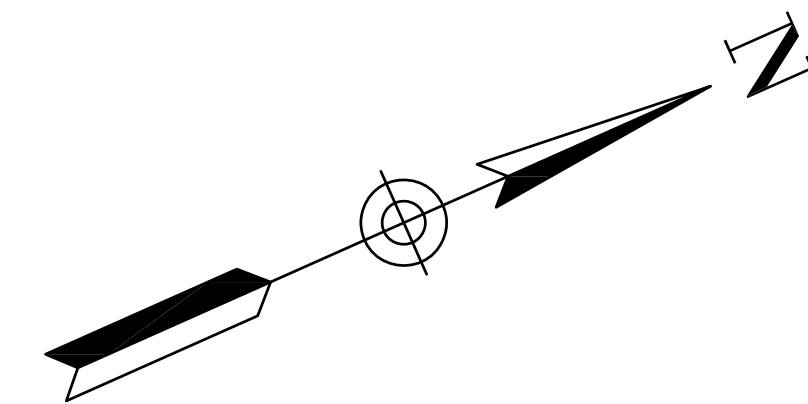
**C201**



SPECIAL R/W NOTES FOR SCDOT PROJECTS:

- 1) CONTRACTOR TO REFER TO THE MOST CURRENT EDITION OF THE SCDOT STANDARD DRAWINGS TO MAKE SURE THAT THE DETAILS SHOWN HEREON ARE THE MOST CURRENT SCDOT DETAILS.
- 2) ANY FIELD CHANGES WITHIN SCDOT R/W OR CHANGES THAT WOULD IMPACT SCDOT R/W WILL REQUIRE WRITTEN SCDOT APPROVAL PRIOR TO CHANGES BEING IMPLEMENTED IN THE FIELD. (E.G. DRAINAGE, GRADING, ACCESS DESIGN ETC.).
- 3) SCDOT WILL REQUIRE THAT YOU PROVIDE A TRAFFIC CONTROL PLAN (PHASED AS NECESSARY) FOR REVIEW AND APPROVAL.
- 4) UTILITY COMPANIES MUST SUBMIT UTILITY ENCROACHMENTS UNDER SEPARATE PERMITS FOR NEW CONNECTIONS OR RELOCATION OF EXISTING SERVICES. NO UTILITY WORK CAN BEGIN WITHIN THE R/W WITHOUT AN APPROVED SCDOT ENCROACHMENT PERMIT FOR EACH UTILITY. SCDOT WILL NOT ALLOW AN OPEN CUT OF A STATE ROAD IF IT WAS RECENTLY RESURFACED.
- 5) ALL PIPE INSTALLATIONS WITHIN SCDOT RIGHT OF WAY TO MEET CURRENT SCDOT BACKFILL AND COMPACTIVE STANDARDS (SEE SCDOT STANDARD DRAWINGS SECTION 714-000).
- 6) THE DETAILS SHOWN ON THIS PLAN ARE FOR REFERENCE ONLY. FULL SIZE DETAILS ARE AVAILABLE ON THE SCDOT WEBPAGE AT [http://www.scdot.org/doing/sd\\_Book.aspx](http://www.scdot.org/doing/sd_Book.aspx)
- 7) THE OWNER SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF DRIVEWAYS AND OTHER ACCESS POINTS, INCLUDING ANY DRAINAGE STRUCTURES, FOR AREAS WITHIN THE RIGHTS-OF-WAYS OF STATE MAINTAINED FACILITIES IN PERPETUITY. DRIVEWAY ACCESS SHALL BE MAINTAINED FOR INGRESS/EGRESS - BLOCKING OF ACCESS WILL NOT BE ALLOWED.
- 8) ALL SIGNS LOCATED IN SCDOT RIGHT OF WAY SHALL BE A U-CHANNEL POST AND BREAK AWAY DESIGN IN ADDITION TO MUTCD. SEE SCDOT DETAIL 651-110-00.

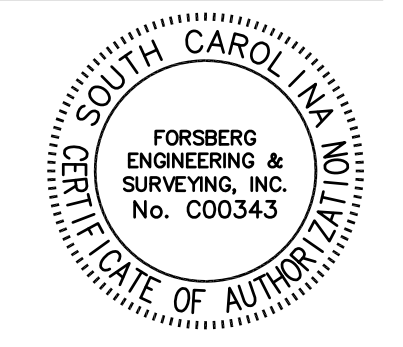
MUTCD 2009  
STOP SIGN - R1-1



PIN  
140-00-00-079.000  
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2.470 Ac.

PIN  
156-00-00-056.000  
33,031.0 Sq.Ft.  
0.760 Ac.

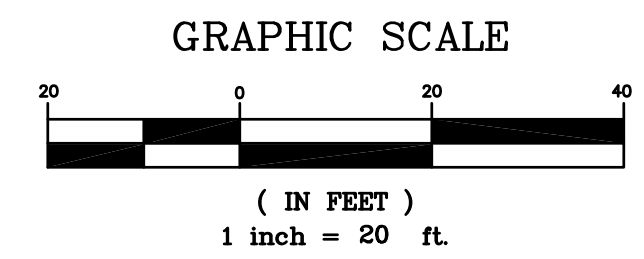
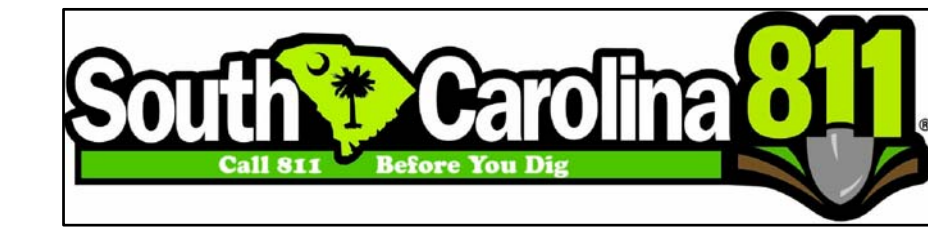
REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
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NEW SITE PLAN



**BENCHMARK**  
PK SET  
EL.: 75.80'  
DATUM: NAVD 88

C301

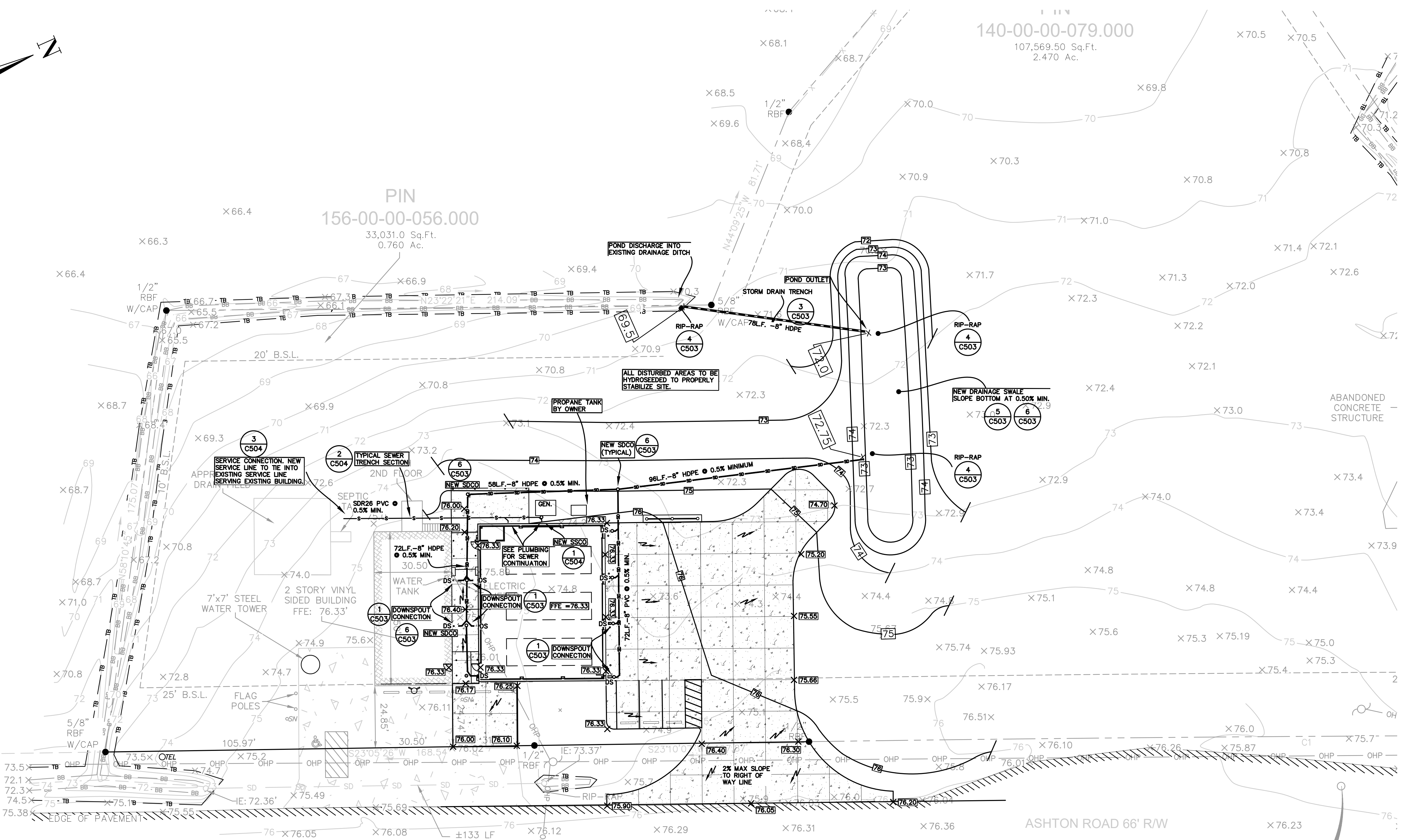
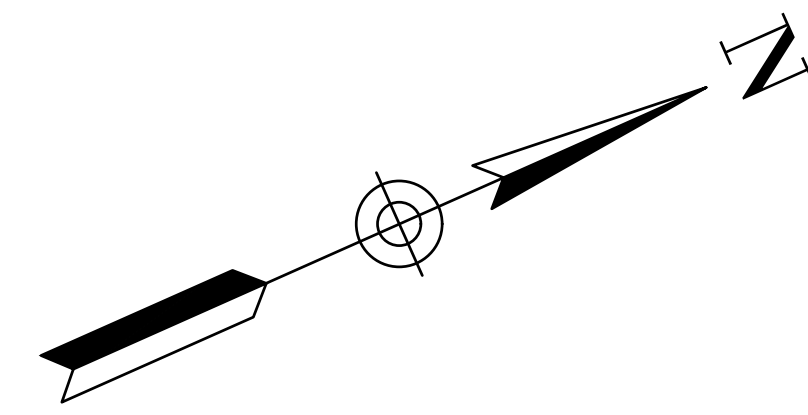


GRADING, DRAINAGE, & UTILITY LEGEND:

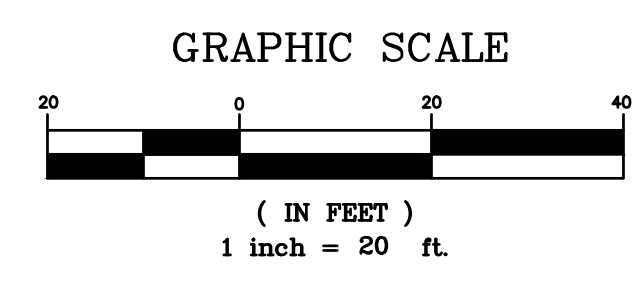
- 7.60 - FINISHED GRADE ELEVATION
- DRAINAGE DIRECTIONAL ARROW
- DI - DROP INLET
- HDPE - HIGH DENSITY POLYETHYLENE PIPE
- RCP - REINFORCED CONCRETE PIPE
- CO - STORM CLEAN OUT
- NEW STORM DRAIN PIPE
- STORM DRAINAGE (ROOF)

GRADING, DRAINAGE, & UTILITY NOTES:

1. NEW STORM DRAINAGE AND SANITARY SEWER SHALL BE LAID UP GRADE FROM LOW POINT IN SYSTEM AFTER CORROBORATION OF EXISTING INVERT ELEVATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR GETTING ALL NEW AND EXISTING SSMH TOPS, INLET TOPS, FIRE HYDRANTS, VALVES, CLEAN-OUTS, & ETC TO FINISHED GRADE. MINOR ADJUSTMENTS MAY BE NECESSARY.
3. ALL DISTURBED AREAS SHALL BE TEMPORARILY STABILIZED IN ACCORDANCE TO GRASSING & SEEDING SCHEDULE SEE SHEET C604 AND PERMANENTLY STABILIZED IN ACCORDANCE TO LANDSCAPE PLANS.
4. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK.
5. VERIFY ELEVATION OF ALL UTILITY CROSSINGS PRIOR TO BEGINNING WORK.
6. CONTRACTOR TO ENSURE POSITIVE DRAINAGE AND PREVENT BIRDBATHS IN THE NEW PAVEMENT.
7. ALL WALK SHALL HAVE A MAXIMUM GRADE OF 5.0% AND MAX. CROSS SLOPE OF 2.0%.
8. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE OS-SWPPP, ALL SWPPP INSPECTIONS, REPORTS, AS-BUILT DRAWINGS, MEETINGS, CERTIFICATIONS, AND NOTICE OF TERMINATION AS REQUIRED BY THE APPROVED NPDES PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES SCRI00000 (2012 CGP) AND AS REQUIRED BY SCDEH AND CHARLESTON COUNTY.
9. CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS OR LOCATIONS MARKED IN THE FIELD BY THE VARIOUS UTILITY COMPANIES. THIS SURVEY DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. CALL PALMETTO UTILITY PROTECTION SERVICE (P.U.P.S.) AT 811 A MINIMUM OF 3 WORKING DAYS BEFORE DIGGING.
10. LITTER, CONSTRUCTION DEBRIS, CONCRETE WASHOUT, OILS, FUELS AND BUILDING PRODUCTS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORMWATER DISCHARGES.
11. THE GENERAL CONTRACTOR(G.C.) SHALL COORDINATE ALL WORK SUCH THAT ALL SANITARY, POTABLE WATER, & FIRE LINES ARE CONNECTED AND TESTED AS REQUIRED. FOR A COMPLETED PROJECT, THE FIRE SUPPLY LINE AND ANY/ALL ELEMENTS OF THE FIRE SYSTEM SUCH AS REMOTE FDC SHALL BE IN ACCORDANCE WITH ALL CURRENT CODES AND SHALL BE CERTIFIED AND TESTED AS REQUIRED BY THE G.C. OR OTHER PROFESSIONALS WORKING FOR THE G.C. THE CIVIL ENGINEER WILL PROVIDE A FIRE SPRINKLER SPECIFICATION SHEET FOR THE SUPPLY LINE FROM THE MAIN TO WITHIN 5' OF THE BUILDING. THE SUPPLY LINE SHALL BE TESTED AS REQUIRED UNDER SPEC SECTION 331100. THE CIVIL ENGINEER DOES NOT SPECIFY OR DESIGN ANY ELEMENTS OF THE FIRE CONTROL SYSTEM. ALL PORTIONS OF THE SUPPLY LINE & FIRE SYSTEM SHALL BE TESTED BY THE G.C. AND CERTIFIED IN ACCORDANCE WITH NFPA 24 AND LATEST VERSION OF THE IBC.
12. CONTRACTOR WILL BE RESPONSIBLE FOR FINAL AS-BUILTS & CERTIFICATIONS IN ACCORDANCE TO SCDEH STANDARDS & SPECS.
13. CONTRACTOR TO COORDINATE SEWER SEPTIC WORK AS NEEDED WITH SCDEH.



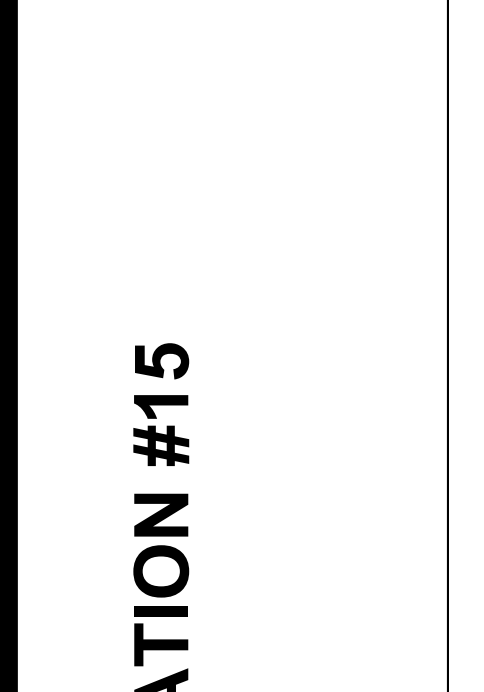
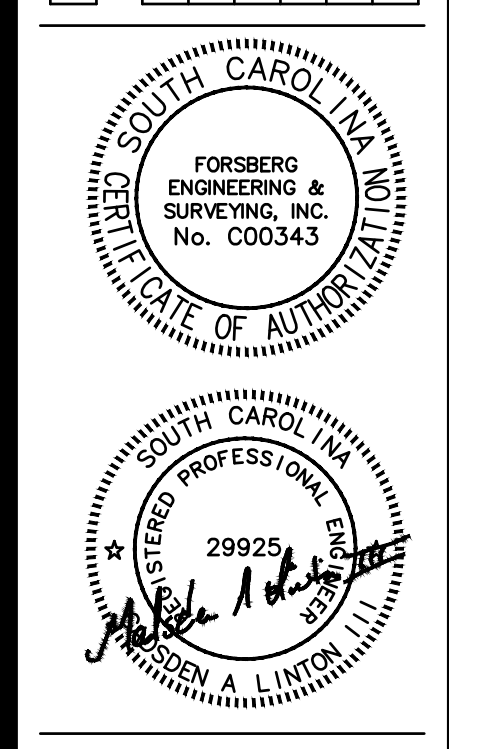
CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS. THIS PLAN DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES PRIOR TO BEGINNING DIGGING OPERATIONS. CALL PALMETTO UTILITIES PROTECTION SERVICE AT 1-888-721-7877 A MINIMUM OF 3 WORKING DAYS BEFORE DIGGING. ANY UTILITIES UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE. ADDITIONALLY, THE CONTRACTOR SHALL CONFIRM THE CONNECTION POINTS OF NEW UTILITIES TO EXISTING UTILITIES PRIOR TO BEGINNING NEW CONSTRUCTION.



**BENCHMARK**  
 PK SET  
 EL.: 75.80'  
 DATUM: NAVD 88



REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
 COLLETON COUNTY  
 547 ASHTON RD.  
 ISLANDTON, SC 29929

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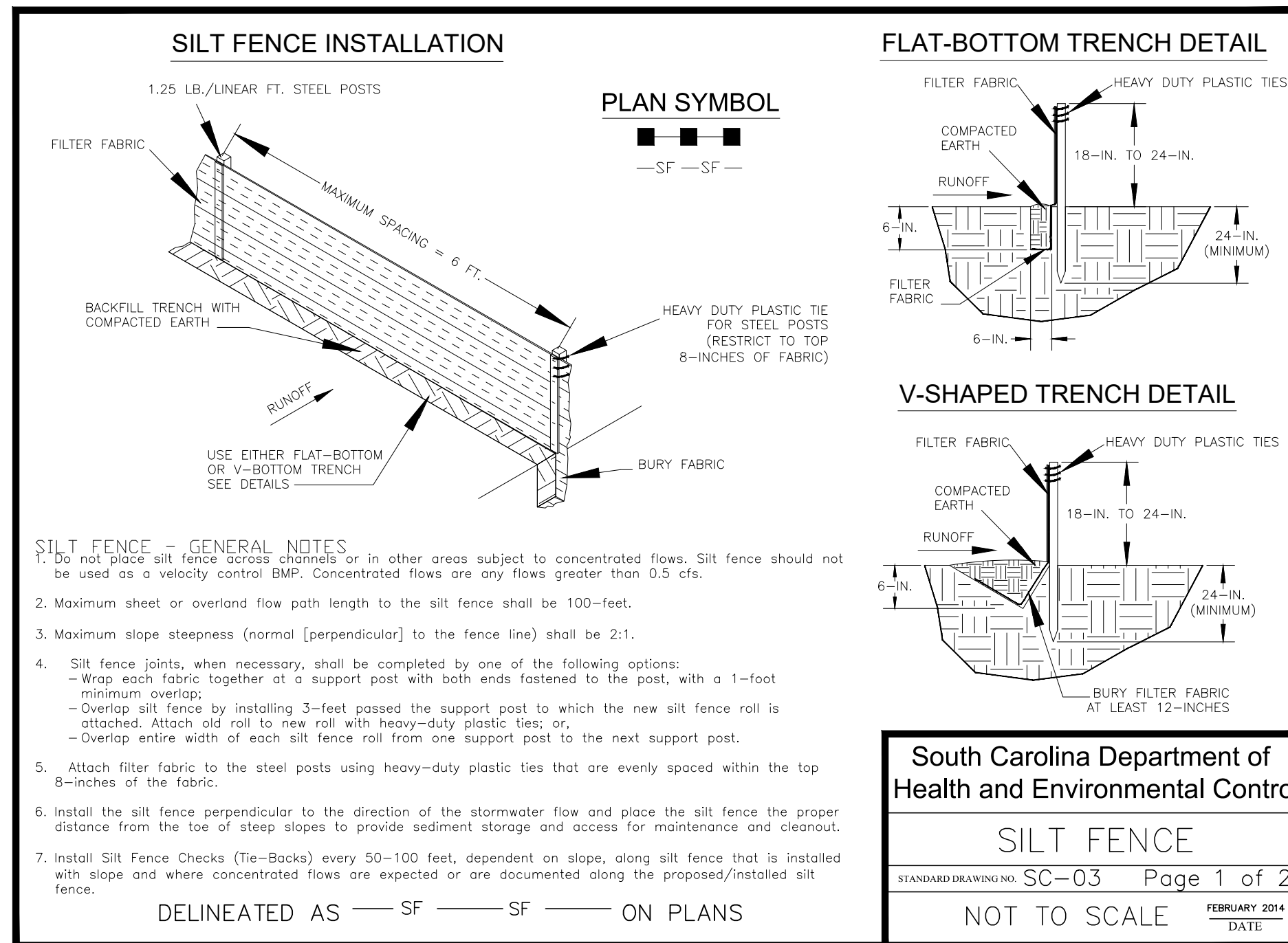
**GRADING, DRAINAGE & UTILITY PLAN**

C401



**SCDHEC NPDES STANDARD NOTES (2012 CUP)**

- IF NECESSARY, SLOPES WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS. IN ADDITION TO HYDROSEEDING, IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
- STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.
  - WHERE STABILIZATION BY THE 14th DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS
  - STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE
  - WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.
- ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY, OR INCORRECTLY, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.
- PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEARED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION, FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE SEDIMENT BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.
- ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
- THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAYS FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.
- RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL LOT PLAN IN ACCORDANCE WITH S.C. REG. 72-300 ET SEQ. AND SC100000.
- TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.
- ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CANT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.
- LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBERS AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER) MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.
- A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.
- INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.
- MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.
- MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.
- MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPs (SEDIMENT BASIN, FILTER BAG, ETC.).
- THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:
  - WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;
  - WASTEWATER FROM WASHOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;
  - FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND
  - SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.
- AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.
- IF EXISTING BMPs NEED TO BE MODIFIED OR IF ADDITIONAL BMPs ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SCS WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPs MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.
- A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.



South Carolina Department of Health and Environmental Control

**SILT FENCE**

STANDARD DRAWING NO. SC-03 PAGE 1 of 2

NOT TO SCALE

FEBRUARY 2014

- SILT FENCE - INSPECTION & MAINTENANCE**
- The key to functional silt fence is weekly inspections, routine maintenance, and regular sediment removal.
    - Regular inspections of silt fence shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
    - Attention to sediment accumulations along the silt fence is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
    - Remove accumulated sediment when it reaches 1/3 the height of the silt fence.
    - Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
    - Check for areas where stormwater runoff has eroded a channel beneath the silt fence, or where the fence has sagged or collapsed due to runoff overtopping the silt fence. Install checks/tie-backs and/or install silt fence, as necessary.
    - Check for tears within the silt fence, areas where silt fence has begun to decompose, and for any other circumstance that may render the silt fence ineffective. Removed damaged silt fence and install new silt fence immediately.
    - Silt fence should be removed within 30 days after final stabilization is achieved and once it is removed, the resulting disturbed area shall be permanently stabilized.

- SILT FENCE - FABRIC REQUIREMENTS**
- Silt fence must be composed of woven geotextile filter fabric that consists of the following requirements:
    - Free of any treatment or coating which might adversely alter its physical properties after installation;
    - Free of any defects or flaws that significantly affect its physical and/or filtering properties; and
    - Have a minimum width of 36-inches.
  - Use only fabric appearing on SC DOT's Qualified Products Listing (QPL), Approval Sheet #34, meeting the requirements of the most current edition of the SC DOT Standard Specifications for Highway Construction.
    - 12-inches of the fabric should be placed within excavated trench and tied in when the trench is backfilled.
  - Filter fabric shall be purchased in continuous rolls and cut to the length of the barrier to avoid joints.
  - Filter fabric shall be installed at a minimum of 24-inches above the ground.

South Carolina Department of Health and Environmental Control

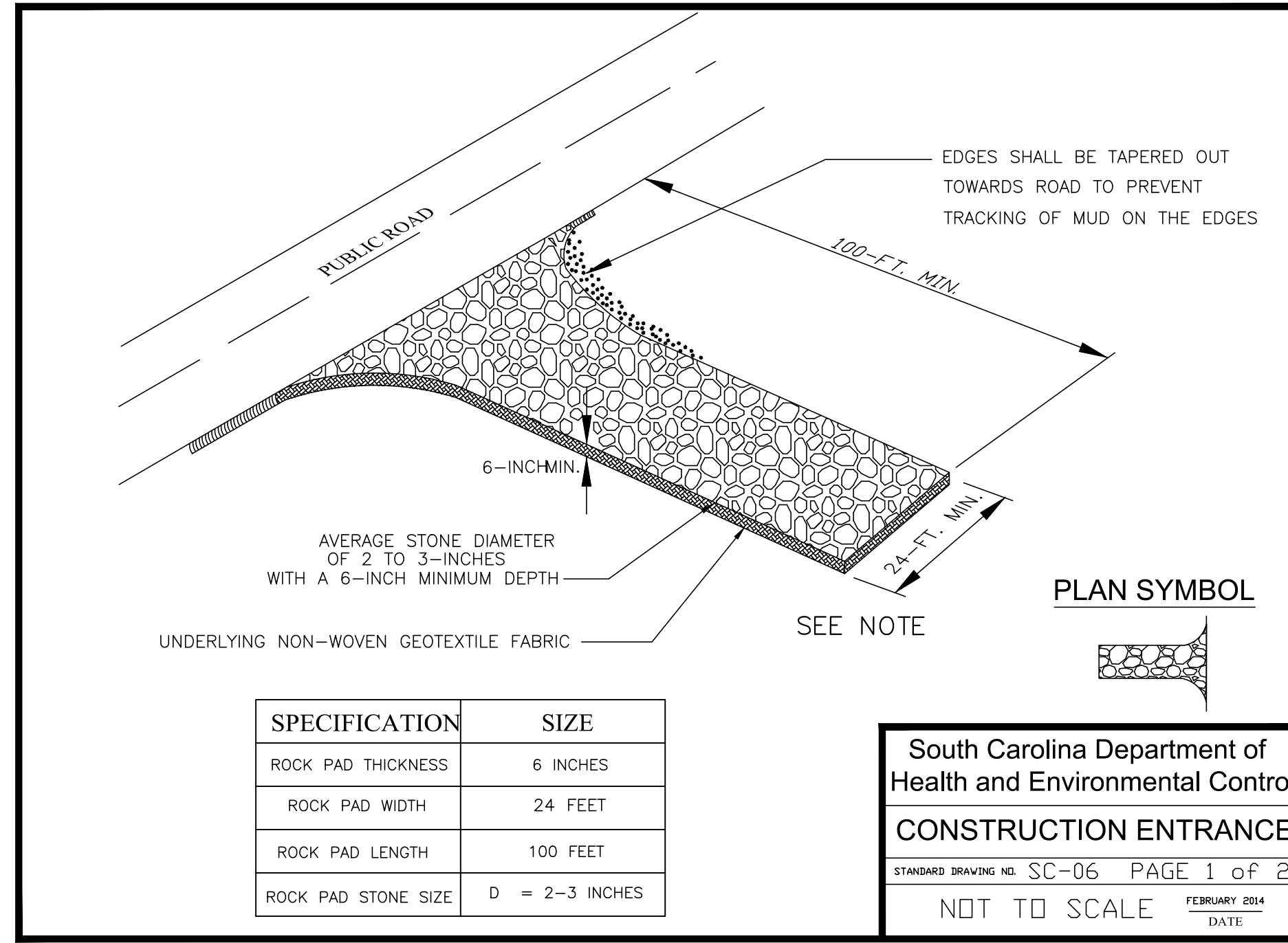
**SILT FENCE**

STANDARD DRAWING NO. SC-03 PAGE 2 of 2

GENERAL NOTES

FEBRUARY 2014

**SILT FENCE PROTECTION**



South Carolina Department of Health and Environmental Control

**CONSTRUCTION ENTRANCE**

STANDARD DRAWING NO. SC-06 PAGE 1 of 2

NOT TO SCALE

FEBRUARY 2014

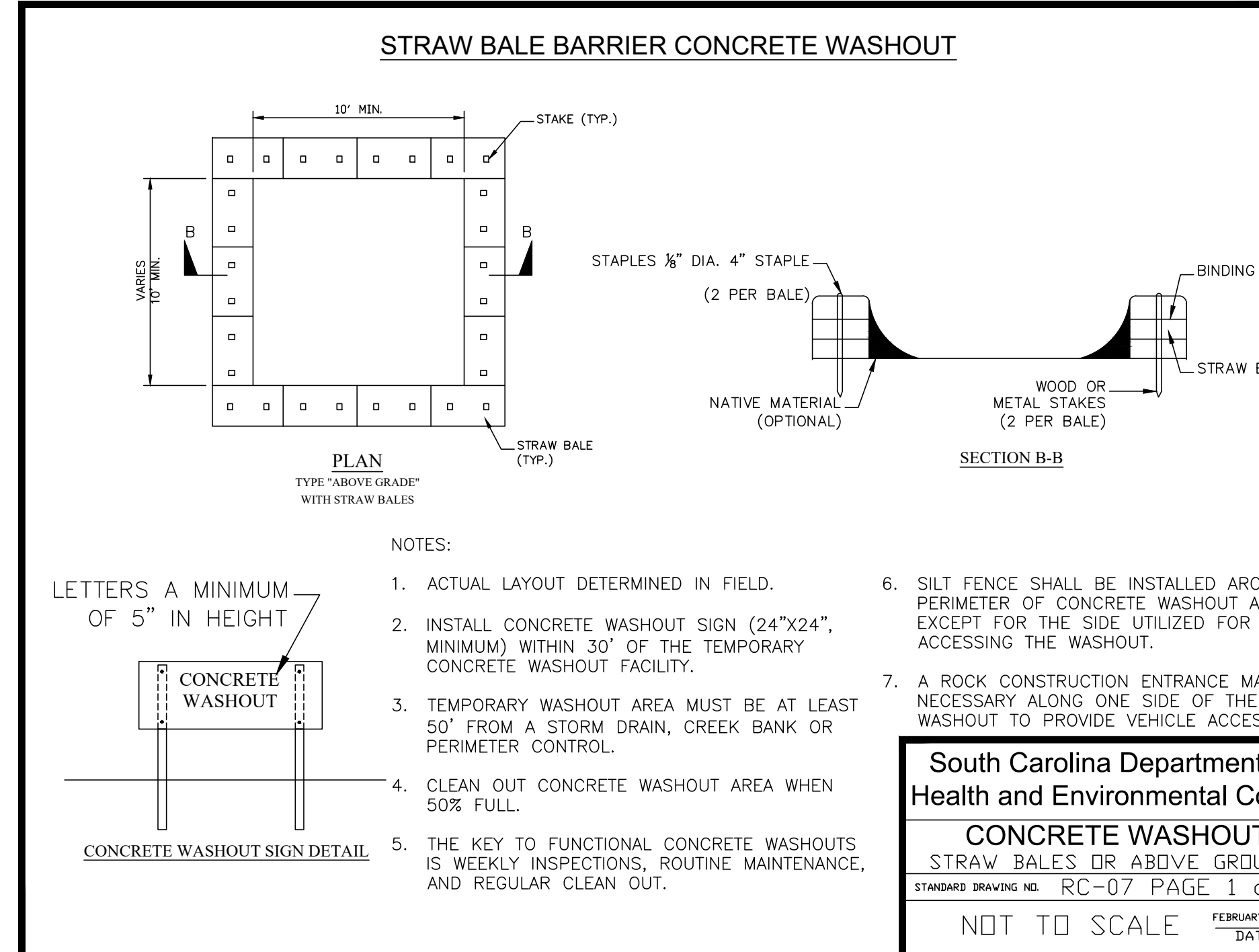
South Carolina Department of Health and Environmental Control

**CONSTRUCTION ENTRANCE**

STANDARD DRAWING NO. SC-06 PAGE 2 of 2

GENERAL NOTES

FEBRUARY 2014



South Carolina Department of Health and Environmental Control

**CONCRETE WASHOUT**

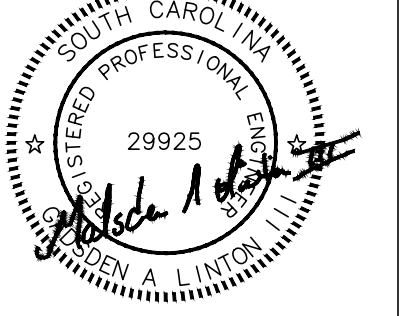
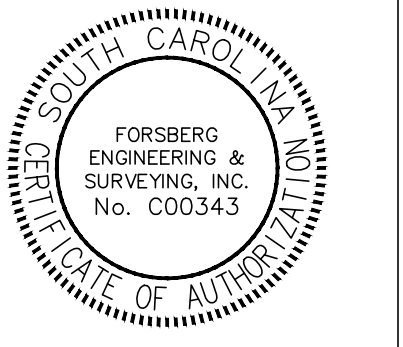
STRAW BALES OR ABOVE GROUND

STANDARD DRAWING NO. RC-07 PAGE 1 of 1

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FEBRUARY 2014

REV. NO.	DATE	DESCRIPTION



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JOB NUMBER: 1928

PROJECT MGR.: MCM

DRAWN BY: MCM

CHECKED BY: SM

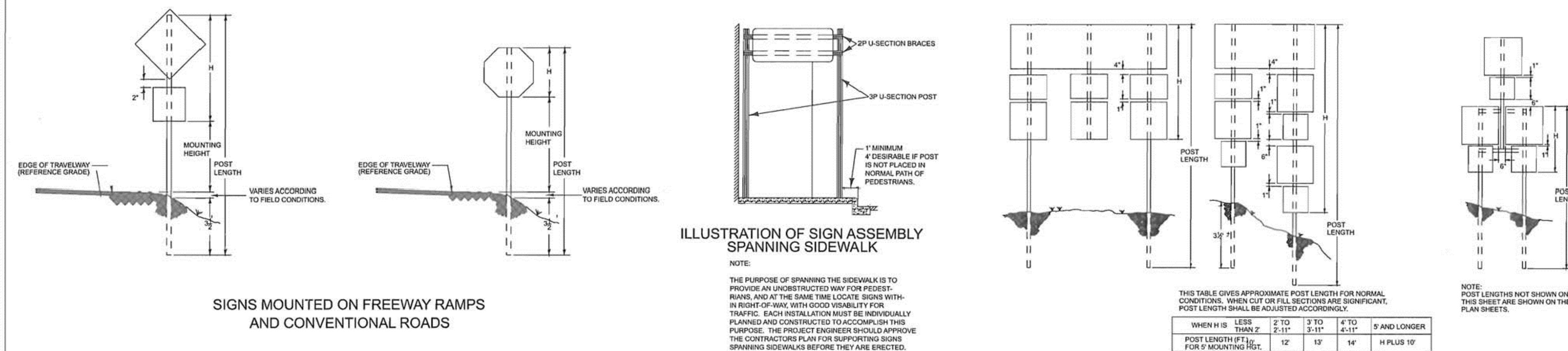
APPROVED BY: MIG

DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/30/2020

**CONSTRUCTION DETAILS**



# FLAT SHEET SIGN MOUNTING DETAILS



SIGNS MOUNTED ON FREEWAY RAMPS AND CONVENTIONAL ROADS

ILLUSTRATION OF SIGN ASSEMBLY SPANNING SIDEWALK

NOTE: THE PURPOSE OF SPANNING THE SIDEWALK IS TO PROVIDE AN UNOBSTRUCTED WAY FOR PEDESTRIANS, AND AT THE SAME TIME LOCATE SIGNS WITHIN RIGHT-OF-WAY WITH GOOD VISIBILITY FOR TRAFFIC. EACH INSTALLATION MUST BE INDIVIDUALLY PLANNED AND CONSTRUCTED TO ACCORD WITH THIS PURPOSE. THE PROJECT ENGINEER SHOULD APPROVE THE CONTRACTOR PLAN FOR SUPPORTING SIGNS SPANNING SIDEWALKS BEFORE THEY ARE ERECTED.

THIS TABLE GIVES APPROXIMATE POST LENGTHS FOR NORMAL CONDITIONS. TRIM CUT OR FULL SECTIONS ARE NON-TYPICAL. POST LENGTH SHALL BE ADJUSTED ACCORDINGLY.

WHEN W IS LESS THAN 2'	2 TO 2 1/2'	2 1/2 TO 3'	3 TO 4'	4' TO 5'	5' AND LONGER
POST LENGTH (H)	12"	12"	12"	12"	12"
FOR 9" MOUNTING HEIGHT	12"	12"	12"	12"	12"

NOTE: ADD 2" TO POST LENGTH FOR 7" MOUNTING HEIGHT.

## REFERENCES

## SIGNING AND MARKING ENGINEER



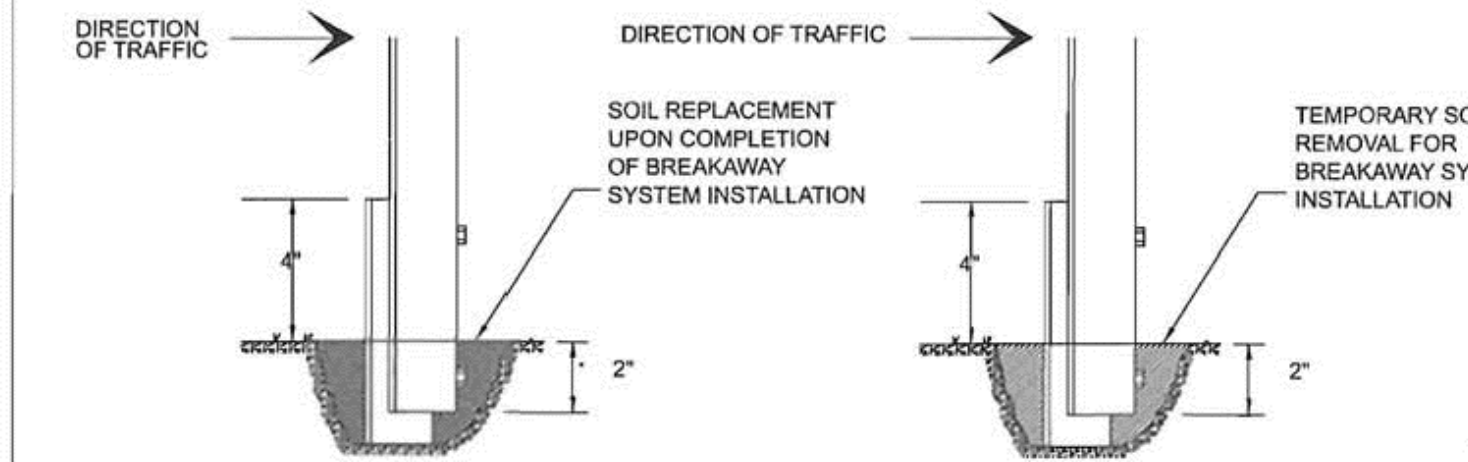
Signature: *Mark H. Anthony*  
DATE: 2-11-07

#	DATE	CHK	DESCRIPTION
6			
5			
4			
3			
2			
1			
0			



## FLAT SHEET MOUNTING DETAILS

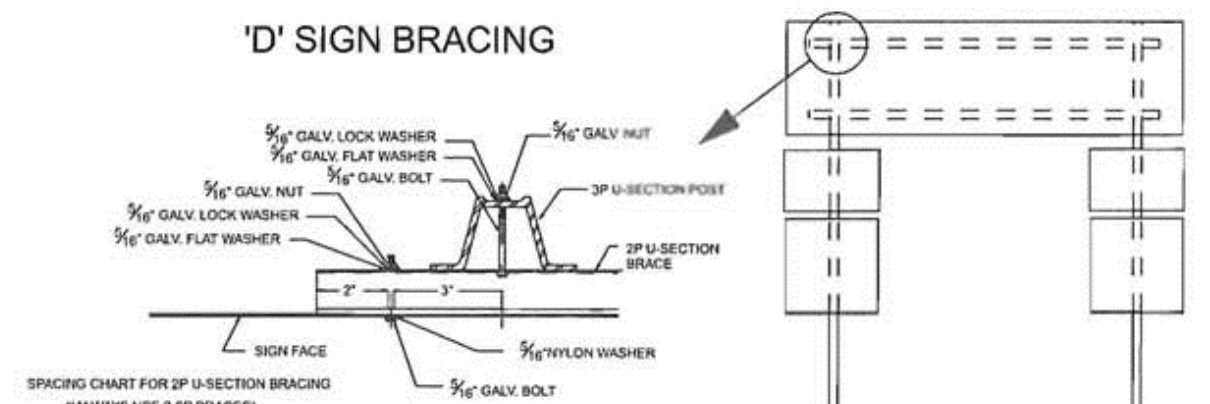
651-110-00  
EFFECTIVE LETTING DATE: MAY 2008



DRIVE THE GROUND SUPPORT (STUB) APPROXIMATELY 30" TO 36" INTO THE GROUND AS SPECIFIED BY THE MANUFACTURER OF THE BREAKAWAY SYSTEM SO THAT NO MORE THAN 4" OF THE GROUND SUPPORT (STUB) EXTENDS ABOVE THE GROUND. REMOVE ENOUGH SOIL FROM AROUND THE GROUND SUPPORT (STUB) TO PERMIT ACCESS TO THE HOLES FOR THE INSERTION AND TIGHTENING OF THE LOWER BOLT OF THE BREAKAWAY SYSTEM. UPON COMPLETING THE INSTALLATION OF THE BREAKAWAY SYSTEM, REPLACE THE SOIL AND TAMPA.

LAP SPLICE FOR U-SECTION POSTS

BOLTS MUST BE 4" APART. THE GROUND SUPPORT (STUB) SHALL NOT EXTEND HIGHER THAN 4" ABOVE THE GROUND. ATTACH THE SIGN SUPPORT TO THE BACK OF THE GROUND SUPPORT (STUB) WITH THE APPROPRIATE HARDWARE PROVIDED BY THE MANUFACTURER OF THE BREAKAWAY SYSTEM. OVERALL LENGTH OF THE BREAKAWAY SYSTEM IS 6'.



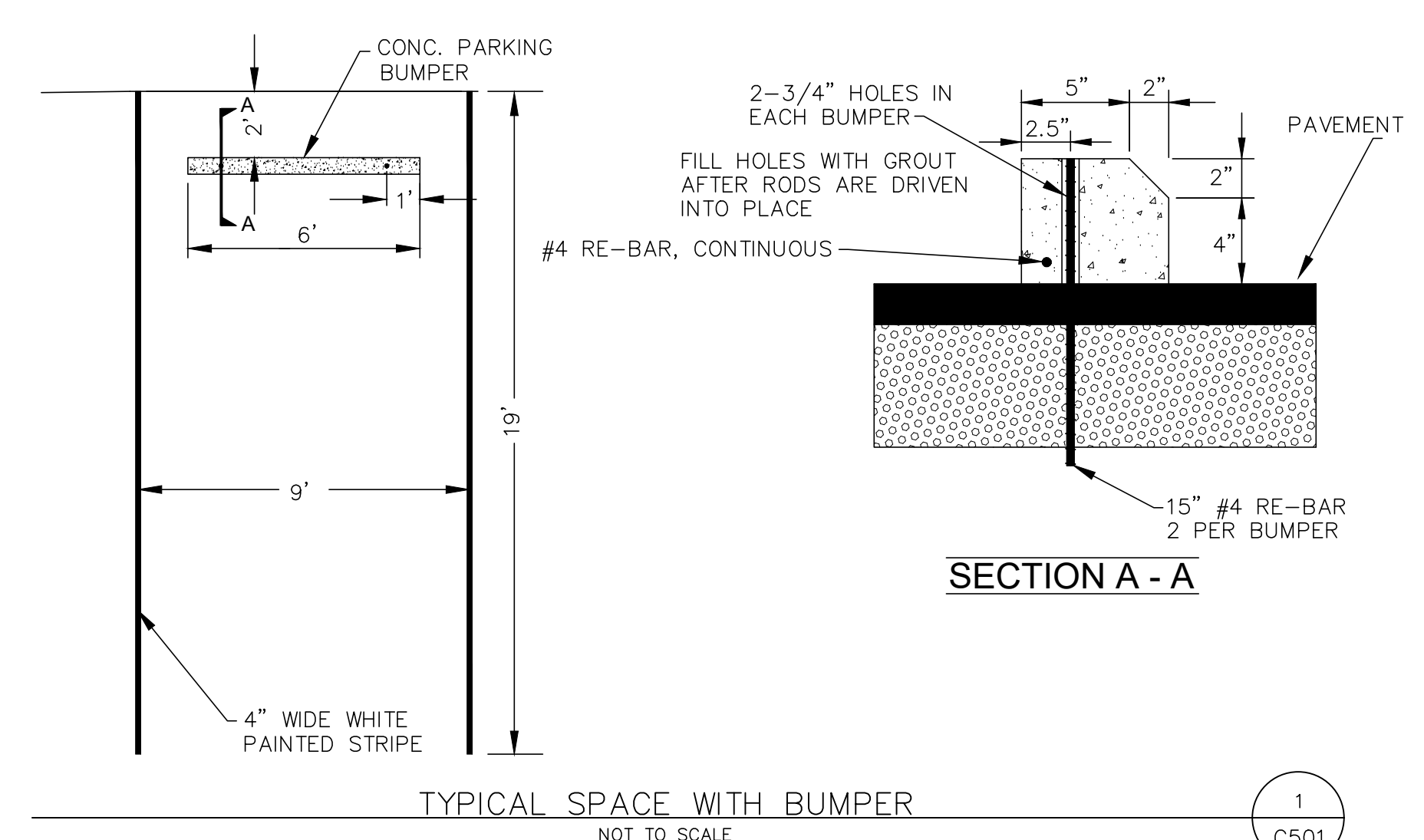
SPACING CHART FOR U-SECTION BRACING (ALWAYS USE 2\"/>

POST WIDTH	BRACE LENGTH
12"	36"
18"	36"
24"	36"
30"	36"
36"	36"
42"	36"
48"	36"
54"	36"
60"	36"
66"	36"
72"	36"
78"	36"
84"	36"
90"	36"
96"	36"
102"	36"
108"	36"
114"	36"
120"	36"

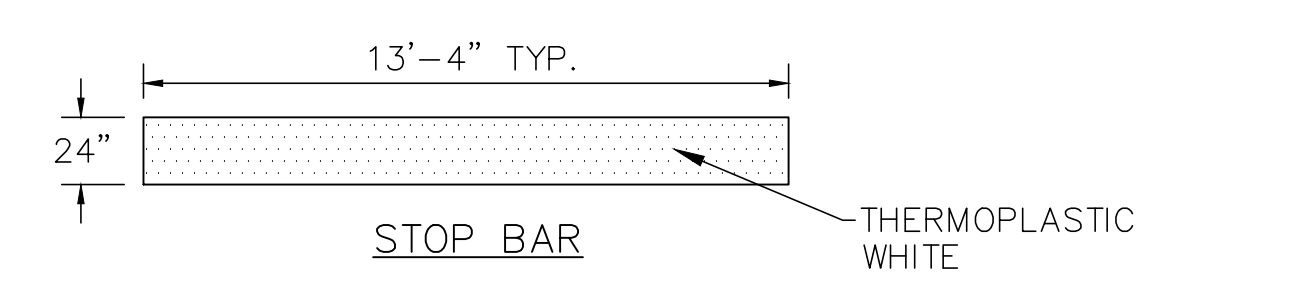
- 1) ALL 'D' TYPE SIGNS ARE TO BE SUPPORTED BY 2 VERTICAL U-SECTION POSTS. ALL 'D' TYPE SIGNS WHICH ARE 6" WIDE OR WIDER WILL BE HORIZONTALLY BRACED WITH 2 2P U-SECTION POSTS. ADDITIONALLY ANY ASSEMBLY OF SIGNS ATTACHED BETWEEN VERTICAL SUPPORTS WILL BE ATTACHED WITH A PRESCRIBED LENGTH OF U-SECTION POST.
- 2) ALL 2P POSTS USED AS CENTER VERTICAL MEMBERS IN SIGN ASSEMBLIES SHALL HAVE HOLES ON 1" CENTERS FOR ENTIRE LENGTH.

SIZE & LENGTH OF U-SECTION POSTS FOR SINGLE SIGNS																		
SIGN NO.	NO. OF POSTS	POST SIZES				SIGN NO.	NO. OF POSTS	POST SIZES				SIGN NO.	NO. OF POSTS	POST SIZES				
		SWING HT.	7 FT. HT.	LEAF	LEAF			SWING HT.	7 FT. HT.	LEAF	LEAF			SWING HT.	7 FT. HT.	LEAF	LEAF	
81-524	1	3P	12	3P	14	811-524	1	3P	12	3P	14	W1-124	1	3P	12	3P	14	THE FOLLOWING TO BE MOUNTED AT HT.
81-520	1	3P	12	3P	14	811-520	2	3P	12	3P	14	W1-120	1	3P	12	3P	14	010-1200
81-440	2	3P	14	3P	16	811-440	2	3P	12	3P	14	W1-140	1	3P	12	3P	14	010-1400
81-528	1	3P	12	3P	14	811-528	2	3P	12	3P	14	W1-128	1	3P	12	3P	14	010-1200
81-540	2	3P	13	3P	15	811-540	2	3P	12	3P	14	W1-530	1	3P	12	3P	14	THE FOLLOWING TO BE MOUNTED AT HT.
81-520	1	3P	12	3P	14	811-520	1	3P	12	3P	14	W1-120	1	3P	12	3P	14	010-1200
81-524	1	3P	12	3P	14	811-524	1	3P	12	3P	14	W1-124	1	3P	12	3P	14	010-1200
81-528	1	3P	12	3P	14	811-528	1	3P	12	3P	14	W1-128	1	3P	12	3P	14	010-1200
81-532	1	3P	12	3P	14	811-532	1	3P	12	3P	14	W1-132	1	3P	12	3P	14	010-1200
81-536	1	3P	12	3P	14	811-536	1	3P	12	3P	14	W1-136	1	3P	12	3P	14	010-1200
81-540	2	3P	14	3P	16	811-540	1	3P	12	3P	14	W1-130	1	3P	12	3P	14	010-1200
81-520	1	3P	12	3P	14	811-520	1	3P	12	3P	14	W1-120	1	3P	12	3P	14	010-1200
81-524	1	3P	12	3P	14	811-524	1	3P	12	3P	14	W1-124	1	3P	12	3P	14	010-1200
81-528	1	3P	12	3P	14	811-528	1	3P	12	3P	14	W1-128	1	3P	12	3P	14	010-1200
81-532	1	3P	12	3P	14	811-532	1	3P	12	3P	14	W1-132	1	3P	12	3P	14	010-1200
81-536	1	3P	12	3P	14	811-536	1	3P	12	3P	14	W1-136	1	3P	12	3P	14	010-1200
81-540	2	3P	14	3P	16	811-540	2	3P	12	3P	14	W1-130	1	3P	12	3P	14	010-1200
81-520	1	3P	12	3P	14	811-520	1	3P	12	3P	14	W1-120	1	3P	12	3P	14	010-1200
81-524	1	3P	12	3P	14	811-524	1	3P	12	3P	14	W1-124	1	3P	12	3P	14	010-1200
81-528	1	3P	12	3P	14	811-528	1	3P	12	3P	14	W1-128	1	3P	12	3P	14	010-1200
81-532	1	3P	12	3P	14	811-532	1	3P	12	3P	14	W1-132	1	3P	12	3P	14	010-1200
81-536	1	3P	12	3P	14	811-536	1	3P	12	3P	14	W1-136	1	3P	12	3P	14	010-1200
81-540	2	3P	14	3P	16	811-540	2	3P	12	3P	14	W1-130	1	3P	12	3P	14	010-1200
81-520	1	3P	12	3P	14	811-520	1	3P	12	3P	14	W1-120	1	3P	12	3P	14	010-1200
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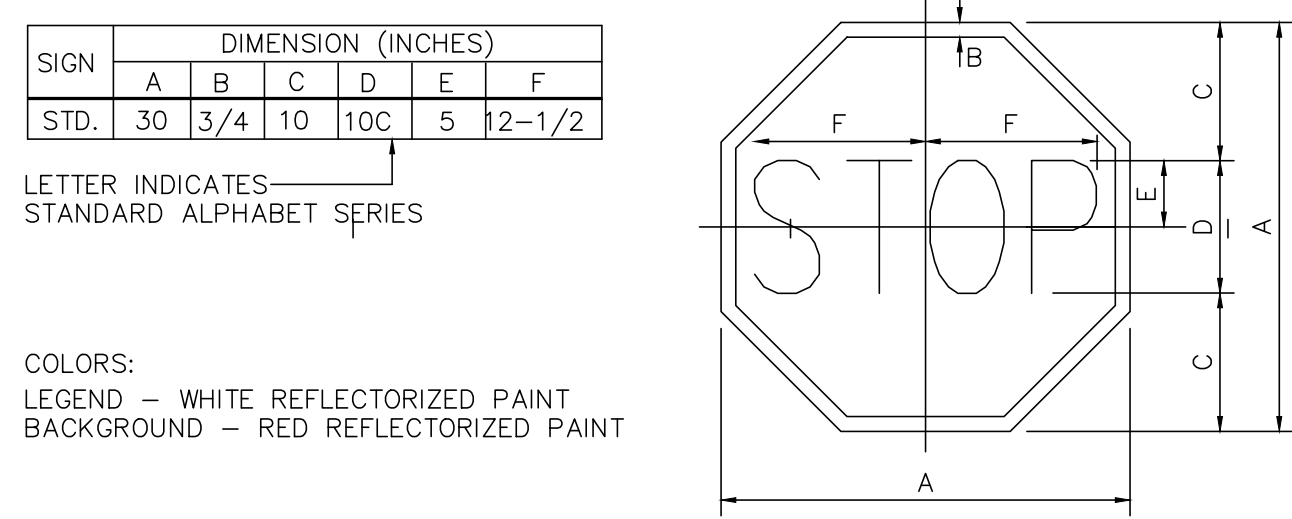
NOTE: POST LENGTHS SHOWN IN THIS CHART ARE GENERAL AND SHOULD BE USED FOR BID PURPOSES ONLY. CONTRACTOR IS REQUIRED TO VERIFY FIELD CONDITIONS TO DETERMINE EXACT LENGTHS OF POSTS NEEDED.



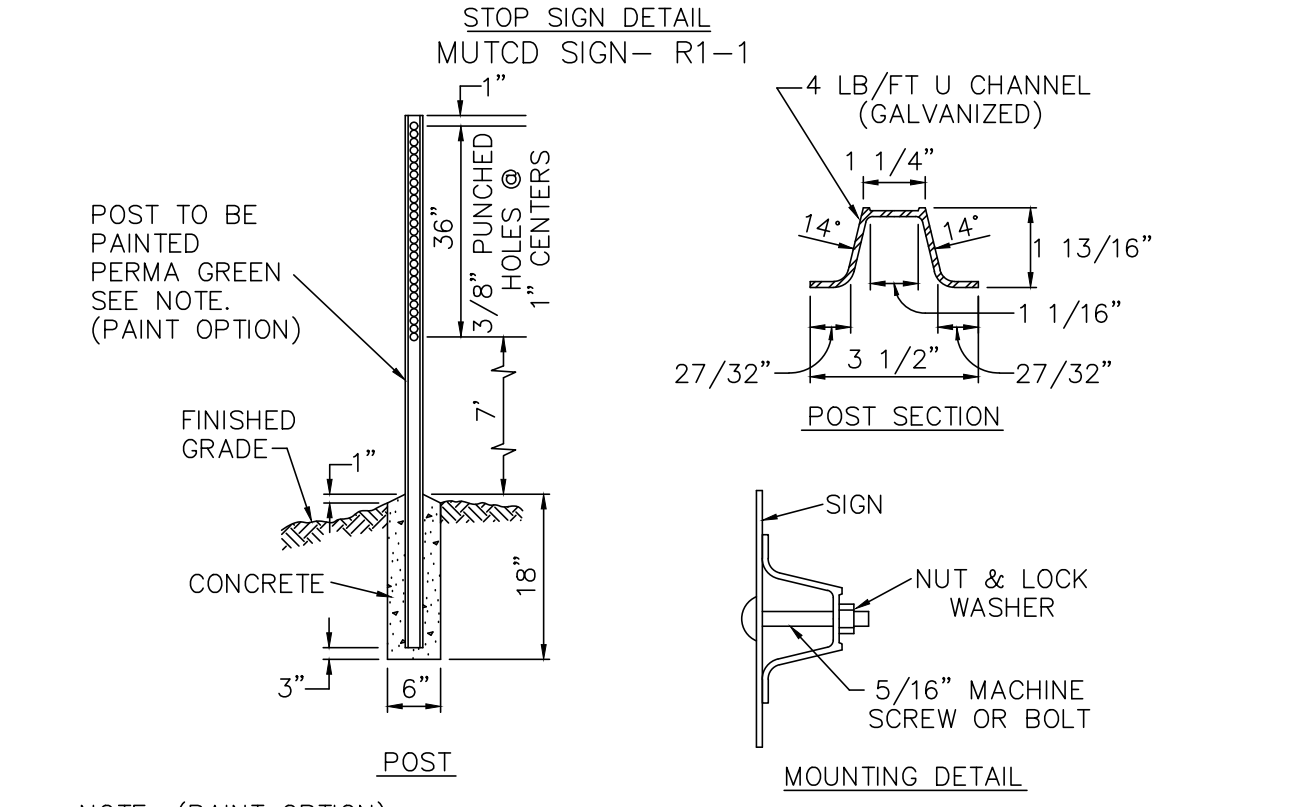
TYPICAL SPACE WITH BUMPER NOT TO SCALE



PAVEMENT MARKING DETAIL (STOP BAR) NOT TO SCALE



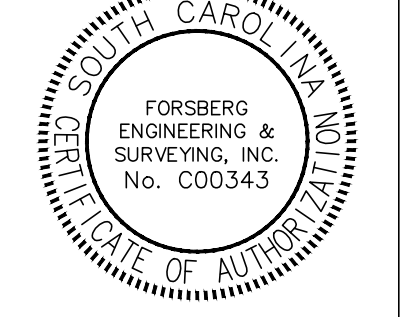
COLORS:  
LEGEND - WHITE REFLECTORIZED PAINT  
BACKGROUND - RED REFLECTORIZED PAINT



NOTE: (PAINT OPTION)  
POST SHALL BE CAREFULLY CLEANED AND PHOSPHATED. IMMEDIATELY AFTER PHOSPHATING POST SHALL BE COATED WITH A MODIFIED POLYESTER PAINT BY ELECTRODEPOSITION AND THEN THOROUGHLY BAKED. COLOR IS PERMA-GREEN PER FEDERAL STANDARD 595-A COLOR NUMBER 14109 (DARK LIMIT V-).

STOP SIGN & POST DETAIL NOT TO SCALE

REV. NO.	DATE	DESCRIPTION



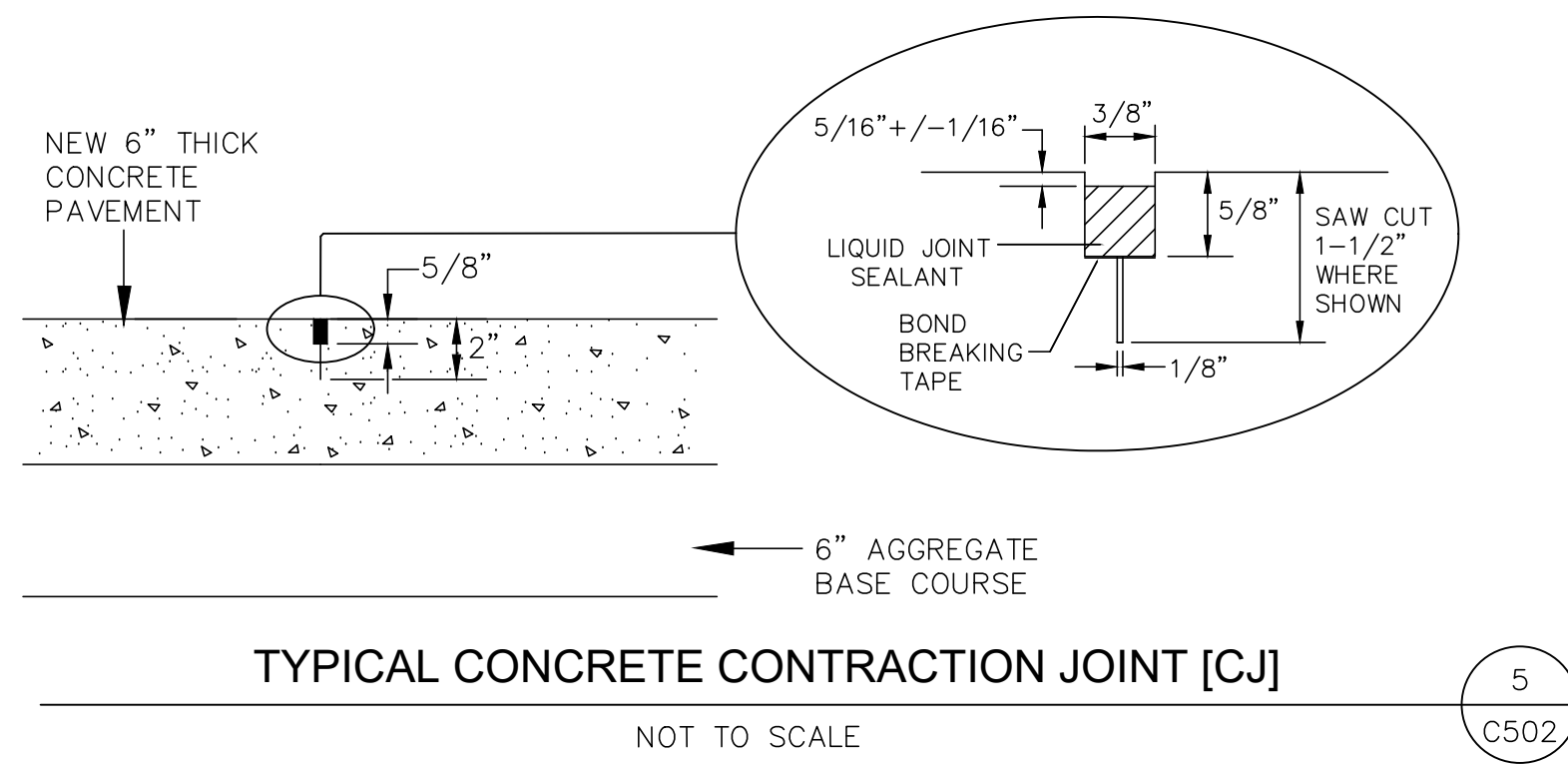
ISLANDTON FIRE STATION #15  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

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JOB NUMBER: 1928  
PROJECT MGR.: MCM  
DRAWN BY: MCM  
CHECKED BY: SM  
APPROVED BY: MIG  
DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/30/2020

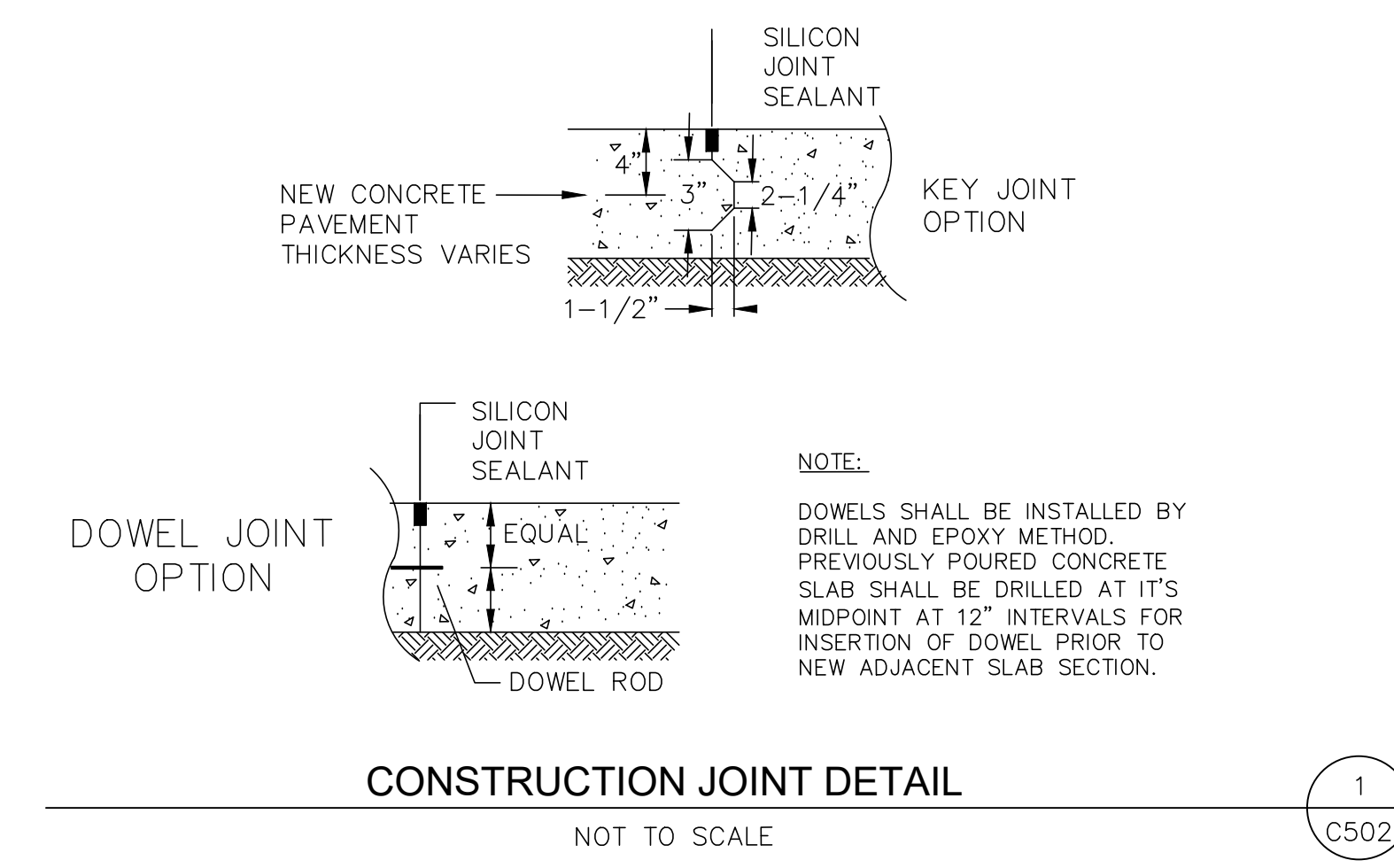
## CONSTRUCTION DETAILS

C501

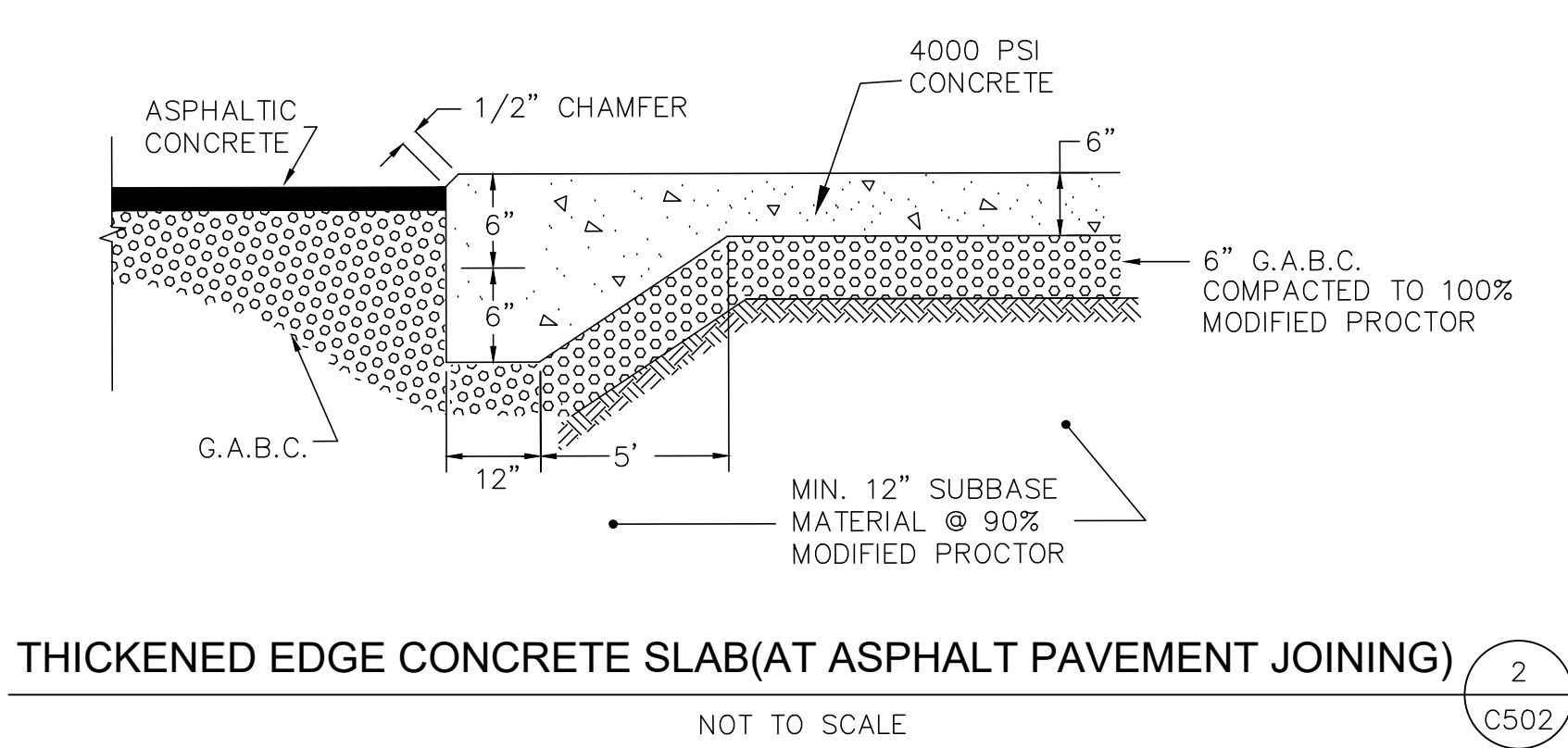




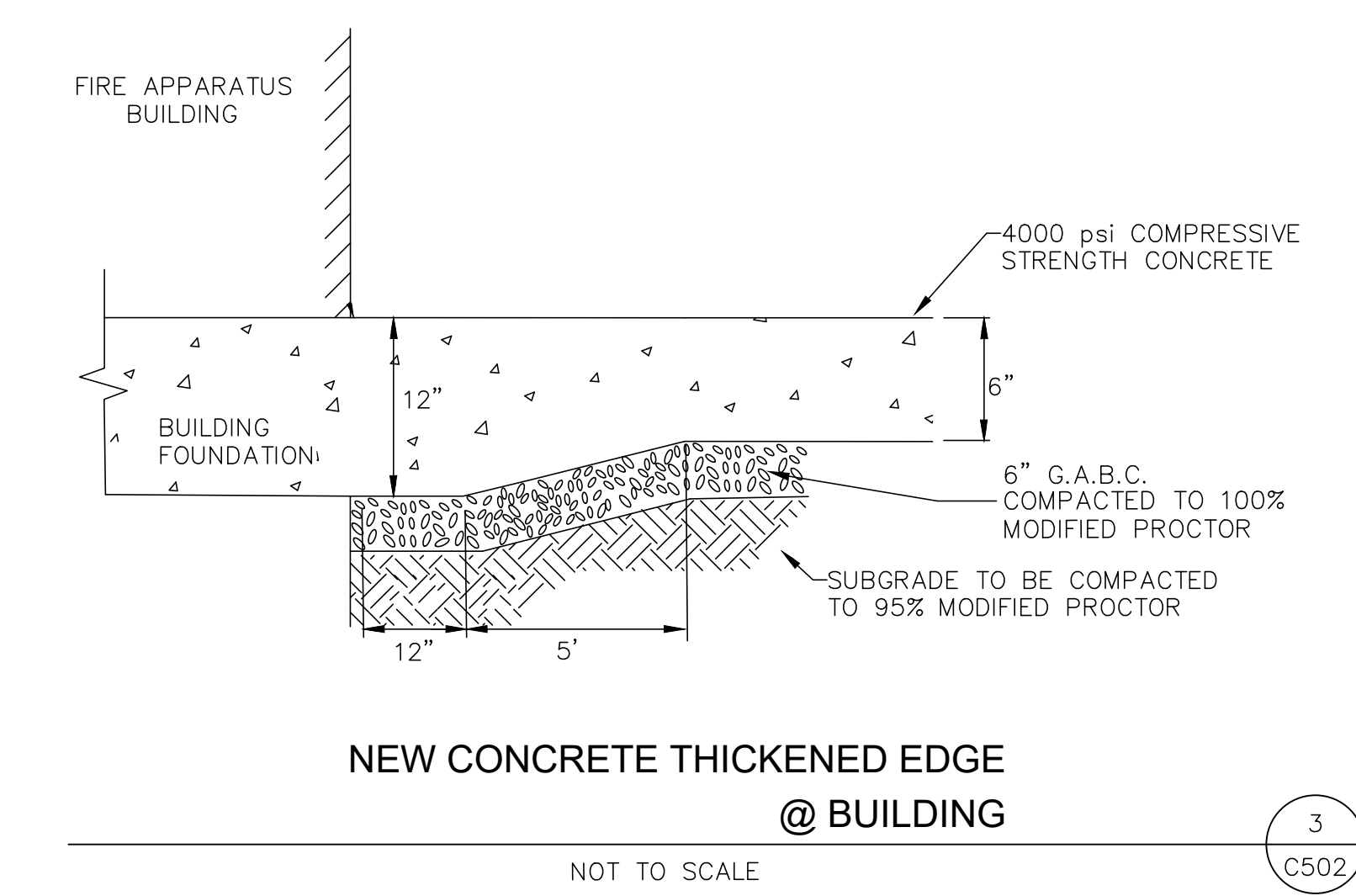
**TYPICAL CONCRETE CONTRACTION JOINT [CJ]**  
NOT TO SCALE



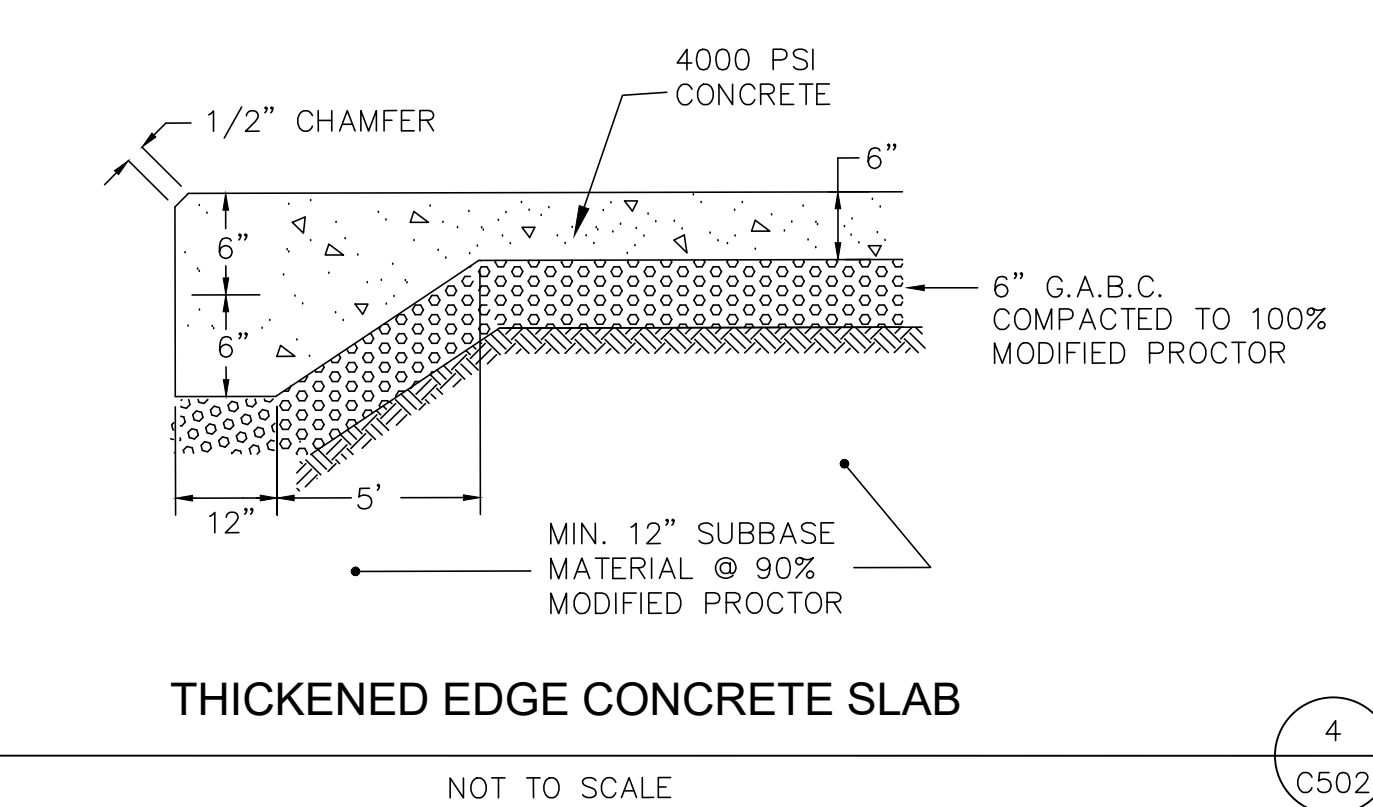
**CONSTRUCTION JOINT DETAIL**  
NOT TO SCALE



**THICKENED EDGE CONCRETE SLAB(AT ASPHALT PAVEMENT JOINING)**  
NOT TO SCALE

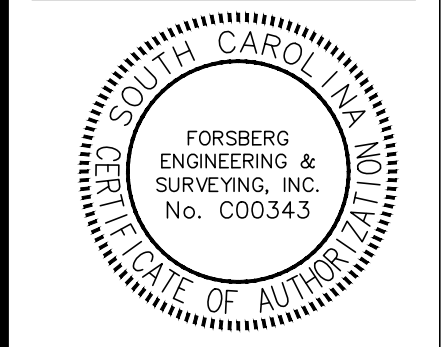


**NEW CONCRETE THICKENED EDGE @ BUILDING**  
NOT TO SCALE



**THICKENED EDGE CONCRETE SLAB**  
NOT TO SCALE

REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD  
ISLANDTON, SC 29929

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APPROVED BY: MIG  
DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/30/2020

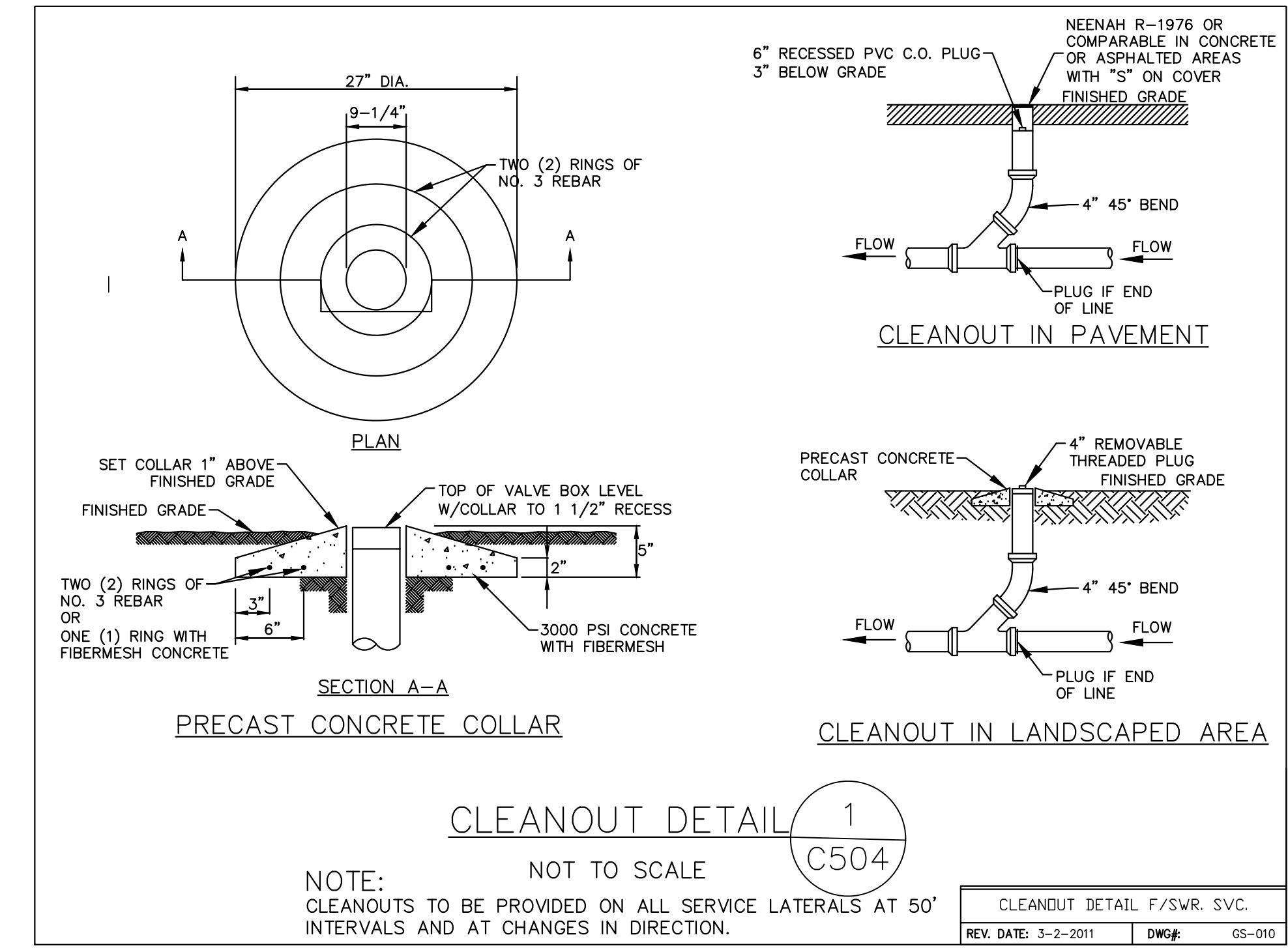
**CONSTRUCTION DETAILS**

**C502**



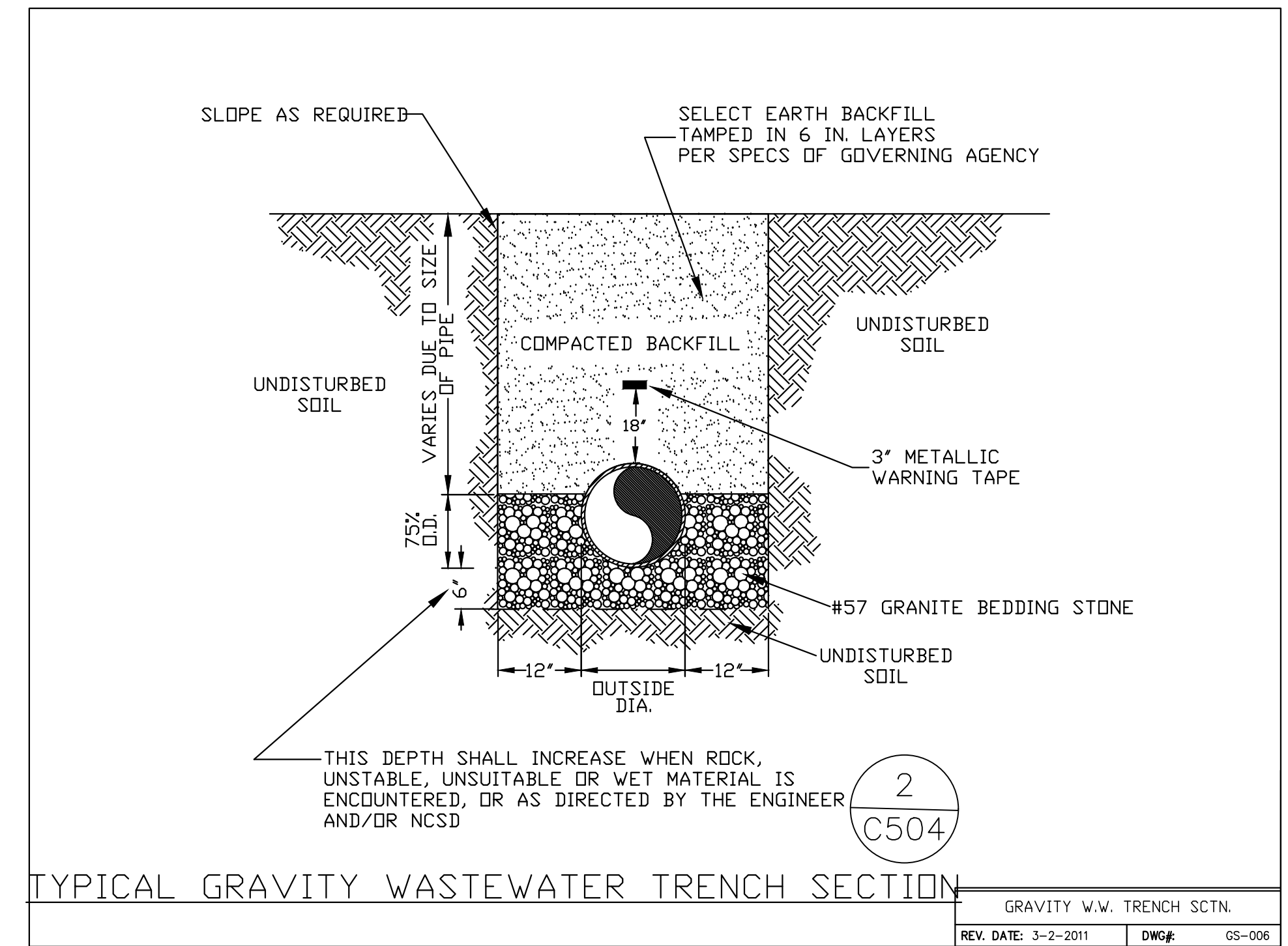






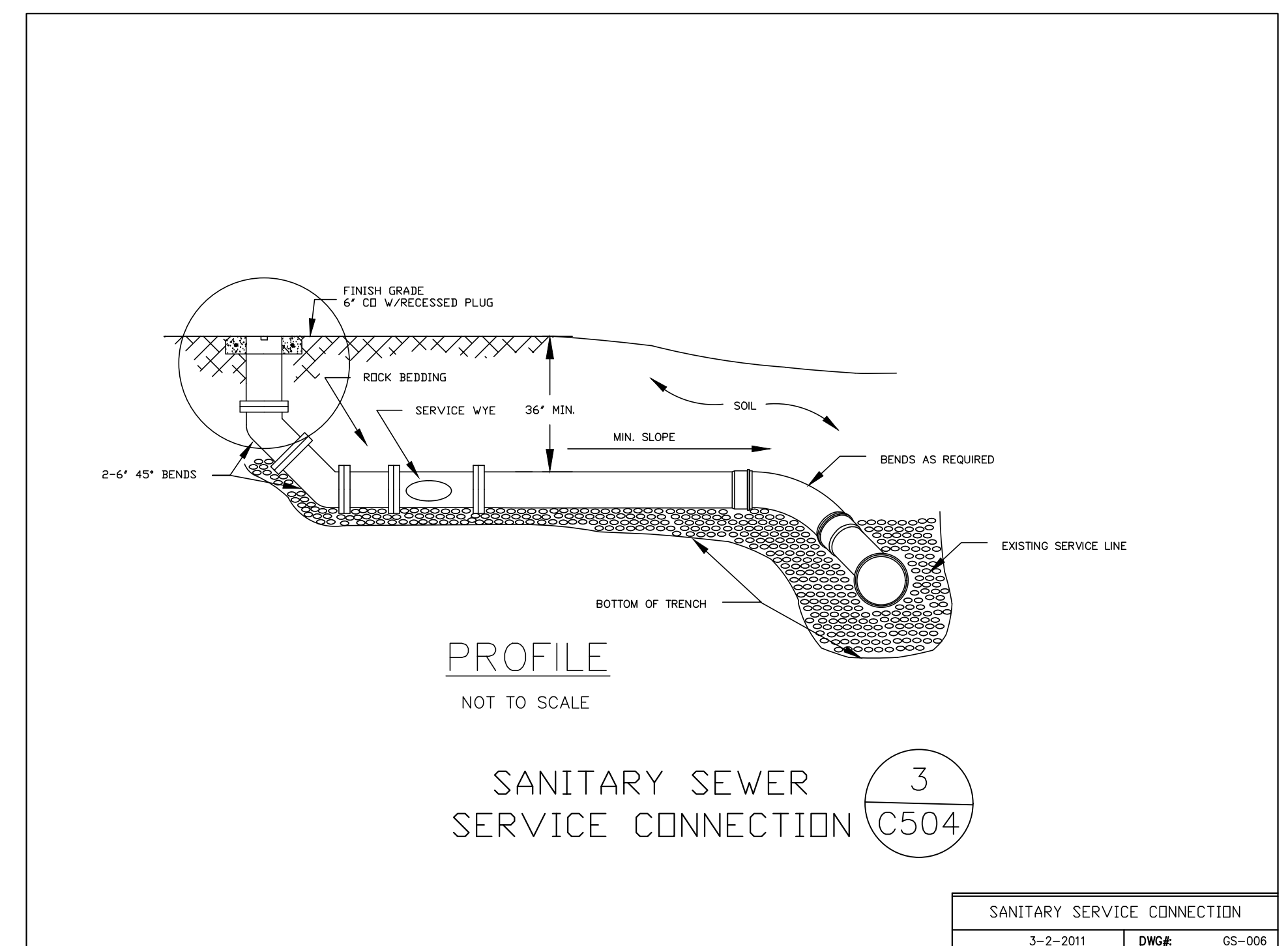
NOTE: NOT TO SCALE  
 CLEANOUTS TO BE PROVIDED ON ALL SERVICE LATERALS AT 50' INTERVALS AND AT CHANGES IN DIRECTION.

REV. NO.	DATE	DESCRIPTION



NOTE: THIS DEPTH SHALL INCREASE WHEN ROCK, UNSTABLE, UNSUITABLE OR WET MATERIAL IS ENCOUNTERED, OR AS DIRECTED BY THE ENGINEER AND/OR NCSB

REV. NO.	DATE	DESCRIPTION



NOTE: NOT TO SCALE

REV. NO.	DATE	DESCRIPTION



**GENERAL NOTES:**

- STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS, MECHANICAL DRAWINGS, AND DRAWINGS RELATED TO OTHER TRADES. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING AND COORDINATING DIMENSIONS, CLEARANCES, ETC. WITH THE WORK OF OTHER TRADES.
- WORK NOT INDICATED ON A PART OF THE DRAWINGS BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING PLACES SHALL BE REPEATED.
- REVIEW PROJECT DOCUMENTS PRIOR TO FABRICATION AND START OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO PROJECT ARCHITECT PRIOR TO PRECEDING WITH WORK.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT EXISTING FACILITIES, STRUCTURES, ETC. FROM DAMAGE DURING CONSTRUCTION.
- THE USE OF CONTRACT DRAWINGS IN WHOLE OR ANY PART FOR SHOP DRAWING PRODUCTION IS NOT PERMITTED.
- REVIEW SHOP DRAWINGS FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANSWER CONTRACTOR RELATED QUESTIONS, STAMP AND INITIAL ALL SHEETS PRIOR TO SUBMITTING SHOP DRAWINGS TO PROJECT ARCHITECT FOR REVIEW.
- THE DESIGN ADEQUACY AND SAFETY OF ERECTION BRACING, SHORING, TEMPORARY SUPPORTS, ETC. IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. ATLANTIC ENGINEERING IS NOT RESPONSIBLE FOR THE CONTRACTOR'S MEANS OR METHODS IN RELATION TO THE EXECUTION OF THE PROJECT.

**SITE/FOUNDATION NOTES:**

- THE FOUNDATION HAS BEEN DESIGNED BASED ON AN ALLOWABLE SOIL CONTACT BEARING PRESSURE OF 2000 PSF.
- SITE PREPARATION, FILL, BACKFILL, ETC. SHALL BE AS RECOMMENDED BY THE PROJECT GEOTECHNICAL ENGINEER AS STATED IN A REPORT SPECIFICALLY FOR THIS PROJECT.
- BACKFILL AND FILL MATERIAL SHALL BE PLACED IN THIN SUCCESSIVE LAYERS, COMPACT FILL TO AT LEAST 95% OF MAXIMUM LABORATORY DENSITY WITHIN 2% OF OPTIMUM MOISTURE CONTENT OR AS PER THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL ENGINEER.

**CONCRETE:**

- 28 DAY CONCRETE COMPRESSIVE STRENGTH (F<sub>c</sub>)
  - LOCATION: Fc (PSI)
  - FOOTINGS/SLABS: 3000
- NOTE: CONCRETE SHALL BE NORMAL WEIGHT UNLESS NOTED OTHERWISE.
- REINFORCING STEEL: ASTM A615, GRADE 60. MINIMUM LAP SHALL BE 40 BAR DIAMETERS (30 INCHES ABSOLUTE MIN) UNLESS NOTED OTHERWISE.
- SLAB(S) ON GRADE SHALL BE REINFORCED WITH W.W.F.
- FOOTINGS SHALL REST EITHER ON UNDISTURBED SOIL OR A MANUALLY OPERATED VIBRATORY SLED OR TAMPER SHOULD BE USED TO DENSIFY ANY SOILS IN THE BOTTOM OF THE FOOTING TRENCHES LOOSENED DURING THE EXCAVATION OPERATION.
- CONTRACTOR IS RESPONSIBLE FOR ADEQUATELY PROTECTING EXCAVATION SLOPES.
- CONTINUOUS HORIZONTAL REINFORCING AND VERTICAL WALL REINFORCING SHALL BE LAPPED ACCORDING TO LAP SPLICE AND EMBEDMENT REQUIREMENTS PER ACI 318, LATEST EDITION.
- REINFORCEMENT SHALL BE SECURELY HELD IN PLACE WHILE PLACING CONCRETE. IF REQUIRED, ADDITIONAL BARS AND STIRRUPS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT FOR BARS.
- REINFORCING STEEL SHALL BE DETAILED, FABRICATED AND INSTALLED IN ACCORDANCE WITH ACI-318-05 AND ACI DETAILING MANUAL, ACI-315 CURRENT EDITION.
- PROVIDE THE FOLLOWING CONCRETE COVERAGE OVER REINFORCING: GRADE BEAMS/FOOTINGS: BOTTOM AND SIDES 3" CLEAR, TOP 2" CLEAR.
- REINFORCING BARS SHALL NOT BE CUT TO ACCOMMODATE THE INSTALLATION OF ANCHORS, EMBEDS OR OTHER ITEMS.
- AT CHANGES IN DIRECTION OF CONCRETE WALLS, BEAMS AND STRIP FOOTINGS, PROVIDE CORNER BARS OF SAME SIZE AND QUANTITY AS FOOTING REINFORCING.
- PLACE CONCRETE PER ACI-304. USE INTERNAL MECHANICAL VIBRATION FOR ALL CONCRETE. LIMIT MAXIMUM FREE FALL DROP OF CONCRETE TO 6'-0" FOR #57 AGGREGATE AND 8'-0" FOR #8 AGGREGATE. ALL PRECAUTIONS SHOULD BE TAKEN TO AVOID SEGREGATION OF CONCRETE DURING PLACEMENT.

**COLD FORMED METAL FRAMING:**

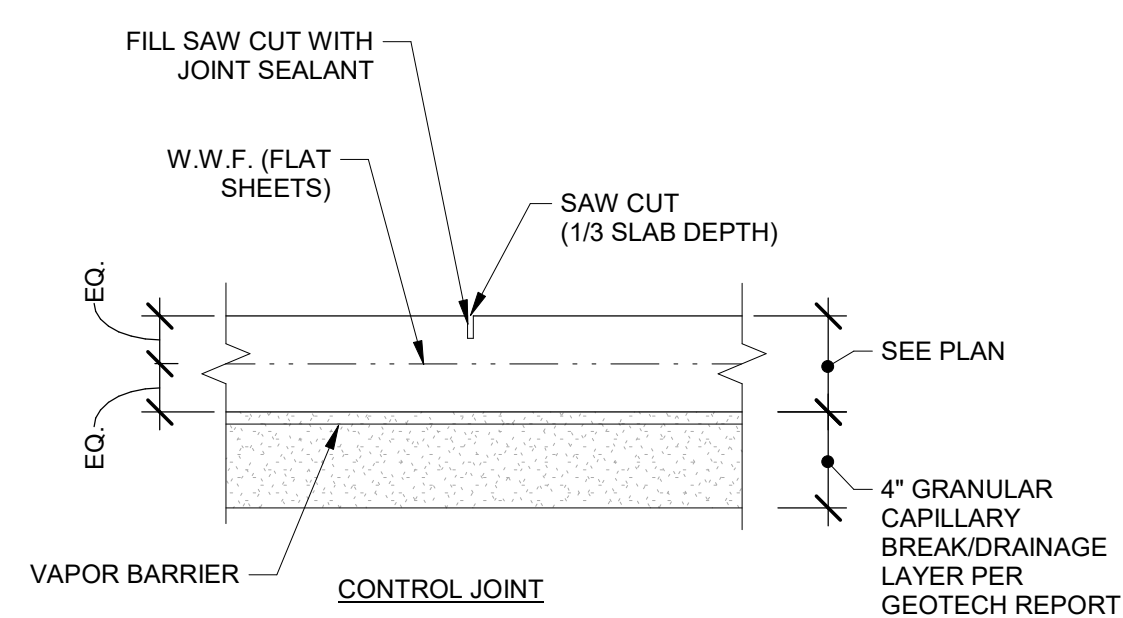
- LT. GAGE FRAMING IS "DELEGATED DESIGN." SUBMIT COMPREHENSIVE SHOP DRAWINGS ALONG WITH CALCULATIONS AND PRODUCT SUBMITTALS. CALCULATIONS SHALL BE SEALED BY A PROFESSIONAL ENGINEER (SIC LICENSE).
- MAXIMUM STUD SPACING SHALL BE 16" O/C (UNLESS NOTED OTHERWISE).
- ALL LT. GAGE METAL FRAMING SUBMITTALS SHALL BE PREPARED BY AND SEALED BY A S.C. REGISTERED P.E.
- PROVIDE #12 SCREWS AT EA. STUD FLANGE (TO TRACK) AND AS INDICATED.
- PROVIDE/INSTALL ALL TYP. METAL STUD FRAMING ACCESSORIES (CLIPS, BRIDGING, SCREWS, TRACKS, ETC.)
- LIGHT GAGE METAL FRAMING MATERIALS SHALL BE BY CLARK DIETRICH (OR ENGINEER APPROVED EQUAL).
- STUDS/JOISTS SHALL BE 50KSI (MIN).
- TRACKS SHALL BE 50KSI (MIN).
- SCREWS SHALL BE "SELF DRILLING" AS REQ'D BASED ON MEMBER GAGE, THICKENS, ETC.
- POWER ACTUATED FASTENERS SHALL BE BY "HILTI" MIN SHANK DIA. = 0.177" LENGTH/CHARGE AS REQ'D FOR APPLICATION.
- COLD-FORMED METAL FRAMING SHALL CONFORM TO AISI STANDARDS.
- FASTENERS SHALL HAVE LOW PROFILE HEADS TO ALLOW FOR FLUSH INSTALLATION OF SHEATHING.
- FOR INTERIOR WALLS: PROVIDE DETAILS TO INCLUDE: CEILING FRAMING, SOFFIT FRMG, TOP OF WALL BRACING ETC.

**DESIGN CRITERIA**

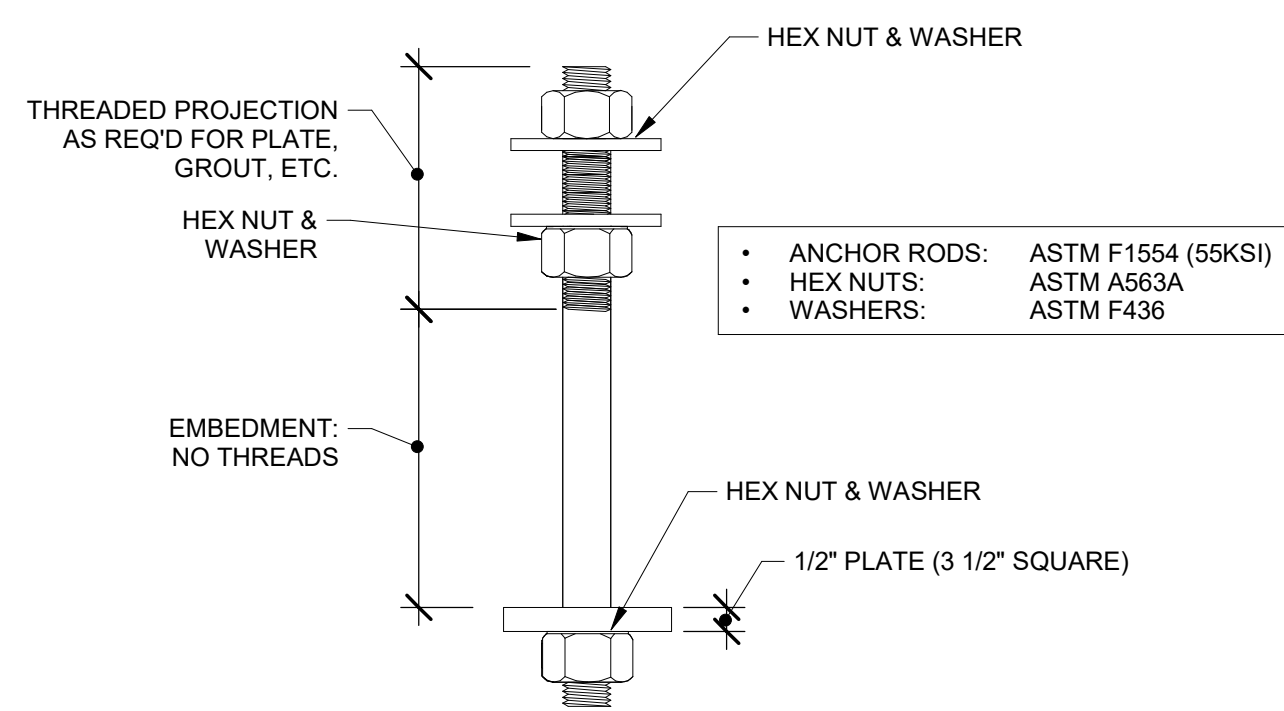
CODE:	IBC 2018
DEAD LOADS:	MATERIAL WEIGHT
ROOF LIVE LOAD:	20 PSF
FLOOR LIVE LOAD:	50 PSF (LIVING QUARTERS)
BLDG RISK CATEGORY:	IV (ESSENTIAL FACILITY)
WIND IMPORTANCE FACTOR:	Iw = 1.00 (ULTIMATE DESIGN)
DESIGN WIND SPEED:	145 MPH (ALLOWABLE DESIGN)
SOIL BEARING PRESSURE:	2000 PSF

**SEISMIC DATA**

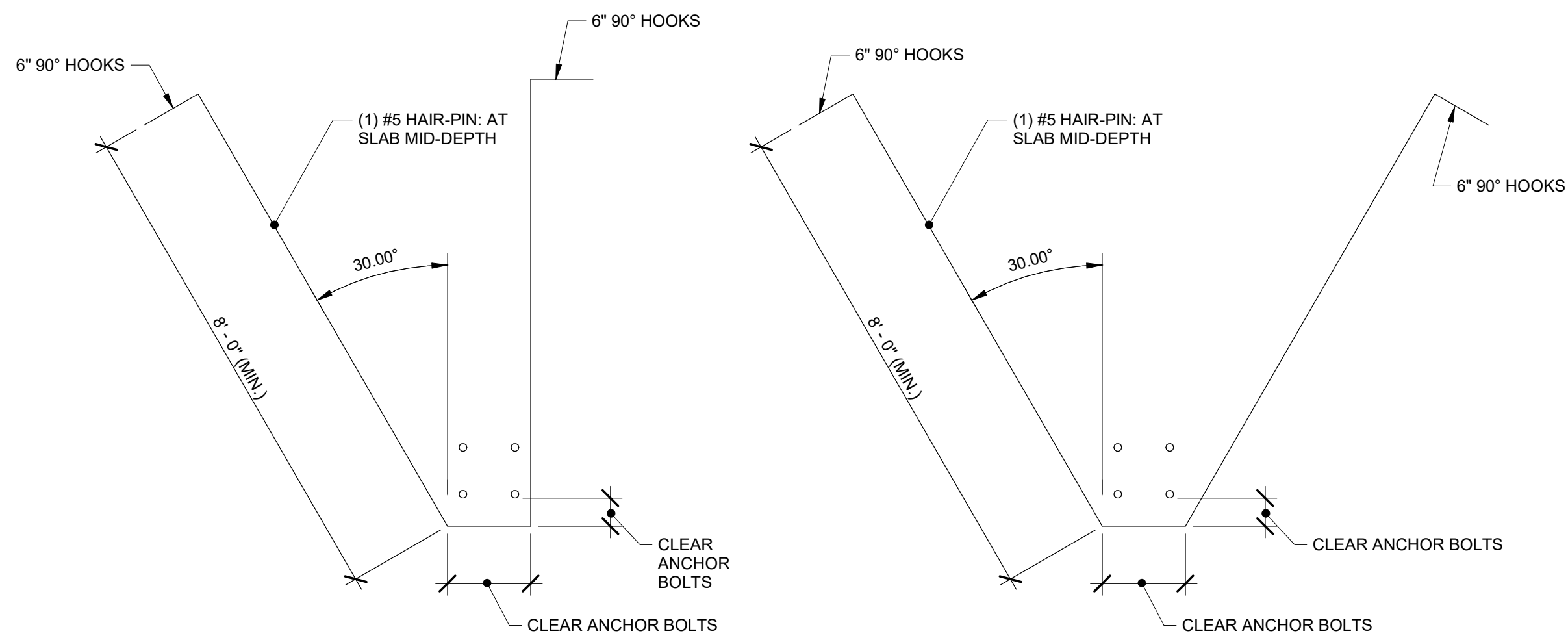
S <sub>DS</sub> = 0.622	"D"
S <sub>1</sub> = 0.268	STEEL ORDINARY FRAMES
SEISMIC DESIGN CATEGORY:	Ie = 1.50
SEISMIC IMPORTANCE FACTOR:	R = 3.50
LATERAL FORCE RESISTING SYSTEM:	C <sub>0</sub> = 3.00



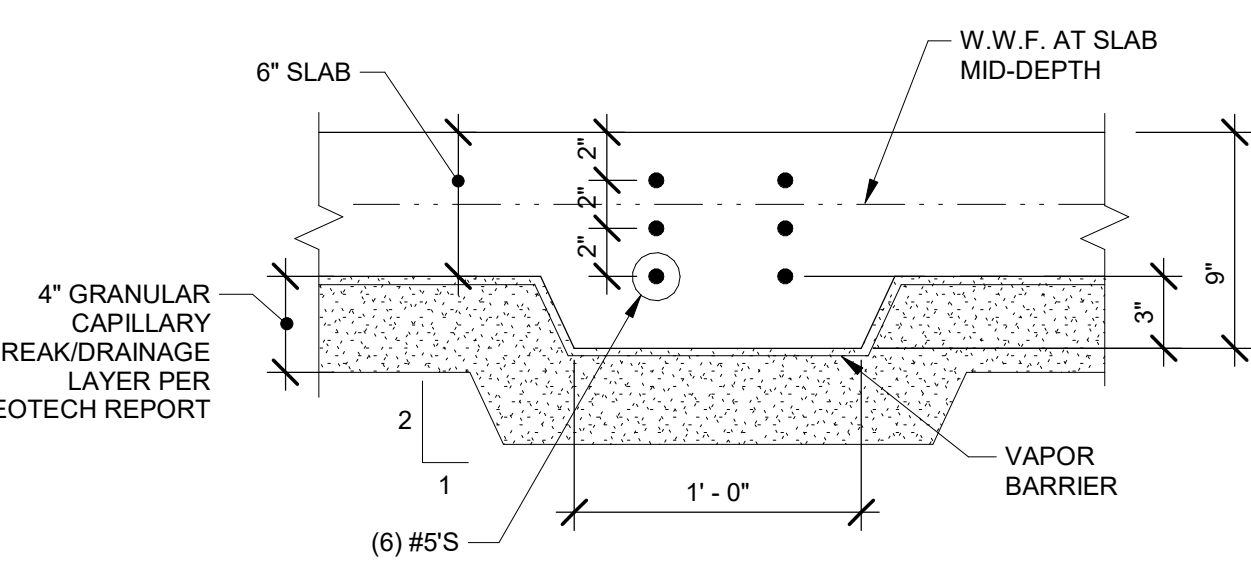
1 TYPICAL SLAB CONTROL JOINT DETAIL  
NO SCALE



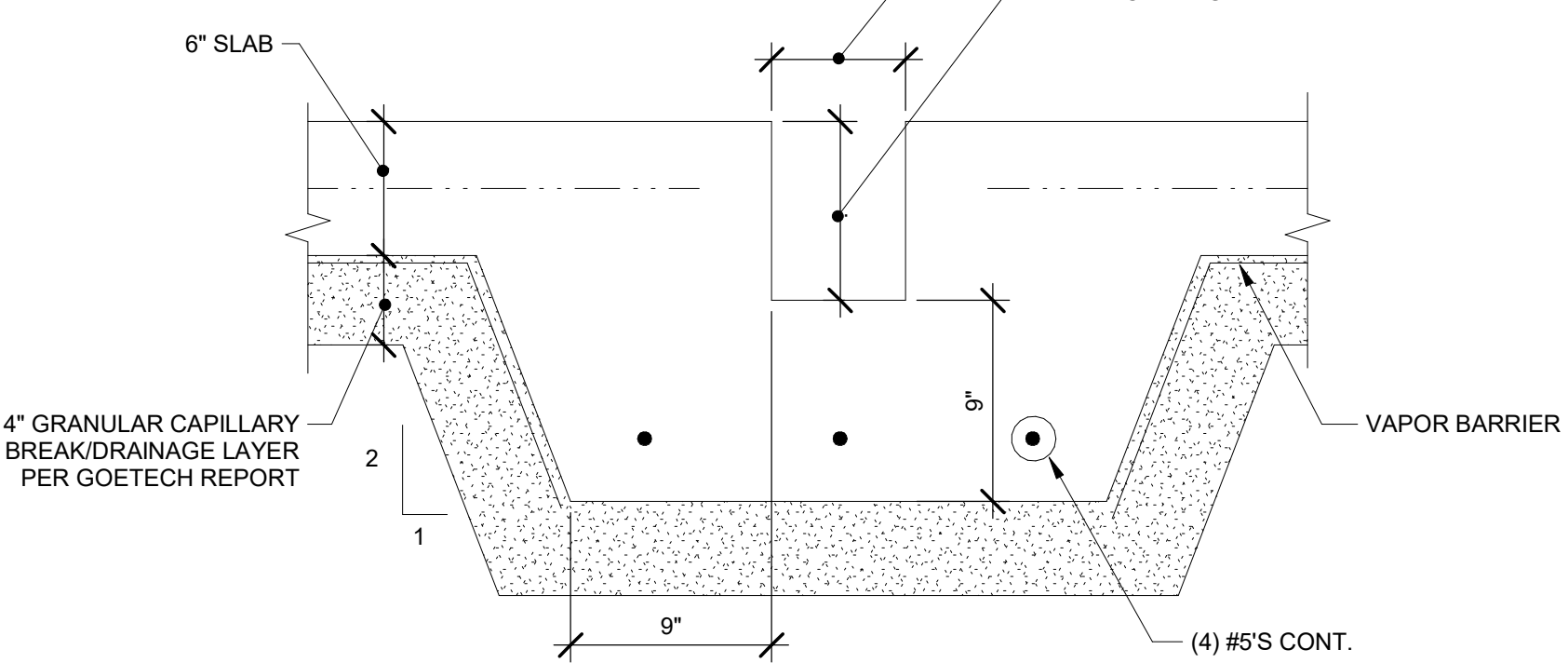
2 TYP. ANCHOR ROD COMPONENTS  
3" = 1'-0"



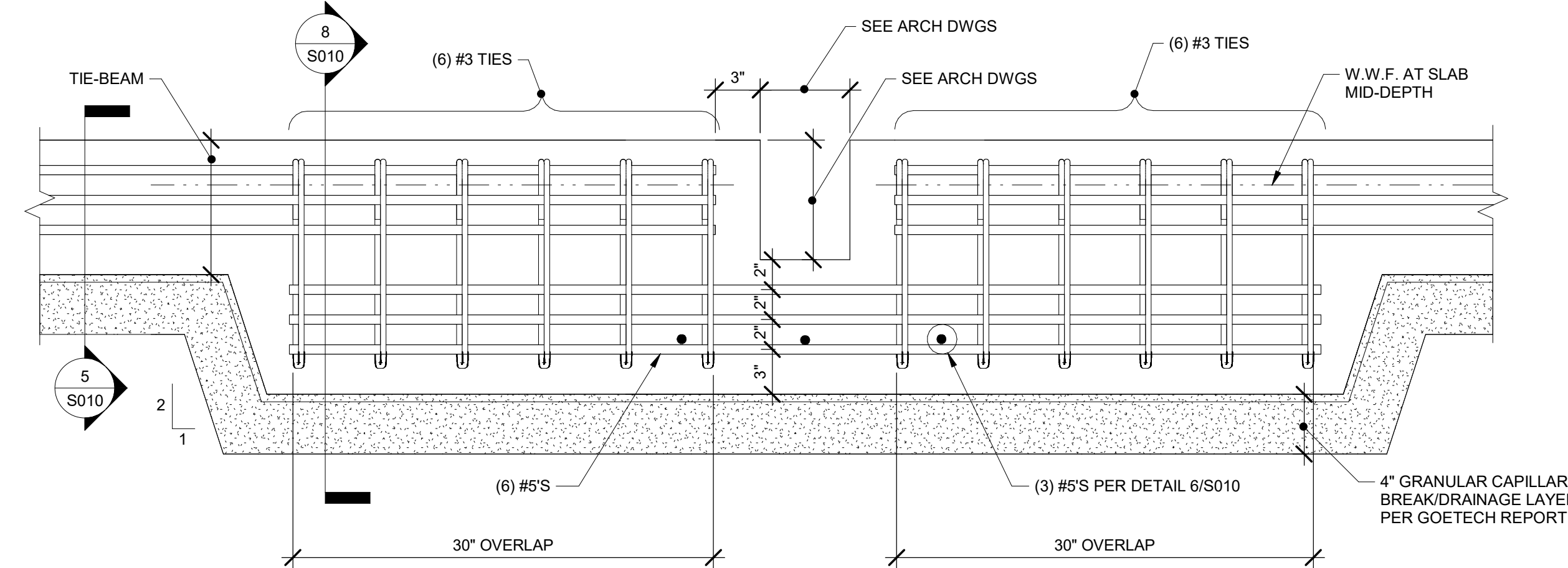
3 Typical Hair-pin Details  
1" = 1'-0"



5 TIE BEAM DETAIL  
1 1/2" = 1'-0"



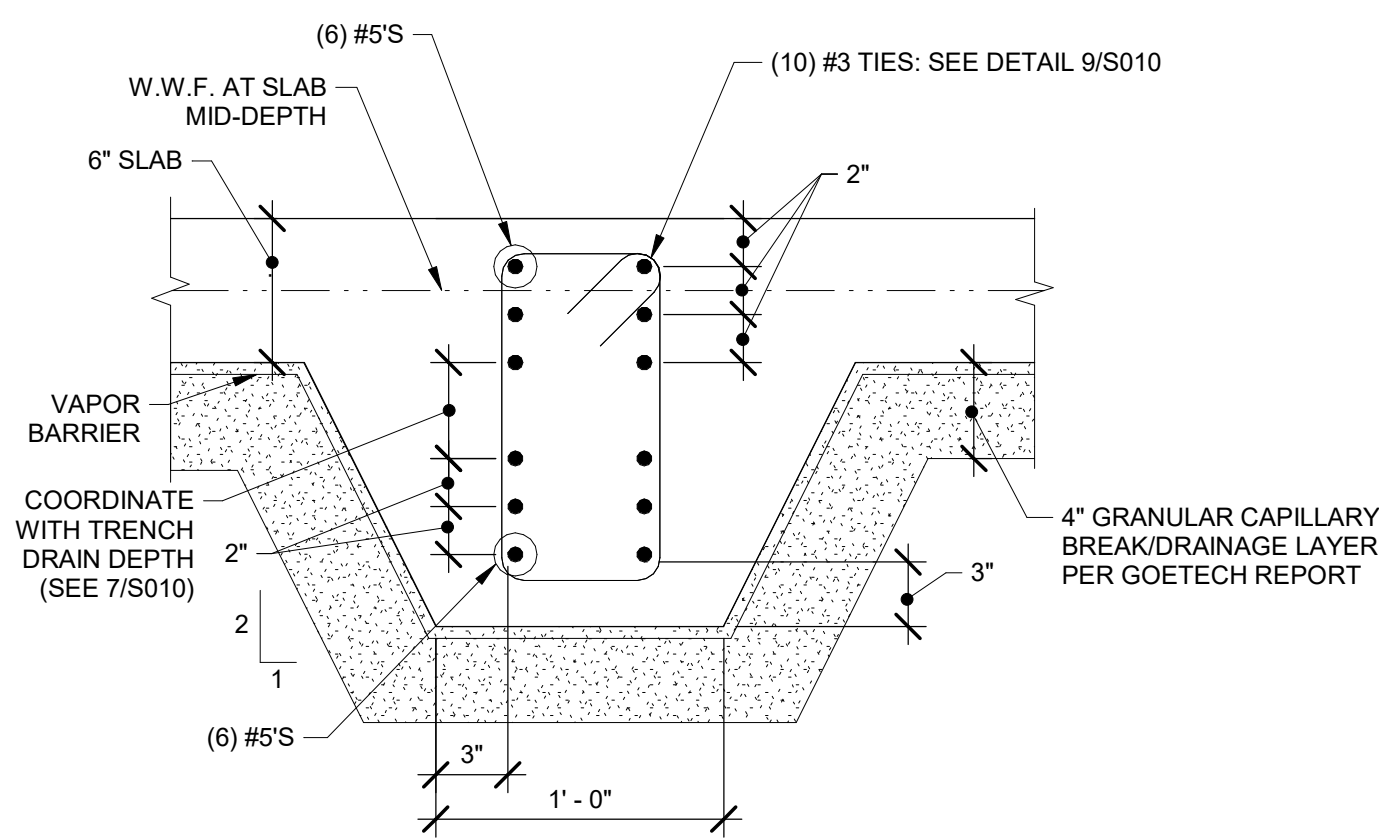
6 TRENCH DRAIN  
1 1/2" = 1'-0"



7 Detail 9  
1 1/2" = 1'-0"

Special Inspection: Cast-in-Place Concrete		
Item	Agency # (Qualif.)	Scope
1. Mix Design	ACI-CCI ICC-RCSI	Periodically review concrete batch tickets and verify compliance with approved mix design (Inspect each ticket).  Periodically verify that water added at the site does not exceed that allowed by the mix design.
2. Reinforcement Installation	ACI-CCI ICC-RCSI	Periodically inspect size, spacing, cover, positioning, bends and grade of reinforcing steel. (100% inspection rate a minimum of once weekly during applicable portion of the work. Periodic inspection shall be completed prior to placing concrete).  Periodically verify that reinforcing bars are free of form oil or other deleterious materials. (100% inspection rate)  Periodically inspect bar lags and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters. (100% inspection rate a minimum of once weekly during applicable portion of the work. Also, inspect immediately prior to placement of concrete.)
3. Anchor Bolts / Threaded Rods	ACI-CCI ICC-RCSI	Periodically inspect size, positioning of anchor rods.  Periodically inspect embedment and projection of anchor rods.  Periodically inspect concrete placement and consolidation around anchors.
4. Sampling and Testing of Concrete	ACI-CFTT ACI-ST	Continuously test concrete compressive strength (ASTM C31 & C39), slump (ASTM C143), air-content (ASTM C231 or C173) and temperature (ASTM C1064). Frequency of sampling and testing as required by section 1905.6 of IBC 2005.

Special Inspection: Light Gage Metal Framing		
Item	Agency # (Qualif.)	Scope
1. Material Grading	PE/ET	Periodically inspect material grades to be in conformance with shop drawings. (100% inspection rate a minimum of once weekly during applicable portion of the work)
2. Connections	PE/ET	Periodically inspect connections to be in conformance with shop drawings. (100% inspection rate a minimum of once weekly during applicable portion of the work)
3. Framing and Details	PE/ET	Periodically inspect framing and details to be in conformance with shop drawings. (100% inspection rate a minimum of once weekly during applicable portion of the work)
4. Bridging and Bracing	PE/ET	Periodically inspect size, configuration and fastening of wall bridging and bracing. Verify with shop drawings. 100% inspection rate a minimum of once weekly during applicable portion of the work)

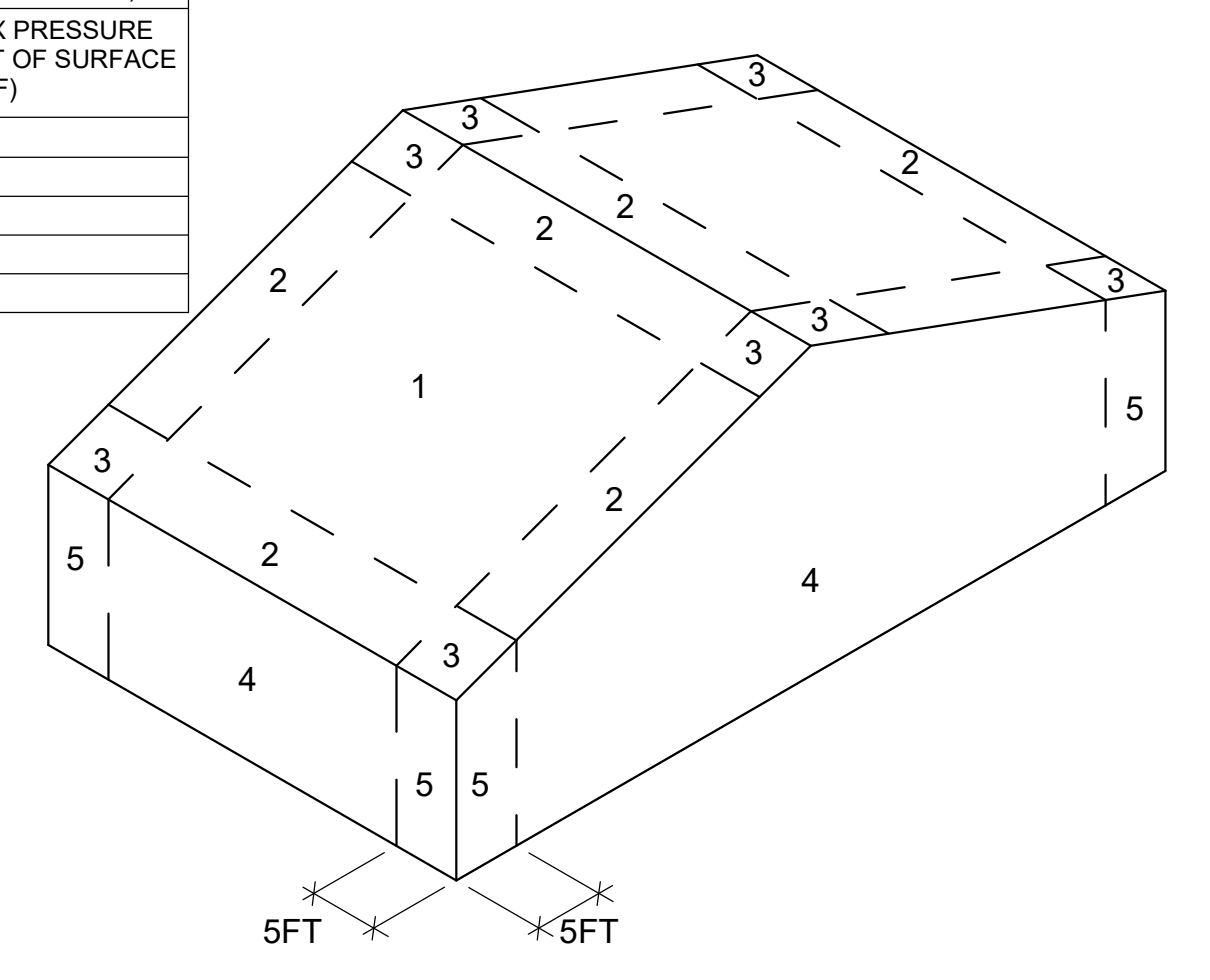


8 Detail 8  
1 1/2" = 1'-0"

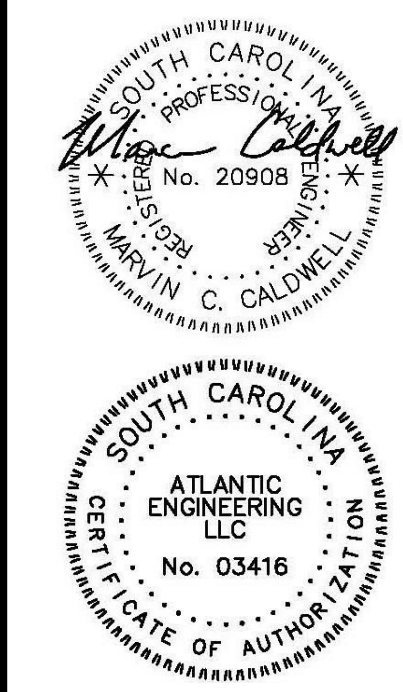
Special Inspection: Soils and Foundations		
Item	Agency # (Qualif.)	Scope
1. Shallow Foundations	PE/GE	Periodically inspect soils below footings for adequate bearing capacity and consistency with the geotechnical report. (100% inspection rate prior to concrete placement).  Periodically verify that excavations are extended to proper depth and width.  Continuously inspect removal of unsuitable material and preparation of sub-grade prior to placement of controlled fill.  Continuously verify use of proper materials, densities and lift thicknesses during placement and compaction of fill.

Special Inspection: P.E. METAL BUILDING		
Item	Agency # (Qualif.)	Scope
1. BOLTED CONNECTIONS	PE/GE	Periodically inspect (100% inspection rate)
1. FRAMING LAYOUT AND DETAILS	PE/GE	Periodically inspect (100% inspection rate)

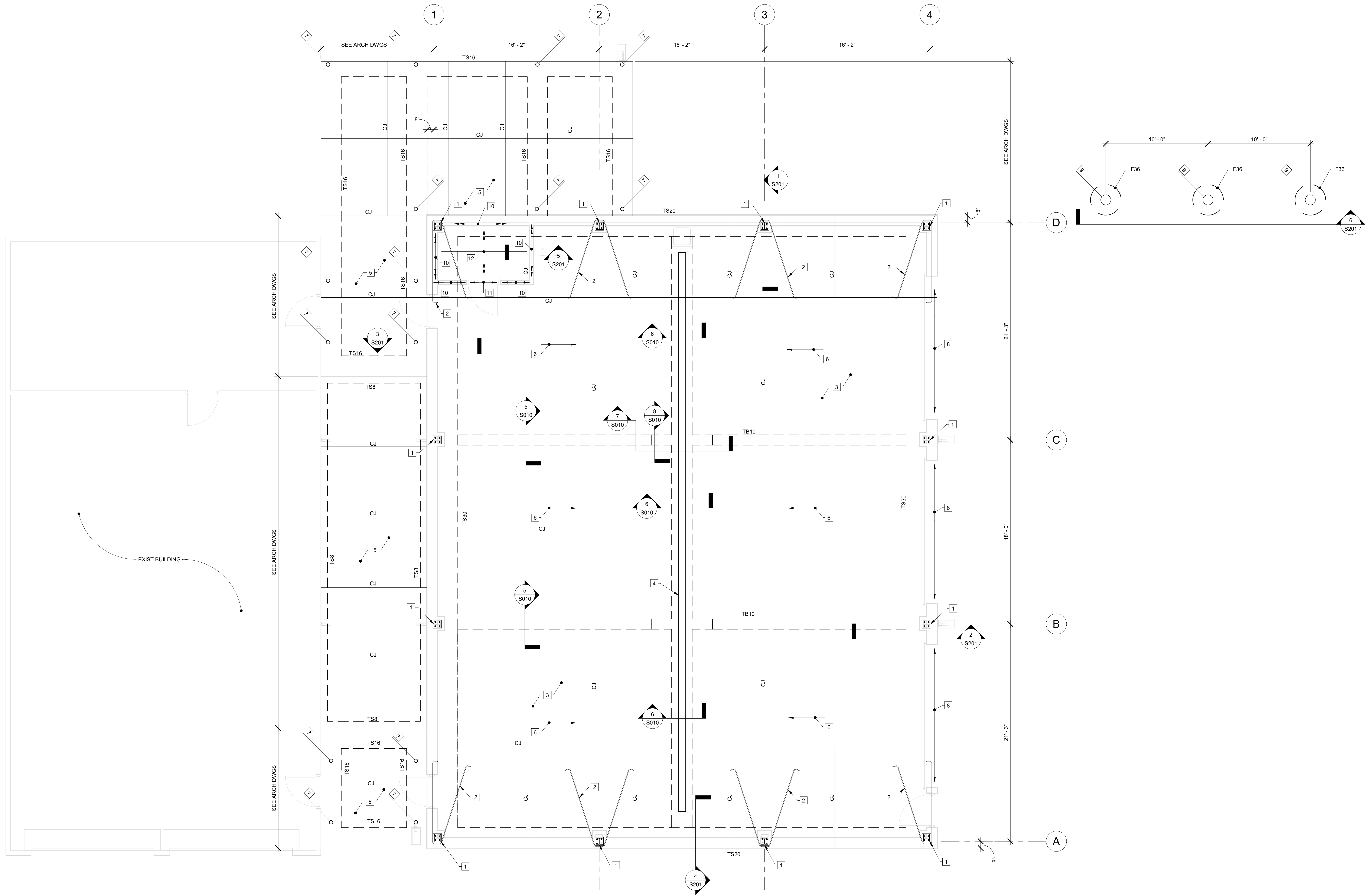
GABLE ROOF		
COMPONENTS & CLADDING WIND PRESSURES (ALLOWABLE DESIGN, ENCLOSED BLDG)		
ZONE	MAX PRESSURE INTO SURFACE (PSF)	MAX PRESSURE OUT OF SURFACE (PSF)
1	25	55
2	25	75
3	25	90
4	30	30
5	30	35



REV. NO.	DATE	DESCRIPTION







**DRAWING NOTES: 1/S101**

1. P.E. BUILDING COLUMN
2. #5 HAIRPIN: AT SLAB MID-DEPTH
3. 6" SLAB ON GRADE WITH ONE LAYER OF 6x6-W2.9xW2.9 W.W.F. (AT SLAB MID-DEPTH, FLAT SHEETS NOT ROLLS)
4. TRENCH DRAIN: COORD. W/ARCH DWGS
5. 4" SLAB ON GRADE WITH ONE LAYER OF 6x6-W1.4xW1.4 W.W.F. (AT SLAB MID-DEPTH, FLAT SHEETS NOT ROLLS)
6. SLOPE SLAB TO DRAIN: APPROX 3/16" PER FOOT
7. CANOPY COLUMN: SEE CANOPY SHOP DWGS
8. SEE METAL BUILDING SHOP DWGS FOR SLAB DETAIL AT DOORS (TYPICAL)
9. 12" BUTT @ TIMBER PILE FOR HOSE RACK: MAX RACK HEIGHT 35'-0"
10. 6" (20GA, 1-3/8" FLANGES) STUDS @ 16" O/C: LOAD BEARING FOR 125 PSF STORAGE PLATFORM ABOVE
11. LT. GA. HEADER OVER DOOR: (2) 10" (18GA, 1-5/8" FLANGES) STUDS. PROVIDE (2) JACK STUDS AND (1) KING STUD AT EA. END.
12. CLG JOISTS (125 PSF STORAGE PLATFORM): 10" STUDS (18GA, 1 5/8" FLANGES) @ 16" O/C

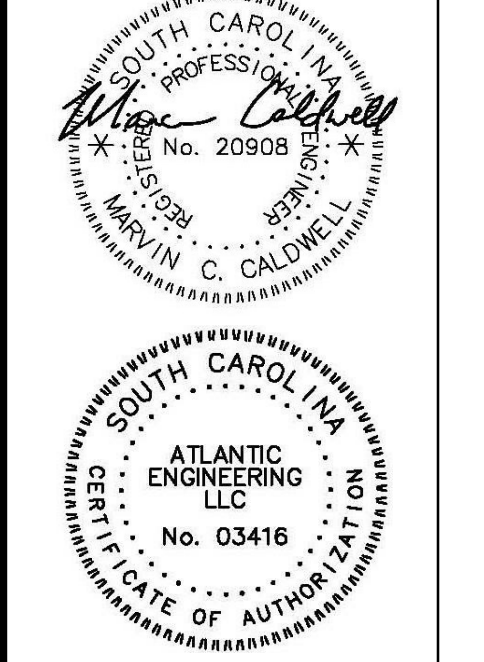
**1 FOUNDATION PLAN**

1/4" = 1'-0"

**LEGEND S101**

MARK	DESCRIPTION
TS8	8" SQUARE THICKENED SLAB EDGE
TB10	1'-0" WIDE (9" DEEP) TIE BEAM WITH (6) #5S
TS16	THICKENED SLAB FTG: 1'-6" WIDE (18" DEEP) WITH (2) #5S IN BOTTOM
TS20	THICKENED SLAB FTG: 2'-0" WIDE (24" DEEP) WITH (2) #5S IN TOP & (3) #5S IN BOTTOM
TS30	THICKENED SLAB FTG: 3'-0" WIDE (24" DEEP) WITH (4) #5S CONT. & #5S 16" O/C (PERP.)
F36	36"Ø FOOTING (7'-0" DEEP): PROVIDE (3) #5S (THROUGH FILE)

REV. NO.	DATE	DESCRIPTION



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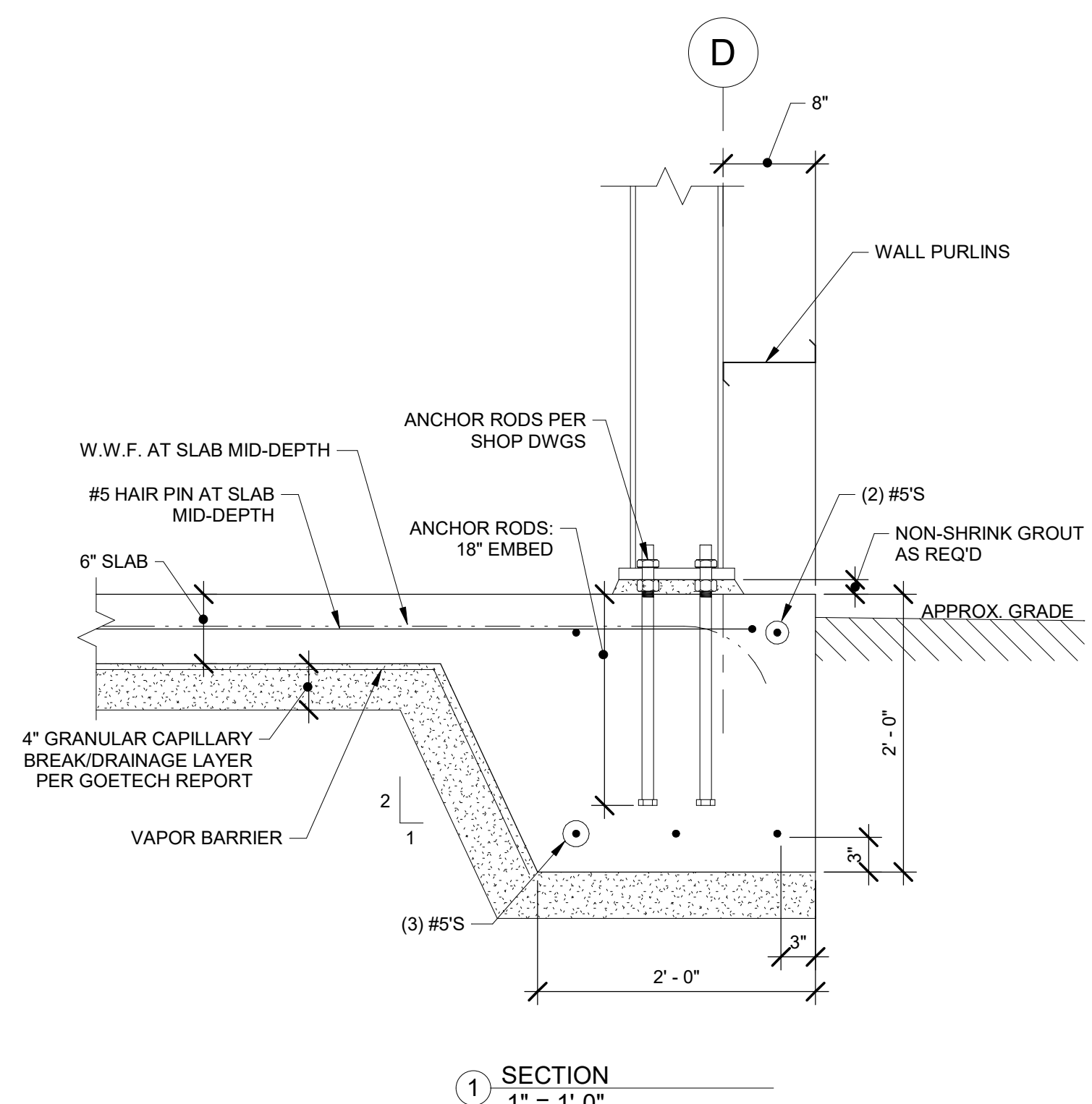
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ATLANTIC PROJECT: 190890  
DRAWN BY: AMD  
CHECKED BY: MCC

DATE ISSUED FOR: CD'S  
01/30/2020

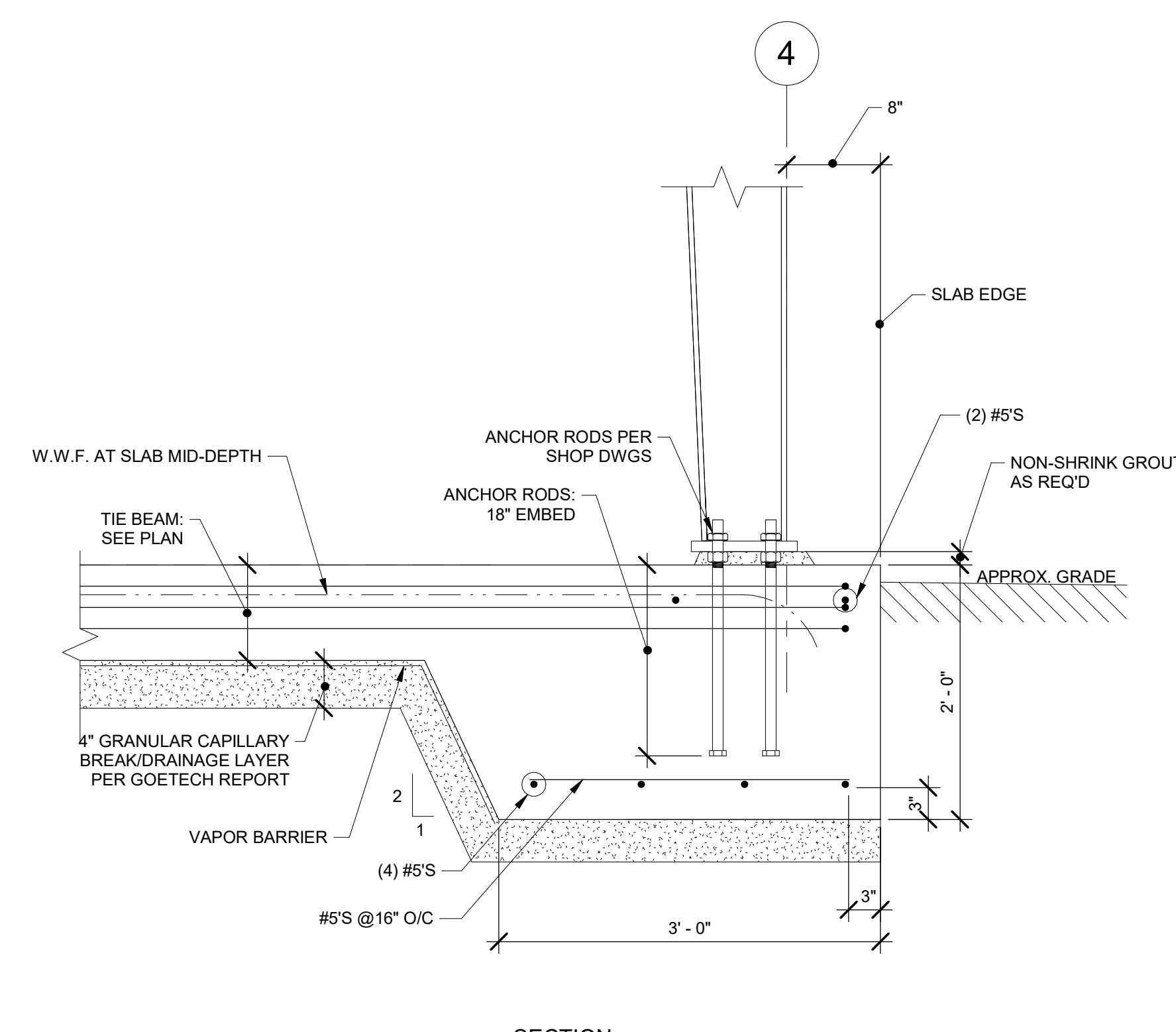
**FOUNDATION PLAN**

**S101**

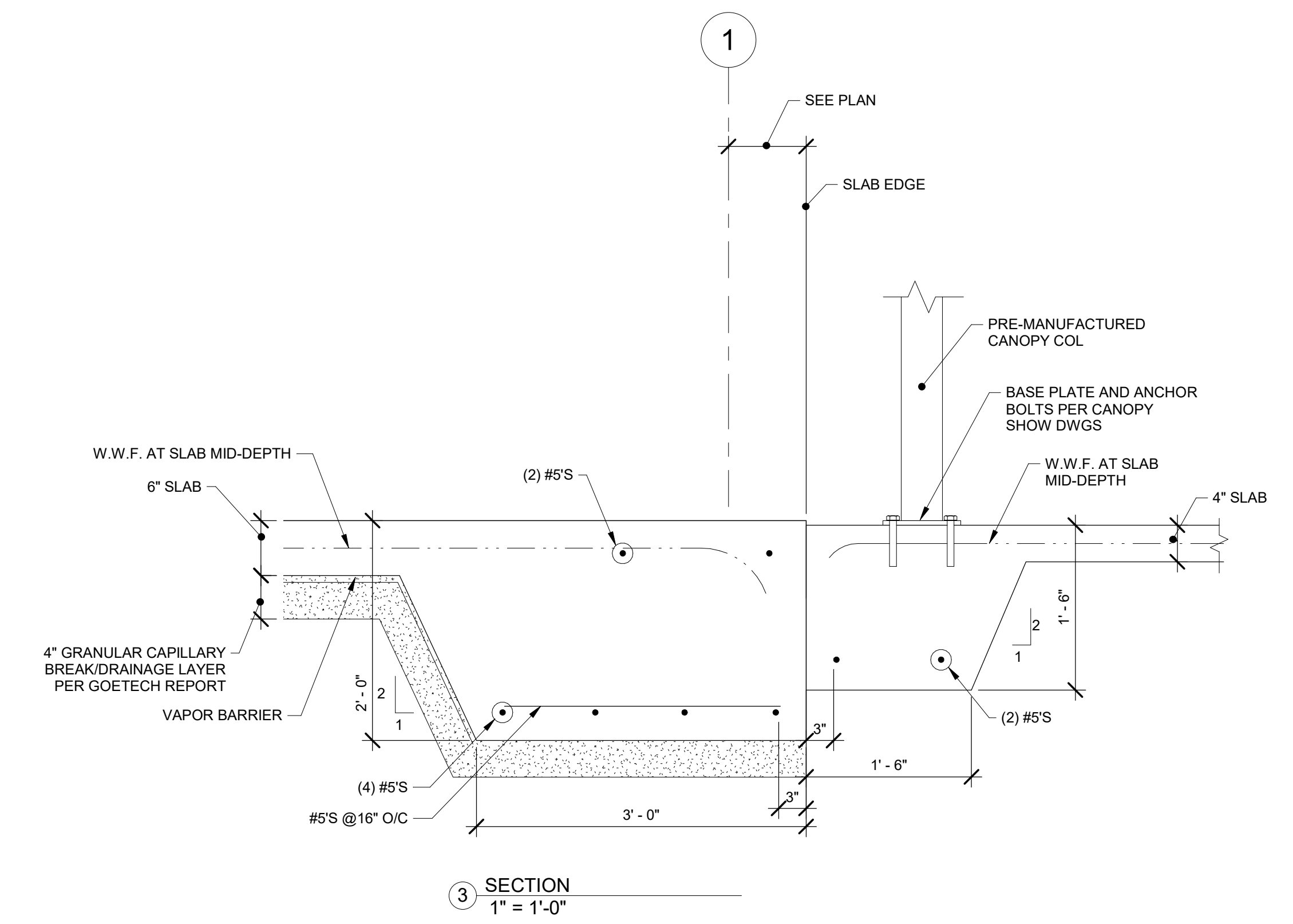




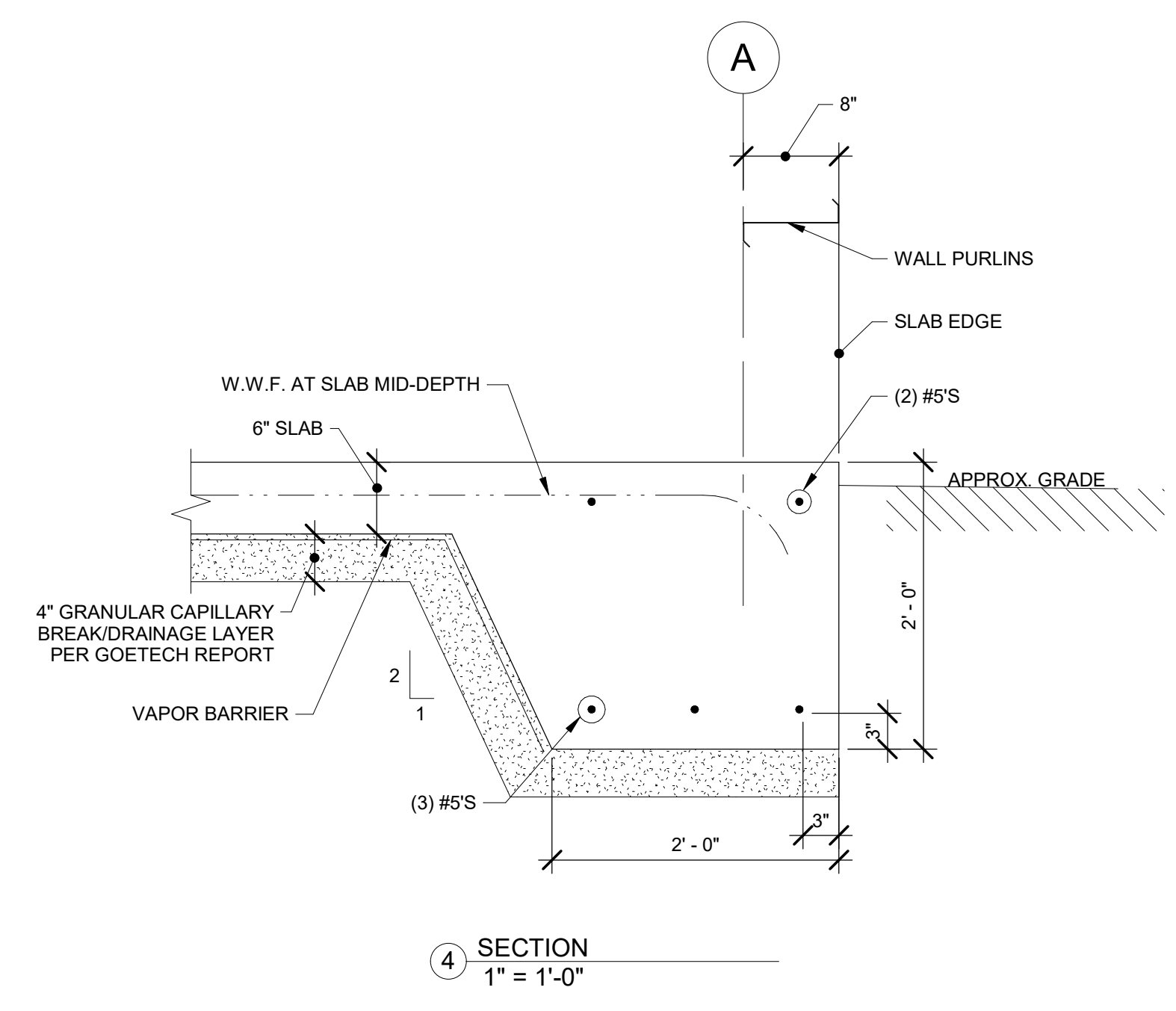
SECTION 1  
1" = 1'-0"



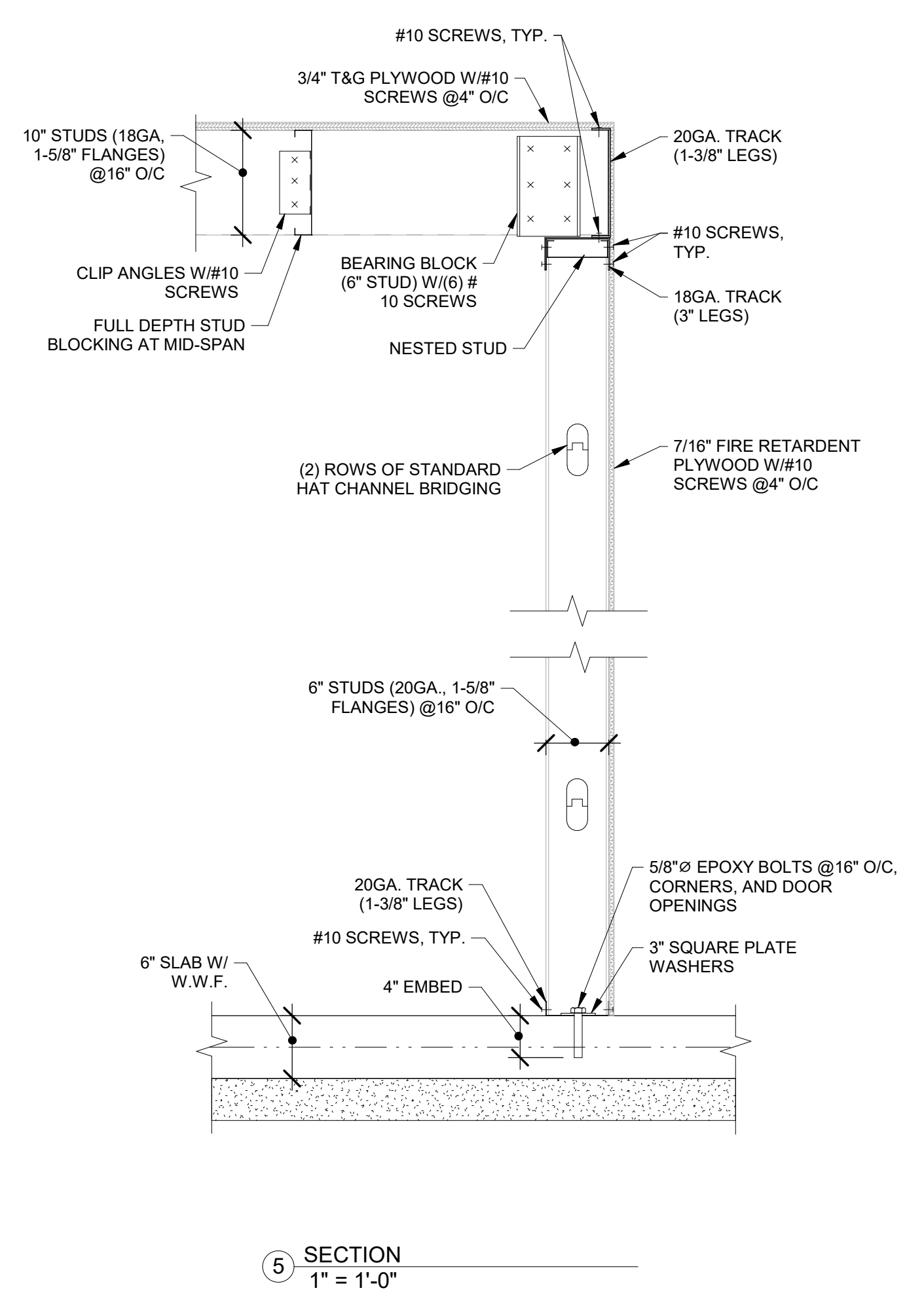
SECTION 2  
1" = 1'-0"



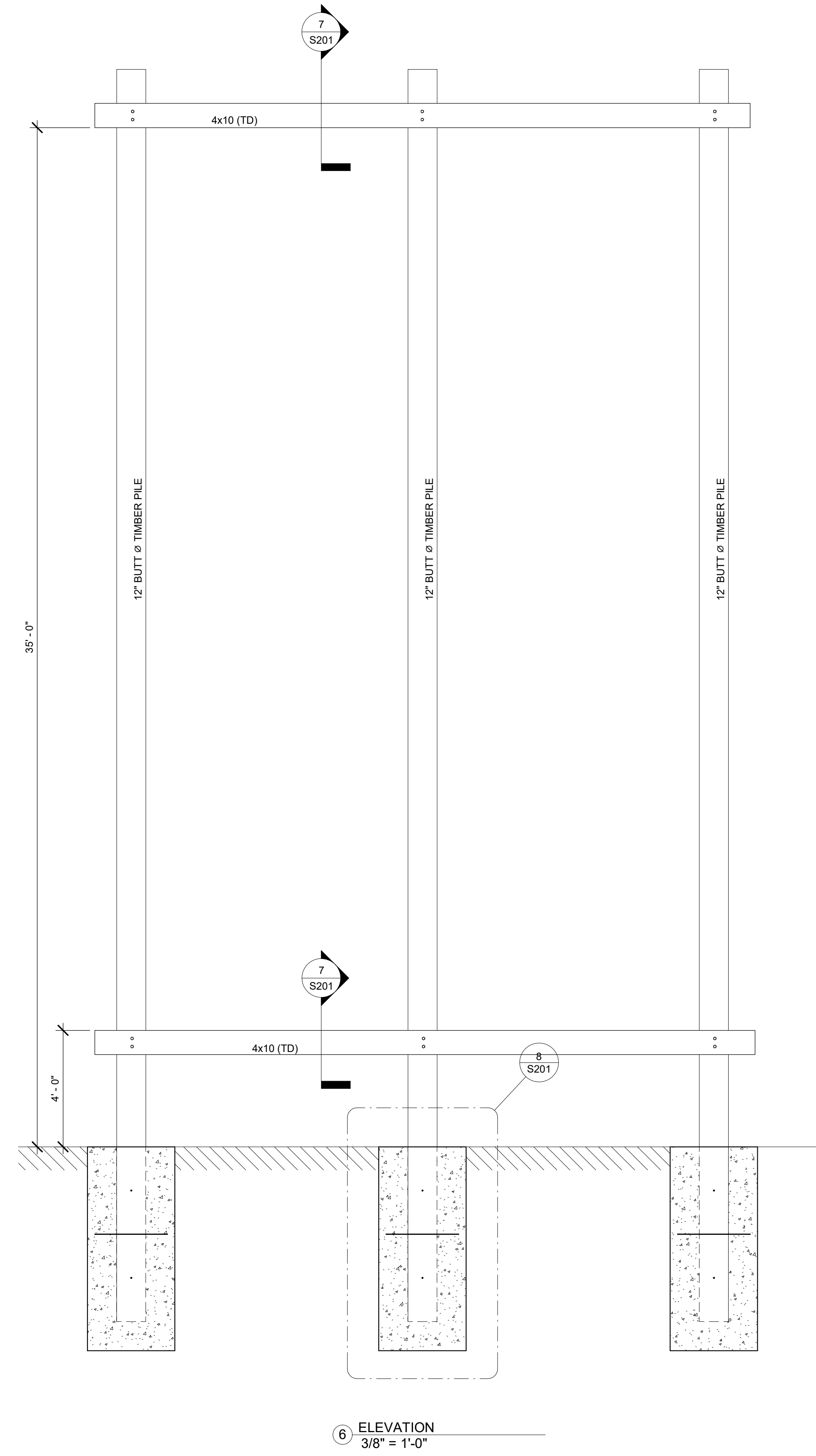
SECTION 3  
1" = 1'-0"



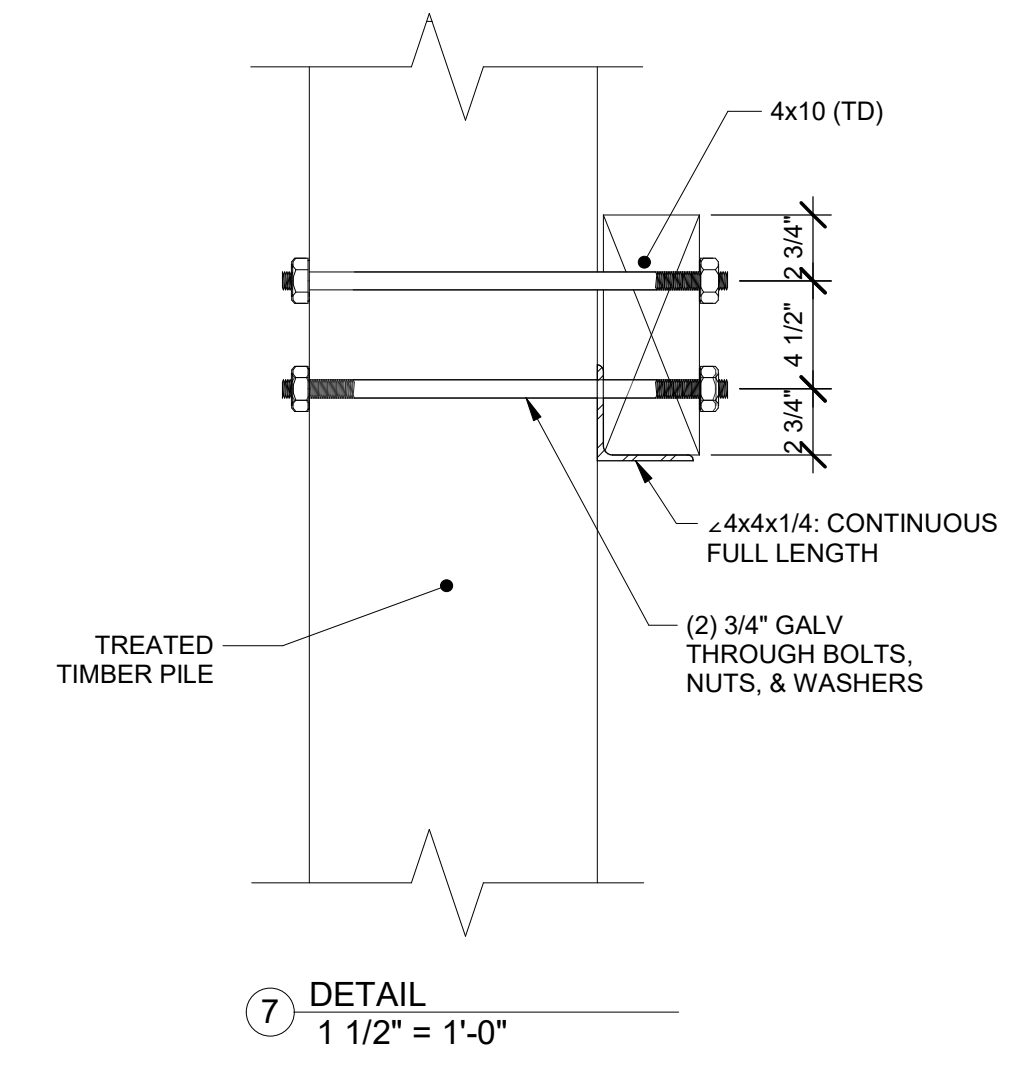
SECTION 4  
1" = 1'-0"



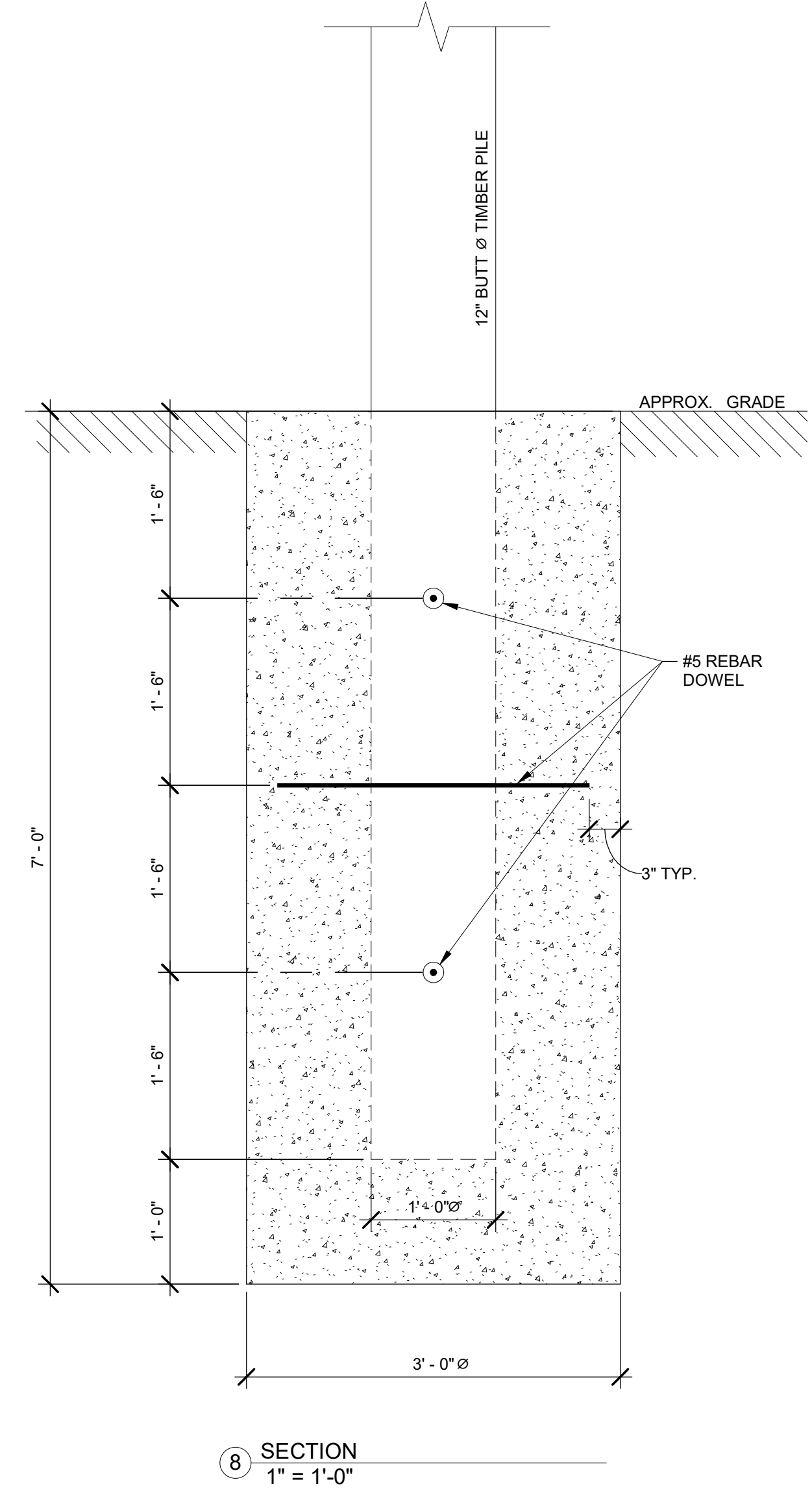
SECTION 5  
1" = 1'-0"



ELEVATION 6  
3/8" = 1'-0"

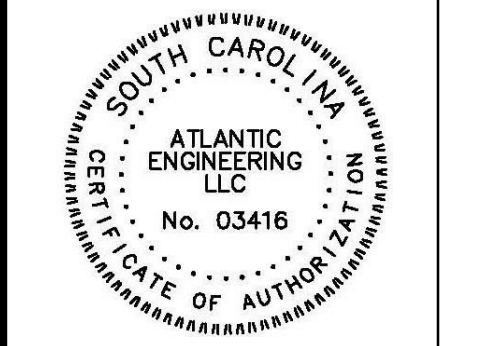


DETAIL 7  
1 1/2" = 1'-0"



SECTION 8  
1" = 1'-0"

REV. NO.	DATE	DESCRIPTION



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 01/30/2020

**S201**



### LEGEND & SYMBOLS

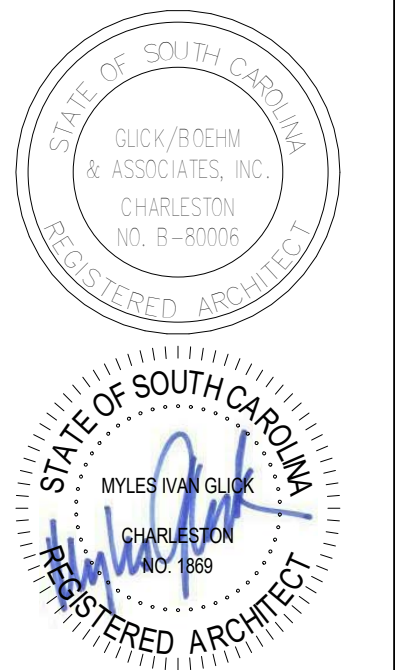
- EXISTING WALL TO REMAIN
- NEW PRE-ENGINEERED METAL BUILDING WALL SYSTEM
- NEW METAL STUD WALL
- NEW CONSTRUCTION KEYNOTE TAG
- DEMOLITION KEYNOTE TAG
- DOOR MARK; REFER TO A600
- WINDOW TYPE MARK, REFER TO A600
- WALL TYPE MARK, REFER TO A301
- WINDOW BLINDS, PROVIDED & INSTALLED BY CONTRACTOR TO MATCH EXISTING
- FLOOR DRAIN, REFER TO PLUMBING DWGS
- FIRE EXTINGUISHER & BRACKET
- DOWNSPOUT

### GENERAL PLAN NOTES

- 1 BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY EXISTING CONDITIONS AND COMPARE RESULTS
- 2 REFER TO G100 FOR GENERAL PROJECT NOTES
- 3 REFER TO A600 FOR DOOR SCHEDULE AND TYPES.
- 5 REFER TO A600 FOR DOOR DETAILS.
- 6 REFER TO A200 FOR EXTERIOR MATERIAL & COLOR & FINISH LEGEND.
- 7 REFER TO A301 FOR ALL WALL TYPES



REV. NO.	DATE	DESCRIPTION

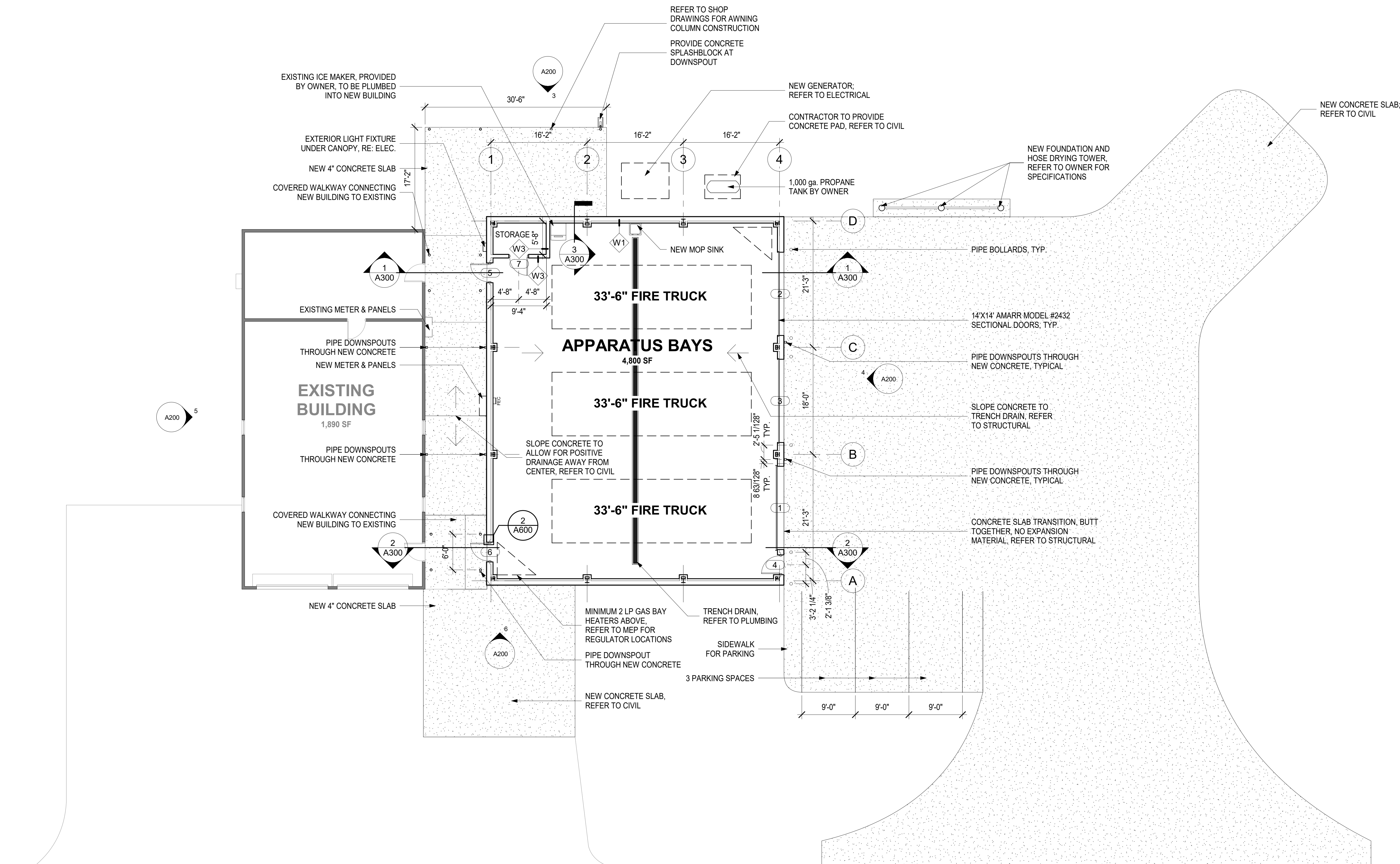


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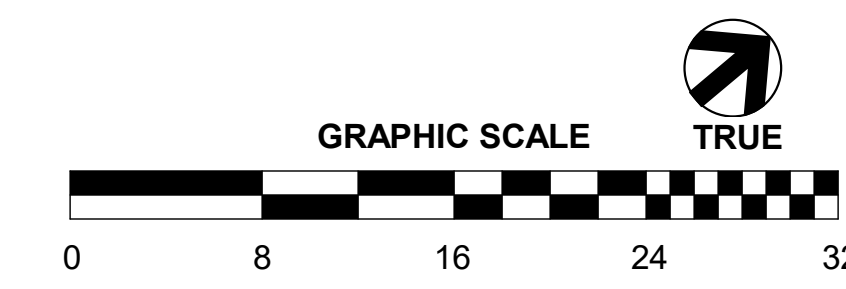
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 JOB NUMBER: 1928  
 PROJECT MGR.: MCM  
 DRAWN BY: MCM  
 CHECKED BY: SM  
 APPROVED BY: MIG  
 DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/10/2020

### FLOOR PLANS

# A100



**1 FIRST FLOOR PLAN**  
 A100 SCALE: 1/8" = 1'-0"





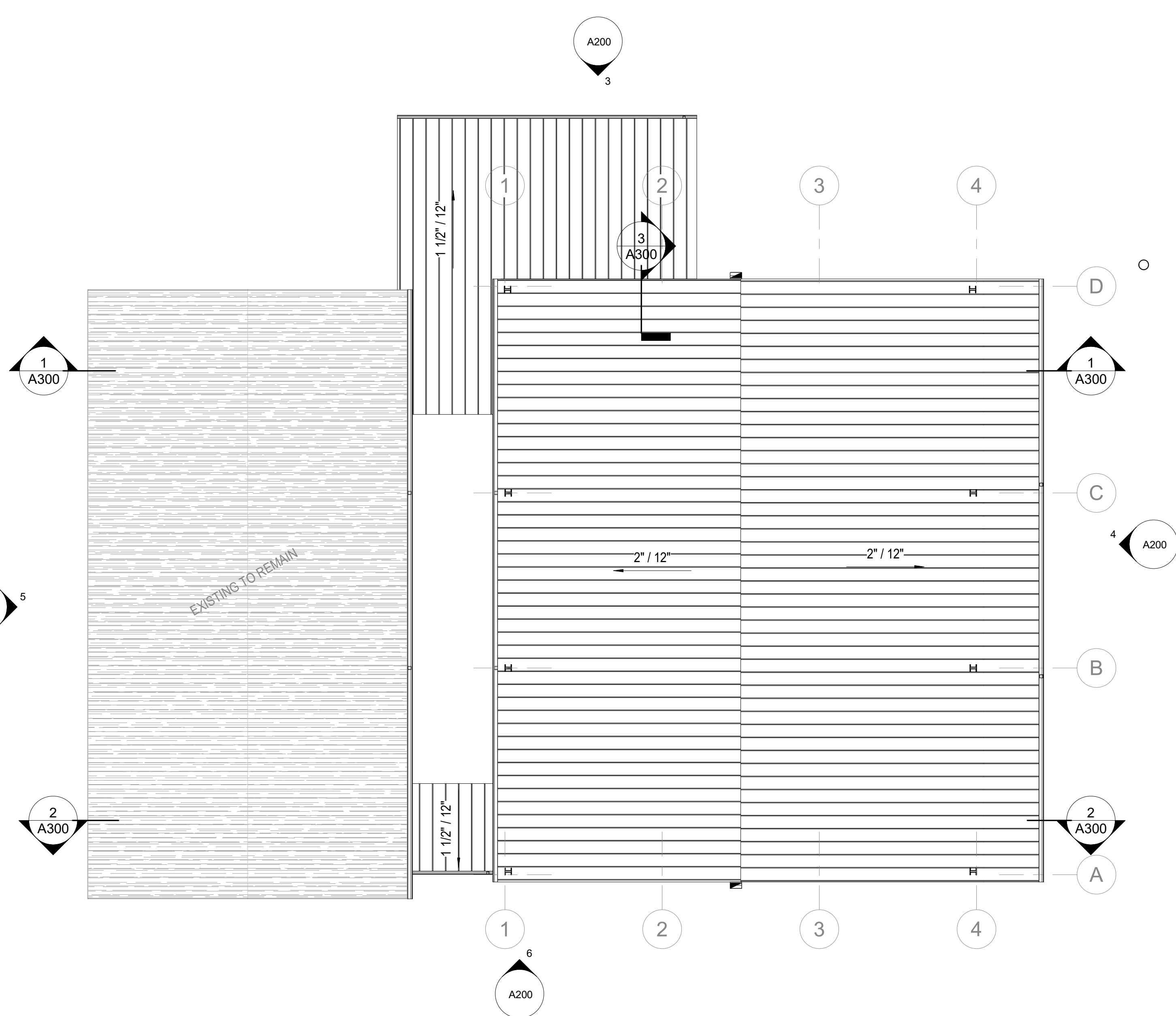
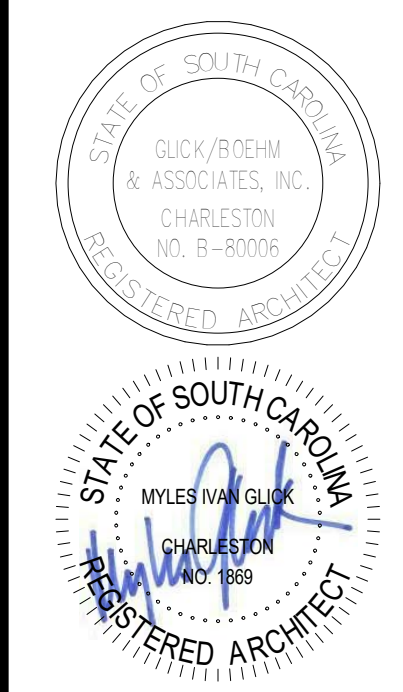
LEGEND & SYMBOLS	
	EXISTING WALL TO REMAIN
	NEW PRE-ENGINEERED METAL BUILDING WALL SYSTEM
	NEW METAL STUD WALL
	LINEAR HIGH BAY LIGHT FIXTURE; REFER TO ELECTRICAL
	CEILING FAN; REFER TO ELECTRICAL

GENERAL PLAN NOTES	
1	BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY EXISTING CONDITIONS AND COMPARE RESULTS
2	REFER TO G100 FOR GENERAL PROJECT NOTES
3	REFER TO A600 FOR DOOR SCHEDULE AND TYPES.
5	REFER TO A600 FOR DOOR DETAILS.
6	REFER TO A200 FOR EXTERIOR MATERIAL & COLOR & FINISH LEGEND.
7	REFER TO A301 FOR ALL WALL TYPES

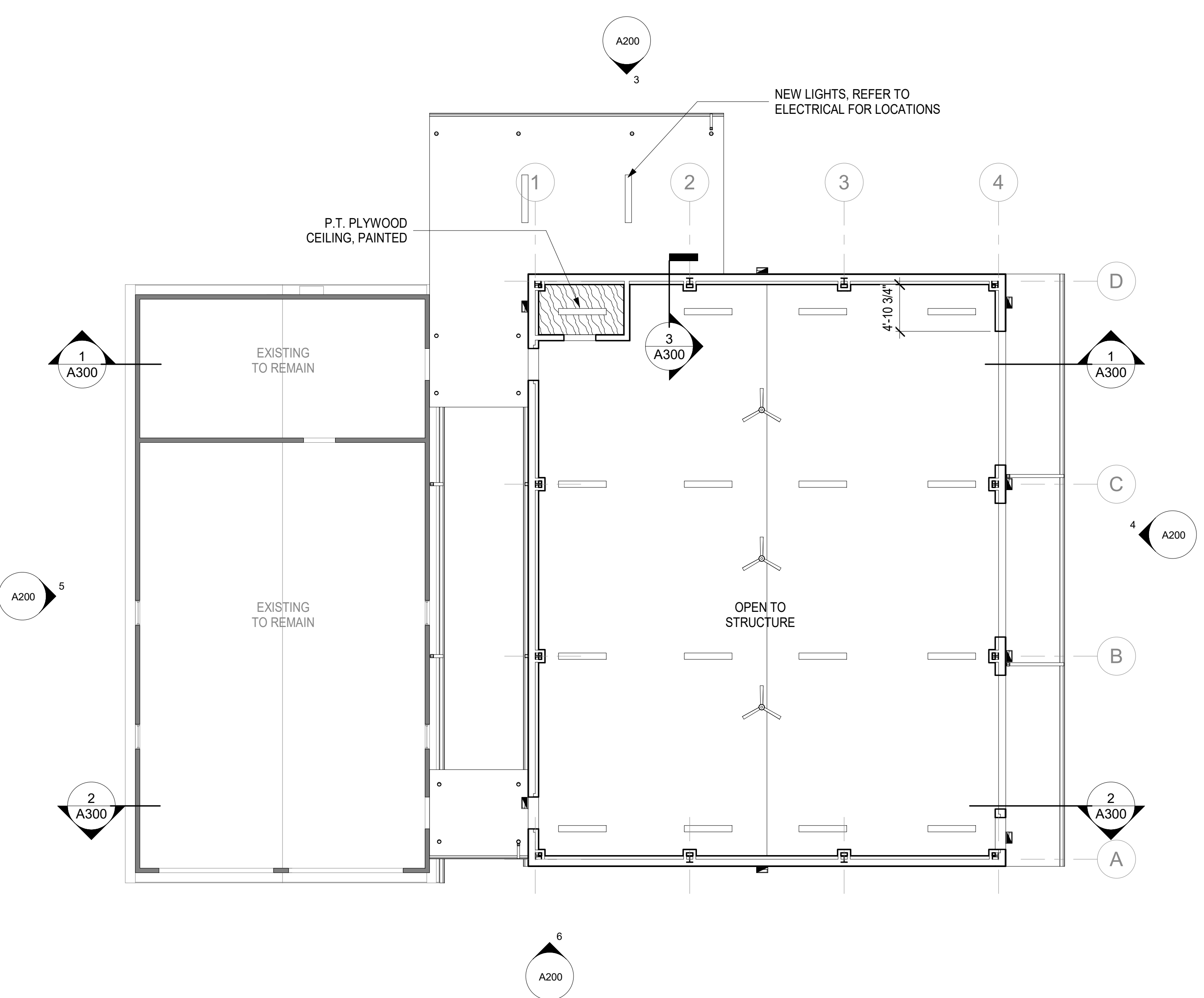
ROOF PLAN NOTES	
1	REFER TO A500 FOR ROOF DETAILS
2	IN THE ABSENCE OF DETAIL FOR ANY CONDITION ON THE ROOF, THE MOST STRINGENT CONDITION OF THE CURRENT NRCA/SMACNA SHALL APPLY.



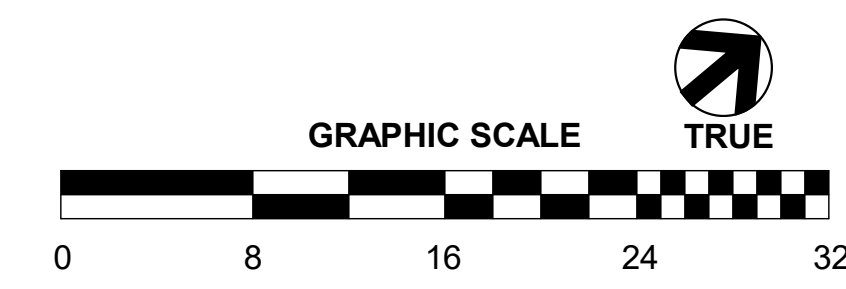
REV. NO.	DATE	DESCRIPTION



**2 ROOF PLAN**  
A101 SCALE: 1/8" = 1'-0"



**1 FIRST FLOOR REFLECTED CEILING PLAN**  
A101 SCALE: 1/8" = 1'-0"



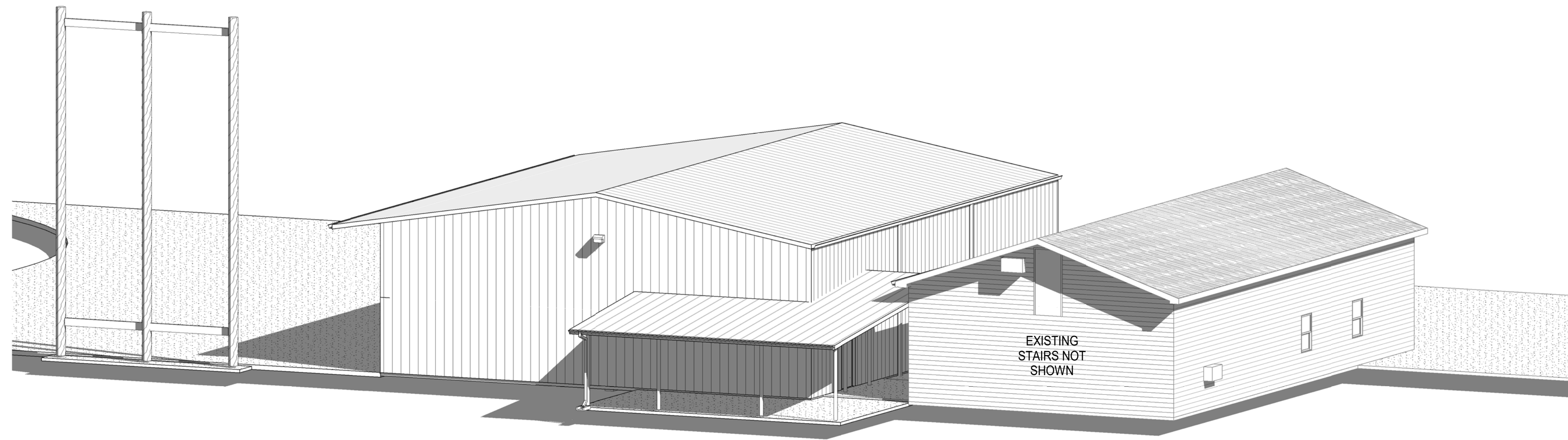
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FLOOR PLANS

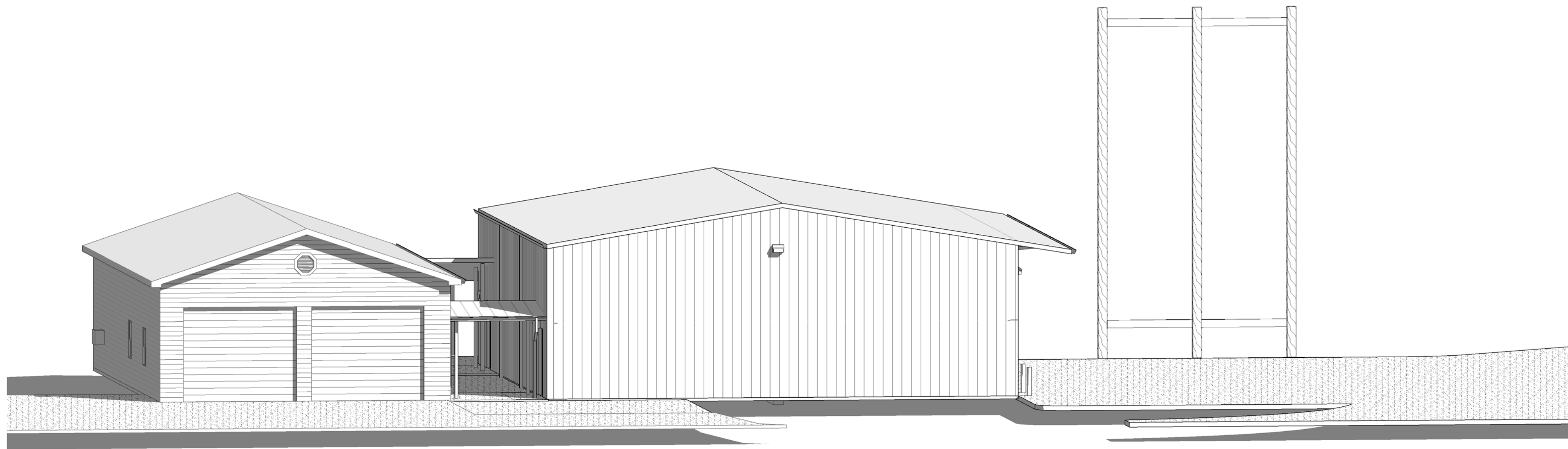
**A101**





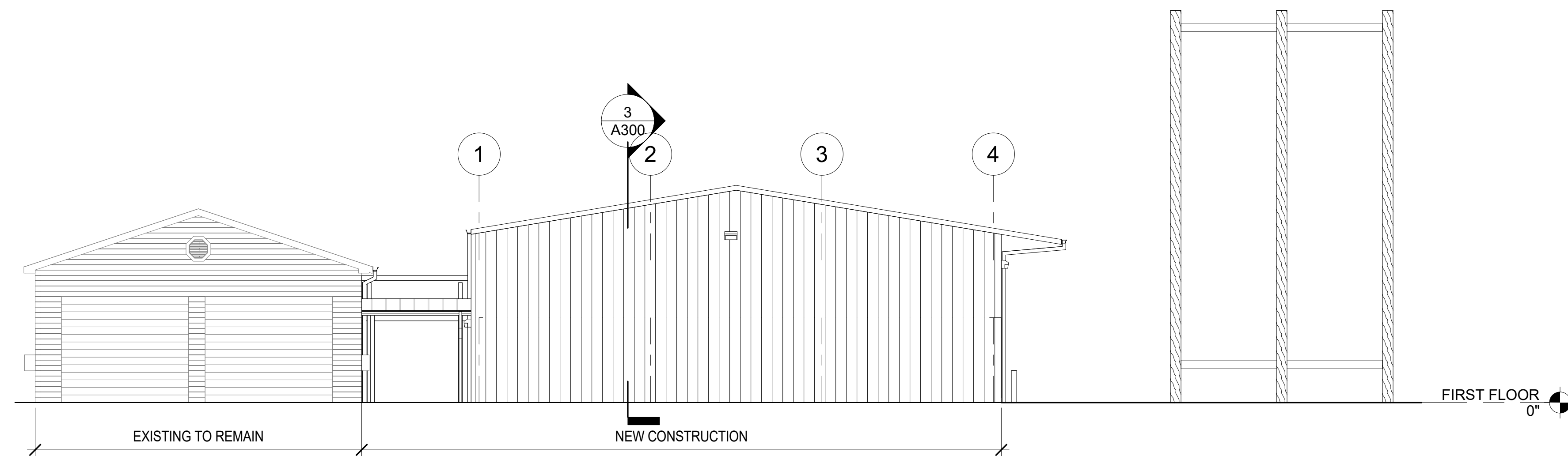
**8 3D AERIAL REAR**

A200 SCALE:



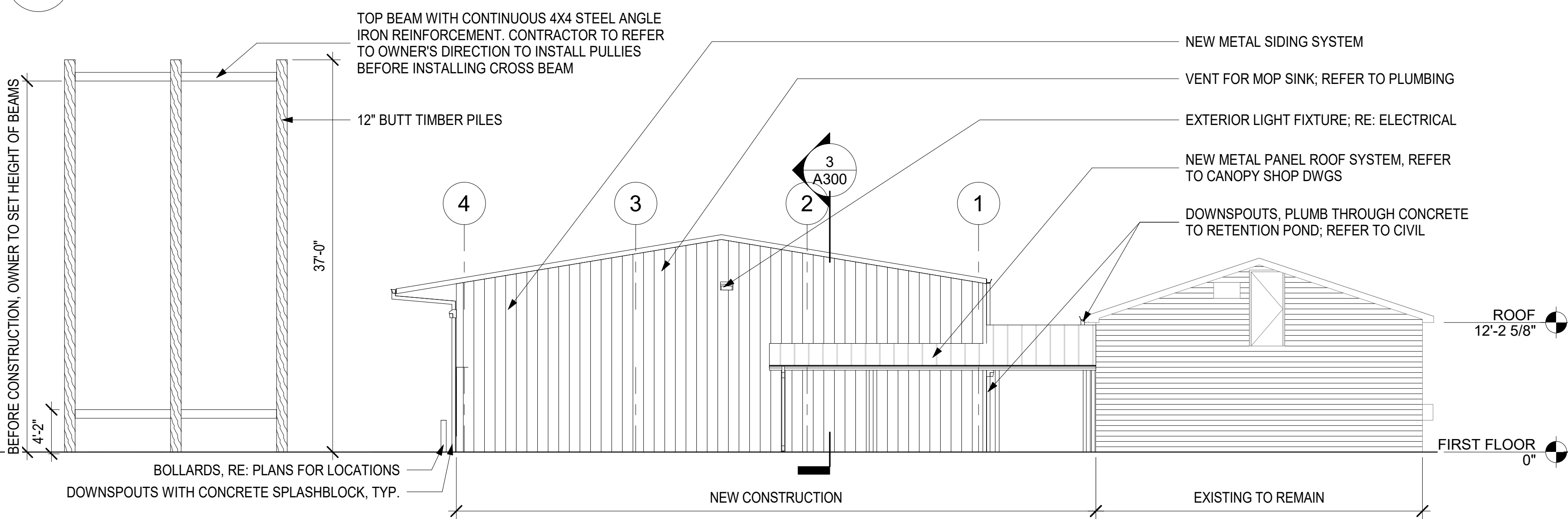
**7 3D AERIAL FRONT**

A200 SCALE:



**6 EAST ELEVATION**

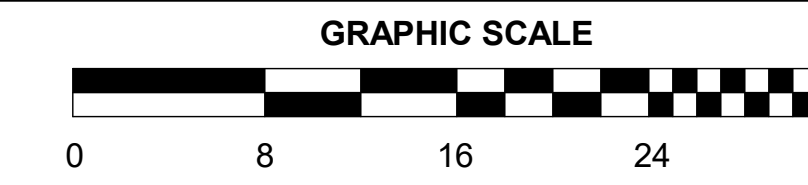
A200 SCALE: 1/8" = 1'-0"



**3 WEST ELEVATION**

A200 SCALE: 1/8" = 1'-0"

EXTERIOR MATERIAL SCHEDULE			
MATERIAL	MANUFACTURER	COLOR	REMARKS
METAL PANEL SYSTEM	TBD	REFER TO OWNER	
METAL PANEL ROOF SYSTEM	TBD	REFER TO OWNER	
GUTTERS AND DOWNSPOUTS	TBD	REFER TO OWNER	

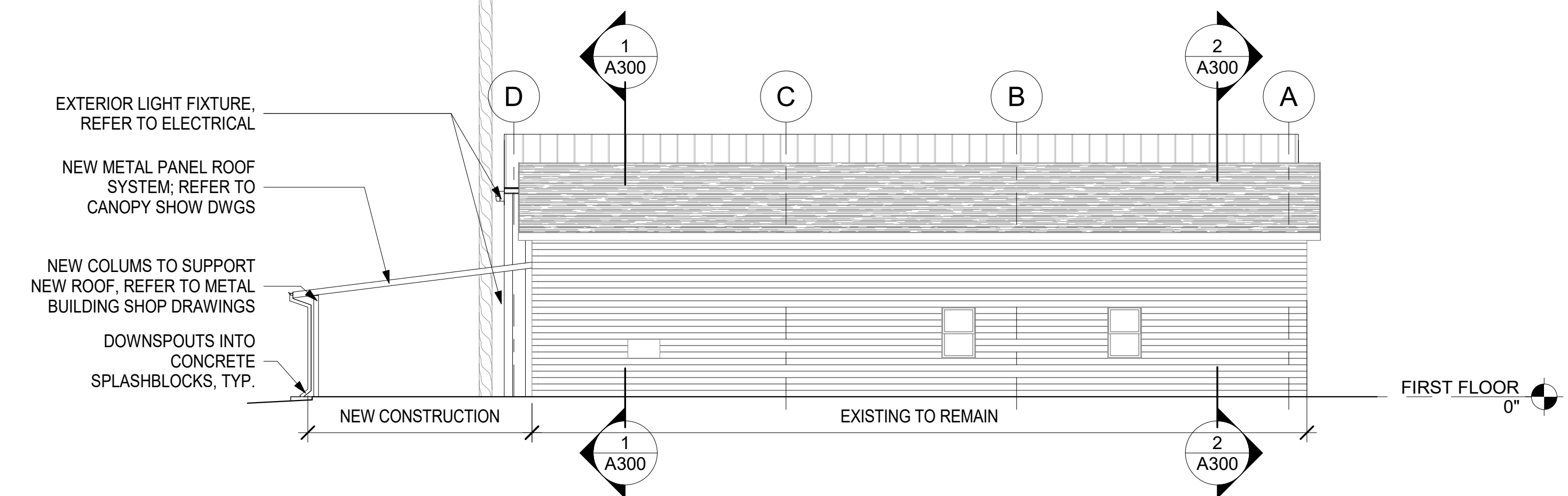


**DEMOLITION ELEV. NOTES**

- 1 REFER TO SHEET G100 FOR GENERAL DEMOLITION NOTES.
- 2 REFER TO DEMOLITION PLANS FOR ADDITIONAL DEMOLITION INFORMATION.
- 3 COORDINATE DEMOLITION AND NEW WORK WITH ELECTRICAL / PLUMBING DRAWINGS.

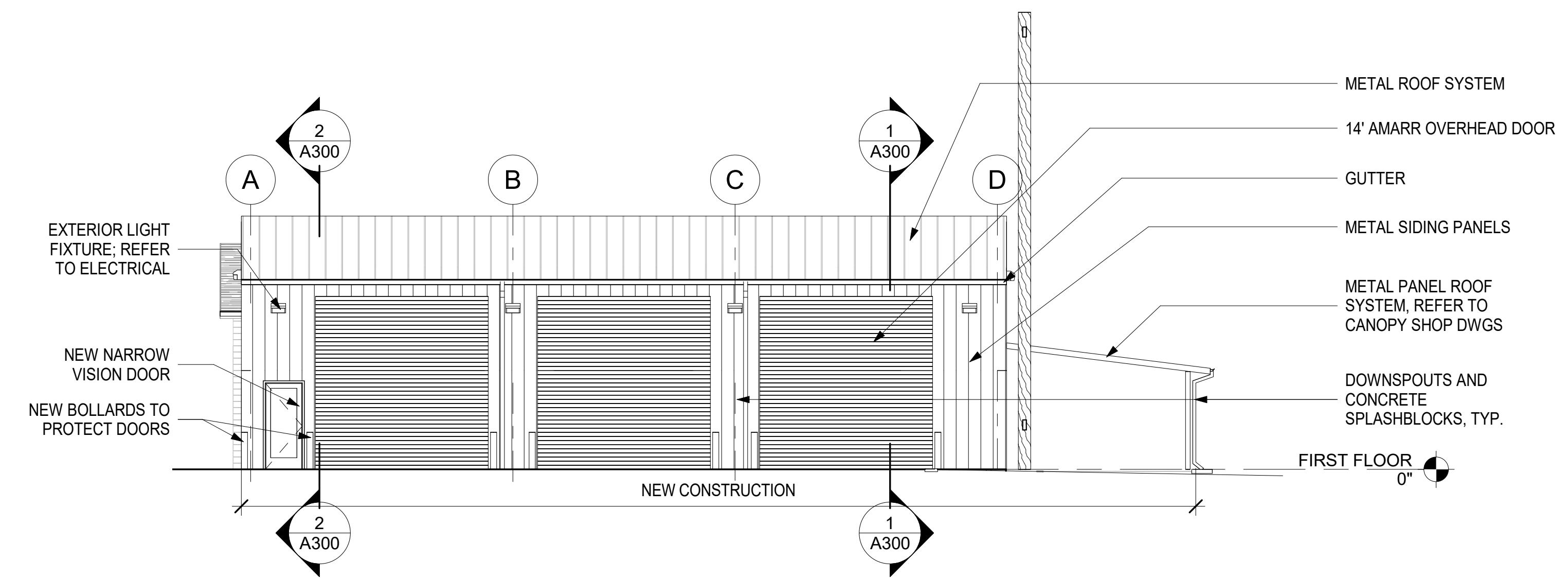
**ELEVATION NOTES**

- 1 REFER TO G100 FOR GENERAL PROJECT NOTES
- 2 REFER TO A200 FOR EXTERIOR MATERIAL SCHEDULE
- 3 CONTRACTOR TO INSTALL KICK-OUT FLASHING AT ALL LOCATIONS WHERE ROOFS TERMINATE WHILE INTERSECTING A VERTICAL WALL



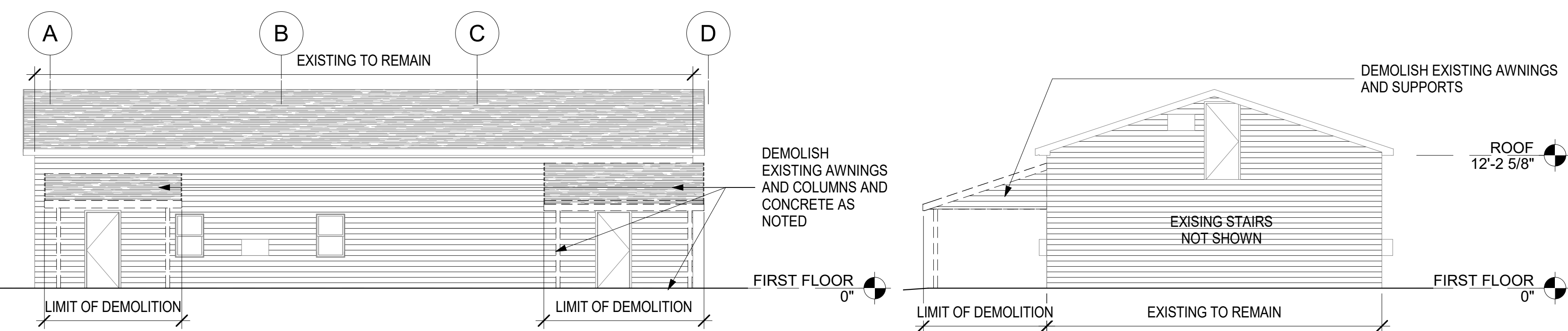
**5 SOUTH ELEVATION**

A200 SCALE: 1/8" = 1'-0"



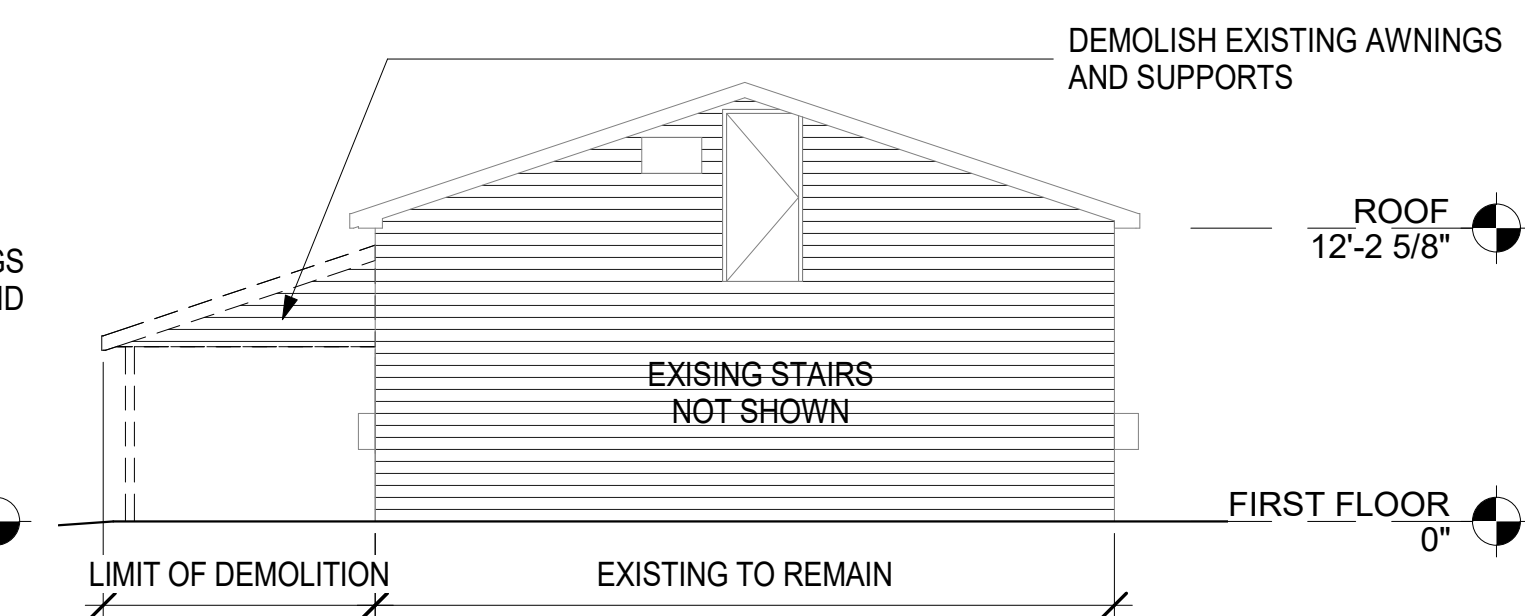
**4 NORTH ELEVATION**

A200 SCALE: 1/8" = 1'-0"



**2 DEMOLITION NORTH ELEVATION**

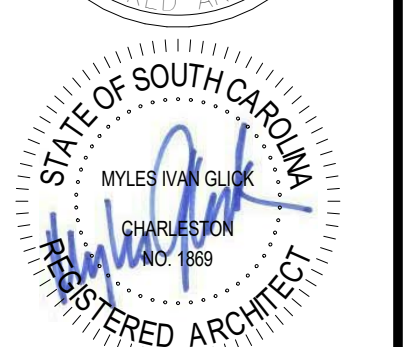
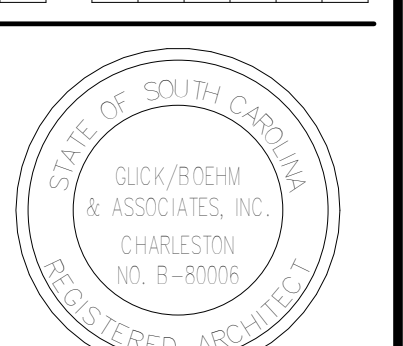
A200 SCALE: 1/8" = 1'-0"



**1 DEMOLITION WEST ELEVATION**

A200 SCALE: 1/8" = 1'-0"

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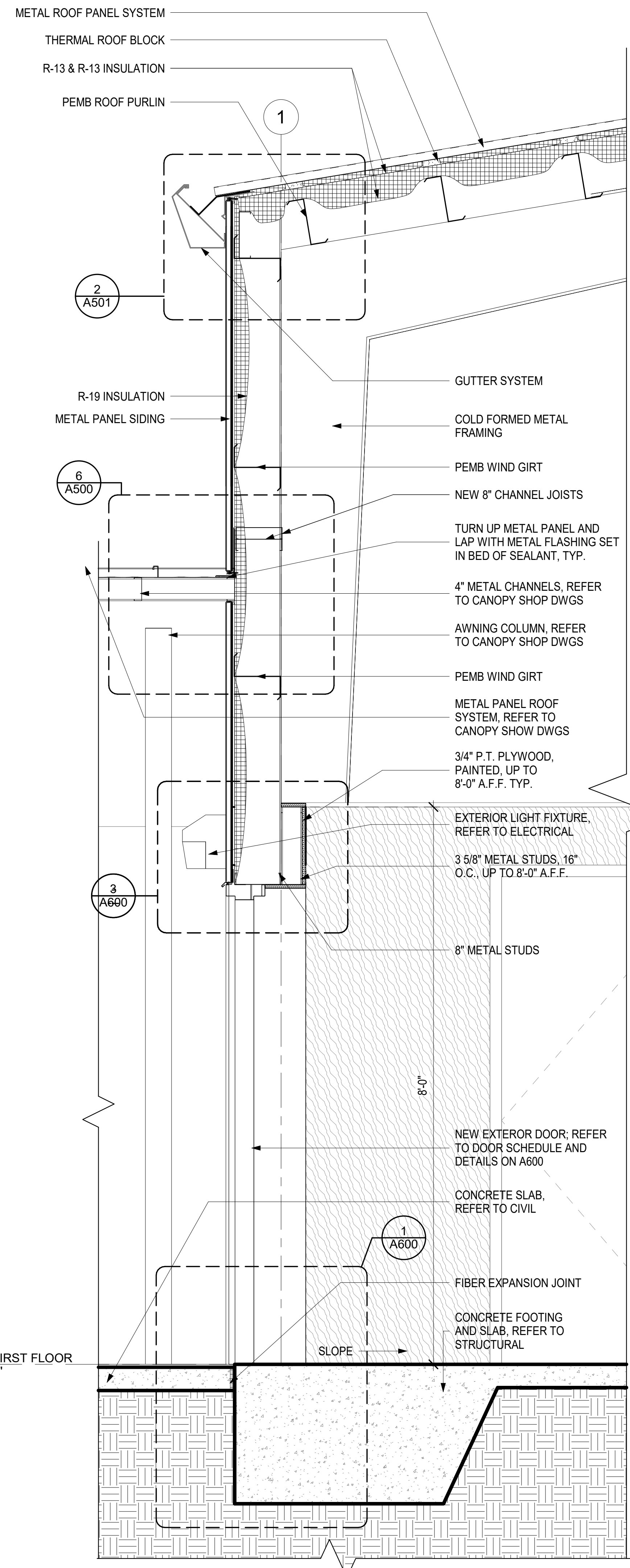
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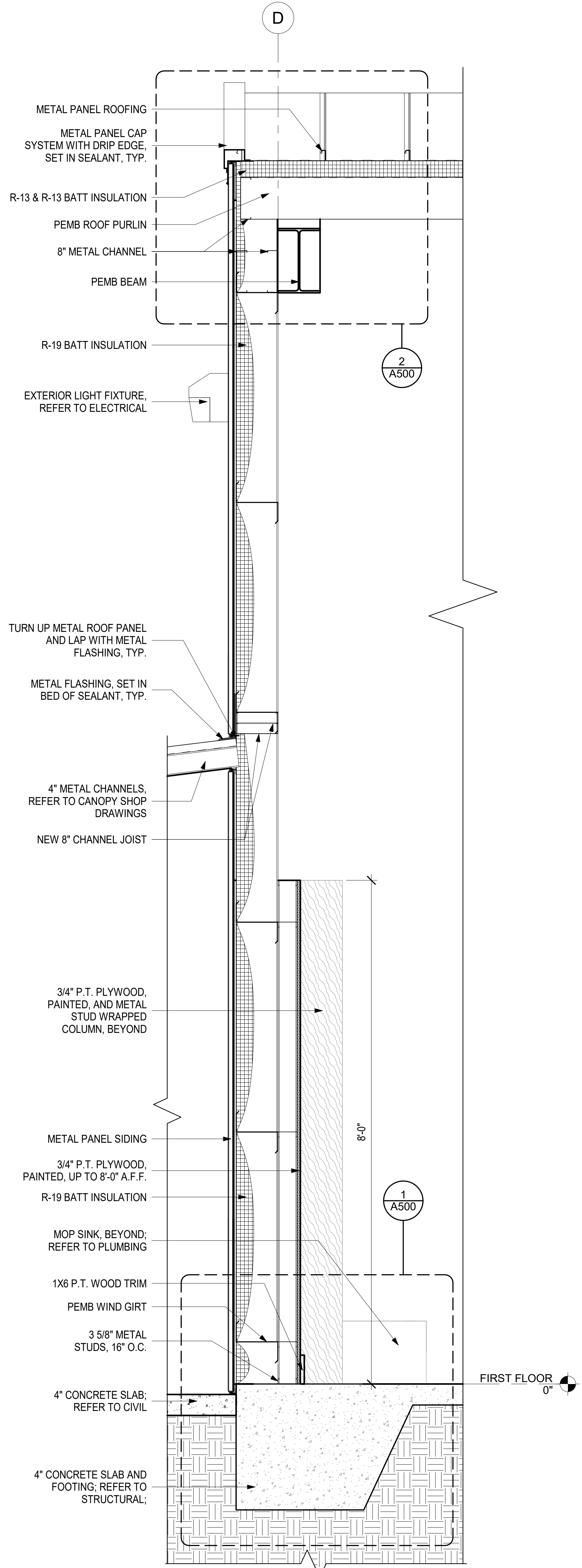
**EXTERIOR ELEVATIONS**

**A200**

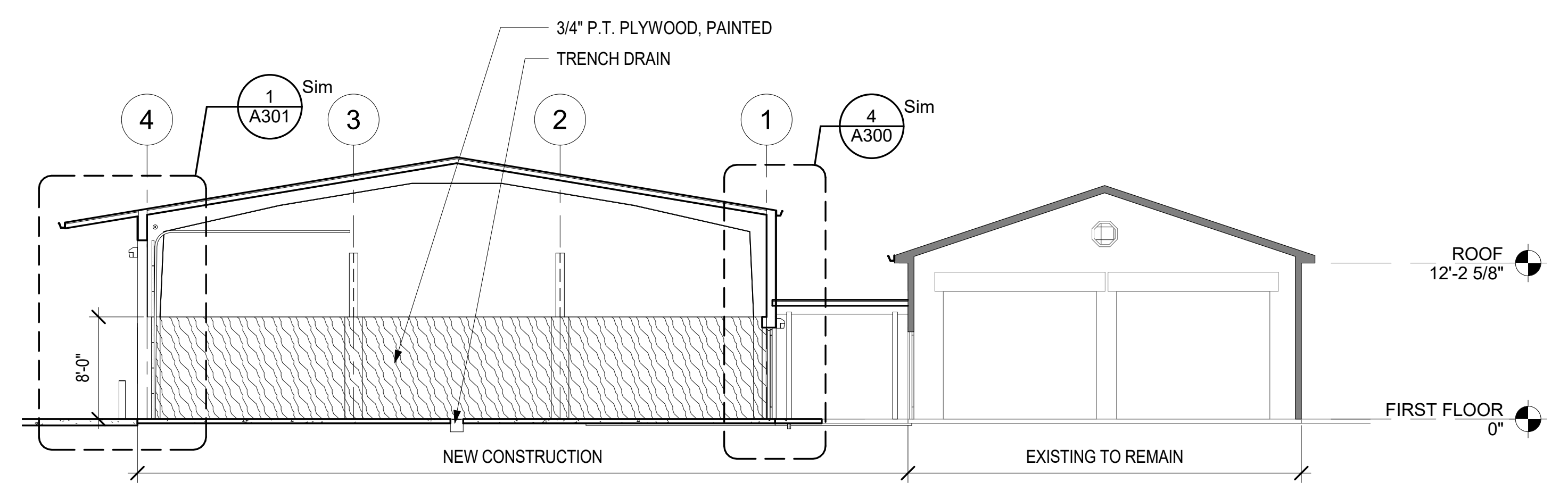




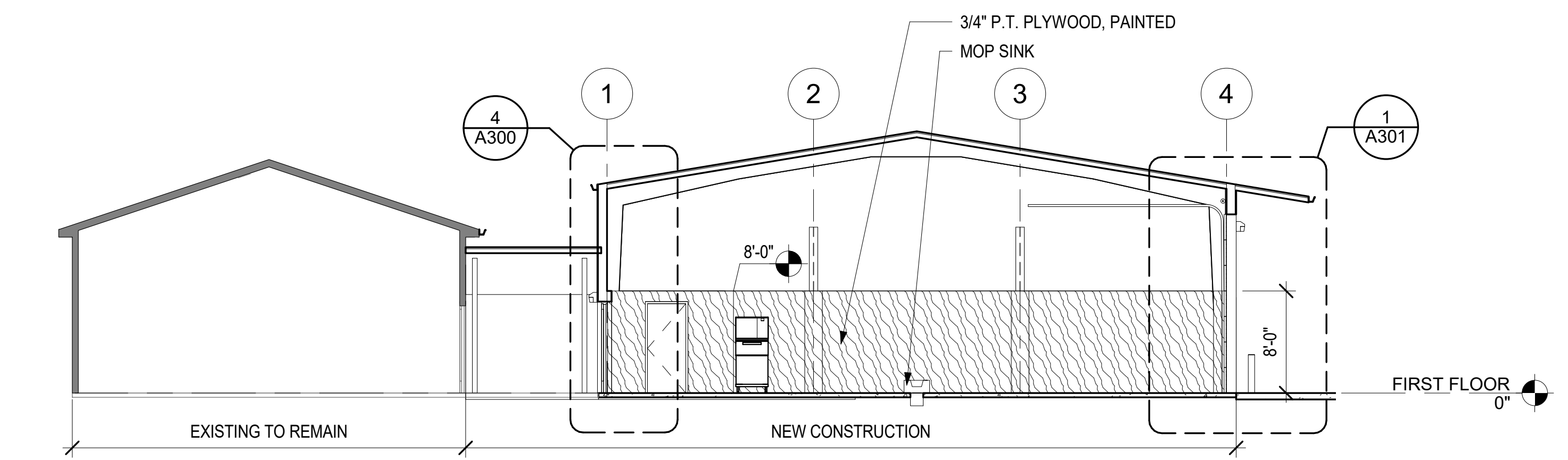
**4 WALL SECTION**  
A300 SCALE: 1" = 1'-0"



**3 WALL SECTION**  
A300 SCALE: 1" = 1'-0"



**2 BUILDING SECTION 2**  
A300 SCALE: 1/8" = 1'-0"



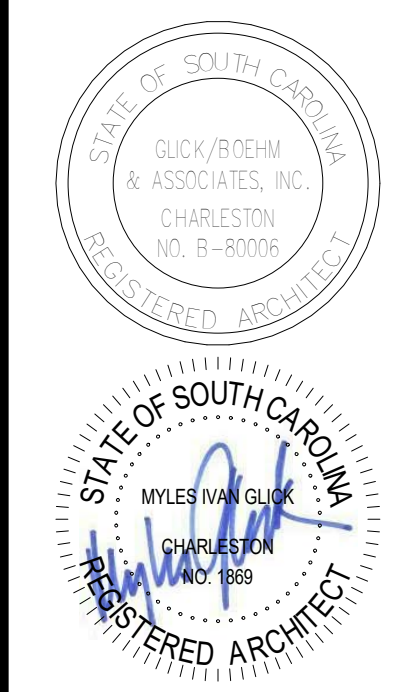
**1 BUILDING SECTION 1**  
A300 SCALE: 1/8" = 1'-0"

SECTION NOTES	
1	REFER TO G100 FOR GENERAL PROJECT NOTES
2	REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE

WALL SECTION NOTES	
1	REFER TO SHEET G100 FOR TYPICAL SYMBOLS, LEGENDS AND ABBREVIATIONS.
2	REFER TO SHEET G100 FOR COMPLETE LIST OF KEYNOTES IN PROJECT; NOT ALL KEYNOTES WILL BE USED ON ALL SHEETS.
3	ALL COLD FORMED METAL FRAMING IS TO COMPLY WITH ALL COLD FORMED METAL FRAMING NOTES ON S010.

REV. NO.	DATE	DESCRIPTION



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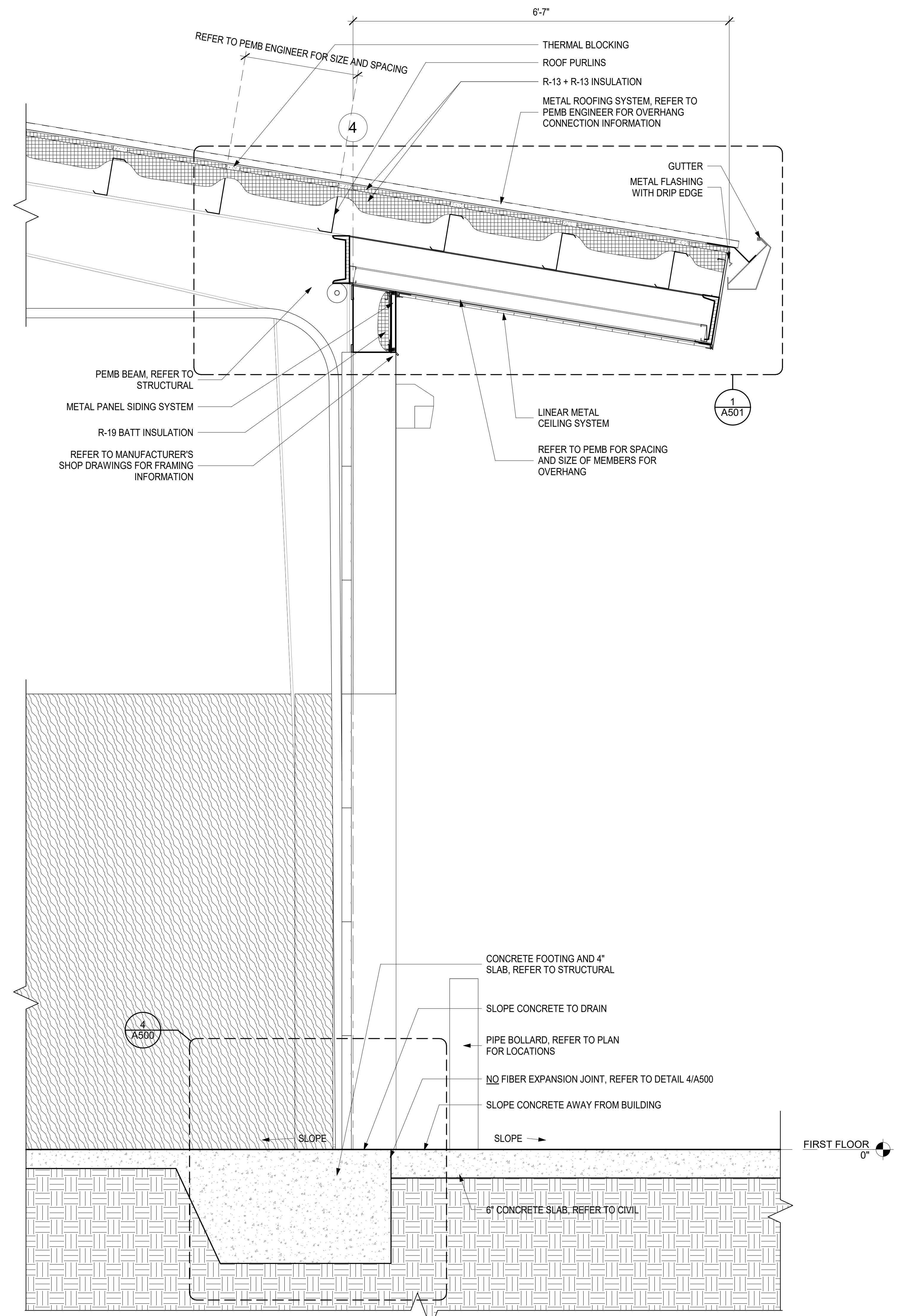
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APPROVED BY: MIG  
DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/10/2020

**BUILDING & WALL SECTIONS**

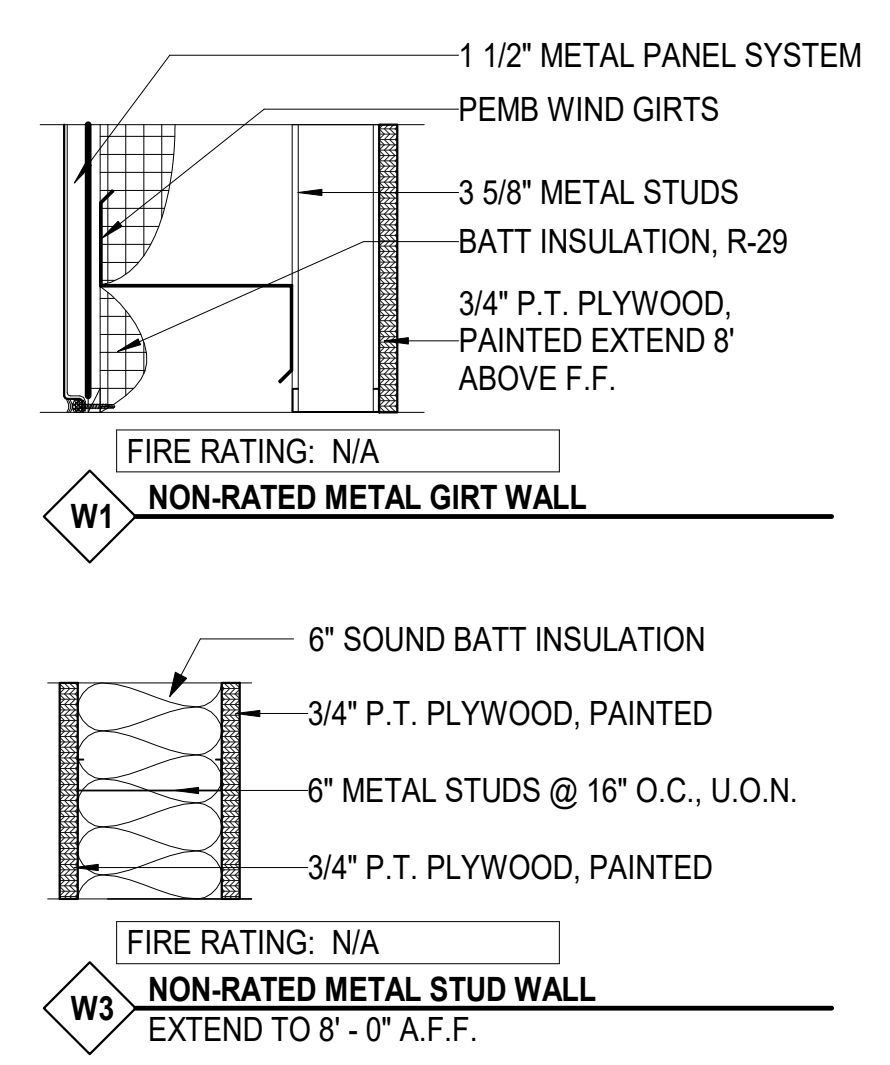
**A300**



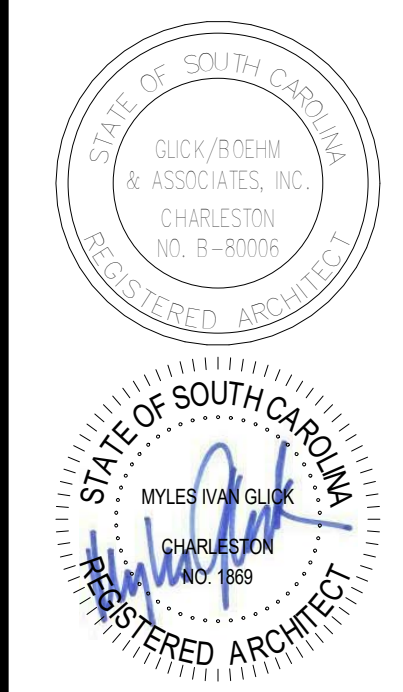
WALL SECTION NOTES	
1	REFER TO SHEET G100 FOR TYPICAL SYMBOLS, LEGENDS AND ABBREVIATIONS.
2	REFER TO SHEET G100 FOR COMPLETE LIST OF KEYNOTES IN PROJECT; NOT ALL KEYNOTES WILL BE USED ON ALL SHEETS.
3	ALL COLD FORMED METAL FRAMING IS TO COMPLY WITH ALL COLD FORMED METAL FRAMING NOTES ON S010.



**1 WALL SECTION 2**  
A301 SCALE: 1" = 1'-0"



REV. NO.	DATE	DESCRIPTION



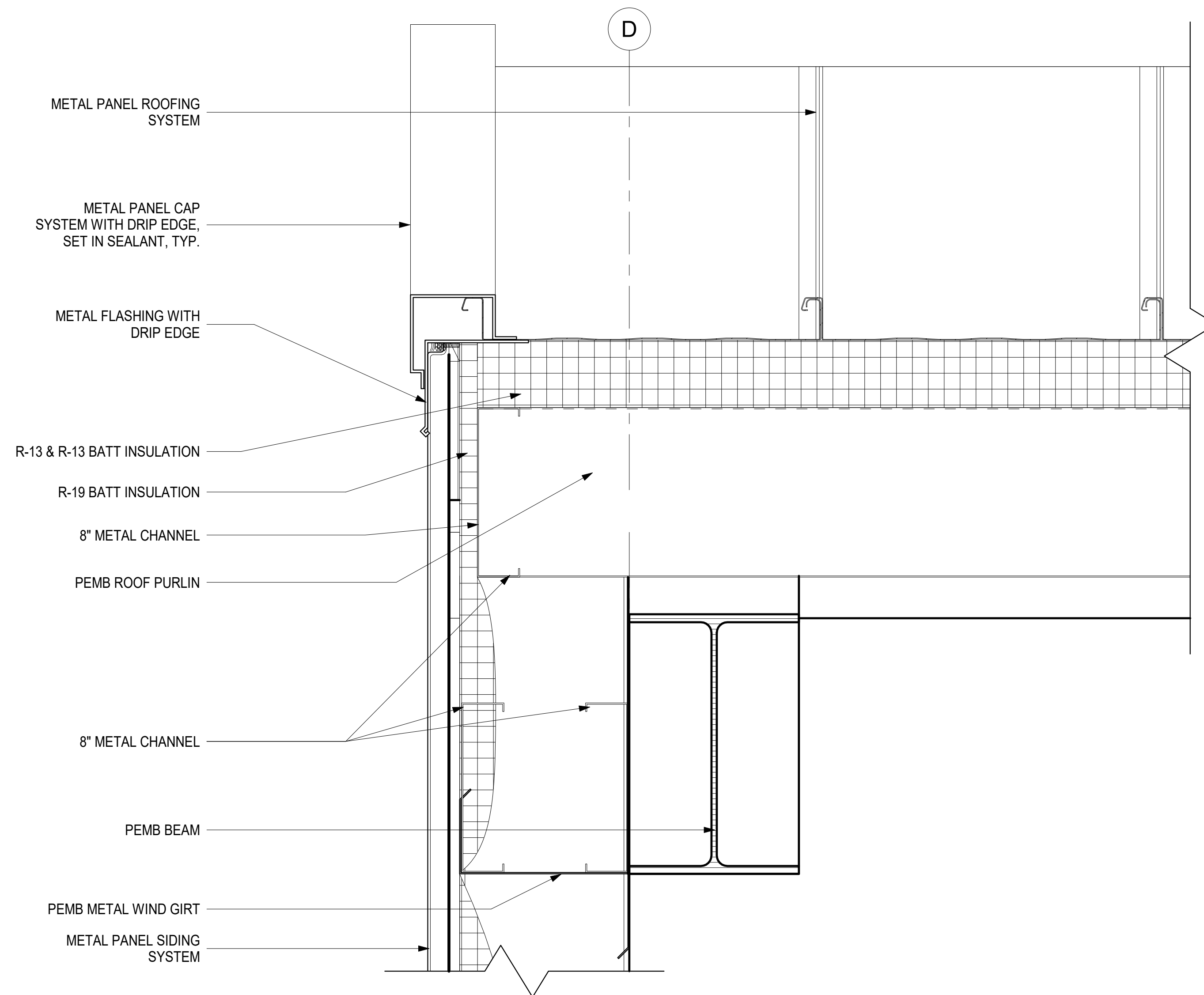
**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

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DRAWN BY: Author  
CHECKED BY: Checker  
APPROVED BY: Approver  
DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/10/2020

**WALL SECTIONS & WALL TYPES**

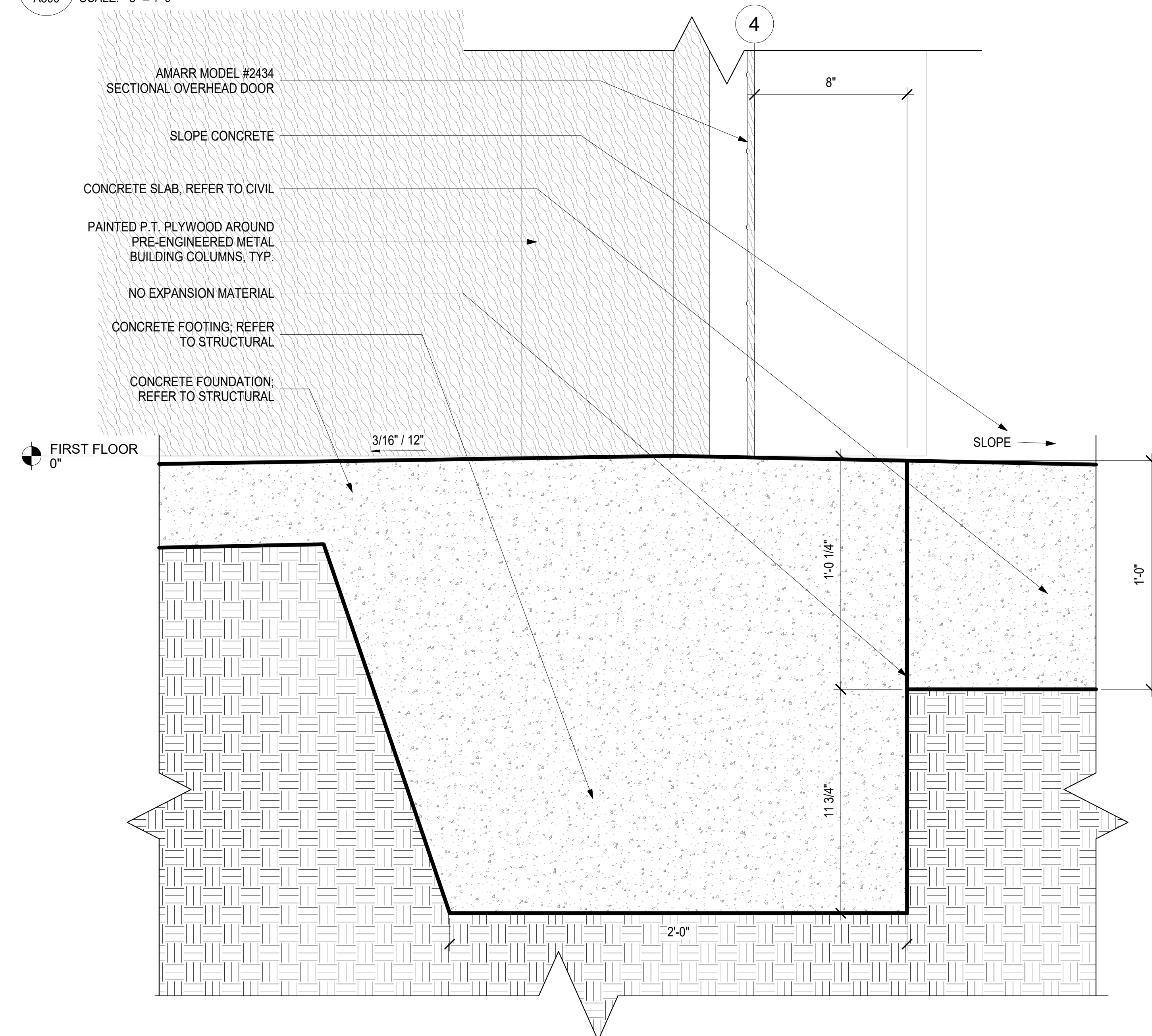
**A301**





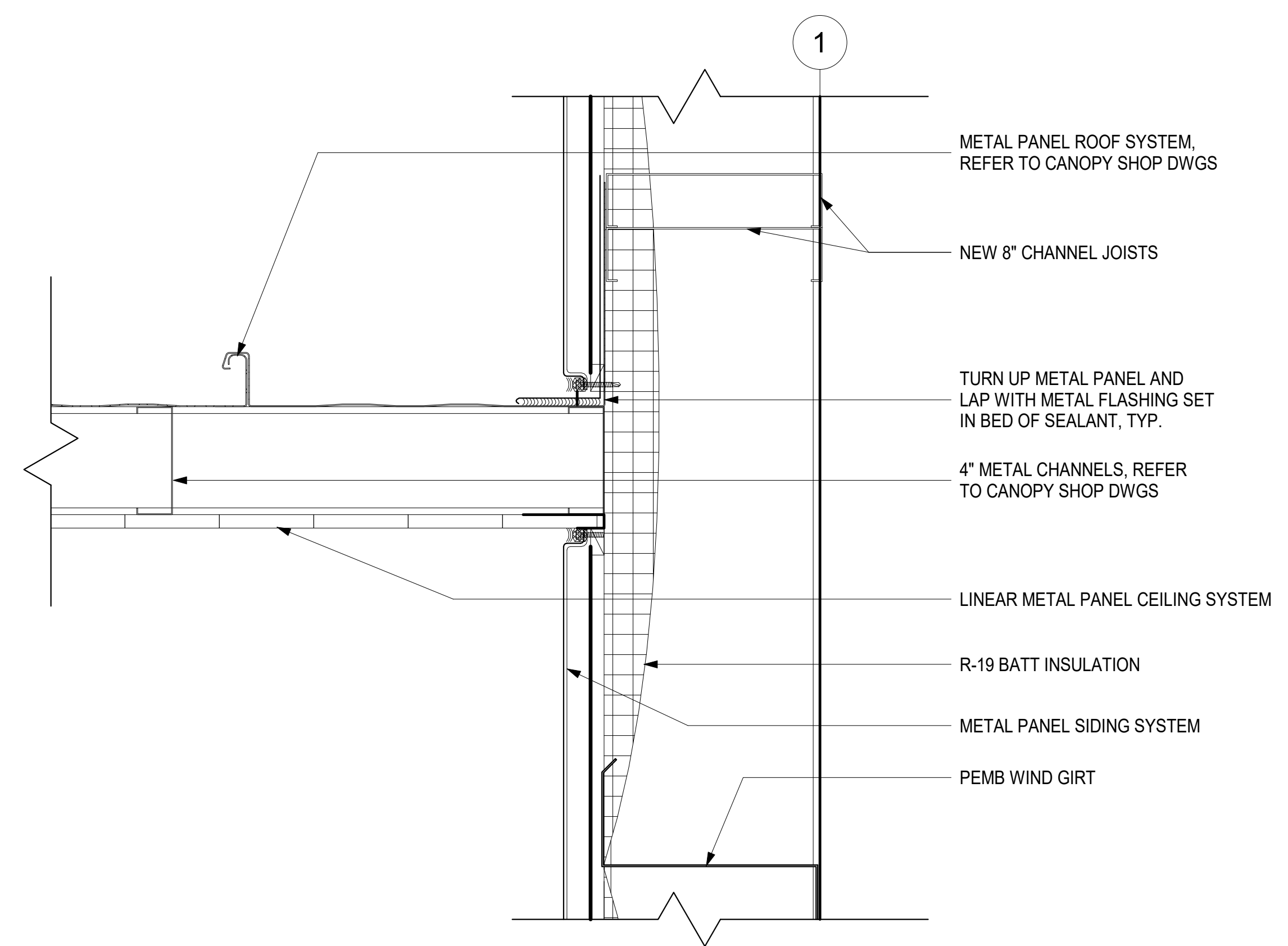
**2 METAL ROOF DETAIL @ RAKE**

A500 SCALE: 3" = 1'-0"



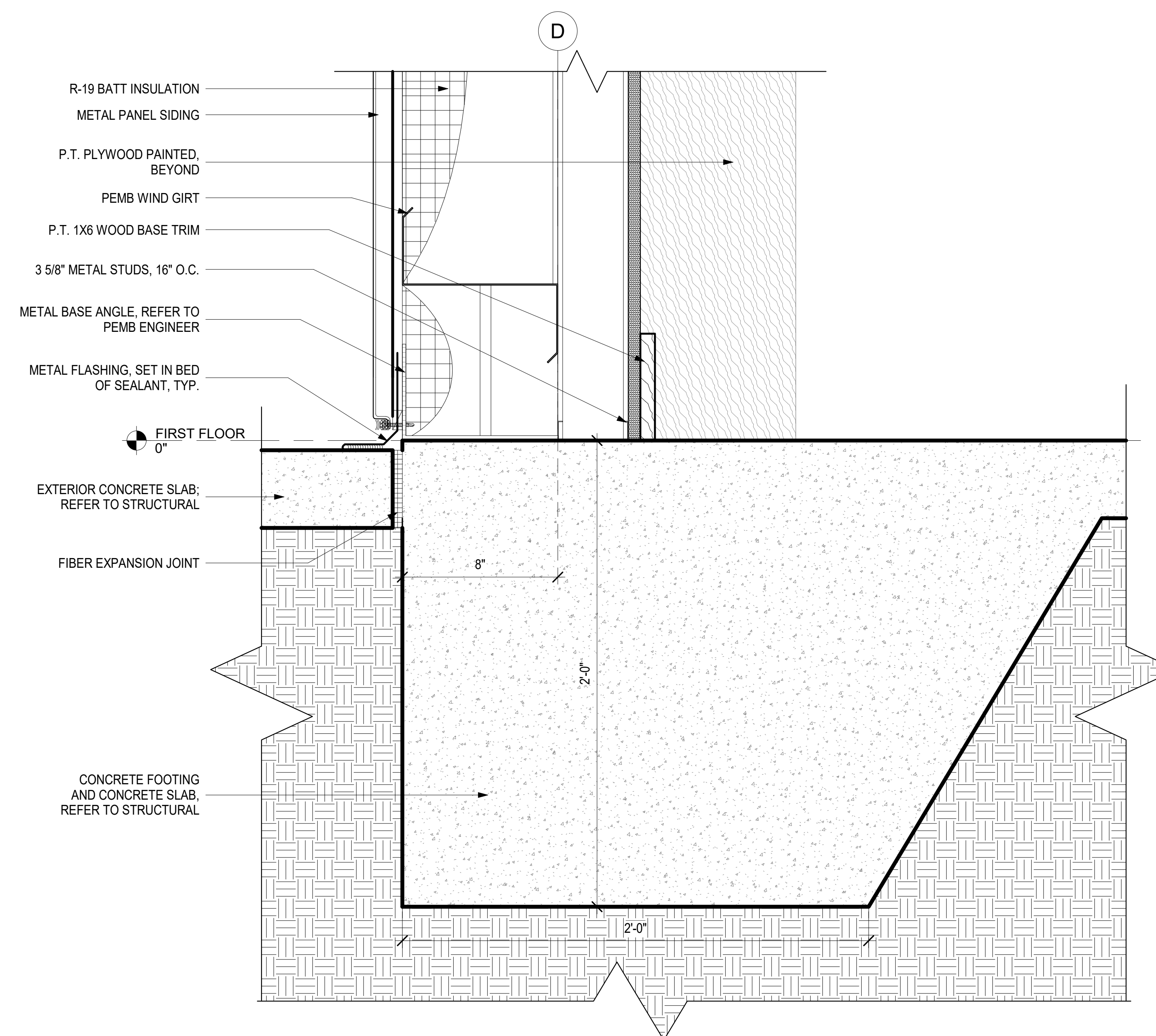
**4 CONCRETE FOOTING @ OVERHEAD DOOR THRESHOLD**

A500 SCALE: 3" = 1'-0"



**6 METAL ROOF @ METAL SIDING DETAIL**

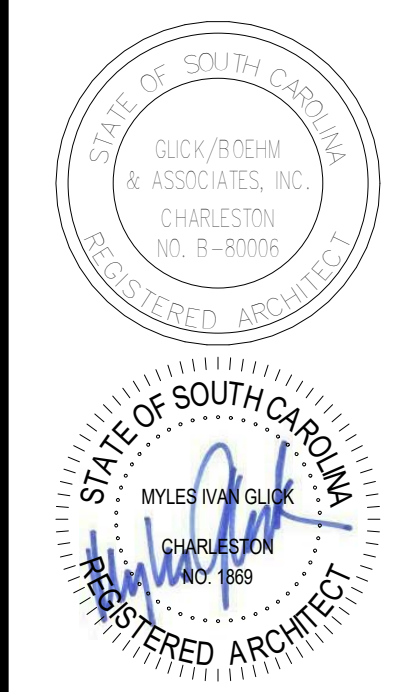
A500 SCALE: 3" = 1'-0"



**1 TYPICAL METAL SIDING TERMINATION DETAIL**

A500 SCALE: 3" = 1'-0"

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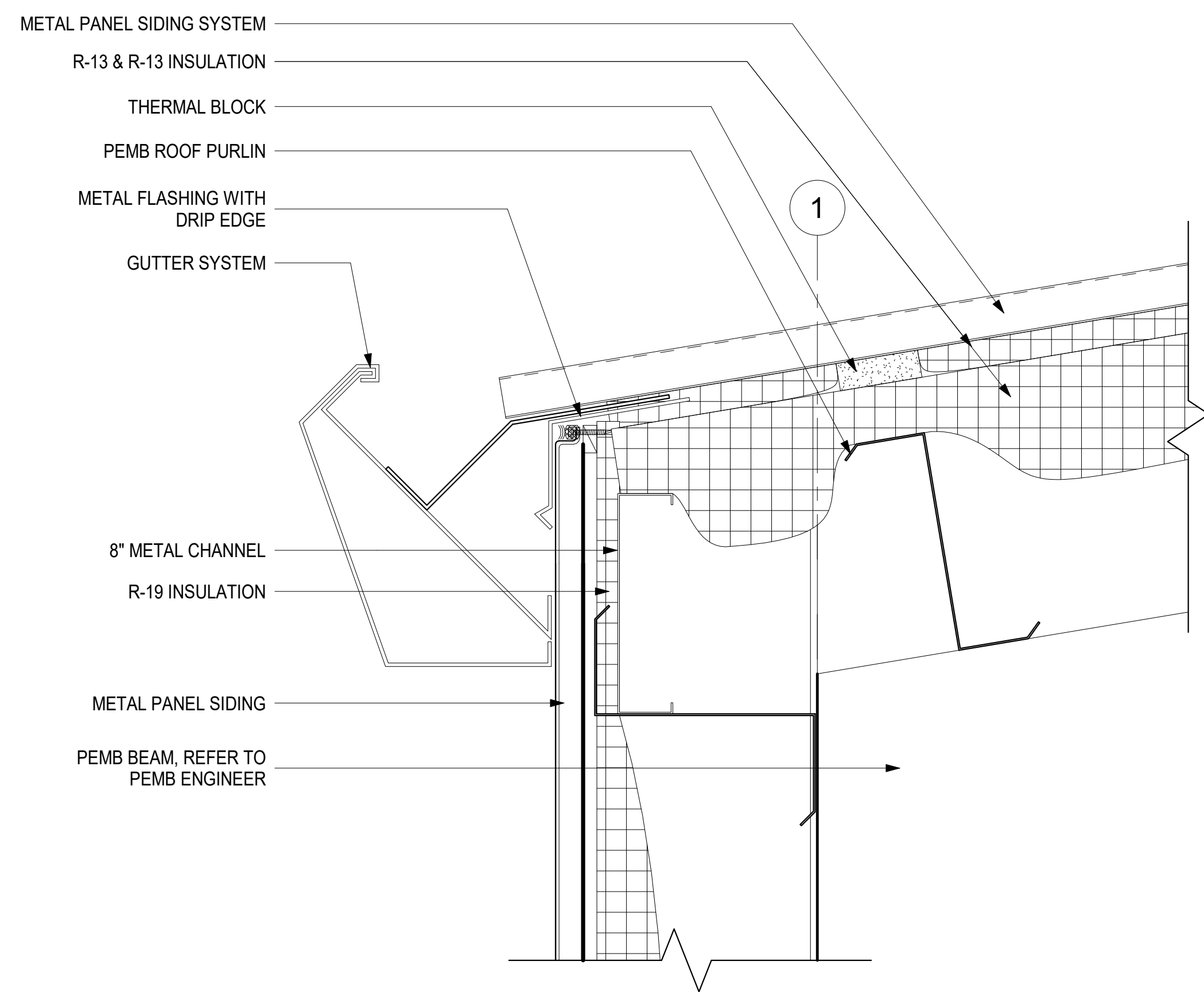
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DETAILS

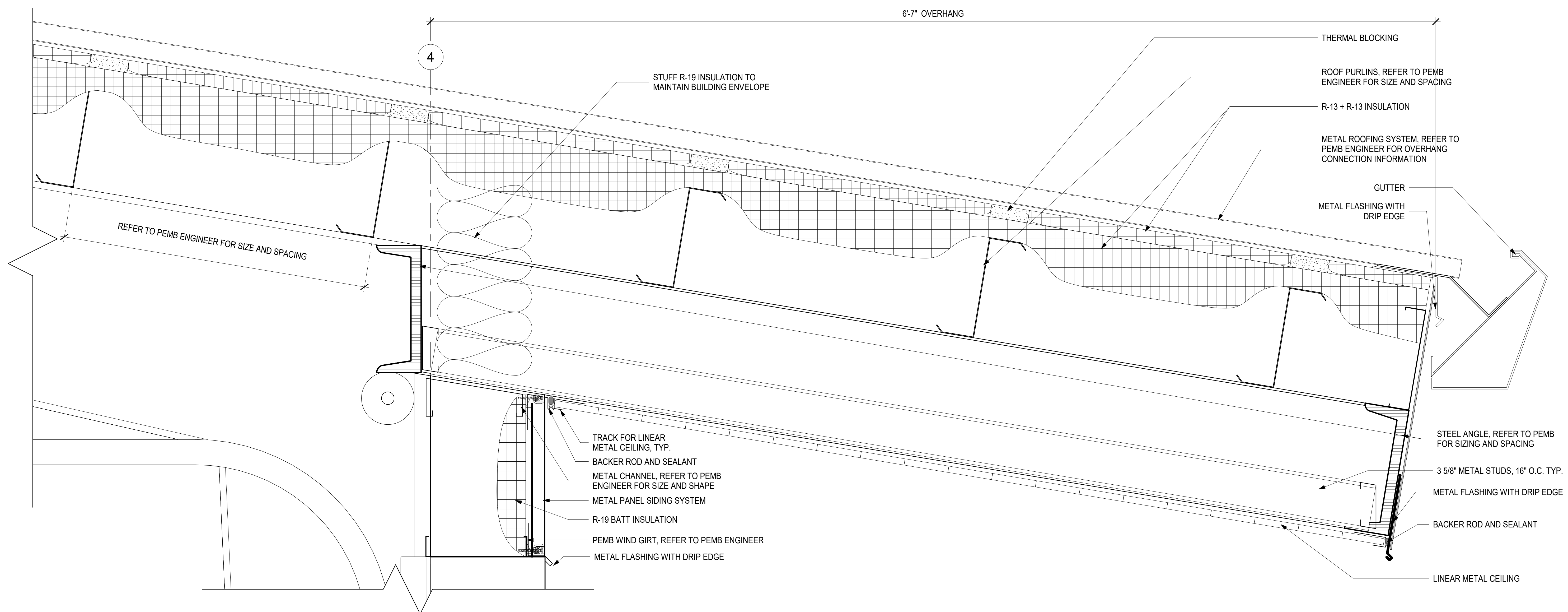
**A500**





**2 ROOF GABLE DETAIL**

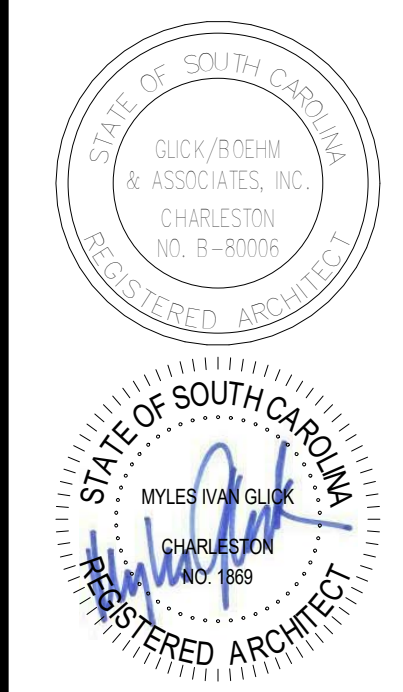
A501 SCALE: 3" = 1'-0"



**1 ROOF OVERHANG DETAIL**

A501 SCALE: 3" = 1'-0"

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DETAILS

**A501**



**DOOR & FRAME SCHEDULE**

TAG	DOOR							FRAME			FIRE RATING	HARDWARE SET	DETAILS			NOTES
	TYPE	HEIGHT	WIDTH	THICKNESS	MATERIAL	FINISH	GLAZING	TYPE	MATERIAL	FINISH			HEAD	JAMB	SILL	
1	01	14'-0"	14'-0"	2"	HM	PNT	-	SEE MANUFACTURER	HM	PNT	-	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	
2	01	14'-0"	14'-0"	2"	HM	PNT	-	SEE MANUFACTURER	HM	PNT	-	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	
3	01	14'-0"	14'-0"	2"	HM	PNT	-	SEE MANUFACTURER	HM	PNT	-	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	SEE MANUFACTURER	
4	D2	7'-0"	3'-0"	1 3/4"	HM	PNT	-	F1	HM	PNT	-	2	3/A600	2/A600	1/A600	SEE SPEC 08 21 00 FOR DOOR HARDWARE
5	D2	7'-0"	3'-0"	1 3/4"	HM	PNT	-	F1	HM	PNT	-	2	3/A600	2/A600	1/A600	SEE SPEC 08 21 00 FOR DOOR HARDWARE
6	D2	7'-0"	3'-0"	1 3/4"	HM	PNT	-	F1	HM	PNT	-	2	3/A600	2/A600	1/A600	SEE SPEC 08 21 00 FOR DOOR HARDWARE
7	03	7'-0"	3'-0"	1 3/4"	HM	PNT	-	F1	HM	PNT	-	1	SIM TO 3/A600	SIM TO 2/A600	SIM TO 1/A600	SEE SPEC 08 21 00 FOR DOOR HARDWARE

**DOOR SCHEDULE NOTES**

- 1 TYPE 01 DOOR TO BE 14'-0" AMARR OVERHEAD DOOR, PER OWNER'S REQUEST.
- 2 TYPE 02 DOOR TO BE NARROW VISION, HOLLOW METAL EXTERIOR DOOR
- 3 TYPE 03 DOOR TO BE PAINTED, SOLID CORE (WOOD DOOR); REFER TO OWNER FOR PAINT COLOR

**GLAZING TYPES**

TYPE	SIZE	DESCRIPTION
GL-1	1/4"	TEMPERED GLASS UNIT
GL-2	3/16"	FIRE-RATED GLASS UNIT

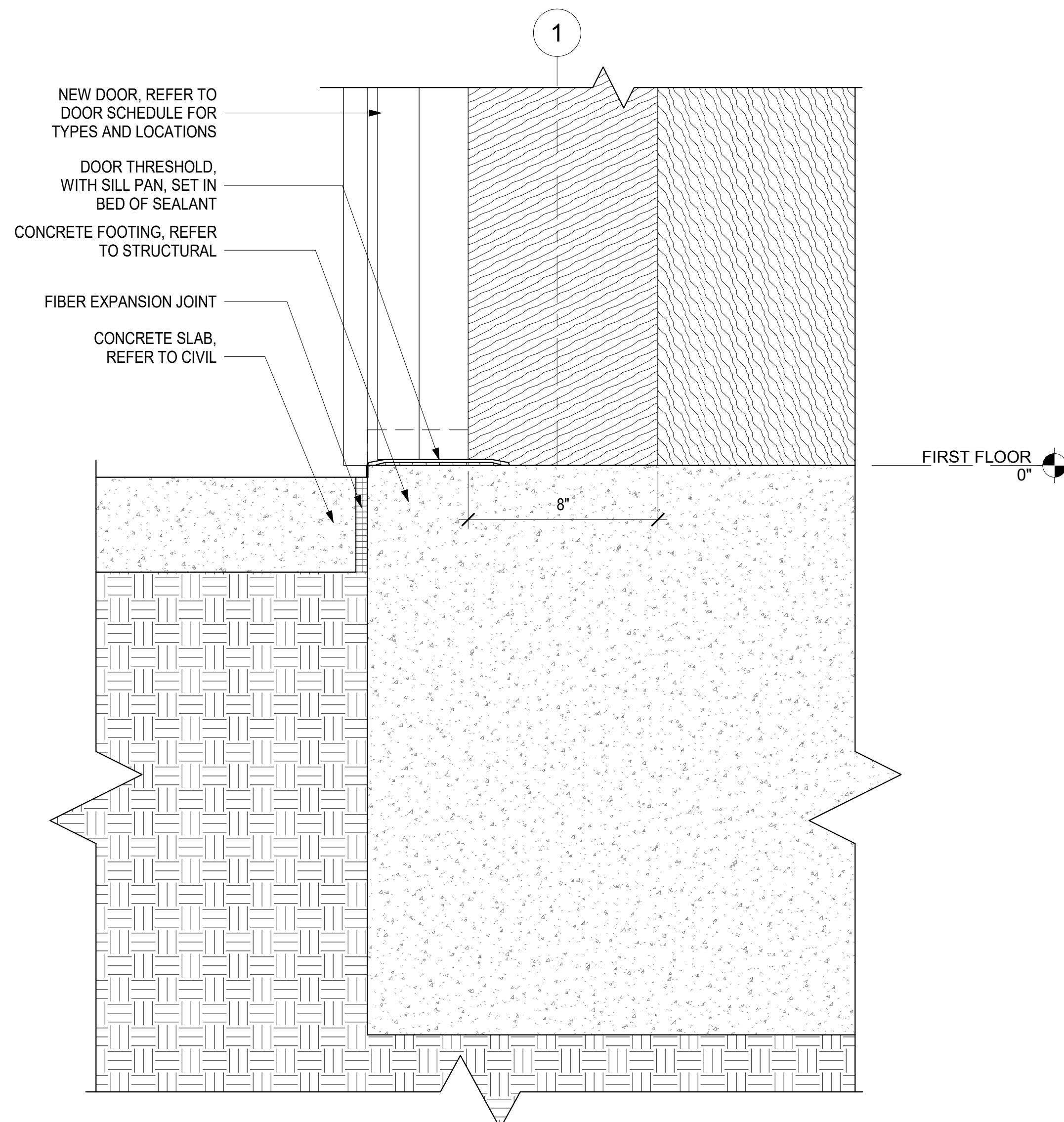
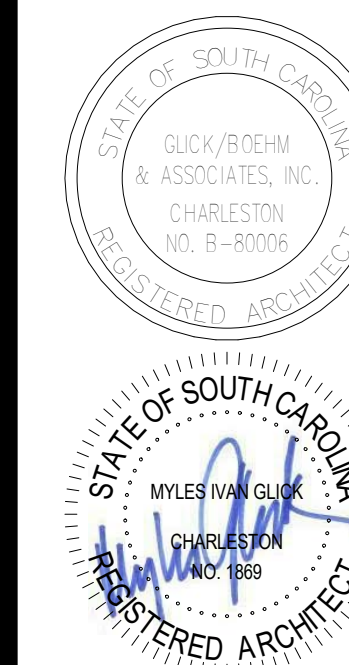
**FINISH LEGEND NOTES**

- 1 REFER TO FLOORING MATERIAL TRANSITION DETAILS ON SHEET A600.
- 2 ALL WALLS TO BE LEVEL 4 FINISH.
- 3 ALL WALLS TO BE PAINTED INSTITUTIONAL, LOW VOC EGG SHELL FINISH.
- 4 ALL CEILINGS TO BE PAINTED INSTITUTIONAL, LOW VOC, FLAT FINISH.
- 5 ALL ROOMS WITH GYPSUM BOARD FINISH TO HAVE A 1X6 WOOD TRIM BASE.

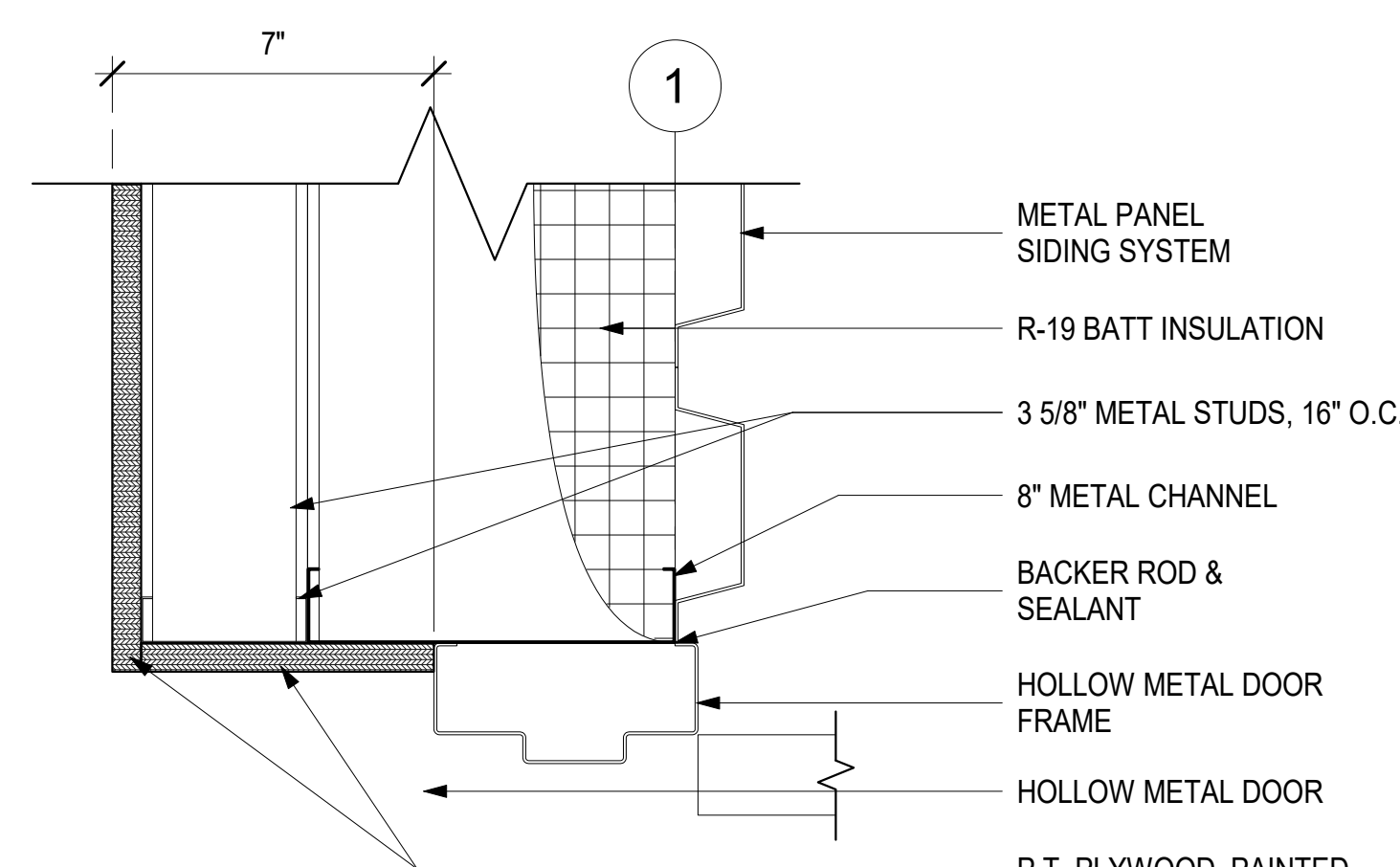
**FINISH ABBREVIATIONS**

ACT	ACOUSTICAL CEILING TILE
ACW	ALUMINUM CLAD WOOD
ALUM	ALUMINUM
CONC.	CONCRETE
CP	CARPET
CT	CERAMIC TILE
FF	FACTORY FINISH
GYP BD	GYPSUM BOARD
MFR	MANUFACTURER FINISH
PNT	PAINT
SC	SEATED CONCRETE
SCW	SOLID CORE (WOOD DOOR)
ST	STAIN (FACTORY FINISH)
WC	WAINSCOT
WD	WOOD

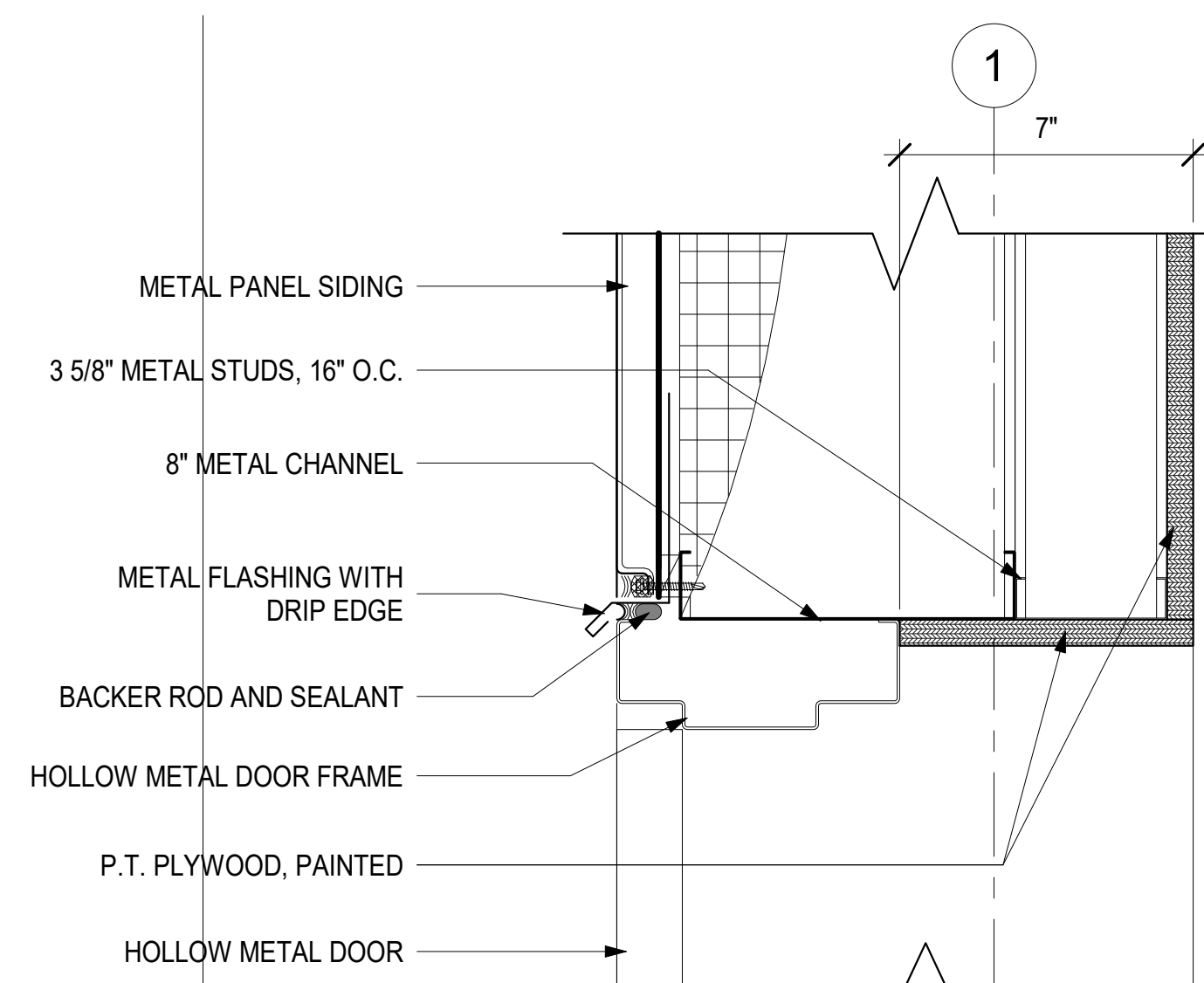
REV. NO. DATE DESCRIPTION



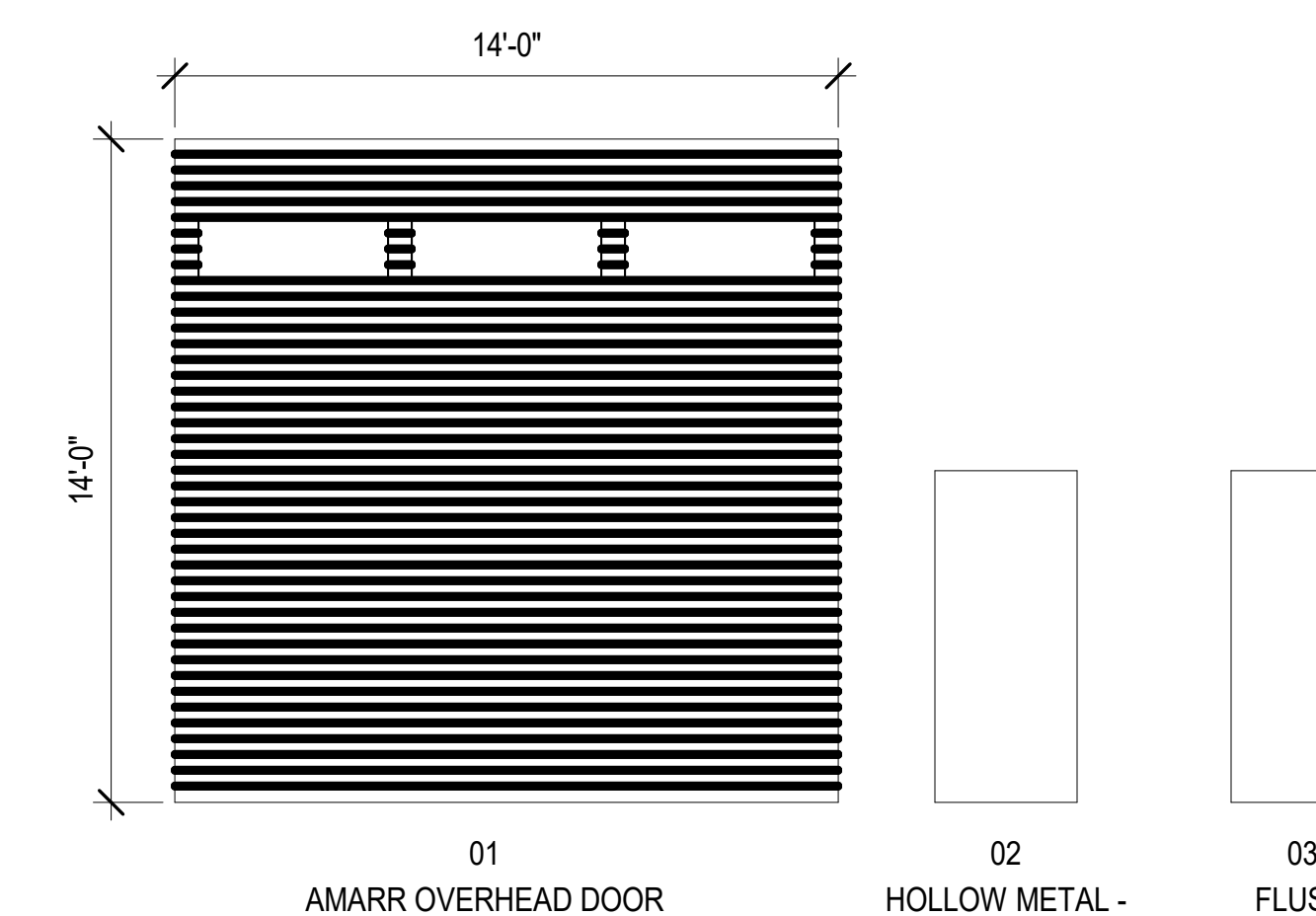
**1 EXTERIOR DOOR THRESHOLD DETAIL**  
A600 SCALE: 3" = 1'-0"



**2 TYPICAL DOOR JAMB DETAIL**  
A600 SCALE: 3" = 1'-0"



**3 TYPICAL DOOR HEAD DETAIL**  
A600 SCALE: 3" = 1'-0"



**DOOR TYPE ELEVATIONS**  
SCALE: 1/4" = 1'-0"

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**SCHEDULES & FINISHES**

**A600**



MECHANICAL SYSTEMS SEISMIC AND WIND REQUIREMENTS PER IBC-2018/ASCE 7-10			
A.	PER THE 2018 INTERNATIONAL BUILDING CODE, MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND COMPONENTS, INCLUDING THEIR SUPPORTS AND ATTACHMENTS, SHALL BE DESIGNED FOR SEISMIC FORCES IN ACCORDANCE WITH CHAPTER 13 OF ASCE 7-10.		
B.	EXTERIOR EQUIPMENT (INCLUDING ROOF CURBS, RAILS, SUPPORTS) EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED TO RESIST THE WIND PRESSURES DETERMINED IN ACCORDANCE WITH CHAPTER 26 TO 29 OF ASCE 7-10.		
C.	WHERE DESIGN FOR SEISMIC AND WIND LOADS IS REQUIRED, THE MORE DEMANDING FORCE MUST BE USED.		
D.	REFERENCE THE STRUCTURAL DRAWINGS FOR SITE SPECIFIC INFORMATION ON SEISMIC DESIGN CATEGORY, WIND SPEEDS, ETC.		
E.	USE THE TABLE BELOW TO DETERMINE SEISMIC RESTRAINT REQUIREMENTS FOR EACH COMPONENT.		
F.	FOR ALL COMPONENTS REQUIRING SEISMIC RESTRAINT, THE COMPONENT SUPPORTS AND ATTACHMENTS SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL REGISTERED IN THE STATE THE JOB IS LOCATED. SUBMITTALS MUST INCLUDE STAMPED AND SIGNED DRAWINGS AND CALCULATIONS.		
G.	WHERE SEISMIC RESTRAINT IS REQUIRED, HOUSEKEEPING PADS NEEDED FOR THE INSTALLATION OF EQUIPMENT UNDER THIS CONTRACT MUST BE DESIGNED BY THE SEISMIC ENGINEER. DO NOT POUR ANY HOUSEKEEPING PADS PRIOR TO THE RECEIPT OF THE APPROVED SEISMIC SUBMITTAL.		
H.	SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, CONDUIT, CABLE TRAYS AND BUS DUCT MUST BE SHOWN ON LAYOUT DRAWINGS SHOWING SPECIFIC RESTRAINT LOCATIONS ALONG WITH ACCOMPANYING DETAILS AND CALCULATIONS.		
MECHANICAL COMPONENT IMPORTANCE FACTOR (Ip) DESIGNATION			
Ip = 1.5			
• ALL HVAC COMPONENTS INCLUDING HEATERS, FANS, PIPING AND APPURTENANCES			
SEISMIC DESIGN CATEGORIES D,E,F			
COMPONENT IMPORTANCE FACTOR (Ip)			
1.5			
COMPONENT IDENTIFICATION	SEISMIC RESTRAINT REQUIREMENT	NOTES	
ROOF MOUNTED	RESTRAIN ALL	-	
FLOOR MOUNTED	RESTRAIN ALL	-	
WALL MOUNTED	RESTRAIN ALL	-	
COMPONENT SUPPORTS	RESTRAIN ALL	-	
SUSPENDED EQUIPMENT	INLINE W/ DUCT	RESTRAIN IF >75 LBS PROVIDE FLEX. CONN.	1
	NOT INLINE W/ DUCT/PIPE	RESTRAIN ALL	-
SUSPENDED DUCTILE PIPING (STEEL, ALUMINUM, COPPER, ETC.)	>1"		2
SUSPENDED NON DUCTILE PIPING (CAST IRON, PLASTIC, CERAMIC)	RESTRAIN ALL		2
SUSPENDED PIPE ON TRAPEZE	RESTRAIN IF ANY PIPE ON TRAPEZE > 1" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10 LBS/FT		2
DUCTWORK	6 SQ.FT. AND LARGER AND > 17 LBS/FT		2,3
MULTIPLE DUCTS ON TRAPEZE	RESTRAIN IF TOTAL WEIGHT OF DUCTS ON TRAPEZE > 10 LBS/FT		1,2
COMPONENT CERTIFICATION	REQUIRED		4
NOTES:			
1. FLEXIBLE CONNECTIONS REQUIRED FOR PIPE CONNECTIONS ONLY.			
2. RESTRAINT IS NOT REQUIRED IF THE PIPING / DUCTWORK IS SUPPORTED BY HANGERS AND EACH HANGER IN THE PIPING RUN IS 12 IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12 IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.			
3. ALL DUCTWORK, REGARDLESS OF SIZE, DESIGNED TO CARRY TOXIC, HIGHLY TOXIC, OR EXPLOSIVE GASES OR USED FOR SMOKE CONTROL MUST BE RESTRAINED.			
4. COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.			

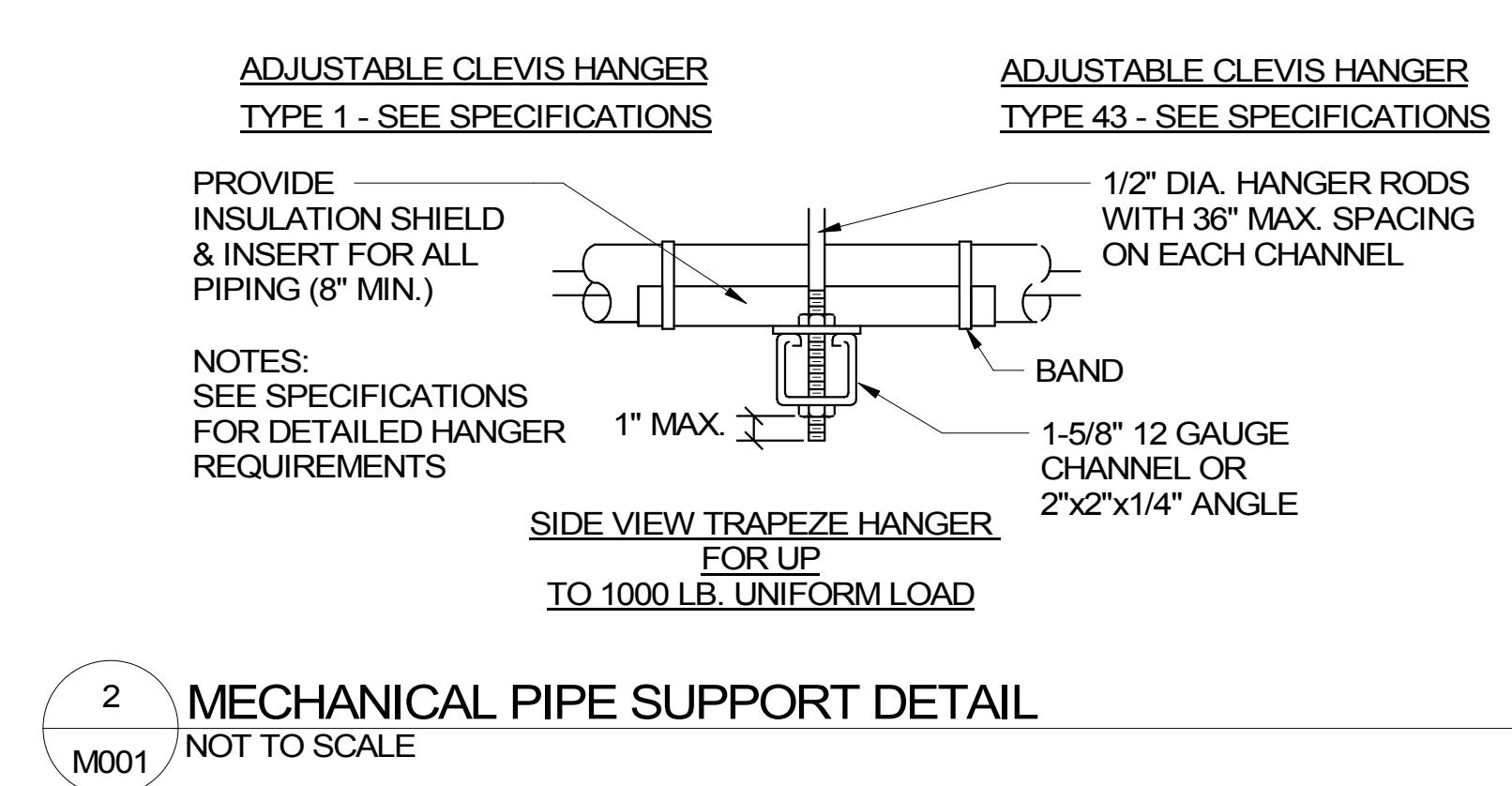
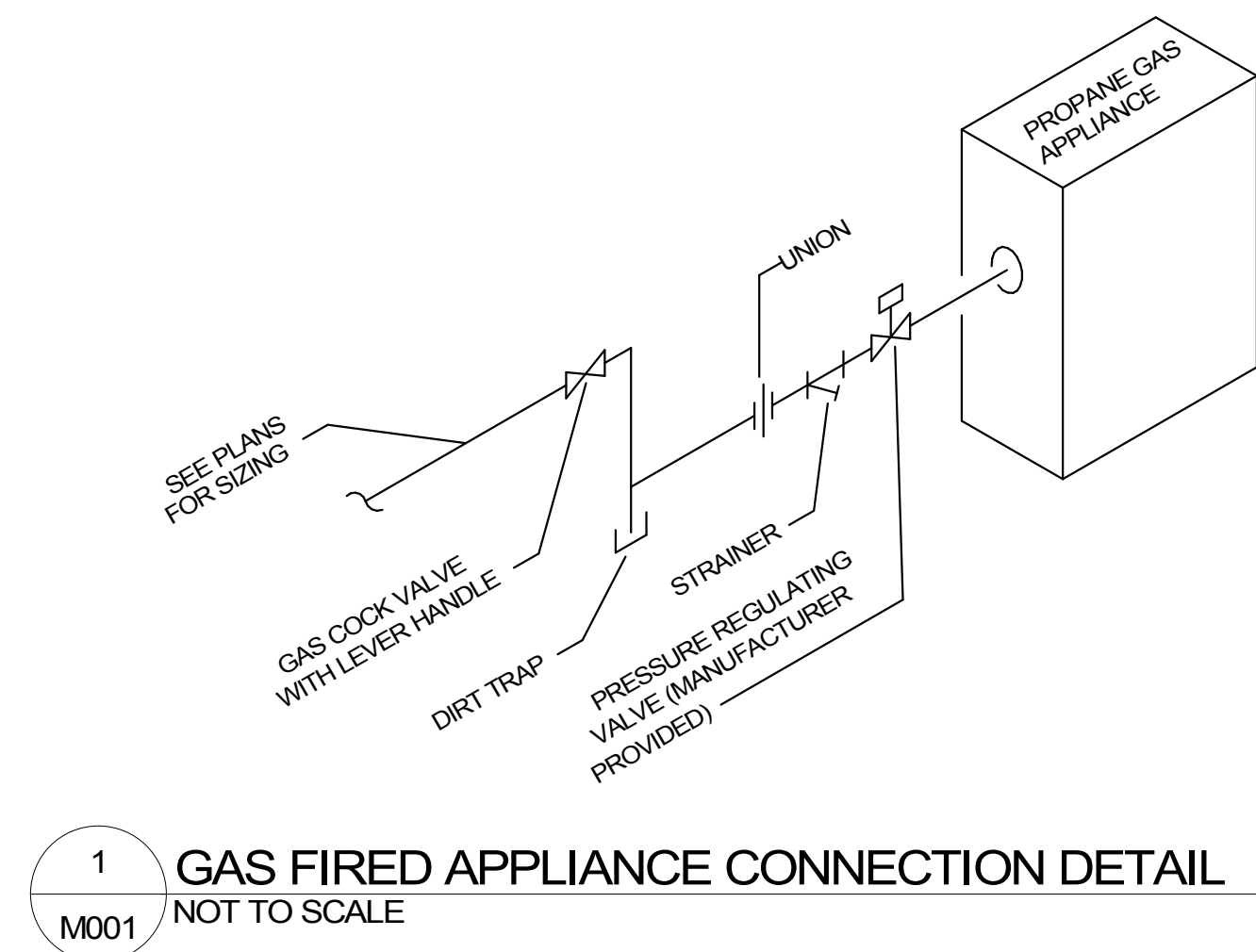
MECHANICAL ABBREVIATIONS	
ABBR	DESCRIPTION
(E)	EXISTING
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
BHP	BRAKE HORSE POWER
BOD	BASIS OF DESIGN
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
DB	DECIBELS
DIA	DIAMETER
EA	EXHAUST AIR
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EH	ELECTRIC HEATER
ESP	EXTERNAL STATIC PRESSURE
FD	FLOOR DRAIN
FD	FIRE DAMPER
FFM	FEET PER MINUTE
FRPM	FAN ROTATIONS PER MINUTE
FT	FEET
GA	GALLONS
GPM	GALLONS PER MINUTE
H	DOMESTIC HOT WATER SUPPLY
HD	HUB DRAIN
HP	HORSEPOWER
IN	INCHES
LAT	LEAVING AIR TEMPERATURE
MBH	THOUSANDS OF BTU'S PER HOUR
MC	MECHANICAL CONTRACTOR
NC	NOISE CRITERIA
OA	OUTSIDE AIR
P	PROPANE GAS
PC	PLUMBING CONTRACTOR
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RPM	ROTATIONS PER MINUTE
SA	SUPPLY AIR
SF	SUPPLY FAN
TYP	TYPICAL
UH	UNIT HEATER
VNT	VENT
W	WITH
°F	DEGREES FAHRENHEIT

HVAC SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	AIR TERMINAL TAG, X=TYPE MARK, Y=CFM		COMPONENT TO BE DEMOLISHED
	AIR TERMINAL DIFFUSER (CEILING MOUNTED)		DUCTWORK (X" = WIDTH, Y" = HEIGHT)
	AIR TERMINAL RETURN GRILLE (CEILING MOUNTED)		TURNING VANES
	AIR TERMINAL EX-HAUST GRILLE (CEILING MOUNTED)		CONDENSING UNIT
	THERMOSTAT		ROOF CAP
	HUMIDISTAT		CEILING MOUNTED EXHAUST FAN
	CO2 SENSOR		PREINSULATED FLEXIBLE DUCT
	DUCT MOUNTED SMOKE DETECTOR (BY E.C.)		PITCH POCKET
	EQUIPMENT CLEARANCE		FLEXIBLE DUCT CONNECTION
	FIRE DAMPER		CONNECTION TO EXISTING SYSTEM
	MANUAL DAMPER		MOTORIZED DAMPER
	THERMOSTAT (DUCT MOUNTED)		HUMIDISTAT (DUCT MOUNTED)

MECHANICAL CODES & STANDARDS	
CODE	DESCRIPTION
IBC (2018)	INTERNATIONAL BUILDING CODE
IECC (2009)	INTERNATIONAL ENERGY CONSERVATION CODE
IMC (2018)	INTERNATIONAL MECHANICAL CODE
NFPA 90A (2009)	STANDARD FOR THE INSTALLATION AIR-CONDITIONING & VENTILATING SYSTEMS
SMACNA (2005)	HVAC DUCT CONSTRUCTION STANDARDS MANUAL, THIRD EDITION

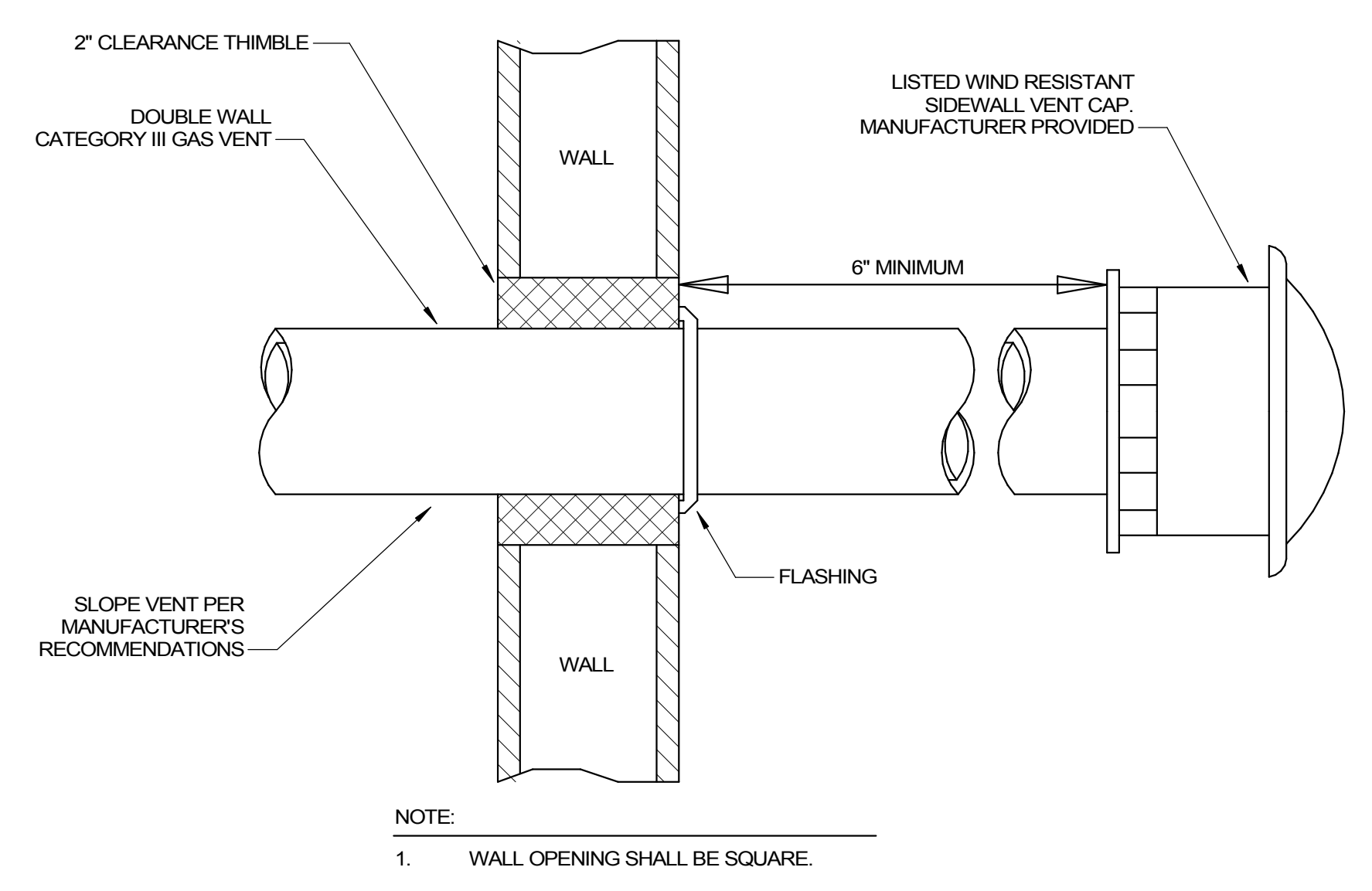
MAXIMUM PIPE/TUBING SUPPORT SPACING												
NOM. SIZE	IN.	THRU 3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
PIPE	FT.	7	7	7	9	10	11	12	14	16	17	19
TUBING	FT.	5 FT	6	7	8	8	9	10	12	13	14	16

NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

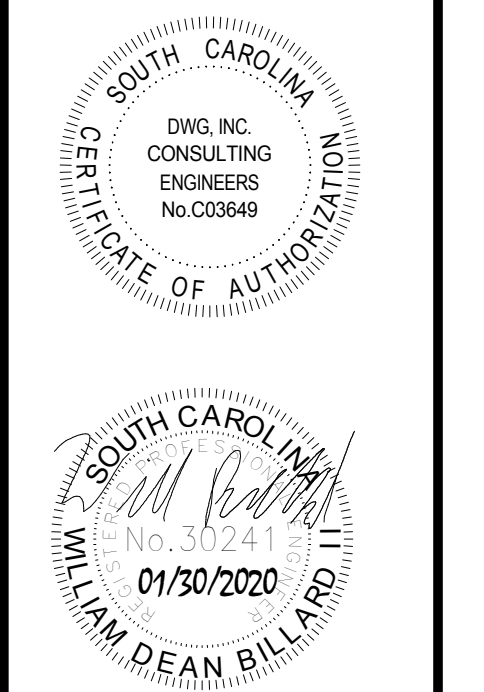


**GENERAL HVAC NOTES**

- THE DRAWINGS SHOW THE GENERAL ARRANGEMENT AND LOCATION OF EQUIPMENT, DUCTWORK, PIPING, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE MECHANICAL INSTALLATION W/ THE STRUCTURE AND OTHER TRADES AND SHALL PROVIDE ADDITIONAL OFFSETS AND FITTINGS AS NECESSARY.
- COORDINATE WORK WITH AUTHORITY HAVING JURISDICTION AND OBTAIN ALL PERMITS AND INSPECTIONS.
- PROVIDE OWNER WITH CERTIFICATES OF FINAL INSPECTION AND ACCEPTANCE FROM AUTHORITY HAVING JURISDICTION.
- THE HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS SHALL COMPLY WITH THE CODES LISTED ON THIS SHEET AS WELL AS ALL LOCAL CODE OFFICIAL REQUIREMENTS. IN THE EVENT OF A CONFLICT BETWEEN CODES, THE MOST STRINGENT SHALL ALWAYS GOVERN.
- DUCT DIMENSIONS ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
- THE CONTRACTOR SHALL CHECK AND VERIFY ALL CLEARANCES PRIOR TO FABRICATION OR INSTALLATION OF EQUIPMENT, DUCTWORK, AND PIPING SYSTEMS. WHERE CONDITIONS REQUIRE A CHANGE IN DUCT OR PIPE ROUTING, NOTIFY THE ARCHITECT FOR AN ACCEPTABLE ALTERNATIVE METHOD. AVOID ROUTING DUCTWORK DIRECTLY OVER LIGHT FIXTURES, DIFFUSERS, AND OTHER CEILING MTD. DEVICES. LOCATE ALL MECHANICAL EQUIPMENT SO THAT FILTERS AND COMPONENTS REQUIRING ACCESS (SERVICE AND MAINTENANCE) ARE FULLY ACCESSIBLE.
- ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS WITH PRESCRIBED CLEARANCES FOR SERVICE AND MAINTENANCE. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IF RECOMMENDED CLEARANCES ARE NOT POSSIBLE BEFORE INSTALLING EQUIPMENT.
- ALL ROTATING MECHANICAL EQUIPMENT SHALL BE PROVIDED WITH VIBRATION ISOLATION.
- SEISMIC PROTECTION OF EQUIPMENT, DUCTWORK, PIPING AND UTILITIES SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 16 OF THE INTERNATIONAL BUILDING CODE, 2018 EDITION. ALL SEISMIC RESTRAINT AND BRACING SHALL BE SUBSTANTIATED BY MANUFACTURER'S SUBMITTALS PER THE SPECIFICATIONS. FOR ADDITIONAL INFORMATION, SEE 'SEISMIC AND WIND REQUIREMENTS FOR MECHANICAL SYSTEMS' ON THIS SHEET. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING INSTALLATION OF SEISMIC BRACING DEVICES WITH THE OWNER'S SEISMIC SPECIAL INSPECTOR. PROVIDE A MINIMUM OF SEVEN DAYS ADVANCE NOTICE OF INSTALLATION.
- ALL CONTROL WIRING AND CONTROLS ACCESSORIES NECESSARY TO IMPLEMENT THE OUTLINED SEQUENCES OF OPERATION SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR.
- SEE ARCHITECTURAL DOCUMENTS FOR WALL PENETRATION AND FLASHING REQUIREMENTS.
- WHERE "APPROXIMATELY" IS USED TO DEFINE INSTALLATION LOCATIONS, CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES TO VERIFY THERE ARE NO CONFLICTS PRIOR TO INSTALLATION AT DIMENSION LISTED.



REV. NO.	DATE	DESCRIPTION



GAS UNIT HEATER SCHEDULE								
MARK	AIRFLOW (CFM)	INPUT (MBH)	OUTPUT (MBH)	MOTOR HP	MOUNTING TYPE	FUEL TYPE	BASIS OF DESIGN	MODEL
UH-1	950	75	60	1/8	CEILING SUSPENDED	PROPANE	LENNOX	LF24-75A
UH-2	950	75	60	1/8	CEILING SUSPENDED	PROPANE	LENNOX	LF24-75A

NOTES:  
 1. SEE ELECTRICAL DRAWINGS FOR VOLTAGE REQUIREMENTS.  
 2. PROVIDE WITH WIRED THERMOSTAT FOR CONTROL. MOUNT ON WALL AT 4'-0" A.F.F.  
 3. PROVIDE WITH MANUFACTURER PROVIDED SIDEWALL VENTING KIT.  
 4. HANG PER THE MANUFACTURER'S REQUIREMENTS.

CEILING FAN SCHEDULE					
MARK	CFM	DESCRIPTION	DIAMETER (INCHES)	MANUFACTURER	MODEL
CF-1	7,000	INDUSTRIAL CEILING FAN	60	GLOBAL INDUSTRIAL	653548
CF-2	7,000	INDUSTRIAL CEILING FAN	60	GLOBAL INDUSTRIAL	653548
CF-3	7,000	INDUSTRIAL CEILING FAN	60	GLOBAL INDUSTRIAL	653548

NOTES:  
 1. ALL UNITS SHALL BE HUNG FROM STRUCTURE PER MANUFACTURER'S RECOMMENDATIONS.  
 2. SEE ELECTRICAL DRAWINGS FOR VOLTAGE AND DISCONNECT REQUIREMENTS.  
 3. PROVIDE WITH ON/OFF SWITCH CONTROL.

LOUVER SCHEDULE									
MARK	TYPE	AIRFLOW (CFM)	MAX VELOCITY (FPM)	MAX AIR PRESSURE DROP (IN W.C.)	MIN FREE AREA (SF)	HEIGHT (FT)	WIDTH (FT)	BASIS OF DESIGN	MODEL
L-1	EXHAUST	2,500	1000	0.35	2.75	2' - 6"	2' - 6"	GREENHECK	EHV-550D
L-2	INTAKE	2,500	1000	.35	2.75	2' - 6"	2' - 6"	GREENHECK	EHV-550D

NOTES:  
 1. COORDINATE LOUVER ELEVATION, LOCATION, AND FINISH WITH ARCHITECTURAL PLANS.  
 2. PROVIDE LOUVER WITH INSECT SCREEN.

FAN SCHEDULE							
TAG	CAPACITY (CFM)	ESP INCHES WG	MOTOR HP	TYPE	FAN CONTROL	BASIS OF DESIGN	MODEL
EF-1	2,500	0.35	0.33	SIDEWALL BELT DRIVE	SWITCH	GREENHECK	SBE-1H20-3

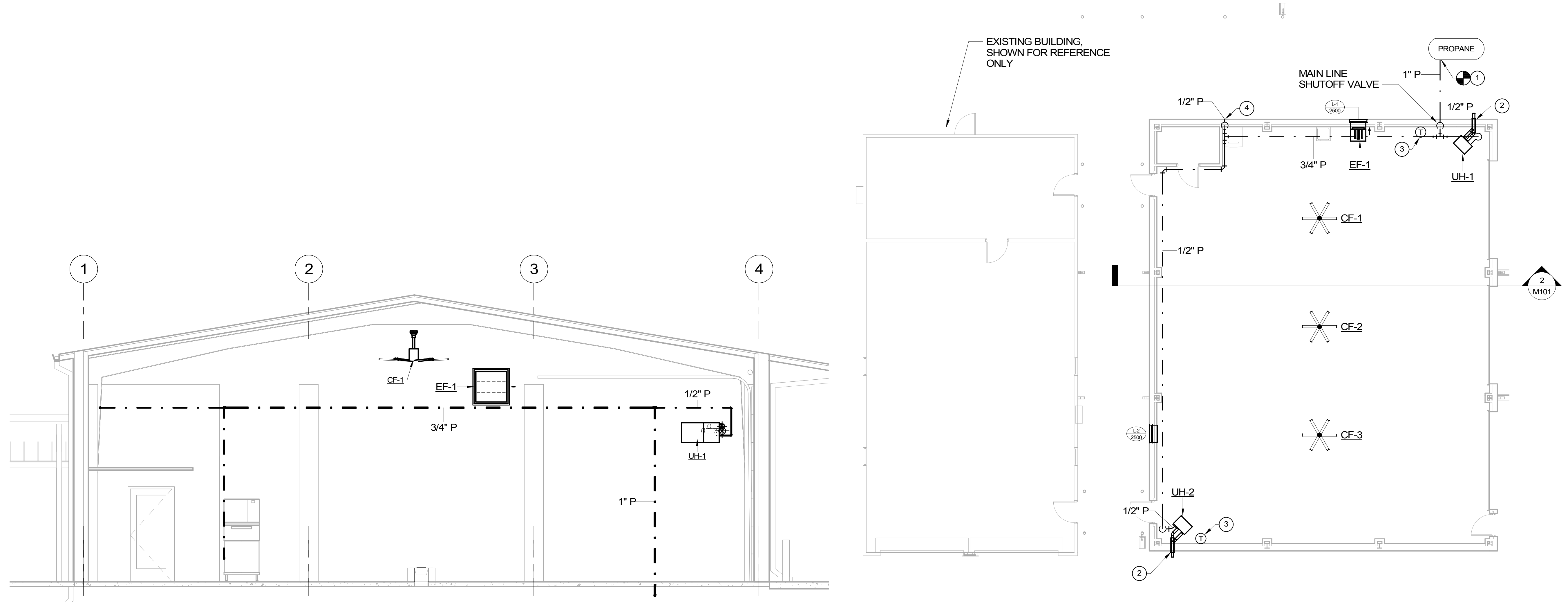
NOTES:  
 1. SEE ELECTRICAL DRAWINGS FOR VOLTAGE AND DISCONNECT REQUIREMENTS.  
 2. PROVIDE WITH SPEED CONTROLLER FOR ADJUSTMENT.  
 3. PROVIDE WITH INTEGRAL BACKDRAFT DAMPER.

KEYNOTES

- ROUTE 1" BURIED GAS LINE FROM OWNER PROVIDED PROPANE TANK. PIPE IS SIZED FOR LOW PRESSURE. PROVIDE GAS REGULATOR AS NEEDED AND COORDINATE WITH PROPANE TANK VENDOR.
- 4" GAS VENT FROM HEATER THROUGH SIDEWALL VENT KIT. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. SEE WALL PENETRATION DETAIL.
- THERMOSTAT FOR UNIT HEATER CONTROL. WALL MOUNT AT 4'-0" A.F.F. ALL CONTROL CONDUIT SHALL BE ROUTED IN WALL.
- PROPANE CONNECTION FITTING WITH MANUAL SHUT OFF VALVE FOR COOKING EQUIPMENT. ROUTE DOWN WALL AND MOUNT AT 24" ABOVE FINISHED GRADE.

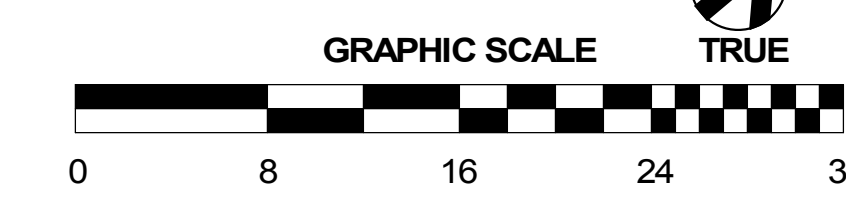
GENERAL NOTES

- ALL VENT DUCT TO BE DOUBLE WALL CATEGORY III VENT. MAINTAIN VENT MATERIAL RECOMMENDED CLEARANCE TO COMBUSTIBLES.
- ALL DUCTWORK AND PIPING SHALL BE INSTALLED TIGHT TO WALLS AND STRUCTURE ABOVE.
- EXHAUST FAN SHALL NOT BE ON WHILE HEATERS ARE IN OPERATION DUE TO POTENTIAL BACKDRAFT OF COMBUSTION FLUE INTO OCCUPIED SPACE.



2 MECHANICAL SECTION  
 M101 SCALE: 1/4" = 1'-0"

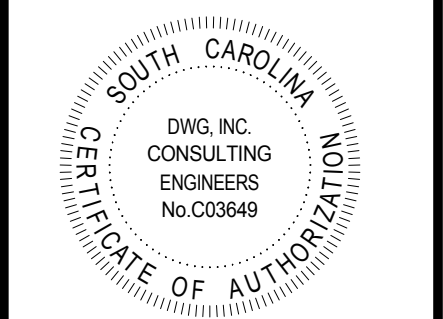
1 HVAC PLAN  
 M101 SCALE: 1/8" = 1'-0"



**GBA**  
 GLICK BOEHM ARCHITECTURE  
 ARCHITECTURE PLANNING INTERIOR DESIGN  
 493 King Street, Suite 100 Charleston, South Carolina 29403  
 P841.772.1738 www.glickboehm.com

**DWG**  
 CONSULTING ENGINEERS  
 1000 North Kings Highway  
 100 North Kings Highway, Suite 202, Mount Pleasant, SC 29528  
 Phone: 843.339.9999 Fax: 843.339.9998

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 COLLETON COUNTY  
 547 ASHTON RD.  
 ISLANDTON, SC 29929

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 GLICKBOEHM & ASSOCIATES, INC.  
 JOB NUMBER: 19153-00  
 PROJECT MGR:  
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 DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/30/2020

MECHANICAL FLOOR PLAN

**M101**



**PLUMBING SYSTEMS  
SEISMIC AND WIND REQUIREMENTS**  
PER IBC-2015/ASCE 7-10

- PER THE 2015 INTERNATIONAL BUILDING CODE, MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND COMPONENTS, INCLUDING THEIR SUPPORTS AND ATTACHMENTS, SHALL BE DESIGNED FOR SEISMIC FORCES IN ACCORDANCE WITH CHAPTER 13 OF ASCE 7-10.
- EXTERIOR EQUIPMENT (INCLUDING ROOF CURBS, RAILS, SUPPORTS) EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED TO RESIST THE WIND PRESSURES DETERMINED IN ACCORDANCE WITH CHAPTER 26 TO 29 OF ASCE 7-10.
- WHERE DESIGN FOR SEISMIC AND WIND LOADS IS REQUIRED, THE MORE DEMANDING FORCE MUST BE USED.
- REFERENCE THE STRUCTURAL DRAWINGS FOR SITE SPECIFIC INFORMATION ON SEISMIC DESIGN CATEGORY, WIND SPEEDS, ETC.
- USE THE TABLE BELOW TO DETERMINE SEISMIC RESTRAINT REQUIREMENTS FOR EACH COMPONENT. FOR ALL COMPONENTS REQUIRING SEISMIC RESTRAINT, THE COMPONENT SUPPORTS AND ATTACHMENTS SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL REGISTERED IN THE STATE THE JOB IS LOCATED. SUBMITTALS MUST INCLUDE STAMPED AND SIGNED DRAWINGS AND CALCULATIONS.
- WHERE SEISMIC RESTRAINT IS REQUIRED, HOUSEKEEPING PADS NEEDED FOR THE INSTALLATION OF EQUIPMENT UNDER THIS CONTRACT MUST BE DESIGNED BY THE SEISMIC ENGINEER. DO NOT POUR ANY HOUSEKEEPING PADS PRIOR TO THE RECEIPT OF THE APPROVED SEISMIC SUBMITTAL.
- SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, CONDUIT, CABLE TRAYS AND BUS DUCT MUST BE SHOWN ON LAYOUT DRAWINGS SHOWING SPECIFIC RESTRAINT LOCATIONS ALONG WITH ACCOMPANYING DETAILS AND CALCULATIONS.

**PLUMBING COMPONENT IMPORTANCE FACTOR (Ip) DESIGNATION**

**Ip = 1.0**

**Ip = 1.5**

- ALL PLUMBING COMPONENTS EXCEPT AS LISTED UNDER Ip = 1.5

**SEISMIC DESIGN CATEGORIES D,E,F**

COMPONENT IDENTIFICATION	SEISMIC RESTRAINT REQUIREMENT	COMPONENT IMPORTANCE FACTOR (Ip)	
		1.0	1.5
ROOF MOUNTED	RESTRAIN ALL	1	RESTRAIN ALL
FLOOR MOUNTED	RESTRAIN ALL	1, 2	RESTRAIN ALL
WALL MOUNTED	RESTRAIN ALL	1, 2	RESTRAIN ALL
COMPONENT SUPPORTS	RESTRAIN ALL	1	RESTRAIN ALL
SUSPENDED EQUIPMENT	RESTRAIN ALL	3	RESTRAIN ALL
SUSPENDED DUCTILE PIPING (STEEL, ALUMINUM, COPPER, ETC.)	>3"	4	>1"
SUSPENDED NON DUCTILE PIPING (CAST IRON, PLASTIC, CERAMIC)	RESTRAIN ALL	4	RESTRAIN ALL
SUSPENDED PIPE ON TRAPEZE	RESTRAIN IF ANY PIPE ON TRAPEZE > 3" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10	4	RESTRAIN IF ANY PIPE ON TRAPEZE > 1" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10
COMPONENT CERTIFICATION (SEE NOTE 6)	NOT REQUIRED	5	REQUIRED

**NOTES:**

- EQUIPMENT 20 LBS. OR LESS IS EXEMPT IF THE COMPONENT IS POSITIVELY ATTACHED TO THE STRUCTURE AND FLEXIBLE CONNECTIONS ARE PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.
- RESTRAINTS ARE NOT REQUIRED IF THE COMPONENT WEIGHS 400 LBS. OR LESS, IS MOUNTED WITH THE CENTER OF MASS LOCATED AT 4 FT. OR LESS ABOVE A FLOOR, IS POSITIVELY ATTACHED TO THE STRUCTURE AND HAS FLEXIBLE CONNECTIONS BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.
- FLEXIBLE CONNECTIONS REQUIRED FOR PIPE CONNECTIONS ONLY.
- RESTRAINT IS NOT REQUIRED IF THE PIPING / DUCTWORK IS SUPPORTED BY HANGERS AND EACH HANGER IN THE PIPING RUN IS 12 IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12 IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.
- ALL DUCTWORK, REGARDLESS OF SIZE, DESIGNED TO CARRY TOXIC, HIGHLY TOXIC, OR EXPLOSIVE GASES OR USED FOR SMOKE CONTROL MUST BE RESTRAINED.
- COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.

**PLUMBING ABBREVIATIONS**

ABBR	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
C	DOMESTIC COLD WATER SUPPLY
FT	FEET
GPH	GALLONS PER HOUR
H	DOMESTIC HOT WATER SUPPLY
HB	HOSE BIBB
IN	INCHES
S	SANITARY/WASTE PIPING
TYP	TYPICAL
U/G	UNDERGROUND
V	VENT PIPING
WH	WATER HEATER

**PLUMBING SYMBOL LEGEND**

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
○	PIPE UP	—	PIPE DN
⌋	PIPE REDUCER	⌋	PIPE STRAIGHT TEE
⊥	PIPE TEE DOWN	○-FCO	FLOOR CLEANOUT
⊥	HOSE BIBB - INTERIOR, EXTERIOR	⊙ FD	FLOOR DRAIN WITH FLOOR SLOPED TO DRAIN
⌋	ISOLATION VALVE	□	TRAP PRIMER
A	WATER HAMMER ARRESTOR		

**PLUMBING PIPING LEGEND**

—	SANITARY AND WASTE PIPING
----	VENT PIPING
----	DOMESTIC COLD WATER PIPING
----	DOMESTIC HOT/TEMPERED WATER PIPING

**PLUMBING CODES AND STANDARDS**

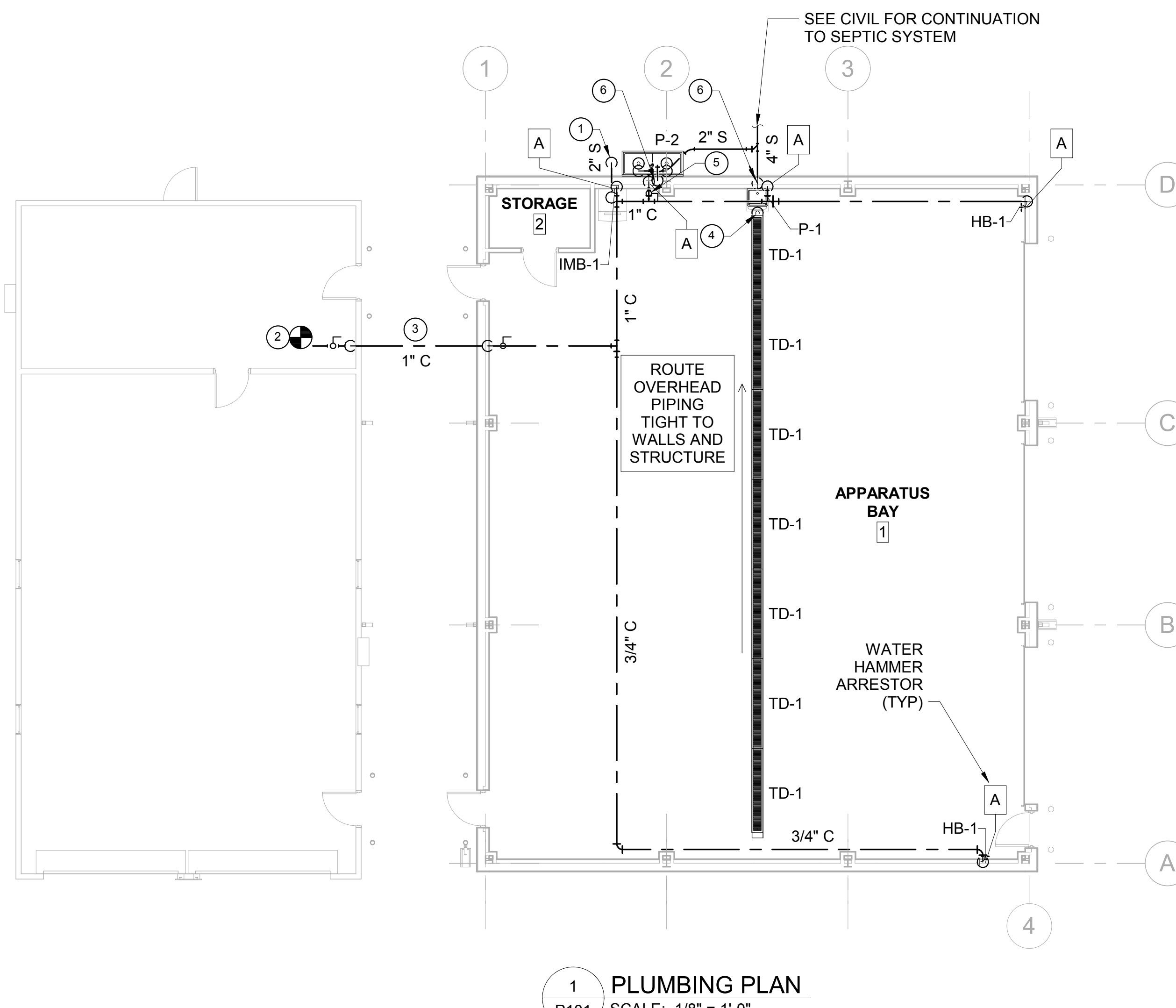
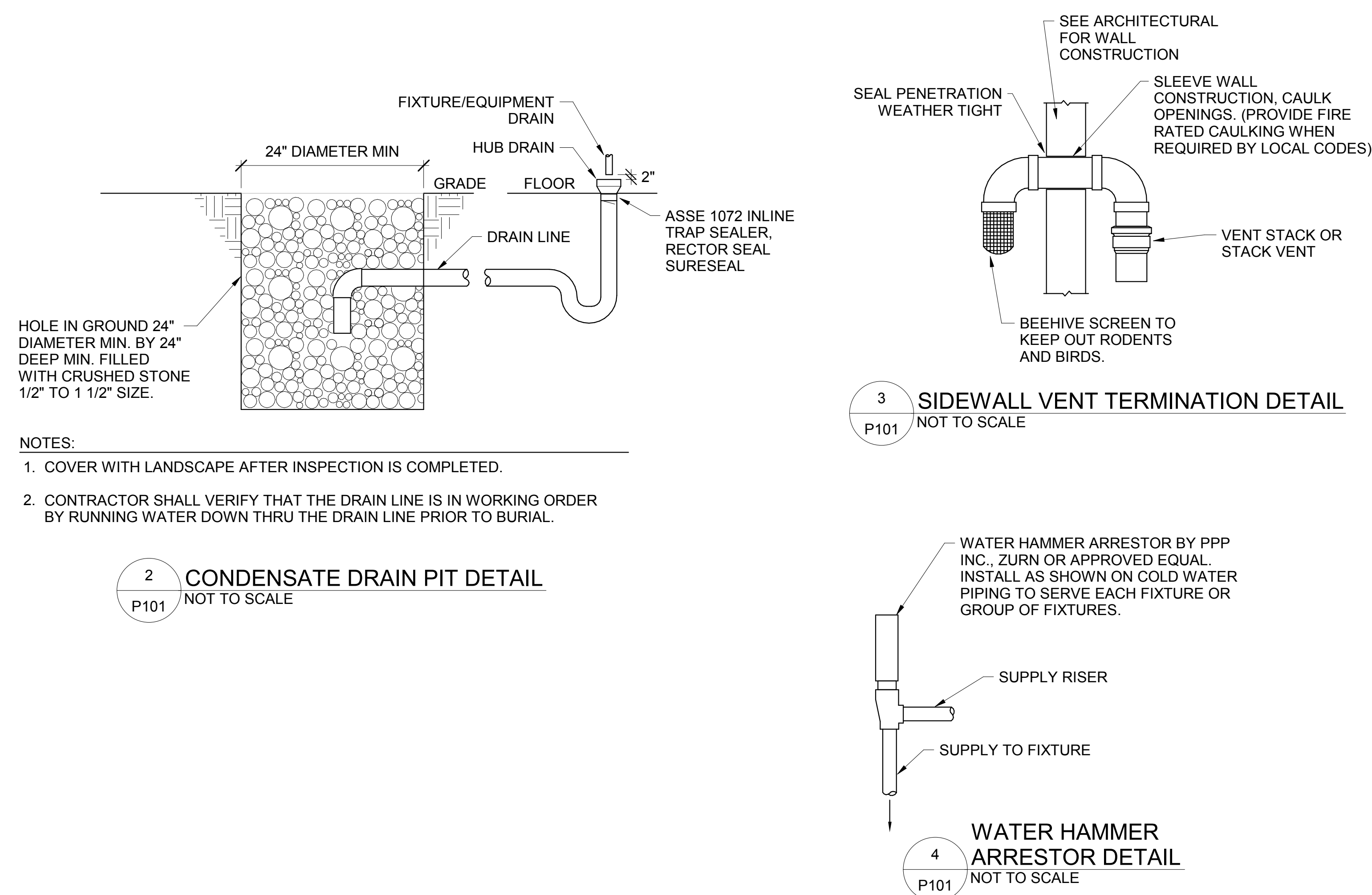
CODE	DESCRIPTION
IBC (2018)	INTERNATIONAL BUILDING CODE
IECC (2009)	INTERNATIONAL ENERGY CONSERVATION CODE
IFGC (2018)	INTERNATIONAL FUEL GAS CODE
IPC (2018)	INTERNATIONAL PLUMBING CODE

**PLUMBING FIXTURE SCHEDULE**

MARK	FIXTURE TYPE	FIXTURE DESCRIPTION	HOT WATER	COLD WATER	WASTE	VENT	BASIS OF DESIGN	MODEL
HB-1	HOSE BIBB - INTERIOR	BRONZE QUARTER TURN, EXPOSED HOSE BIBB WITH 3/4" HOSE CONNECTION, INTEGRAL VACUUM BREAKER AND WHEEL HANDLE.	---	3/4"	---	---	JR SMITH	5670-H
IMB-1	ICE MAKER BOX	LOW LEAD, DOMESTIC WATER SUPPLY BOX COMPLETE WITH QUARTER TURN SHUTOFF VALVE AND ASSE 1010 TYPE A WATER HAMMER ARRESTOR. PROVIDE WITH DUAL CHECK VALVE CONFORMING TO ASSE 1024.	---	1/2"	---	---	OATEY	39125
P-1	CONVENIENCE SINK	18" x 23.5" x 33" ONE PIECE MOLDED CONSTRUCTION WITH MOLD AND MILDEW-RESISTANT RESIN, FLOOR MOUNTED CONVENIENCE SINK WITH INTEGRALLY MOLDED-IN DRAIN AND STEEL LEGS WITH ADJUSTABLE LEVELERS. PROVIDE WITH 6" SWING SPOUT FAUCET WITH AERATOR AND DRAIN STOPPER.	3/4"	3/4"	2"	2"	MUSTEE FIXTURE & FAUCET	12C
P-2	OUTDOOR SINK	2-COMPARTMENT, CONSTRUCTED OF 14 GAUGE, TYPE 304 STAINLESS STEEL. EACH COMPARTMENT SHALL BE SIZED AT 21"x30". LEGS SHALL BE 1-5/8" OD 16 GAUGE 304 STAINLESS STEEL TUBING WITH ADJUSTABLE IMPACT RESISTANT METAL FEET. FAUCET HOLES ARE 8" ON CENTER. FAUCET SHALL BE WALL MOUNT, 8" CENTERS WITH 6" SWING NOZZLE AND 24" FLEXIBLE STAINLESS STEEL HOSE WITH 1.15 GPM SPRAY VALVE. IT SHALL BE LOW LEAD COMPLIANT WITH LEVER HANDLES.	---	3/4"	2"	2"	SINK: AERO FAUCET: T&S	SINK: 2F2-2130 FAUCET: MPZ-8WLN-06
TD-1	TRENCH DRAIN	8' LONG, 12" WIDE REVEAL, PRE-SLOPED, BOTTOM OUTLET, HOPE TRENCH DRAIN WITH REBAR CLIPS, 1/4" HEAVY DUTY CARBON STEEL FRAME ASSEMBLY CONFORMING TO ASTM A36 WITH POWDER COATED FINISH AND 4" LONG CONCRETE ANCHORS. PROVIDE WITH CLASS E BLACK ACID RESISTANT EPOXY COATED DUCTILE IRON SLOTTED GRATE. SEE PLANS FOR OUTLET LOCATIONS.	---	---	4"	2"	ZURN	Z882

**NOTES:**

- PROVIDE P-TRAPS, ESCUTCHEON PLATES, WHEEL HANDLE STOPS, SUPPLY TUBING, ETC. FOR COMPLETE INSTALLATION ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
- ALL SUPPLY AND WASTE LINES SHALL BE CONCEALED IN ADJACENT WALL OR FLOOR, UNLESS NOTED OTHERWISE.
- COORDINATE EXTERIOR HOSE BIBBS WITH WALL THICKNESS TO ENSURE PIPING CAN BE CONCEALED IN WALL CONSTRUCTION.

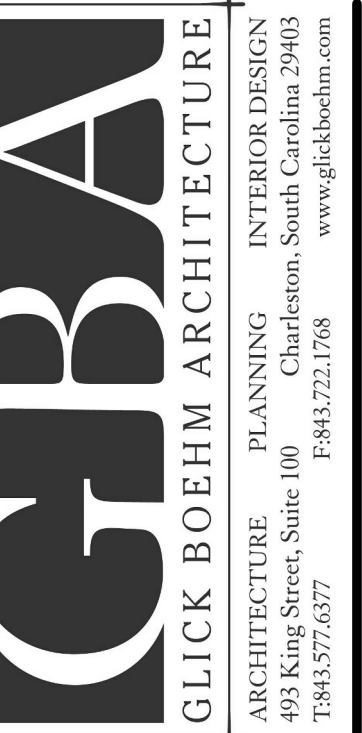
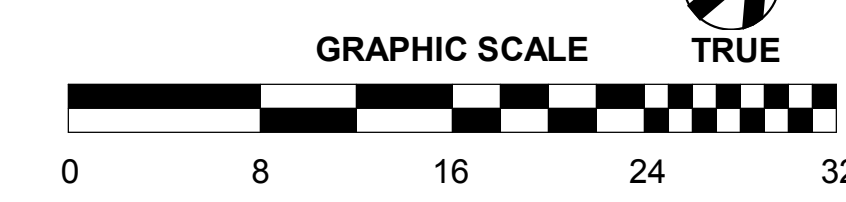


**KEYNOTES**

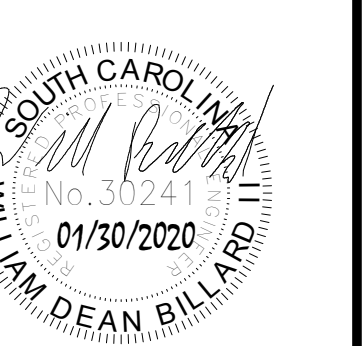
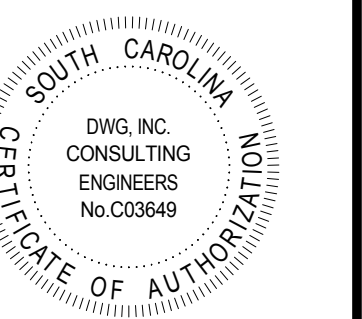
- PROVIDE HUB DRAIN ROUTED TO DRAIN PIT. SEE DETAIL FOR ADDITIONAL INFORMATION.
- CONNECT NEW DOMESTIC WATER PIPING TO EXISTING OF EQUAL OR GREATER SIZE. ROUTE PIPING THROUGH CANOPY AND EXISTING EXTERIOR WALL TO MECHANICAL ROOM AND CONNECT TO EXISTING DOMESTIC COLD WATER PIPING.
- PROVIDE PIPING IN CANOPY WITH HEAT TRACE AND ALUMINUM JACKETING.
- PROVIDE BARRIER-TYPE TRAP SEAL PROTECTION DEVICE IN THROAT OF TRENCH DRAIN SEWER CONNECTION CONFORMING TO ASSE 1072.
- PROVIDE SHUT-OFF BALL VALVE THAT CAN BE SHUT OFF AND DRAINED DURING COLD WEATHER.
- 2" SIDEWALL VENT TERMINATION ABOVE CANOPY, SEE DETAIL.

**GENERAL NOTES**

- PROVIDE ALL MATERIALS AND LABOR NECESSARY FOR A COMPLETE PLUMBING SYSTEM.
- DO NOT SCALE DRAWINGS. OBTAIN ROUGH-IN DIMENSIONS FROM ARCHITECTURAL DRAWINGS OR FROM MANUFACTURERS PRINTED INSTRUCTIONS AND RECOMMENDATIONS ONLY.
- COORDINATE PLUMBING SYSTEMS WITH ALL TRADES TO AVOID CONFLICTS PRIOR TO INSTALLATION OF PLUMBING COMPONENTS.
- OBTAIN ALL PERMITS AND INSPECTIONS FROM AUTHORITY HAVING JURISDICTION. THIS INCLUDES ALL FEES THAT MAY BE REQUIRED.
- PROVIDE OWNER WITH CERTIFICATES OF FINAL INSPECTION FROM AUTHORITY HAVING JURISDICTION.
- WHENEVER THE WORD "PROVIDE" IS USED, IT SHALL MEAN FURNISH AND INSTALL COMPLETE AND READY FOR USE.
- UNLESS OTHERWISE SHOWN OR NOTED, ALL PIPING SHALL BE RUN CONCEALED IN WALLS, CHASES AND/OR ABOVE CEILINGS.
- ALL SUSPENDED PIPING SHALL BE SUPPORTED FROM BUILDING STRUCTURAL MEMBERS. IN NO CASE SHALL PIPING BE SUSPENDED FROM FLOOR OR ROOF DECK.
- WHERE PIPES PENETRATE FIRE RATED ASSEMBLIES, SEAL OPENING AROUND PIPES WITH U.L. LISTED FIRE STOPPING MATERIAL TO MAINTAIN THE FIRE RATING OF THE ASSEMBLY.
- PROVIDE INSULATION FOR PIPING COLLECTING CONDENSATE DRAIN.
- PROVIDE HANGERS AND SUPPORTS WITHIN 12" OF EACH HORIZONTAL ELBOW FOR SANITARY AND VENT PIPING.
- ALL CONNECTIONS TO, OR SHUTDOWN OF, EXISTING SYSTEMS SHALL BE COORDINATED WITH THE OWNER TO PROVIDE MINIMAL INTERFERENCE WITH THEIR OPERATIONS AND DOWNTIME OF THE SYSTEM.
- AREAS OF WORK EXIST FOR THE PROJECT WHICH WERE NOT ACCESSIBLE OR PROVIDED LIMITED ACCESS DURING DESIGN. AS SUCH, CONTRACTOR SHALL VERIFY ALL UTILITIES IN AREA OF WORK INCLUDING LOCATION AND INVERT ELEVATION BEFORE DEMOLITION OF ANY SERVICE. ANY PIPING NOT SHOWN SHALL BE IDENTIFIED AND THE ARCHITECT AND ENGINEER SHALL BE NOTIFIED AS SOON AS POSSIBLE. NO PIPING REWORK SHALL BE COMENCED WITHOUT COORDINATION OF BOTH ARCHITECT AND ENGINEER.
- WHERE PIPE RUNOUT SIZE IS NOT SHOWN, REFER TO PLUMBING FIXTURE SCHEDULE FOR CONNECTION SIZE.
- WATER HAMMER ARRESTORS ARE SHOWN DIAGRAMMATICALLY. SEE DETAIL FOR ADDITIONAL INFORMATION.
- VENT PIPING SHOWN DIAGRAMMATICALLY.
- COORDINATE LOCATIONS OF HOSE BIBBS WITH OWNER.



REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

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JOB NUMBER: 19153-00  
PROJECT MGR.:  
DRAWN BY: CCG  
CHECKED BY: WDB  
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DATE ISSUED FOR CONSTRUCTION DOCUMENTS: 01/30/2020

**PLUMBING PLAN**

**P101**



## ELECTRICAL SYSTEMS SEISMIC REQUIREMENTS PER IBC-2018/ASCE 7-10

- A. PER THE 2018 INTERNATIONAL BUILDING CODE, MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND COMPONENTS, INCLUDING THEIR SUPPORTS AND ATTACHMENTS, SHALL BE DESIGNED FOR SEISMIC FORCES IN ACCORDANCE WITH CHAPTER 13 OF ASCE 7-10.
- B. EXTERIOR EQUIPMENT (INCLUDING ROOF CURBS, RAILS, SUPPORTS) EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED TO RESIST THE WIND PRESSURES DETERMINED IN ACCORDANCE WITH CHAPTER 26 TO 29 OF ASCE 7-10.
- C. WHERE DESIGN FOR SEISMIC AND WIND LOADS IS REQUIRED, THE MORE DEMANDING FORCE MUST BE USED.
- D. REFERENCE THE STRUCTURAL DRAWINGS FOR SITE SPECIFIC INFORMATION ON SEISMIC DESIGN CATEGORY, WIND SPEEDS, ETC.
- E. USE THE TABLE BELOW TO DETERMINE SEISMIC RESTRAINT REQUIREMENTS FOR EACH COMPONENT.
- F. FOR ALL COMPONENTS REQUIRING SEISMIC RESTRAINT, THE COMPONENT SUPPORTS AND ATTACHMENTS SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL REGISTERED IN THE STATE THE JOB IS LOCATED. SUBMITTALS MUST INCLUDE STAMPED AND SIGNED DRAWINGS AND CALCULATIONS.
- G. WHERE SEISMIC RESTRAINT IS REQUIRED, HOUSEKEEPING PADS NEEDED FOR THE INSTALLATION OF EQUIPMENT UNDER THIS CONTRACT MUST BE DESIGNED BY THE SEISMIC ENGINEER. DO NOT POUR ANY HOUSEKEEPING PADS PRIOR TO THE RECEIPT OF THE APPROVED SEISMIC SUBMITTAL.
- H. SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, CONDUIT, CABLE TRAYS AND BUS DUCT MUST BE SHOWN ON LAYOUT DRAWINGS SHOWING SPECIFIC RESTRAINT LOCATIONS ALONG WITH ACCOMPANYING DETAILS AND CALCULATIONS.

### ELECTRICAL COMPONENT IMPORTANCE FACTOR (Ip) DESIGNATION

Ip = 1.5	Ip = 1.5
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- ALL ASSOCIATED ELECTRICAL WORK UNLESS NOTED OTHERWISE
- LIGHTS

### SEISMIC DESIGN CATEGORIES D,E,F

COMPONENT IDENTIFICATION	COMPONENT IMPORTANCE FACTOR (Ip)			
	1.0		1.5	
	SEISMIC RESTRAINT REQUIREMENT	NOTES	SEISMIC RESTRAINT REQUIREMENT	NOTES
ROOF MOUNTED	RESTRAIN ALL	1	RESTRAIN ALL	-
FLOOR MOUNTED	RESTRAIN ALL	1,2	RESTRAIN ALL	-
WALL MOUNTED	RESTRAIN ALL	1,2	RESTRAIN ALL	-
COMPONENT SUPPORTS	RESTRAIN ALL	1	RESTRAIN ALL	-
SUSPENDED EQUIPMENT	RESTRAIN ALL	1	RESTRAIN ALL	-
SINGLE CONDUIT	RESTRAIN IF ≥ 2.5"	3	RESTRAIN IF ≥ 2.5"	3
CABLE TRAY/BUS DUCT TRAPEZED CONDUIT	DO NOT DELETE ON TRAPEZE > 2.5". RESTRAIN IF TOTAL WEIGHT OF SUSPENDED COMPONENT > 10 LBS/FT	3	RESTRAIN IF ANY CONDUIT ON TRAPEZE > 2.5". RESTRAIN IF TOTAL WEIGHT OF SUSPENDED COMPONENT > 10 LBS/FT	3
COMPONENT CERTIFICATION	NOT REQUIRED	-	REQUIRED	5
PENDANT, LAY-IN AND CAN LIGHTS	REQUIRED	4	REQUIRED	4

- NOTES:**
1. EQUIPMENT 20 LBS. OR LESS IS EXEMPT IF THE COMPONENT IS POSITIVELY ATTACHED TO THE STRUCTURE AND FLEXIBLE CONNECTIONS ARE PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.
  2. RESTRAINTS ARE NOT REQUIRED IF THE COMPONENT WEIGHS 400 LBS. OR LESS, IS MOUNTED WITH THE CENTER MASS AT 4' OR LESS ABOVE A FLOOR, IS POSITIVELY ATTACHED TO THE STRUCTURE, AND HAS FLEXIBLE CONNECTIONS BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.
  3. RESTRAINT IS NOT REQUIRED IF THE CONDUIT IS SUPPORTED BY HANGERS AND EACH HANGER IN THE RUN IS 12" IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12" IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.
  4. THE RESTRAINT OF PENDANT, LAY-IN AND CAN LIGHTS IS ADDRESSED IN ASTM C636 AND E580.
  5. COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.

## GENERAL ELECTRICAL NOTES

1. BRANCH CIRCUIT WIRING FOR 20A CIRCUITS SHALL BE SIZED PER WIRE SIZING CHART. WHERE CONDUCTOR AND RACEWAY SIZE ARE SHOWN AT HOMERUN, SUCH SIZE SHALL BE USED FOR THE ENTIRE CIRCUIT. EXCEPTION: FINAL CONNECTION TO DEVICES IN OUTLET BOXES IS NOT REQUIRED TO BE LARGER THAN #12.
2. PRIOR TO ROUGH-IN, COORDINATE THE LOCATION AND MOUNTING HEIGHT OF ALL WALL MOUNTED DEVICES WITH THE ARCHITECTURAL INTERIOR ELEVATIONS AND MILLWORK SHOP DRAWINGS. IN THE EVENT OF A CONFLICT, NOTIFY THE ARCHITECT. MINOR ADJUSTMENTS IN DEVICE LOCATION, SUCH AS 5" IN ANY DIRECTION, SHALL BE DONE AT AN ADDITIONAL COST TO THE OWNER. UNDERCABINET LIGHT FIXTURES, RECEPTACLES AND OTHER DEVICES TO BE MOUNTED INSIDE CABINETS SHALL BE REVIEWED WITH THE ARCHITECT PRIOR TO ROUGH IN TO CONFIRM THE EXACT LOCATION OF FIXTURES AND DEVICES. OUTLET BOXES FOR SWITCHES, RECEPTACLES, ETC. MOUNTED ON OPPOSITE SIDES OF PARTITIONS SHALL NOT BE MOUNTED IN THE SAME WALL CAVITY. SEPARATE WALL PENETRATIONS BY MOUNTING ON OPPOSITE SIDES OF WALL STUDS OR OTHER VERTICAL STRUCTURAL MEMBERS IN THE WALL. WHERE OUTLET BOXES ARE INSTALLED IN A FIRE-RATED PARTITION, INSTALLATION SHALL COMPLY WITH INTERNATIONAL BUILDING CODE 714.3.2.
3. RACEWAYS SHALL BE INSTALLED CONCEALED IN NEW WALL CONSTRUCTION, ABOVE CEILINGS, BELOW FLOOR AND IN OTHER CAVITIES TO THE GREATEST EXTENT POSSIBLE. EXPOSED RACEWAYS MAY BE USED IN UNFINISHED SPACES, WHERE EXPLICITLY NOTED ON PLANS AND WHERE APPROVED BY THE ARCHITECT AND ENGINEER. LAY OUT EXPOSED RACEWAYS TO MINIMIZE THE NUMBER OF VERTICAL RUNS.
4. FEEDER CONDUITS AND BRANCH CIRCUIT ROUTING SHALL COMPLY WITH DETAILS ON DRAWINGS AND SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES BEFORE AND DURING CONSTRUCTION. COORDINATE THE ROUTING OF UNDERGROUND CONDUITS WITH STUD DRAWINGS AND FINISHINGS OF BUILDING. FEEDER CONDUITS AND BRANCH CIRCUITS SHALL BE ROUTED OVERHEAD UNLESS PRIOR APPROVAL HAS BEEN GRANTED BY THE ARCHITECT AND ENGINEER.
5. A FIRESTOP SYSTEM SHALL BE USED TO SEAL ALL PENETRATIONS OF ELECTRICAL CONDUITS AND CABLES THROUGH FIRE-RATED PARTITIONS. THE FIRESTOP SYSTEM SHALL CONSIST OF A FIRE-RATED CAULK TYPE SUBSTANCE AND HIGH TEMPERATURE FIBER INSULATION BY STI OR APPROVED EQUAL. ONLY METAL CONDUIT SHALL BE USED TO PENETRATE FIRE-RATED PARTITIONS. SEE ARCHITECTURAL DRAWINGS FOR ALL LOCATIONS OF FIRE-RATED WALLS.
6. THE USE OF MC CABLE IS ALLOWED ABOVE ACCESSIBLE CEILINGS AND IN STUD CONSTRUCTION ONLY. HOMERUNS TO PANEL SHALL BE WIRE IN RACEWAY ONLY, MC CABLE IS NOT ACCEPTABLE FOR HOMERUNS. MC CABLE IS ONLY ACCEPTABLE FOR 20A BRANCH CIRCUITS.
7. PROVIDE A LISTED EXPANSION/DEFLECTION FITTING FOR ALL CONDUIT CROSSING EXPANSION JOINTS PER NEC 300.4 H. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF EXPANSION JOINTS.
8. WHEREVER THE WORD "PROVIDE" IS USED ON THE ELECTRICAL DRAWINGS, IT SHALL BE INFERRED TO MEAN "FURNISH AND INSTALL", UNLESS NOTED OTHERWISE.
9. OUTLET BOXES FOR GFCI DEVICES SHALL BE DEEP BOXES (2-1/8" MINIMUM). ALL OTHER OUTLET BOXES SHALL BE STANDARD DEPTH (1-1/2" MINIMUM), UNLESS NOTED OTHERWISE.
10. THE ARRANGEMENT, GROUPING, AND ROUTING OF BRANCH CIRCUITS SHALL BE PROVIDED AT THE CONTRACTOR'S DISCRETION IN ACCORDANCE WITH GENERALLY ACCEPTED PRACTICE FOR ELECTRICAL WORK, THE NATIONAL ELECTRICAL CODE REQUIREMENTS, LOCAL ORDINANCES, AND THE FOLLOWING: 1 - A COMMON NEUTRAL MAY BE INSTALLED IN A HOMERUN FOR 2 OR 3 BRANCH CIRCUITS ONLY IF A MEANS TO SIMULTANEOUSLY DISCONNECT ALL UNDERGROUND CONDUCTORS AT THE POINT OF ORIGIN IS PROVIDED PER NEC 210.4 B. 2 - MULTIPLE SINGLE-POLE BRANCH CIRCUITS (UP TO 3 HOTS, 3 NEUTRALS AND 1 GROUND) RATED FOR 30A OR LESS MAY BE PULLED INTO A SINGLE RACEWAY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING THE RACEWAYS AND DE-RATING CONDUCTORS PER NEC 310.15. 3 - A GROUND CONDUCTOR SHALL BE PROVIDED IN ALL RACEWAYS UNLESS NOTED OTHERWISE.
11. REFER TO THE ARCHITECTURAL DRAWINGS FOR PROJECT PHASING.

## GENERAL POWER NOTES

1. EXISTING UTILITY POLE TO BE REUSED. COORDINATE WITH THE UTILITY COMPANY TO PROVIDE AN UPSIZED POLE MOUNTED 240V, 1PH SERVICE TRANSFORMER. PROVIDE NEW HANDHOLE AT BOTTOM OF THE UTILITY POLE AND EXTEND (2) 4" CONDUIT FROM HAND HOLE TO NEW HANDHOLE AT UTILITY SERVICE POINT. ALL ELBOWS SHALL BE RIGID GALVANIZED STEEL. SEE THE ELECTRICAL SITE PLAN FOR ASSUMED LOCATIONS OF THE TRANSFORMER POLE AND UTILITY SERVICE POINT. COORDINATE EXACT LOCATION WITH THE UTILITY COMPANY.

THE EXISTING OVERHEAD SERVICE IS IN CONFLICT WITH THE NEW APPARATUS BAY AND MUST BE RELOCATED TO AN UNDERGROUND SERVICE PRIOR TO CONSTRUCTION BEGINNING. THE SERVICE WORK IS THEREFORE PROPOSED IN 2 PHASES AS DESCRIBED BELOW:

PHASE 1 CONSISTS OF FOLLOWING PROPOSED SERVICE WORK TO BE COMPLETED PRIOR TO THE APPARATUS BAY CONSTRUCTION:

- A. PROVIDE AND INSTALL NEW UNDERGROUND SERVICE CONDUIT FROM THE EXISTING UTILITY TRANSFORMER POLE TO A NEW HANDHOLE AND THE EXISTING METER/DISCONNECT LOCATION.
- B. PROVIDE CONDUIT FROM HANDHOLE TO PROPOSED NEW METER AND PANELBOARD LOCATION AT THE APPARATUS BAY ADDITION.
- C. COORDINATED WITH COASTAL ELECTRICAL COOPERATIVE TO PROVIDE NEW SERVICE FEEDERS BELOW GROUND TO FEED EXISTING SERVICE DURING CONSTRUCTION.
- D. COASTAL COOPERATIVE SHALL REMOVE THE EXISTING OVERHEAD CONDUCTORS TO ALLOW FOR CONSTRUCTION OF THE APPARATUS BAY ADDITION.

PHASE 2 CONSISTS OF FOLLOWING PROPOSED SERVICE WORK TO BE COMPLETED DURING THE ADDITION OF THE APPARATUS BAY:

- A. INSTALL NEW PANELBOARD AND SERVICE METER FOR THE NEW ELECTRICAL SERVICE LOCATED ON APPARATUS BAY ADDITION.
- B. COORDINATED WITH COASTAL ELECTRICAL COOPERATIVE TO PROVIDE NEW SERVICE FEEDERS BELOW GROUND TO FEED NEW ELECTRICAL SERVICE LOCATED ON THE APPARATUS BAY ADDITION.
- C. PROVIDE NEW CONDUCTORS AS SHOWN ON THE ONE-LINE DIAGRAM TO SUBFEED THE EXISTING EXTERIOR DISCONNECT FROM THE NEW PANELBOARD A.
- D. REMOVE THE EXISTING METER FROM THE EXISTING BUILDING.
- E. REMOVE EXISTING TRANSFER SWITCH AND INSTALL NEW SERVICE DISCONNECT FOR THE EXISTING BUILDING.

2. COORDINATE WITH THE UTILITY COMPANY TO PROVIDE A METER ON SERVICE. METER SHALL BE LOCATED PER UTILITY COMPANY REQUIREMENTS. ALL COSTS ASSOCIATED WITH THE UTILITY SERVICE (POLE, PRIMARY CONDUIT, METER, PERMITTING, ETC.) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE GROUND ROD CLUSTER FOR THE SERVICE GROUND SHALL CONSIST OF THREE 3/4" X 10'-0" COPPER CLAD STEEL GROUND RODS. THEY SHALL BE DRIVEN IN A TRIANGULAR CONFIGURATION APPROXIMATELY 20' APART AND INTERCONNECTED IN DELTA WITH A #10 BARE COPPER CONDUCTOR. TOPS OF THE RODS SHALL BE 12" BELOW FINISHED GRADE. CONNECTION TO THE RODS SHALL BE WITH EXOTHERMIC WELDS.
4. PROVIDE NEMA CONFIGURATION RECEPTACLES TO MATCH PLUGS ON EQUIPMENT FURNISHED.

## GENERAL LIGHTING NOTES

1. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR THE EXACT LOCATION OF ALL CEILING MOUNTED LIGHTING FIXTURES. REFER TO ARCHITECTURAL DRAWINGS FOR MOUNTING DETAILS OF LIGHT FIXTURE TO ACOUSTICAL CEILING SYSTEM AND STRUCTURE.
2. LIGHTING FIXTURE CATALOG NUMBERS ARE INDICATIVE OF THE STYLE OF FIXTURE REQUIRED. CONTRACTOR SHALL PROVIDE FIXTURES WITH THE PROPER TRIM, VOLTAGE AND OPTIONS NECESSARY FOR INSTALLATION.
3. REGARDLESS OF CATALOG NUMBER INDICATED IN SCHEDULE, PROVIDE BATTERY BACK-UP FOR ALL FIXTURES INDICATED ON THE DRAWINGS TO BE EMERGENCY TYPE.
4. REGARDLESS OF HOW NOTED ON PLANS, ALL EMERGENCY LIGHTING FIXTURES INDICATED IN PRIVATE SPACES SHALL BE WIRED SO AS TO BE SWITCHED "ON/OFF" WITHOUT OPERATING THE EMERGENCY BATTERY BACK-UP. EMERGENCY BATTERY BACK-UP SHALL NOT BE ACTIVATED UNLESS A LOSS OF NORMAL BUILDING POWER OCCURS.
5. REGARDLESS OF CATALOG NUMBER INDICATED IN SCHEDULE, ALL EXIT SIGNS SHALL BE PROVIDED WITH BATTERY BACK-UP, SHALL BE WIRED AHEAD OF LOCAL SWITCH AND SHALL NOT BE SWITCHED.

## GENERAL EXISTING CONDITION NOTES

1. AREAS OF WORK EXIST FOR THIS PROJECT WHICH WERE NOT ACCESSIBLE OR HAD LIMITED ACCESS DURING DESIGN. AS SUCH, CONTRACTOR SHALL VERIFY ALL UTILITIES IN AREA OF WORK BEFORE DEMOLITION OF ANY SERVICE. ANY ELECTRICAL COMPONENTS NOT SHOWN SHALL BE IDENTIFIED AND THE ARCHITECT AND ENGINEER SHALL BE NOTIFIED AS SOON AS POSSIBLE. NO ELECTRICAL REWORK SHALL BE COMMENCED WITHOUT COORDINATION OF BOTH ARCHITECT AND ENGINEER. WHERE INFORMATION SHOWN ON THESE DRAWINGS CONFLICTS WITH VERIFIED FIELD CONDITIONS, IT SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING A FIRESTOP SYSTEM IN ALL PENETRATIONS OF FIRE-RATED FLOORS AND WALLS CREATED BY THE REMOVAL OF EXISTING ELECTRICAL CONDUIT OR CABLES, AS WELL AS THOSE CREATED BY NEWLY INSTALLED CONDUITS AND SLEEVES.

## GENERAL DEMOLITION NOTES

1. ALL ELECTRICAL EQUIPMENT TO BE REMOVED SHALL REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR SHALL NOT DISPOSE OF ANY MATERIALS UNTIL RELEASED BY THE OWNER'S PROJECT MANAGER. MATERIALS THAT THE OWNER'S PROJECT MANAGER CHOOSES TO RETAIN SHALL BE DELIVERED BY THE CONTRACTOR TO A LOCATION DESIGNATED BY THE PROJECT MANAGER. ALL OTHER MATERIALS SHALL BE PROPERLY DISPOSED OF BY THE CONTRACTOR.

LIGHTING SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
☐	LIGHT FIXTURE (TYPICAL ALL DIMENSIONS)	§	LIGHT SWITCH, SINGLE POLE
☐	LIGHT FIXTURE (SHADING INDICATES EMERGENCY, TYPICAL ALL LIGHTING SYMBOLS)	§ <sup>x</sup>	LIGHT SWITCH, "X" INDICATES SWITCH TYPE
☐	EMERGENCY LIGHTING UNIT	↔	EXIT SIGN, SINGLE SIDED (ARROWS INDICATE CHEVRON DIRECTION)

POWER AND TELECOMMUNICATIONS SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
⊕	DUPLX RECEPTACLE "X" INDICATES RECEPTACLE TYPE	Ⓣ	THERMOSTAT (WALL MOUNTED, ROUGH-IN ONLY)
⊕ <sup>x</sup>	GFCI DUPLX RECEPTACLE "X" INDICATES RECEPTACLE TYPE	SPD	SURGE PROTECTION DEVICE
⊕ <sup>x</sup>	QUADRUPLEX RECEPTACLE "X" INDICATES RECEPTACLE TYPE	M	METER
⊕ <sup>x</sup>	GFCI QUADRUPLEX RECEPTACLE "X" INDICATES RECEPTACLE TYPE	■	PANELBOARD - BRANCH, SURFACE MOUNTED
⊕ <sup>x</sup>	JUNCTION BOX (WALL MOUNTED) "X" INDICATES JUNCTION BOX TYPE	☐	DISCONNECT SWITCH (FUSIBLE OR NON-FUSIBLE)
§ <sup>x</sup>	CONTROL SWITCH, "X" INDICATES SWITCH TYPE		

## ELECTRICAL ABBREVIATIONS

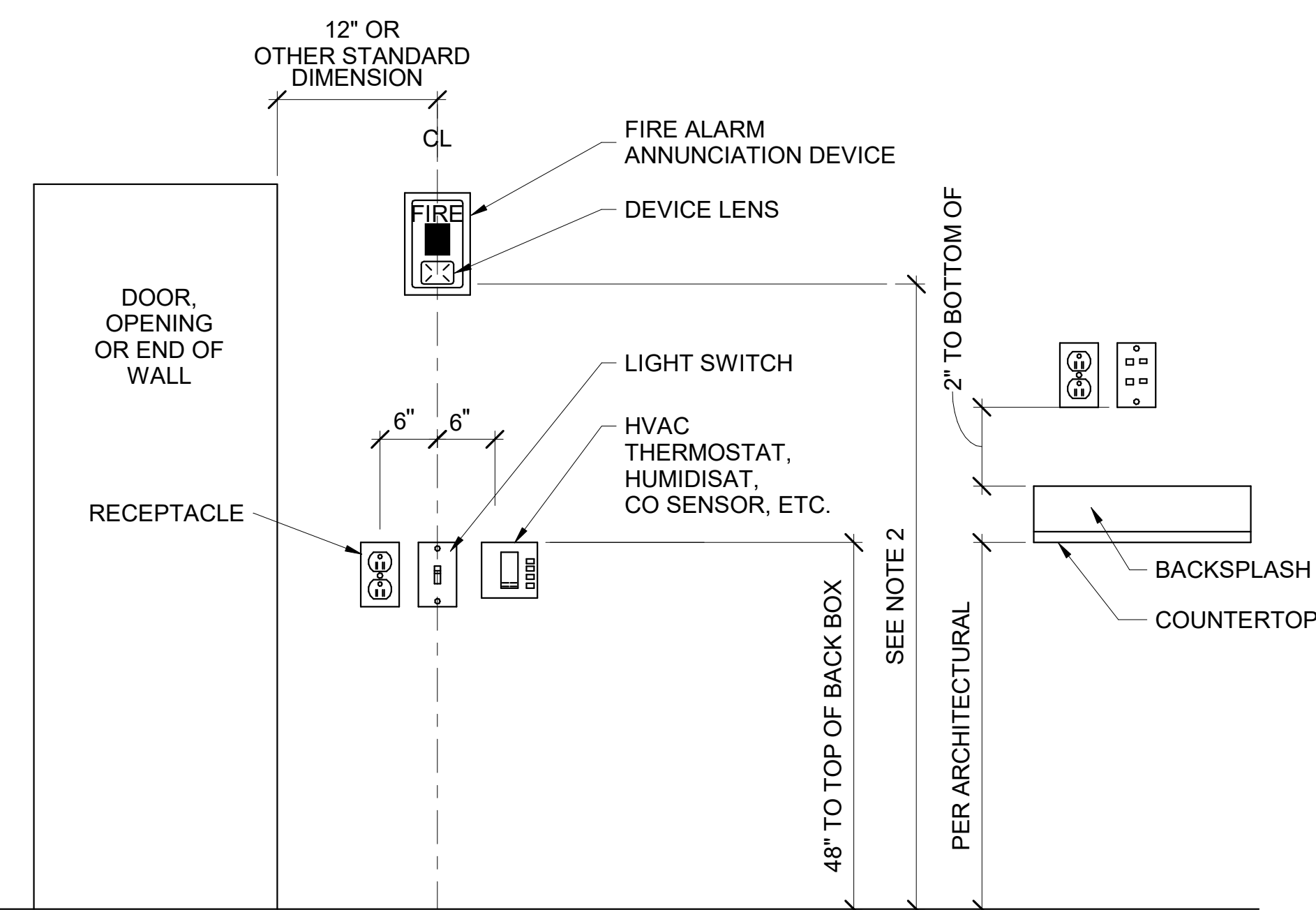
ABBR	DESCRIPTION
(E)	EXISTING
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BFC	BELOW FINISHED CEILING
BFG	BELOW FINISHED GRADE
BOD	BOTTOM OF DEVICE
cd	CANDELA
CLG	CEILING
ECB	ENCLOSED CIRCUIT BREAKER
EF	EXHAUST FAN
FDS	FUSED DISCONNECT SWITCH
GFCI	GROUND-FAULT CIRCUIT-INTERRUPTING
GFI	GROUND-FAULT INTERRUPTING
GP	GENERAL PURPOSE
J-BOX	JUNCTION BOX
KW	KILOWATTS
NEC	NATIONAL ELECTRICAL CODE
NFDS	NON-FUSED DISCONNECT SWITCH
OC	ON CENTER
SPD	SURGE PROTECTION DEVICE
UNO	UNLESS NOTED OTHERWISE
W/	WITH
WH	WATER HEATER
JUNCTION BOX/SWITCH	DESCRIPTION
OH	OVERHEAD DOOR
LIGHT SWITCH	DESCRIPTION
3	THREE WAY
4	FOUR WAY
CF	ADJUSTABLE SPEED CEILING FAN CONTROL SWITCH
OS	OCCUPANCY SENSOR

## ELECTRICAL CODES AND STANDARDS

CODE	DESCRIPTION
IBC (2018)	INTERNATIONAL BUILDING CODE
IECC (2009)	INTERNATIONAL ENERGY CONSERVATION CODE
IFC (2018)	INTERNATIONAL FIRE CODE
NFPA 70 (2017)	NATIONAL ELECTRICAL CODE
NFPA 72 (2013)	NATIONAL FIRE ALARM AND SIGNALING CODE
NFPA 101 (2015)	LIFE SAFETY CODE

## LINE LEGEND

SYMBOL	DESCRIPTION
—	EXISTING TO REMAIN
—	NEW CONSTRUCTION
---	DEMOLISH

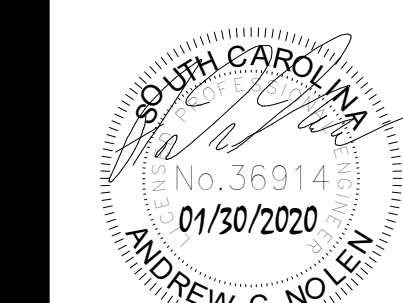
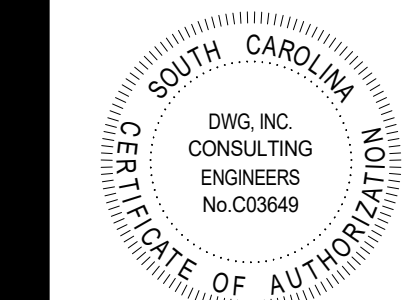


**NOTE 1:** DEVICES SHOWN WITHIN 48" OF EACH OTHER ON ALL ELECTRICAL PLANS SHALL BE ALIGNED PER THIS DETAIL. IF DEVICES ARE SHOWN IN MIDDLE OF WALL, THEN CENTER DEVICES ON WALL.

**NOTE 2:** MOUNT 80" ABOVE FINISHED FLOOR WHERE POSSIBLE. WHERE CEILING HEIGHTS DO NOT ALLOW THIS HEIGHT, MOUNT 6" BELOW CEILING. WHERE OBSTRUCTIONS DO NOT ALLOW THIS HEIGHT, MOUNT 80" TO 96" ABOVE FINISHED FLOOR. ALL MOUNTING HEIGHTS FOR NOTIFICATION DEVICES SHALL BE MEASURED TO THE BOTTOM OF THE LENS.

1 DEVICE ALIGNMENT DETAIL  
E001 NOT TO SCALE

REV. NO.	DATE	DESCRIPTION



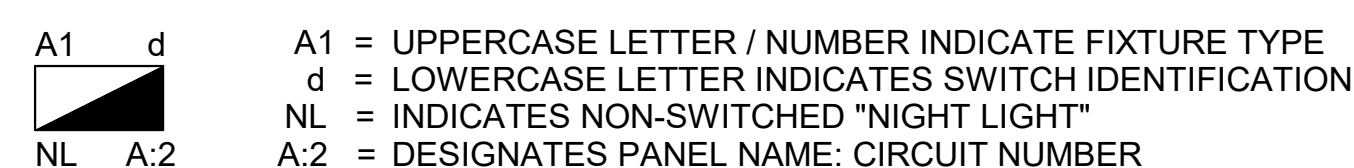
### LIGHT FIXTURE SCHEDULE

FIXTURE SPECIFICATIONS					LAMPING		ELECTRICAL		MOUNTING REMARKS	NOTES
TYPE	FIXTURE DESCRIPTION	MANUFACTURER	CAT. #	NO.	LAMP TYPE	TOTAL LUMENS	COLOR TEMP.	LOAD		
A	HIGH BAY	ILP	HBB-12L-U-40-FRL	1	LED	11548	4000 K	89	120 V	SUSPEND SO BOD IS 180" AFF
AE	HIGH BAY EMERGENCY	ILP	HBB-12L-U-40-FRL-FI/ILBCP10	1	LED	11548	4000 K	89	120 V	SUSPEND SO BOD IS 180" AFF
B	LINEAR STRIP	COLUMBIA	LXEN-4-40LW-RFA-EU	1	LED	4000	4000 K	37	120 V	MOUNT TO UNDERSIDE OF CANOPY
U1E	EMERGENCY WALL PACK	ILP	WPMO-45-UNIV-40-PCU-LEDBCT-BLK	1	LED	5216	4000 K	45	120 V	WALL MOUNTED SO THAT BOD IS AT HEIGHT NOTED ON PLANS
U2	WALL PACK	ILP	WPMO-70-UNIV-40-PCU-BLK	1	LED	7770	4000 K	70	120 V	WALL MOUNTED SO THAT BOD IS AT HEIGHT NOTED ON PLANS
X	RED SINGLE FACED EXIT SIGN	DUALITE	CCEL-S-E-W-XX	1	LED			4	120 V	WALL MOUNTED AT 108" AFF

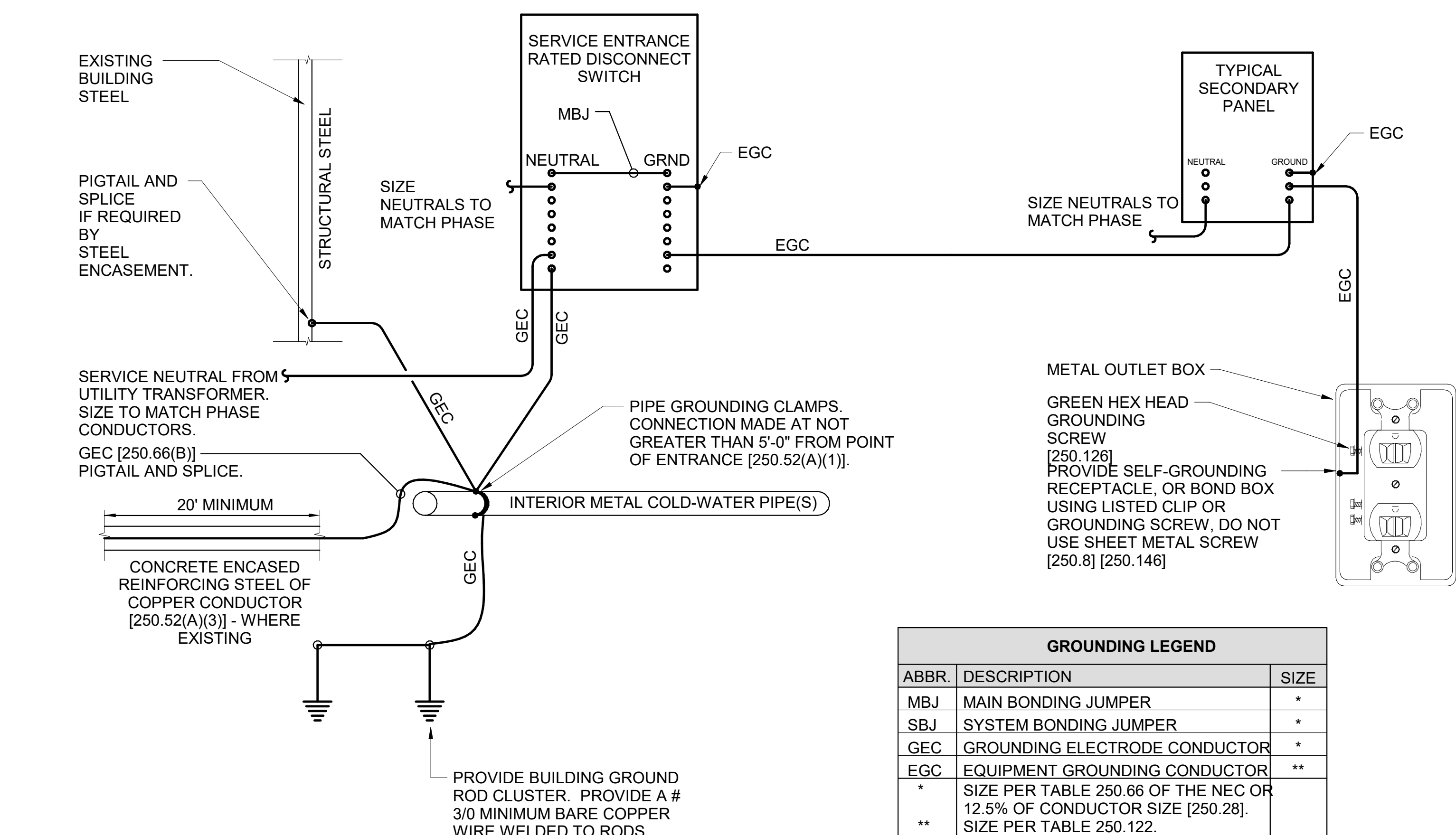
LIGHT FIXTURE SCHEDULE NOTES:  
 • EQUAL MANUFACTURERS ARE H.E. WILLIAMS AND SIGNIFY.

### LIGHT FIXTURE PLAN KEY

SHADING INDICATES EMERGENCY FIXTURE SUPPLIED WITH EMERGENCY BATTERY BACKUP.



ALL EMERGENCY FIXTURES INDICATED ON PLAN CONTAIN EMERGENCY BATTERY BACKUP. ALL EMERGENCY BACKUP FIXTURES REQUIRE AN EXTRA CONSTANT POWER CONDUCTOR TO BE CONNECTED TO THE EMERGENCY BACKUP FOR CHARGING. THIS CONDUCTOR MUST NOT BE CONTROLLED BY ANY LIGHTING SYSTEM OR HAVE POWER INTERRUPTED AT ANY TIME.



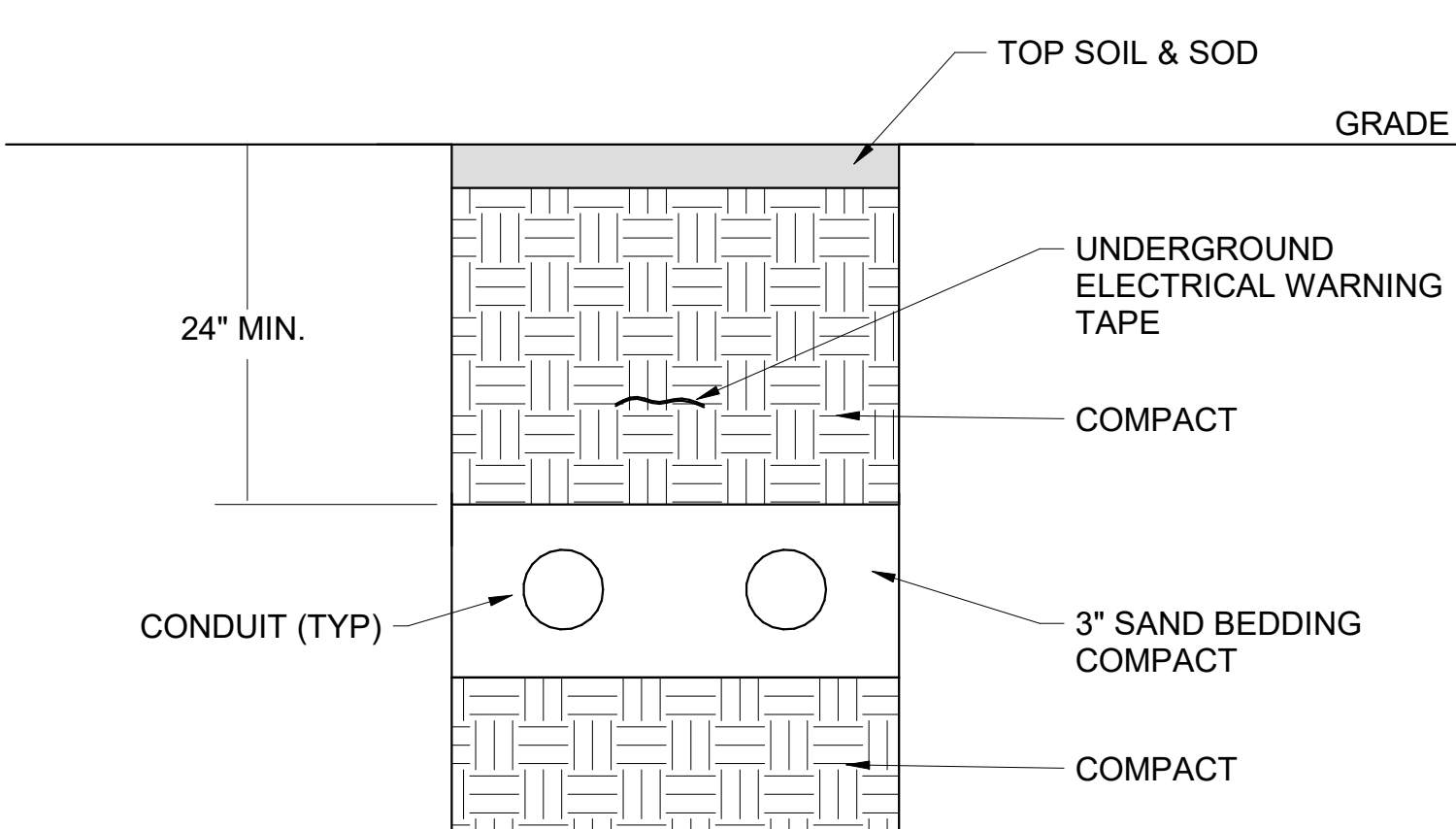
ABBR.	DESCRIPTION	SIZE
MBJ	MAIN BONDING JUMPER	*
SBJ	SYSTEM BONDING JUMPER	*
GEC	GROUNDING ELECTRODE CONDUCTOR	*
EGC	EQUIPMENT GROUNDING CONDUCTOR	**
*	SIZE PER TABLE 250.66 OF THE NEC OR 12.5% OF CONDUCTOR SIZE [250.28].	
**	SIZE PER TABLE 250.122.	

#### GROUNDING NOTES:

- NUMBERS IN BRACKETS REFER TO SPECIFIC SECTIONS OF THE NATIONAL ELECTRICAL CODE.
- ALL UNDERGROUND OR OTHERWISE INACCESSIBLE GROUND CONNECTIONS AND SPLICES SHALL BE EXOTHERMICALLY WELDED [250.68].
- GROUND ELECTRODE OR SEPARATELY DERIVED SYSTEMS SHALL BE THE NEAREST METAL WATER PIPE OR STRUCTURAL METAL. IF EITHER IS NOT AVAILABLE, PROVIDE GROUNDING CONDUCTOR BACK TO MAIN GROUND BUS AT SERVICE ENTRANCE.
- PROVIDE A GROUND WIRE IN ALL CONDUITS.
- EARTH SHALL NOT BE USED AS THE SOLE GROUND RETURN PATH FOR ANY EQUIPMENT POWERED UNDER THIS PROJECT. OTHERWISE OVERCURRENT PROTECTION MIGHT NOT WORK, OR IT MIGHT CAUSE POWER QUALITY PROBLEMS.
- NO ALUMINUM SHALL BE USED FOR GROUNDING WORK WITHOUT THE SPECIFIC WRITTEN PERMISSION OF THE ENGINEER. EXCEPTION: ALUMINUM BUILDING STRUCTURAL MATERIALS SHALL BE BONDED WITH LISTED ALUMINUM EQUIPMENT WITH ALUMINUM TO COPPER CONNECTORS FOR ROUTING COPPER EGC'S.
- PROVIDE GROUNDING BUSHING ON BOTH ENDS OF ALL SERVICE ENTRANCE RACEWAYS. SIZE AS A GEC [250.80]. THIS INCLUDES RIGID STEEL ELBOWS ON PVC CONDUIT. ALL METAL ENCLOSURES AND RACEWAYS SHALL BE BONDED TO GROUND [250.86]. FOR CIRCUITS OVER 250V PROVIDE BOND PER [250.97]. STANDARD LOCKNUTS ARE NOT ACCEPTABLE.
- PROVIDE EGC CONNECTED TO ANY JUNCTION BOX WHERE SPLICE IS MADE [250.148].
- PROVIDE BOND TO EXPOSED METAL ON ALL MOTORS, PUMPS, AND LIGHTING FIXTURES PER [250.112].

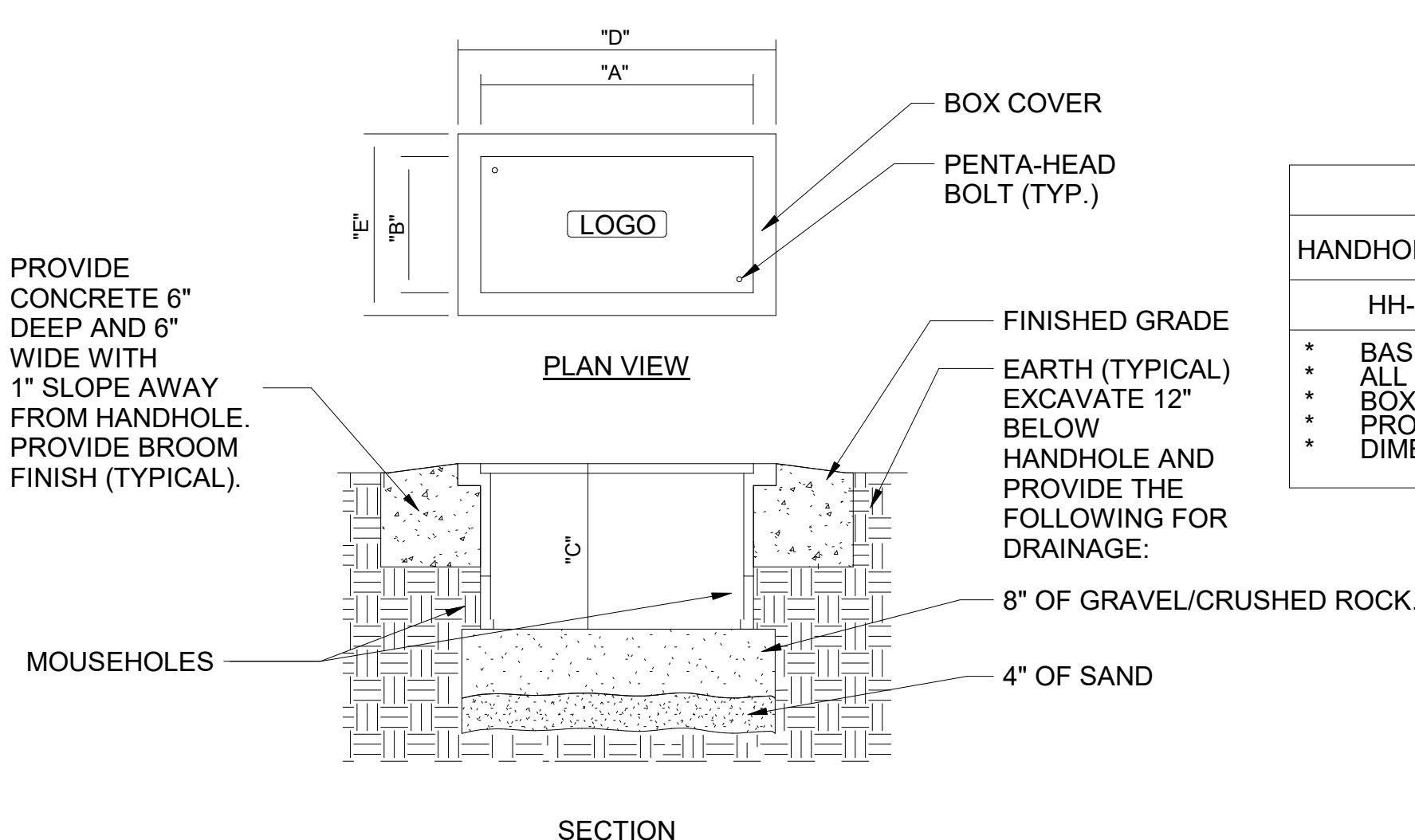
### 3 GROUNDING DETAIL

E002 NOT TO SCALE



### 1 UNDERGROUND CONDUIT DETAIL

E002 NOT TO SCALE



### 2 HANDHOLE DETAIL

E002 NOT TO SCALE

HANDHOLE SCHEDULE		DIMENSIONS					
HANDHOLE NO.	LOAD CAPACITY	COVER LOGO	"A"	"B"	"C"	"D"	"E"
HH-1	TIER 5	ELECTRIC	15.375"	10"	12"	17.438"	12.063"

\* BASIS OF DESIGN IS QUAZITE PG STYLE HANDHOLES.  
 \* ALL HANDHOLES SHALL BE UL LISTED TO MEET ANSI 77 REQUIREMENTS.  
 \* BOXES AND COVERS SHALL BE GREEN IN COLOR.  
 \* PROVIDE TWO (2) PENTA-SOCKET LUG WRENCHES TO OWNER.  
 \* DIMENSIONS INDICATED IN SCHEDULES INDICATES THE MINIMUM.

### EQUIPMENT CONNECTION SCHEDULE

UNIT I.D.	VOLTS	# OF POLES	LOAD (VA)	BRANCH CIRCUIT WIRING	DISCONNECT/RECEPTACLE TYPE	NOTES
CASCADE MACHINE						
CM-1	240 V	2	10500	2 #6, #10G IN 3/4" C	60A/2P/NF/1 DISCONNECT	2
CEILING FAN						
CF-1	120 V	1	73	2 #12, #12G IN 3/4" C	SWITCH	3
CF-2	120 V	1	73	2 #12, #12G IN 3/4" C	SWITCH	3
CF-3	120 V	1	73	2 #12, #12G IN 3/4" C	SWITCH	3
FANS						
EF-1	120 V	1	1296	2 #12, #12G IN 3/4" C	TOGGLE SWITCH	2
HEAT TRACE						
HT-1	120 V	1	500	2 #12, #12G IN 3/4" C	HARD WIRED	
OVERHEAD DOORS						
OHD-1	120 V	1	1800	2 #12, #12G IN 3/4" C	5-20R	1,4
OHD-2	120 V	1	1800	2 #12, #12G IN 3/4" C	5-20R	1,4
OHD-3	120 V	1	1800	2 #12, #12G IN 3/4" C	5-20R	1,4
UNIT HEATER						
UH-1	120 V	1	615	2 #12, #12G IN 3/4" C	TOGGLE SWITCH	2
UH-2	120 V	1	615	2 #12, #12G IN 3/4" C	TOGGLE SWITCH	2

#### EQUIPMENT CONNECTION SCHEDULE NOTES:

- PROVIDE WITH 3 PUSH BUTTON CONTROL FOR MOTOR AT 48" AFF ADJACENT TO DOOR OPENING.
- DISCONNECT OR TOGGLE SWITCH TO BE MOUNTED AT 48" AFF.
- INSTALL MANUFACTURER PROVIDED REMOTE CONTROL.
- COORDINATE EXACT RECEPTACLE TYPE WITH GARAGE DOOR OPENER AND ADJUST AS NECESSARY.

### PANELBOARD SCHEDULE

PANEL NAME: A  
 LOCATION: APPARATUS BAY 1  
 SOURCE: ATS  
 MOUNTING: Surface

VOLTS: 120/240 Single  
 PHASES: 1  
 WIRES: 3  
 ENCLOSURE: Type 1

A.I.C. RATING: 22000  
 MAINS RATING: 400 A  
 MAINS TYPE: MAIN CIRCUIT BREAKER

CKT NO.	CIRCUIT DESIGNATION	TRIP	POLES	A	B	TRIP	CIRCUIT DESIGNATION	CKT NO.
1	CEILING FANS	20 A	1	220 VA / 580 VA		20 A	LTG- EXTERIOR	2
3	EF-1	20 A	1		1300 VA / 1430 VA	20 A	LTG- APPARATUS BAY	4
5	OHD-1	20 A	1	1800 VA / 1230 VA		20 A	UH-1, UH-2	6
7	OHD-2	20 A	1		1800 VA / 1080 VA	20 A	REC- EXTERIOR	8
9	OHD-3	20 A	1	1800 VA / 720 VA		20 A	REC- APPARATUS BAY	10
11	HEAT TRACE	20 A	1		500 VA / 1720 VA	20 A	REC- APPARATUS BAY	12
13	ICE MAKER	20 A	1	1000 VA / 1440 VA		20 A	REC- WATER HEATER	14
15					5250 VA / 1500 VA	20 A	GEN. BLOCK HEATER	16
17	CM-1	60 A	2	5250 VA / 1200 VA		20 A	GEN. BATTERY CHARGER	18
19	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	20
21	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	22
23	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	24
25	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	26
27	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	28
29	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	30
31	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	32
33	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	34
35	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	36
37	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	38
39	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	40
41	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	42
43	SPARE	20 A	1		0 VA / 0 VA	20 A	SPARE	44
45	SPARE	20 A	1	0 VA / 0 VA		20 A	SPARE	46
47	SPARE	20 A	1		0 VA / 0 VA	20 A	SPACE FOR SPD	48
49	SPARE	20 A	1	0 VA / 0 VA		--	SPACE FOR SPD	50
51	PANEL '1'	200 A	2	19200 VA / 0 VA	19200 VA / 0 VA	--	SPACE FOR 200A BREAKER	52
53				34440 VA	33781		SPACE FOR 200A BREAKER	54
				<b>TOTAL PHASE LOAD:</b>				
				<b>TOTAL PHASE CURRENT:</b>	287 A	282 A		
				<b>PANEL TOTALS</b>				
				<b>TOTAL CONNECTED LOAD:</b>	68224			
				<b>TOTAL CONNECTED CURRENT:</b>	284 A			

#### PANEL SCHEDULES NOTES:

- EXISTING ELECTRICAL LOADS WERE ESTIMATED BASED ON 80% OF MAIN BREAKER SIZE. IF EXACT LOADS ARE REQUIRED CONTRACTOR TO PROVIDE 30 DAY DATA LOGGER CURRENT MEASUREMENTS.
- PROVIDE GFCP TYPE BREAKER.

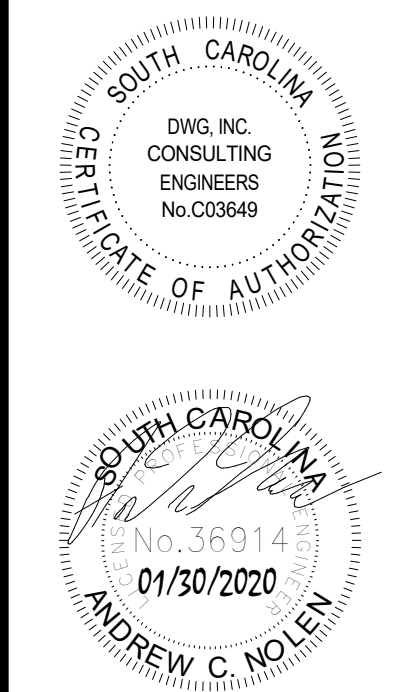
#### GENERAL PANEL SCHEDULE NOTES:

- PROVIDE EATON PRL3A OR EQUAL TYPE PANEL, TO SUPPORT 200A BRANCH BREAKER TO SUBFEED EXISTING PANEL '1'.

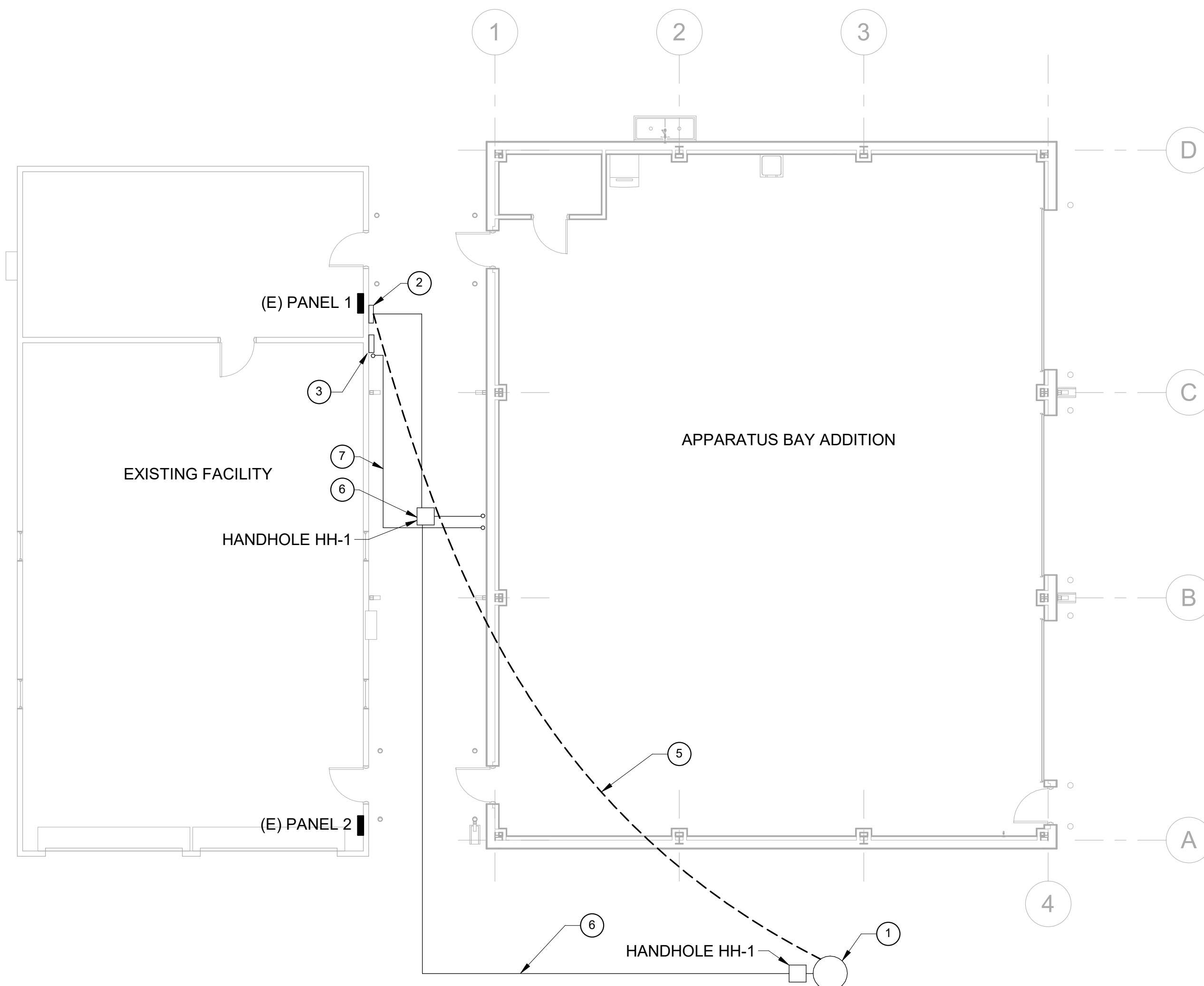
#### AVAILABLE FAULT CURRENT

BASED ON ONE 15 KVA, 1% Z UTILITY TRANSFORMER THE MAXIMUM FAULT CURRENT AVAILABLE AT THE SERVICE ENTRANCE DISCONNECT IS CALCULATED TO BE 3780 AMPS. LABEL THE SERVICE ENTRANCE DISCONNECT WITH THIS MAXIMUM FAULT CURRENT AND THE DATE OF INSTALLATION. CONTACT ENGINEER 2 WEEKS PRIOR TO SUBSTANTIAL COMPLETION TO CONFIRM THE AVAILABLE FAULT CURRENT PRIOR TO LABELING EQUIPMENT.

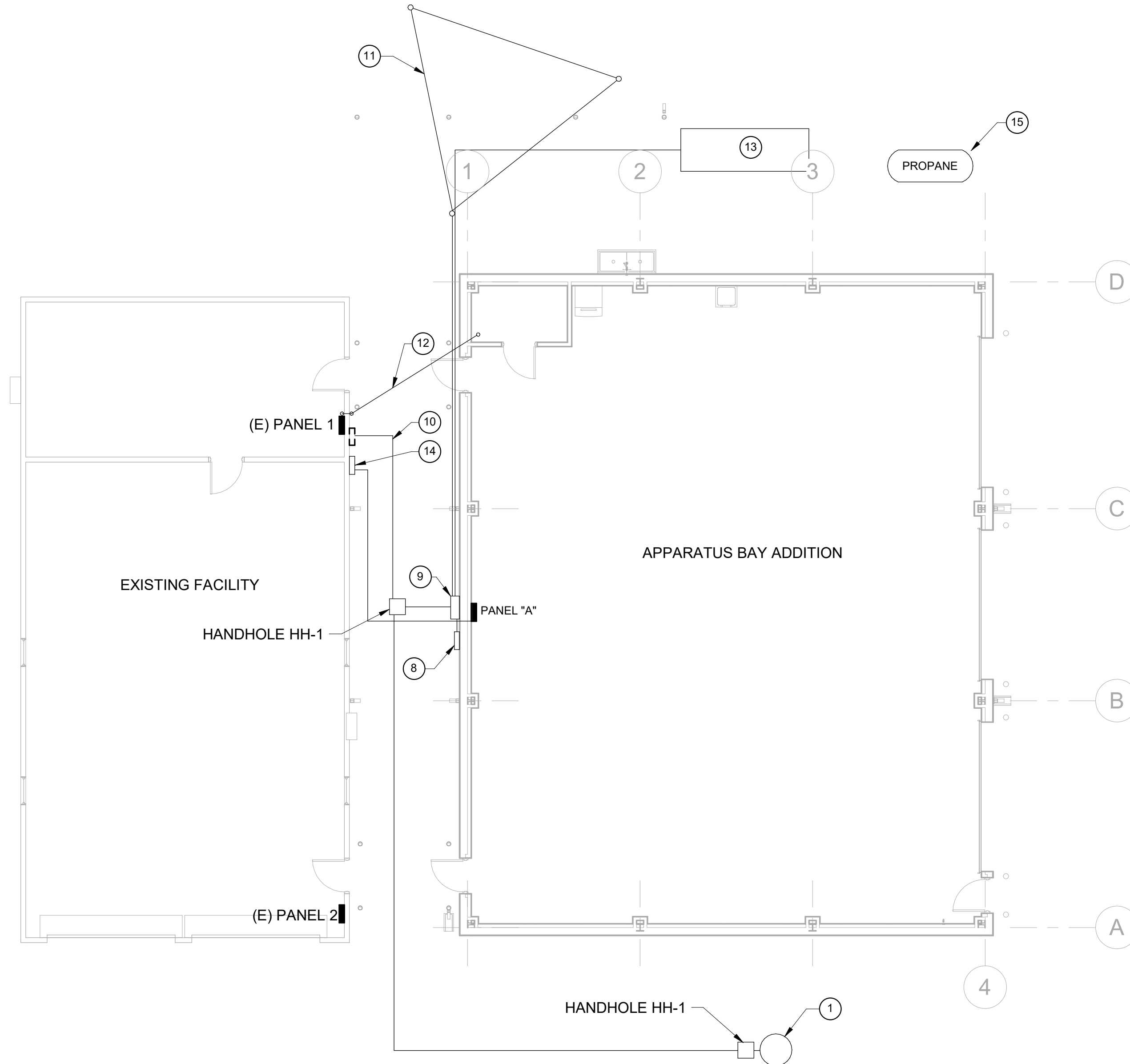
REV. NO.	DATE	DESCRIPTION







3 ELECTRICAL SITE PLAN- PHASE 1  
E100 SCALE: 1/8" = 1'-0"

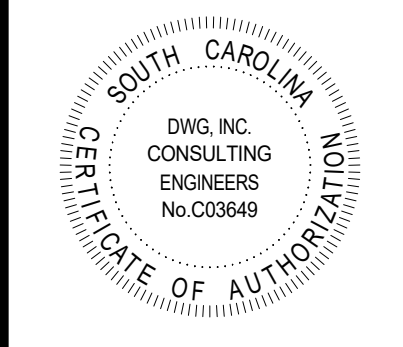


1 ELECTRICAL SITE PLAN- PHASE 2  
E100 SCALE: 1/8" = 1'-0"

KEYNOTES

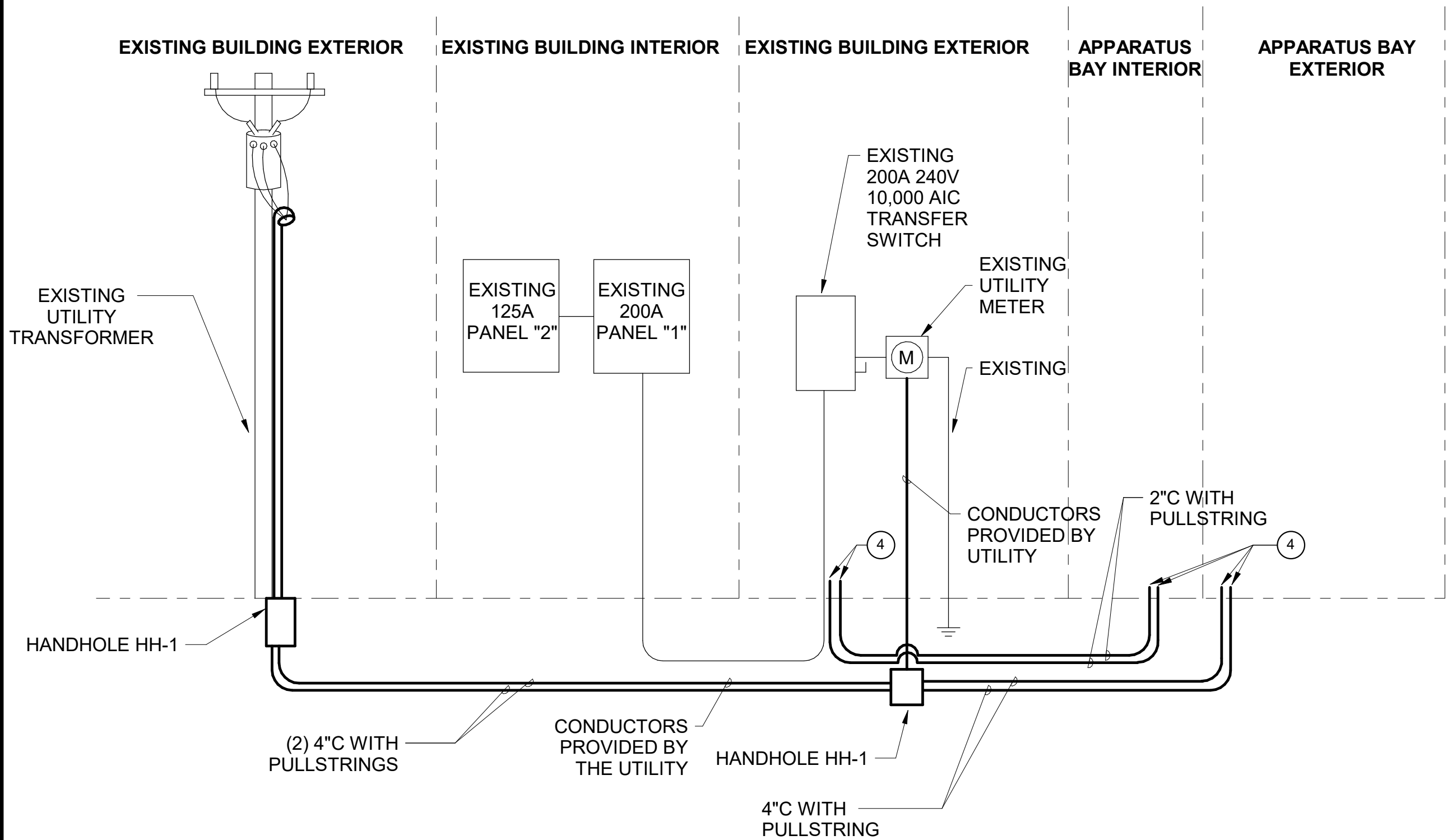
- 1 LOCATION OF EXISTING UTILITY TRANSFORMER.
- 2 LOCATION OF EXISTING UTILITY METER.
- 3 LOCATION OF EXISTING MANUAL TRANSFER SWITCH.
- 4 STUB UP SHALL BE CAPPED AND GASKETED 6" ABOVE FINISH GRADE.
- 5 COORDINATE WITH COASTAL ELECTRICAL COOPERATIVE TO REMOVE OVERHEAD SERVICE.
- 6 PROVIDE NEW UNDERGROUND SERVICE CONDUITS TO FEED EXISTING AND NEW SERVICE.
- 7 PROVIDE NEW UNDERGROUND CONDUIT TO SUBFEED EXISTING SERVICE WHEN NEW ADDITION SERVICE IS COMPLETE.
- 8 PROPOSED LOCATION OF NEW UTILITY METER.
- 9 PROPOSED LOCATION OF NEW ATS.
- 10 DISCONNECT AND REMOVE EXISTING METER AFTER TRANSITION TO NEW SERVICE LOCATION.
- 11 LOCATION OF GROUNDING TRIAD.
- 12 PROVIDE 1" CONDUIT WITH PULLSTRING ROUTED BELOW GRADE AND STUBBED UP IN STORAGE ROOM FOR FUTURE DATA USE.
- 13 PROPOSED LOCATION FOR OWNER PROVIDED GENERATOR.
- 14 PROPOSED LOCATION OF NEW BUILDING DISCONNECT.
- 15 PROPOSED LOCATION FOR PROPANE TANK.

REV. NO.	DATE	DESCRIPTION

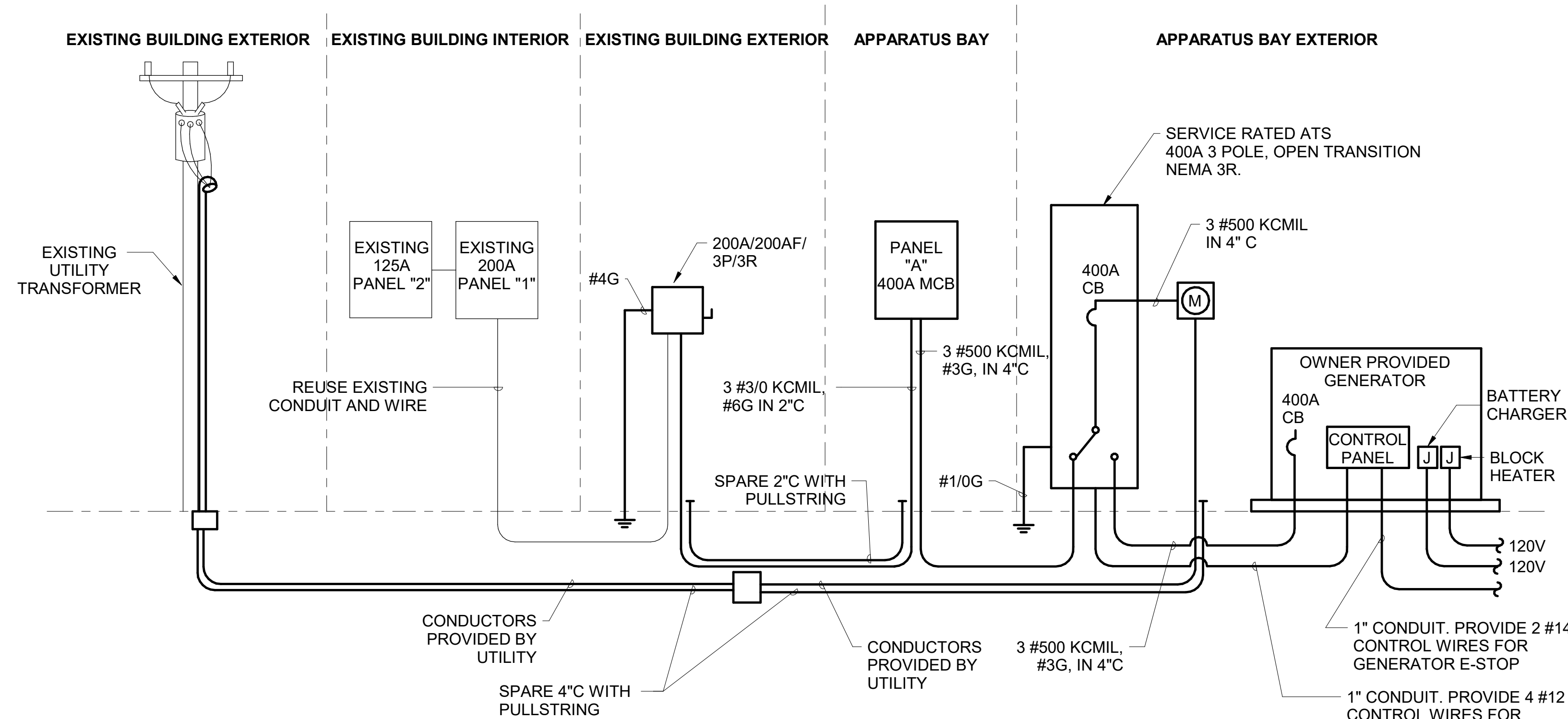


GENERAL NOTES

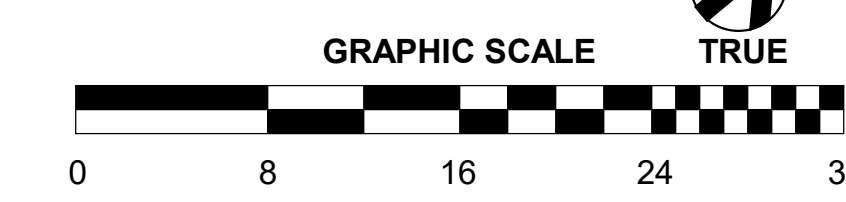
1. COORDINATE FINAL GENERATOR LOCATION WITH LOCATION OF PROPANE TANK. GENERATOR SHALL NOT BE WITHIN 10' OF COMBUSTIBLE SOURCE (PROPANE TANK).

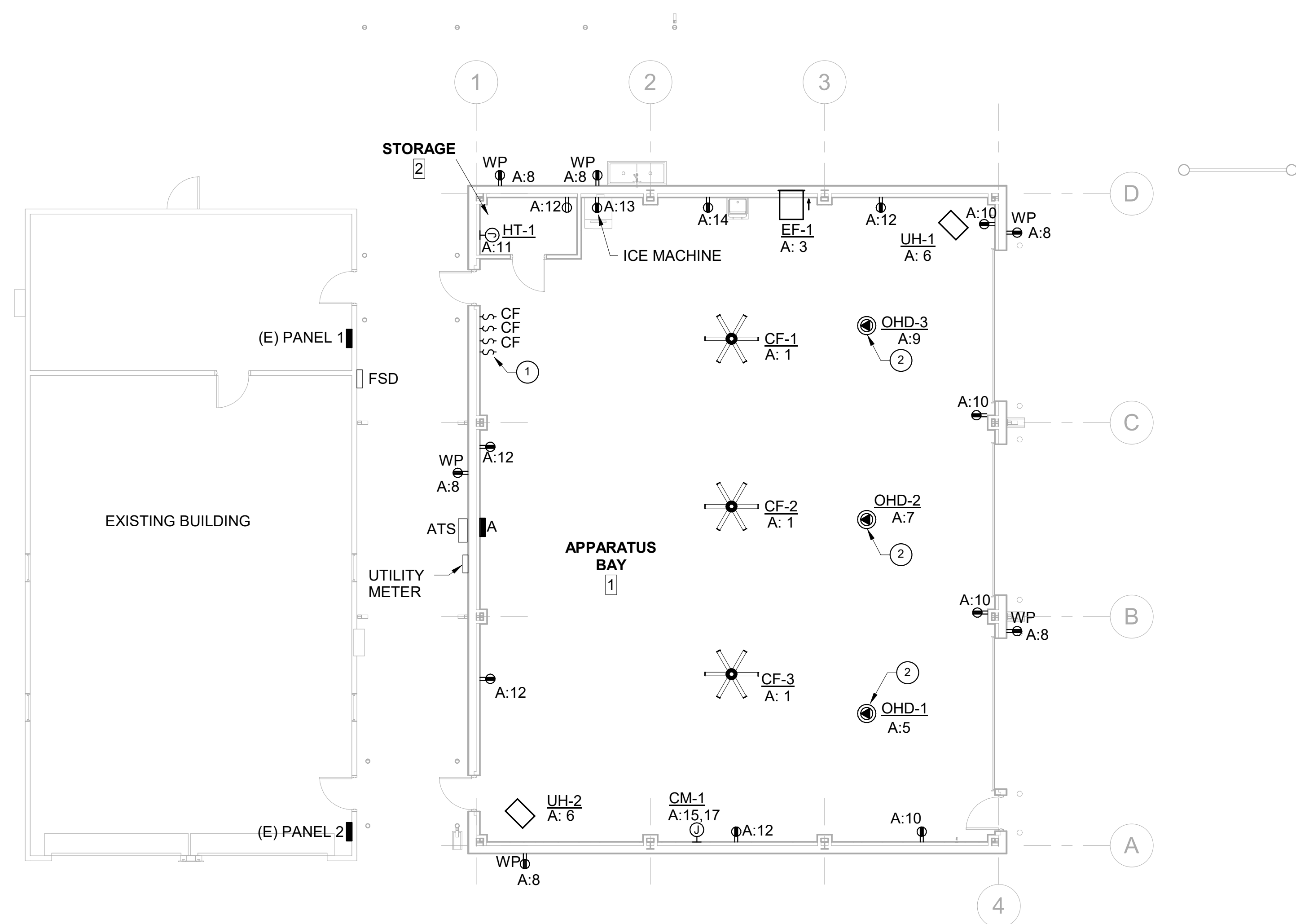


4 ONE-LINE DIAGRAM- PHASE 1  
E100 NOT TO SCALE

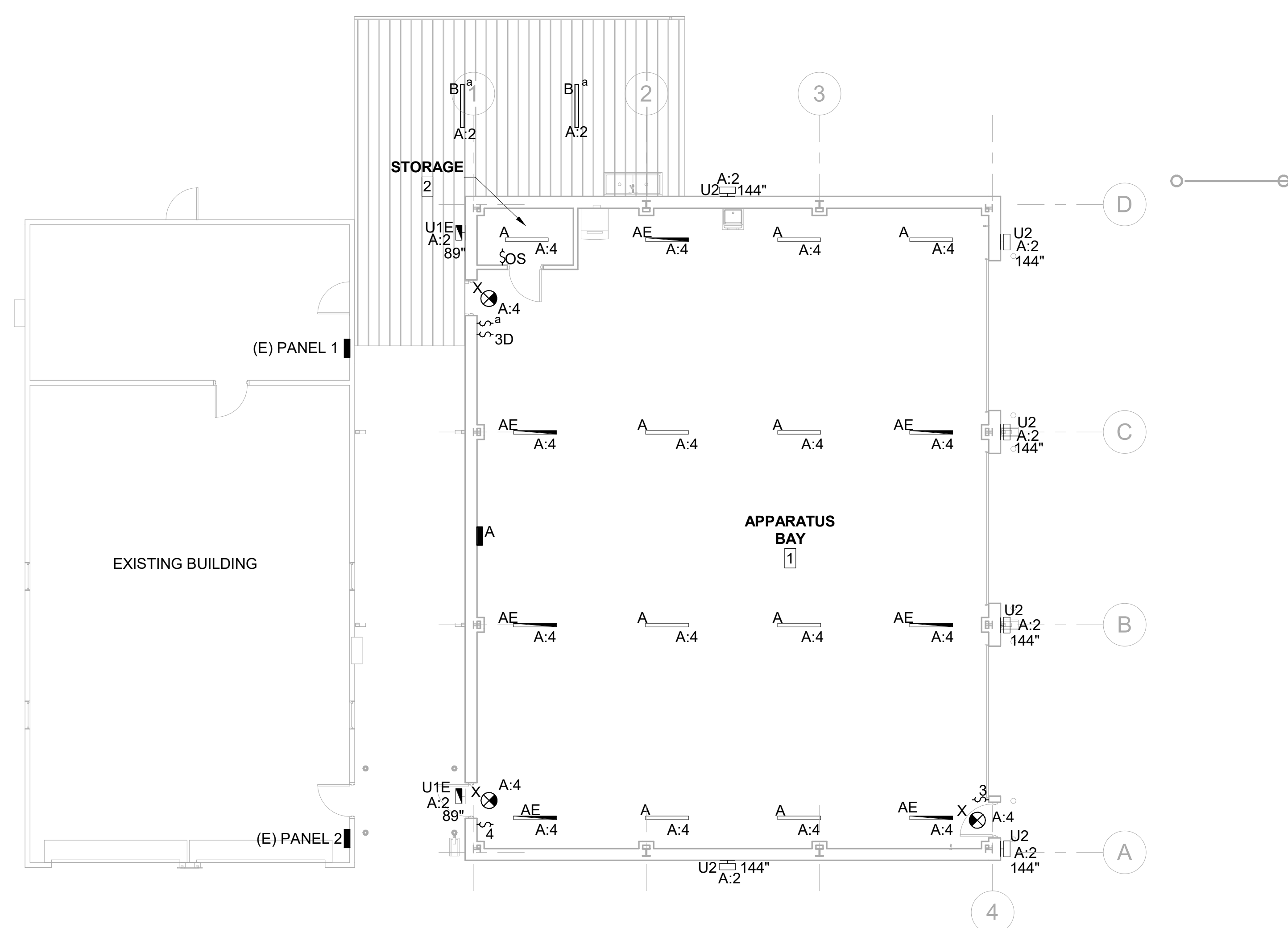


2 ONE-LINE DIAGRAM- PHASE 2  
E100 NOT TO SCALE





1 FIRST FLOOR POWER PLAN  
E101 SCALE: 1/8" = 1'-0"



2 FIRST FLOOR LIGHTING PLAN  
E101 SCALE: 1/8" = 1'-0"

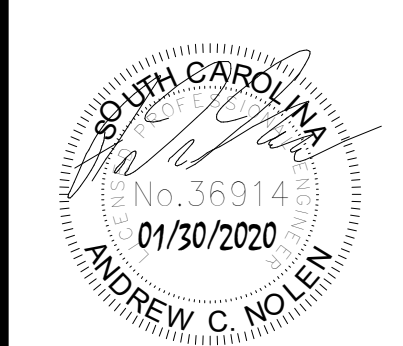
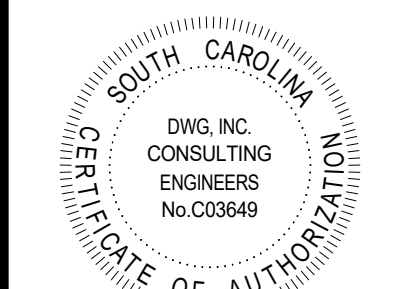
KEYNOTES

- 1 PROVIDE SWITCH FOR SIDEWALL EXHAUST FAN.
- 2 COORDINATE EXACT POWER REQUIREMENTS AND LOCATION WITH GARAGE DOOR AND ADJUST AS NECESSARY.

GENERAL NOTES



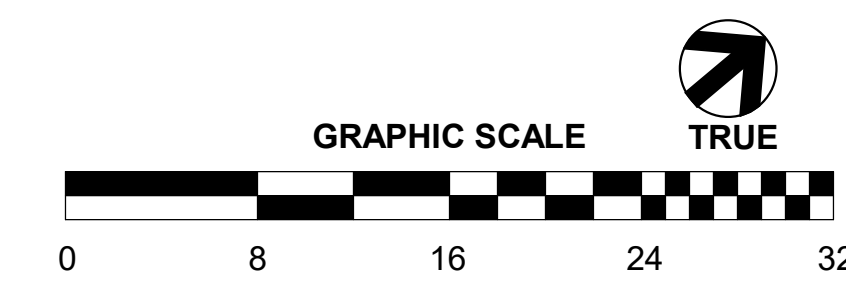
REV. NO.	DATE	DESCRIPTION



**ISLANDTON FIRE STATION #15**  
COLLETON COUNTY  
547 ASHTON RD.  
ISLANDTON, SC 29929

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JOB NUMBER: 19153-00  
PROJECT MGR.:  
DRAWN BY: BMP  
CHECKED BY: ACN  
APPROVED BY: ACN  
DATE ISSUED FOR:  
CONSTRUCTION DOCUMENTS 01/30/2020

**ELECTRICAL PLANS**



**E101**

# SPECIFICATIONS

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## ISLANDTON FIRE STATION #15 ADDITION

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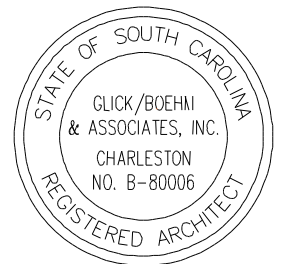
547 Ashton Road  
Islandton, South Carolina 29929

For The Owner:

**Colleton County**

GBA PROJECT N°.: 1928

DATE: January 31, 2020



***ARCHITECTURE / PLANNING / INTERIOR DESIGN***

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**00 01 10**

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- NOT USED

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- NOT USED

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- 07 90 05 - JOINT SEALERS

**DIVISION 08 - DOORS AND WINDOWS**

- 08 12 13 - HOLLOW METAL FRAMES & DOORS
- 08 71 00 - DOOR HARDWARE

**DIVISION 09 - FINISHES**

- 09 22 16 - NON-STRUCTURAL METAL FRAMING
- 09 90 00 - PAINTING AND COATING

**DIVISION 10 - SPECIALTIES**

- 10 44 00 - FIRE PROTECTION SPECIALTIES

**DIVISION 11 - EQUIPMENT**

- NOT USED

**DIVISION 12 - FURNISHINGS**

- NOT USED

**DIVISION 13 - SPECIAL CONSTRUCTION**

- 13 34 19 - METAL BUILDING SYSTEMS

**DIVISION 14 - VERTICAL CIRCULATION**

- NOT USED

**DIVISION 21 - FIRE SUPPRESSION**

- NOT USED

**DIVISION 22 - PLUMBING**

- 22 00 00 - BASIC PLUMBING MATERIALS AND METHODS
- 22 05 10 - PLUMBING COORDINATION
- 22 05 11 - COMMON WORK RESULTS FOR PLUMBING
- 22 05 23 - GENERAL DUTY VALVES FOR PLUMBING PIPING
- 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

- 22 05 33 – HEAT TRACING FOR PLUMBING PIPING
- 22 05 48 – VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
- 22 05 53 – IDENTIFICATION FOR PLUMBING PIPING
- 22 07 19 – PLUMBING PIPING INSULATION
- 22 11 16 – DOMESTIC WATER PIPING
- 22 11 19 – DOMESTIC WATER PIPING SPECIALTIES
- 22 13 16 – SANITARY WASTE AND VENT PIPING
- 22 13 19 – SANITARY WASTE PIPING SPECIALTIES
- 22 40 00 – PLUMBING FIXTURES

**DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING**

- 23 00 00 – BASIC MECHANICAL MATERIALS AND METHODS
- 23 05 10 – MECHANICAL COORDINATION
- 23 05 29 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
- 23 05 48 – VIBRATION AND SEISMIC CONTROLS FOR HVAC
- 23 05 53 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
- 23 11 26 – FACILITY LIQUEFIED-PETROLEUM GAS PIPING
- 23 34 23 – HVAC POWER VENTILATORS
- 23 51 00 – BREECHINGS, CHIMNEY AND STACKS
- 23 55 33 – FUEL-FIRED UNIT HEATERS

**DIVISION 26 – ELECTRICAL**

- 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL
- 26 05 01 – ELECTRICAL DEMOLITION
- 26 05 02 – ELECTRICAL ACCEPTANCE TESTS
- 26 05 10 – ELECTRICAL SUBMITTALS
- 26 05 11 – ELECTRICAL WORK CLOSOUT
- 26 05 12 – ELECTRICAL COORDINATION
- 26 05 19 – LOW VOLTAGE ELECTRICAL CONDUCTORS AND CABLES
- 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
- 26 05 33 – RACEWAY AND BOXES ELECTRICAL SYSTEMS
- 26 05 43 – UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
- 26 05 48 – VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
- 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS
- 26 24 00 – SWITCHBOARDS AND PANELBOARDS
- 26 27 26 – WIRING DEVICES
- 26 36 00 – TRANSFER SWITCHES
- 26 43 00 – SURGE PROTECTIVE DEVICES
- 26 51 00 – LIGHTING
- 26 56 00 – EXTERIOR LIGHTING



**SECTION 00 31 00**  
**AVAILABLE PROJECT INFORMATION**

**PART 1 GENERAL**

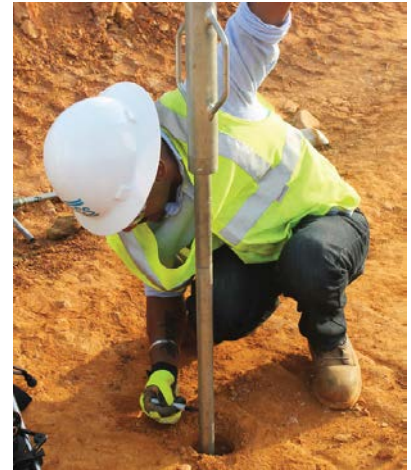
**1.01 EXISTING CONDITIONS**

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:
- B. Geotechnical Report: Entitled Report of Subsurface Exploration and Geotechnical Engineering Analysis for Islandton Station #15 Addition, 547 Ashton Road, Islandton, SC 29929 prepared by ECS Southeast, LLP dated October 21, 2019.
  - 1. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



# ECS Southeast, LLP

Report of Subsurface Exploration and Geotechnical Engineering Analysis

## Islandton Station #15 Addition

547 Ashton Road  
Islandton SC 29929

ECS Project Number 34:3775

October 21, 2019





# ECS SOUTHEAST, LLP

Geotechnical • Construction Materials • Environmental • Facilities

"Setting the Standard for Service"

SC Registered Engineering Firm 3240  
NC Registered Engineering Firm F-1078  
NC Registered Geologists Firm C-406

October 21, 2019

Mr. Myles Glick  
Glick/Boehm & Associates, Inc.  
493 King Street, Suite 100  
Charleston, South Carolina 29403

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis  
**Islandton Station #15 Addition**  
547 Ashton Road  
Islandton SC 29929

ECS Project Number 34:3775

Dear Mr. Glick:

ECS Southeast, LLP (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 34:3886-GP, dated September 30, 2019. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and engineering analyses conducted and our recommendations for design and construction of geotechnical related items.

It has been our pleasure to be of service to you during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify the assumptions of subsurface conditions made for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

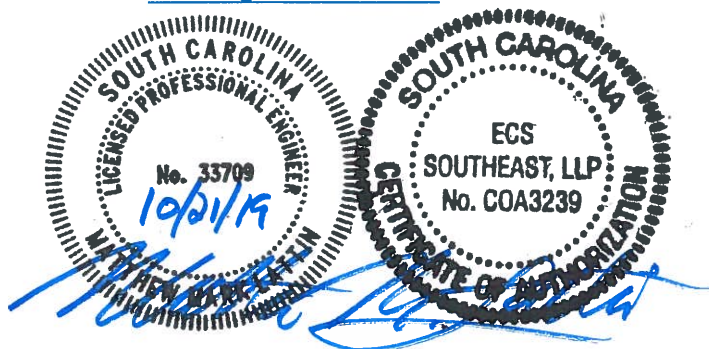
Respectfully submitted,

ECS Southeast, LLP

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**APPENDICES**

**APPENDIX A – Drawings & Reports**

- Site Location Diagram
- Test Location Diagram

**APPENDIX B – Field Operations**

- Reference Notes for Cone Penetration Test (CPT) Soundings
- CPT Sounding
- Reference Notes for Boring Logs
- Hand Auger Log

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## EXECUTIVE SUMMARY

ECS Southeast, LLP (ECS) has completed the subsurface exploration for the proposed one-story addition to the existing fire station located at 547 Ashton Road in Islandton, South Carolina. The project information summarized below is based exclusively on the information made available to us by the client at the time of this report and the results of our subsurface exploration. Our findings, conclusions, and recommendations are summarized below.

### PROJECT INFORMATION:

- Site Location : 547 Ashton Road Islandton, South Carolina
- Building Scope: 1-story addition to existing building
- Building Type: Shallow foundations, slab-on-grade
- Assumed Loads: Max. Column loads = 40 kips, Max. wall loads = 4 klf
- Assumed Earthwork: Approximately 1 to 3 feet of fill anticipated in the addition area

### SUBSURFACE CONDITIONS:

- Field Exploration: 1 cone penetration test and 1 hand auger boring
- Surface Material: Approximately 4 inches of organic laden topsoil, where explored
- Coastal Sedimentary Deposits: Observed to the maximum depth explored of approximately 42 feet
- Groundwater: Cave in observed at approximately 5 feet below the current ground surface, may be an indicator of groundwater presence.

### GEOTECHNICAL CONCERNS:

- Presence of organic laden soil to a depth of approximately 4 inches
- Construction operations in the vicinity of existing structures should not undermine or disturb existing foundations and vibratory rolling should not be performed in the vicinity of existing structures

### DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Seismic Design: Seismic Site Class "D"
- Foundations: 2,500 psf
- Slabs-on-Grade: Modulus of Subgrade Reaction,  $k = 175$  pci

This summary should not be considered apart from the entire text of the report with the qualifications and considerations mentioned herein. Details of our conclusions and recommendations are discussed in the report text.

---

## 1.0 INTRODUCTION

### 1.1 GENERAL

The purpose of this study was to provide geotechnical information for the design of foundations for a single-story structure.

The recommendations developed for this report are based on the results of our subsurface exploration and project information supplied by Glick/Boehm & Associates, Inc. This report contains the results of our subsurface exploration, site characterization, engineering analyses, and recommendations for the design and construction of the planned structure.

### 1.2 SCOPE OF SERVICES

To obtain the necessary geotechnical information required for design of the planned facility, one (1) Cone Penetration Test (CPT) and one (1) hand auger boring were performed at a location selected by ECS. The CPT was located within the footprint of the proposed building addition.

This report discusses our exploratory and testing procedures, presents our findings and evaluations, and includes the following.

- Description of subsurface exploration program and test location plan.
- Description of tests performed, results of tests and data collected.
- CPT and Hand-Auger boring logs and soil classification in accordance with Unified Soil Classification System.
- Pertinent geological data and general description of area soils.
- Seismic site class determination per 2015 International Building Code (IBC 2015).
- Shallow foundation recommendations.
- Estimated total and differential settlement.
- Impact of potential soil liquefaction on design and construction.
- Constructability recommendations including suitability of site soils for use as structural fill, compaction requirements, dewatering, maximum slopes, and identifying undesirable subgrade material present such as old fill, refuse, rubble, existing foundations, organic material, etc., which are recommended for removal.
- Recommendations on subgrade modulus for design of at-grade slabs.
- Pavement Recommendations.

### 1.3 AUTHORIZATION

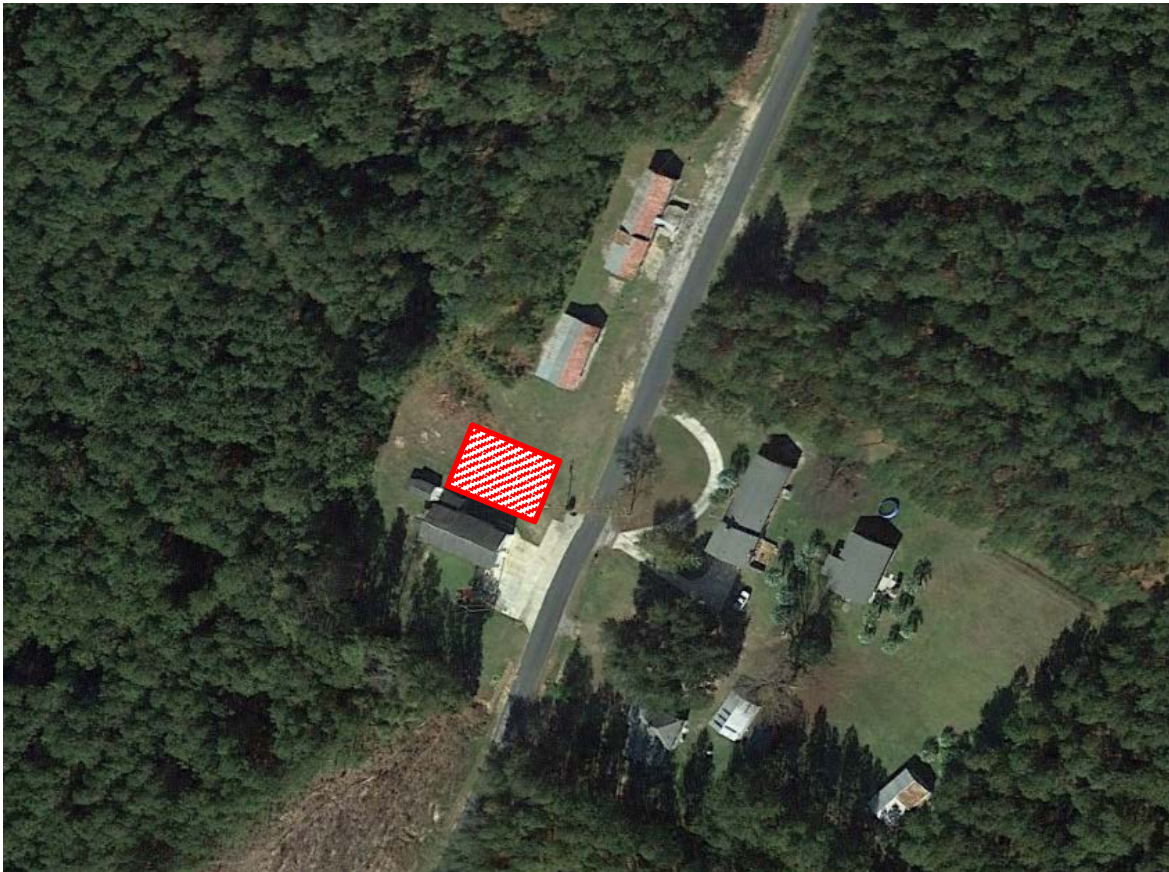
Our services were provided in accordance with our Proposal No. 34:3886-GP, dated September 30, 2019, as authorized by Mr. Myles Glick on October 2, 2019 and includes the Terms and Conditions of Service outlined with our Proposal.



## 2.0 PROJECT INFORMATION

### 2.1 PROJECT LOCATION

The project site is located at 547 Ashton Road in Islandton, South Carolina, as shown below and on Figure 1 in [Appendix A](#). The site is bound by Ashton Road to the east, undeveloped wooded land to the south and west, and a vacant set of buildings to the north.



**Figure 2-1** Site Location

### 2.2 CURRENT SITE CONDITIONS

Currently the site is developed and is occupied by an active fire station with associated parking and drive areas. According to the provided plans, current site grades range from approximately +73 feet to +75 feet (NAVD 88) within the proposed addition footprint. The finished floor elevation of the existing structure is noted as +76.33 feet (NAVD 88).

### 2.3 PROPOSED CONSTRUCTION

According to conceptual architectural plans dated October 2, 2019, the proposed construction consists of an approximate 4,800 square-foot addition to the existing structure with associated drive lanes. The plans depict the location of the proposed structure on the north side of the existing fire station. This portion of the site is undeveloped and grassy.



### 2.3.1 Structural Information/Loads

The following information explains our understanding of the structures and their loads:

**Table 2-1** Design Assumptions

SUBJECT	DESIGN INFORMATION / EXPECTATIONS
Building Footprint	Approximately 4,800 square feet
# of Stories	One story above grade
Usage	EMS/Fire Department Vehicle Storage
Column Loads	40 kips maximum allowable load (assumed)
Wall Loads	4 kips per linear feet (klf) allowable load (assumed)
Finished Floor Elevation	Matching the existing structure (+76.33 feet NAVD88)

---

## 3.0 FIELD EXPLORATION

### 3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field data to assist in the determination of geotechnical recommendations.

The test location was identified in the field by ECS personnel using GPS techniques and is shown on the Test Location Diagram in [Appendix A](#). Prior to performing the field exploration, we contacted Palmetto Utility Protection Service (PUPS) and hired a private utility locator to check the test locations for potential underground utilities.

#### 3.1.1 Cone Penetration Testing (CPT)

The Cone Penetration Test (CPT) sounding, designated C-1, was performed within the footprint of the proposed structure to a depth of approximately 42 feet. The CPT was performed in general conformance with ASTM D5778 by our subcontractor. The sounding was performed with a track-mounted rig.

The cone used in the sounding has a tip area of 15 cm<sup>2</sup> and a sleeve area of 225 cm<sup>2</sup>. The CPT sounding recorded tip resistance and sleeve friction measurements to assist in determining pertinent index and engineering properties of the site soils. The ratio of the sleeve friction to tip resistance is then used to aid in assessing the soil types through which the tip is advanced. The CPT sounding log is presented in [Appendix B](#).

#### 3.1.2 Hand Auger Borings

One (1) hand auger boring, designated C-1, was performed adjacent to the CPT location. The hand auger boring was conducted in general conformance with ASTM D1452.

In this procedure, the auger boring is made by manually rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings were visually classified in the field. Stratification lines shown on the hand auger boring log represent approximate boundaries between physical soil types. The hand auger boring log is presented in [Appendix B](#).

### 3.2 REGIONAL/SITE GEOLOGY

The site is located in the Coastal Plain Physiographic Province of South Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the adjacent Piedmont Physiographic Province. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

### 3.3 SUBSURFACE CHARACTERIZATION AND GROUNDWATER OBSERVATIONS

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata encountered during our subsurface exploration.

Surficial material consisting of approximately 4 inches of topsoil was observed in the hand auger boring. Beneath the topsoil, sand with varying amounts of clay (SP-SC, SC) was observed to the maximum depth explored in the hand auger boring of about 4 feet below the current ground surface. CPT sounding interpretations indicate that the medium dense to dense SAND extends to a depth of about 5 feet below the current site grades. The near surface sand is underlain by stiff to hard CLAY/SILT (CL/ML) to a depth of approximately 30 feet.

Below the clay/silt interbedded layers of medium dense to very dense SAND with varying amounts of silt (SP, SM) and stiff to hard CLAY/SILT (CL/ML) were interpreted from the CPT soundings to the maximum depth explored of about approximately 42 feet

For subsurface information at a specific location, refer to the CPT and hand auger logs in [Appendix B](#)

Borehole caving was observed at a depth of approximately 5 feet in the CPT sounding. Borehole caving may be an indicator of groundwater presence as noted on the log in [Appendix B](#).

Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors. Following seasonal heavy rains the groundwater table could rise 1 foot or more or perch on near surface silty/clayey soil.

---

## 4.0 DESIGN RECOMMENDATIONS

### 4.1 GENERAL

The primary purpose of this geotechnical exploration was to help identify and evaluate the general subsurface conditions relative to the proposed construction. Our recommendations have been developed on the basis of the previously described project information and subsurface conditions identified during this study.

#### 4.1.1 Organic-Laden Soil

Existing organic-laden soil was observed at the test location to a depth of approximately four inches. This material should be further assessed by ECS at the time of construction and handled in accordance with the recommendations in this report. Some undercut or remediation will likely be required prior to fill placement or footing construction. The extent of those measures will be determined by ECS at the time of construction.

#### 4.1.2 Protection of Existing Foundations

Construction operations in the vicinity of existing structures should not undermine or disturb existing foundations. Vibratory rolling should not be performed in the vicinity of existing structures. We recommend the structural engineer consider the zone of load influence from new construction on existing foundations and the potential to induce settlement or create bearing capacity issues.

#### 4.1.3 Groundwater Control

Based upon our subsurface exploration at this site, as well as significant experience on sites in nearby areas of similar geologic setting, it is our opinion that construction dewatering at this site will likely be limited to mainly removing perched water or accumulated rain water. Dewatering can be completed using pumps in sumps for small areas. Removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with DOT size No. 57 Stone or open graded bedding material.

#### 4.1.4 Construction Monitoring

ECS should be on-site full-time during earthwork and foundation construction activities to document that our recommendations are followed and to provide recommendations for remedial activities, where necessary. If we are not retained for this critical geotechnical consulting during earthwork construction and foundation construction, ECS cannot be responsible for long-term performance of the subgrade-supported construction.

### 4.2 BUILDING DESIGN

The following sections provide recommendations for seismic design parameters, foundation design, and soil supported slabs.

#### 4.2.1 Seismic Design Considerations

**Liquefaction:** When a saturated soil with little to no cohesion liquefies during a major earthquake, it experiences a temporary loss of shear strength as a result of a transient rise in excess pore water pressure generated by strong ground motion. Flow failure, lateral spreading,

differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction.

We completed our liquefaction analysis in accordance with the 2015 International Building Code (IBC) design earthquake<sup>1</sup>. Layers of very loose to medium dense saturated sand with varying amounts of silt varying in thickness were encountered below the ground water table to a depth of approximately 40 feet below the existing ground surface. ECS has compared the cyclic stress in these saturated soils to the cyclic resistance to estimate a Factor of Safety Against Liquefaction (FASL).<sup>2</sup> On the basis of the results of our analyses, we conclude several of these layers have the potential to liquefy during the design seismic event.

**Our analysis indicates that at-grade structures such as parking, slabs and shallow foundations could potentially settle on the order of ½ inch during and immediately following the design seismic event.** Differential settlement associated with liquefaction-induced settlement is expected to be approximately ½ to ¾ of the overall anticipated liquefaction settlement. This settlement would result from volumetric compression of the liquefiable sand layers which occurs as seismically-induced excess soil pore water pressures dissipate.

**Seismic Site Classification:** Section 1613.3.2 of the International Building Code (IBC) 2015 classifies sites with the potential for liquefaction as Seismic Site Class F. However, the IBC 2015 allows the design spectral response accelerations for a site to be determined without regard to liquefaction provided buildings have a fundamental period of less than or equal to 0.5 seconds and the risks of liquefaction are considered in design. The building should meet this criterion; however, this must be confirmed by the structural engineer.

In addition, the IBC requires site classification for seismic design based on the upper 100 feet of a soil profile. Three methods are utilized in classifying sites, namely the shear wave velocity ( $v_s$ ) method; the Standard Penetration Resistance (N-value) method; and the undrained compressive strength ( $s_u$ ) method.

Based on the results of the CPT soundings and our knowledge of local geologic conditions, it is our interpretation the site may be considered a **Seismic Site Classification “D”**, as shown in the preceding table in accordance with the IBC 2015.

**Ground Motion Parameters** In addition to the seismic site classification noted above, ECS has determined the design spectral response acceleration parameters following the IBC 2015 methodology. The Mapped Responses were estimated from the free Seismic Design Map Tool available from <https://hazards.atcouncil.org>. The design responses for the short (0.2 second,  $S_{D5}$ ) and long period (1-second,  $S_{D1}$ ) are noted in bold at the far right end of the following table.

---

1 The IBC design earthquake has a 2% probability of exceedance in 50 years. Our liquefaction analysis was based on an earthquake with a magnitude of 7.3 and ground surface acceleration of 0.299 g.

2 Analysis completed following the procedures presented in the 1996 NCEER and the 1998 NCEER/NSF workshops on the Evaluation of Liquefaction Resistance of Soils (Youd and Idriss 2001). To estimate volumetric strain and associated liquefaction-induced settlement, we used the procedures developed by Zhang et al. (2002) and a depth weighting factor proposed by Cetin (2009).



**Table 4-1** Ground Motion Parameters – Site Class D (IBC 2015 Method)

Period (sec)	Mapped Spectral Response Accelerations (g)		Values of Site Coefficient for Site Class (unitless)		Maximum Spectral Response Acceleration Adjusted for Site Class (g)		Design Spectral Response Acceleration (g)	
Reference	Figures 1613.3.1 (1) & (2)		Tables 1613.3.3 (1) & (2)		Eqs. 16-37 & 16-38		Eqs. 16-39 & 16-40	
0.2	$S_s$	0.531	$F_a$	1.375	$S_{MS}=F_a S_s$	0.730	$S_{DS}=2/3 S_{MS}$	<b>0.487</b>
1.0	$S_1$	0.174	$F_v$	2.103	$S_{M1}=F_v S_1$	0.366	$S_{D1}=2/3 S_{M1}$	<b>0.244</b>

The Site Class definition should not be confused with the Seismic Design Category designation, which the structural engineer typically assesses.

#### 4.2.2 Shallow Foundations

Assuming that the fill heights and building loads are no greater than those assumed, liquefaction risk is accepted or mitigated, and subgrade preparation and earthwork operations are completed in strict accordance with the recommendations of this report, the proposed structure can be supported by conventional shallow foundations: individual column footings and continuous wall footings. The design of the foundation shall utilize the following parameters:

**Table 4-2** Shallow Foundation Design

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure <sup>1</sup>	2,500 psf	2,500 psf
Acceptable Bearing Soil Material	Stratum I or Approved structural fill.	Stratum I or Approved structural fill.
Minimum Width	24 inches	12 inches
Minimum Footing Embedment Depth (below slab or finished grade)	12 inches	12 inches
Estimated Total Settlement <sup>2</sup>	1 inch	1 inch
Estimated Differential Settlement	Less than 0.5 inches between columns	Less than 0.5 inches over 30 feet

1. Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
2. The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. These settlements are in addition to the estimated liquefaction induced settlement reported in Section 4.2.1. The settlement calculations were based on maximum footing sizes of 4.0 ft x 4.0 ft for columns and 1.75 ft wide strip footings.

Estimates of settlement for foundations bearing on engineered or non-engineered fills are strongly dependent on the quality of fill placed. Factors which may affect the quality of fill include maximum loose lift thickness of the fills placed and the amount of compactive effort placed on each lift. The final footing elevation should be evaluated by ECS personnel to document that the bearing soils are capable of supporting the recommended net allowable bearing pressure and are suitable for foundation construction. These evaluations should include visual observations, hand rod probing, and dynamic cone penetrometer (ASTM STP 399) testing, or other methods deemed appropriate by the geotechnical engineer at the time of construction, in each column footing excavation and at intervals not greater than 25 feet in continuous footing excavations.

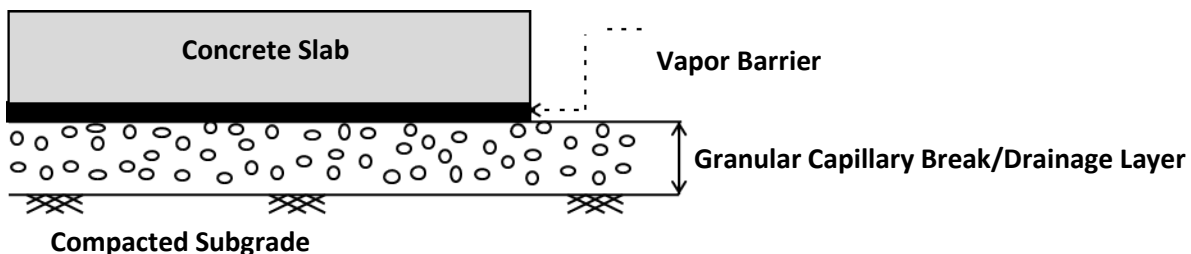
If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled up to the original design bottom of footing elevation with one of the following:

- Lean concrete ( $f'_c \geq 1,000$  psi at 28 days).
- Concrete at the time of footing concrete placement (ensure that footing reinforcing steel is placed at the project specified elevation).
- DOT size No. 57 stone; up to 2 feet in thickness.
- Compacted structural fill (with additional compaction testing and soil bearing evaluation).

**Protection of Foundation Excavations:** Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

#### 4.2.3 Floor Slabs

We assume that the slabs will bear on newly placed structural fill that is observed to be free of unsuitable materials, placed in accordance with the recommendations of this report, that are considered suitable for support of floor slabs. Moisture control during earthwork operations, including the use of diking or appropriate drying equipment, may be necessary. The following graphic depicts our soil-supported slab recommendations:



1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)
3. Subgrade compacted to 95% maximum dry density per ASTM D1557

**Figure 4-1** Concrete slab-on-grade diagram

**Subgrade Modulus:** Provided the placement of structural fill and granular drainage layer per the recommendations discussed herein, the slab may be designed assuming a modulus of subgrade reaction,  $k_1$  of 175 pci (lbs/cu. inch).

**Slab Isolation:** Ground-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab, the slab should be designed with suitable

reinforcement and load transfer devices to preclude overstressing of the slab.

**Design Considerations:** We also recommend that slabs-on-grade be underlain by a minimum of 4 inches of suitable material as shown in the figure above to help provide a firm working surface for equipment and reduce the risk of capillary rise of subsurface moisture from adversely affecting the slab. If open graded aggregate is not available or is cost prohibitive, clean sand with less than 5 percent fines can be used provided the placement and compaction of the sand complies with the above recommendations. If floor covering such as tile or carpet will likely be utilized for interior finishes, a polyethylene vapor barrier may be used beneath the floor slab for moisture control considerations.

A vapor barrier should be installed on top of the subgrade in areas to receive moisture-sensitive floor coverings to help reduce dampness on the surface of the floor slab. A vapor barrier is generally understood to consist of a minimum 10-mil thickness, overlapping sheets of plastic in which no attempt is made to seal the overlap between the individual sheets. If at least one foot of sandy fill is placed prior to slab placement an open graded aggregate is not required under the slabs; provided that a 10 mil or thicker vapor barrier is provided and suitable placement of the material is considered during construction.

We recommend that the perm rating of the vapor barrier be sufficient to protect the rating of the floor coverings (0.01 perms or less for moisture sensitive floor coverings) and have sufficient puncture resistance according to the expected foot traffic and equipment and materials placed on the barrier. If the vapor barrier is punctured or unsealed during construction, the perm rating will likely be greatly decreased and vapor intrusion may occur through the slab after construction. Punctures can be caused by concrete finishing, placement of reinforcement, or by equipment and foot traffic. Openings may be caused by unsealed edges at the floor wall interface or laps.

**Slab Subgrade Verification:** A representative of ECS should observe exposed subgrades within the expanded building limits prior to structural fill placement to confirm that adequate subgrade preparation has been achieved. A proofroll using a loaded dump truck should be performed in their presence at that time.

Once subgrades have been prepared and compacted, new structural fill can be placed. Existing subgrades to a depth of at least 10 inches and structural fill should be moisture conditioned to within -3/+3 percentage points of optimum moisture content then be compacted to the required density. If there will be a significant time lag between the site grading work and final grading of concrete slab areas prior to the placement of the subbase stone and concrete, a representative of ECS should confirm and document the condition of the prepared subgrade. Prior to final slab construction, the subgrade may require scarification, moisture conditioning, and re-compaction to restore stable conditions.

## 4.3 SITE DESIGN CONSIDERATIONS

### 4.3.1 Pavement Sections

Based on local experience, we offer our recommendations for new flexible (asphalt) and rigid (concrete) pavement. Strength testing was not performed on the subgrade soils, as a result, we based our recommendations on an assumed California Bearing Ratio (CBR) value of 7 percent. The below sections assume that unsuitable material is removed during stripping/demolition and replaced with compacted structural fill. The recommended minimum pavement sections are as follows:

**Table 4-3 Recommended Minimum Pavement Sections**

Material	Flexible Pavement		Rigid Pavement	
	Heavy Duty	Light Duty	Heavy Duty	Light Duty
Asphaltic Concrete Surface Course (9.5 mm)*	3 inches	2 inches	-	-
Portland Cement Concrete (f'c = 4,000 psi)	-	-	6 inches	4 inches
Graded Aggregate Base Course	8 inches	6 inches	4 inches	4 inches

\*A combination of asphaltic concrete surface course and asphaltic concrete binder course may be used.

Based on previous analyses, we estimate approximately 25,000 ESALs and 125,000 ESALs over 15 years for light duty and heavy duty flexible pavement, respectively. Light duty pavement is suitable for parking and drive areas subject only to automobile traffic. Heavy duty pavements should be used in any areas subject to heavy truck traffic. Materials and workmanship should follow the latest edition of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

The light and heavy-duty rigid pavement sections should be a minimum of 4 inch and 6 inch thick concrete, respectively. Heavy duty rigid pavements are recommended for heavily trafficked areas (EMT/Fire vehicle maintenance areas and turning areas) where wheel loads will be concentrated. Provisions for construction traffic have not been included in our analysis.

Concrete pavements should be properly jointed and reinforced as needed to help reduce the potential for cracking and to permit proper load transfer.

A stable subgrade is very important to pavement performance. Immediately prior to paving, the subgrade should be proofrolled and any unstable areas that are not firm and unyielding be repaired. The base course should be compacted to at least 100% of the maximum dry density, as determined by the Modified Proctor Compaction Test (ASTM D1557). To document that the base course has been uniformly compacted, in-place field density tests should be performed by ECS and the area should be methodically proofrolled under our observation.

The performance of pavements will be dependent upon a number of factors, including subgrade conditions at the time of paving, rainwater runoff, and traffic. Rainwater runoff should not be allowed to seep below pavements from adjacent areas. Therefore, drainage swales or underdrains may be required.

The above recommendations are very important for long-term performance of the pavements. Because pavement design typically has relatively low factors of safety, it will be very important that the specifications are followed closely during pavement construction. Our analysis was based on a 15-year design life; however, some isolated areas could require repair or premature maintenance in a shorter period of time.

**4.4 SITE DRAINAGE**

Positive drainage should be provided around the perimeter of the structure to minimize the potential for moisture infiltration into the foundation and slab subgrade soils. We recommend that landscaped areas adjacent to the structure be sloped away from the construction and maintain a fall of at least 6 inches for the first 10 feet outward from the structure. Roof drains

should discharge at least 5 feet from the building perimeter or directly into below grade storm water piping. The parking lots, sidewalks, and any other paved areas should also be sloped to divert surface water away from the proposed building. Site drainage should be the sole responsibility of the project civil engineer.



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## 5.0 SITE CONSTRUCTION RECOMMENDATIONS

### 5.1 SUBGRADE PREPARATION

Because organic-laden topsoil was noted during our exploration, we emphasize the importance of comprehensive subgrade evaluations prior to engineered fill placement and/or other construction activities. These evaluations may include proofrolling the subgrade soils, performing hand auger borings, and excavation of test pits. The mentioned evaluations would help in identifying areas of soft, loose, otherwise unsuitable materials, which would require remedial activities.

#### 5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, and any other soft or unsuitable materials from the 5-foot expanded building pad, 5-foot expanded pavement limits, and to 5 feet beyond the toe of structural fills.

The hand auger boring performed on site contained approximately 4 inches of organic-laden topsoil. Deeper topsoil may be present at unexplored areas of the site. Some undercutting or remediation will likely be required prior to fill placement or footing construction. ECS should observe and document that unsuitable surficial materials have been removed and that subgrades are firm and unyielding and are evaluated for adequate bearing capacity prior to the placement of structural fill or footing construction.

#### 5.1.2 Proofrolling

After removing unsuitable surface materials, cutting to the proposed grade, and prior to the placement of any structural fill or other construction materials, the exposed subgrade should be examined by ECS. The exposed subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck).

The areas subject to proofrolling should be traversed by the equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle under the observation of ECS. This procedure is intended to assist in identifying any localized yielding materials. In the event that unstable or "pumping" subgrade is identified by the proofrolling, those areas should be repaired prior to the placement of any subsequent structural fill or other construction materials.

Loose/soft subgrade soils that cannot be improved in-place should be undercut and replaced with new engineered fill. Methods of repair of unstable subgrade, such as stabilization with geogrid, undercutting or moisture conditioning or chemical stabilization, should be discussed with ECS to determine the appropriate procedure with regard to the existing conditions causing the instability.

A test pit(s) may be excavated to explore the shallow subsurface materials in the area of the instability to help in determining the cause of the observed unstable materials and to assist in the evaluation of the appropriate remedial action to stabilize the subgrade.

## 5.2 STRUCTURAL FILL RECOMMENDATIONS

### 5.2.1 Structural Fill Materials

**Product Submittals:** Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which will include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

**Satisfactory Structural Fill Materials:** Materials satisfactory for use as structural fill should consist of inorganic soils classified as SM, SC, SW, SP, GW, GP, GM, and GC, or a combination of these group symbols, per ASTM D2487. The structural fill materials should be free of organic matter, debris, and should contain no particle sizes greater than 3 inches in the largest dimension. Open graded materials, such as gravels (GP), which contain void space in their mass should not be used in structural fills unless properly encapsulated with filter fabric. Suitable structural fill material should have the index properties shown in the table below.

**Table 5-1** Structural Fill Index Properties

Location with Respect to Final Grade	Liquid Limit	Plasticity Index	Max % Fines Passing # 200 Sieve
Building Area	35 max	10 max	35
Pavement Area	35 max	10 max	35

**Unsatisfactory Materials:** Materials that should not be used as engineered fill include topsoil, organic materials (OH, OL), and high plasticity CLAYS and SILTS (CH, MH). Such materials removed during grading operations should be placed in approved off-site disposal areas.

**On-Site Borrow Suitability:** Organic-laden topsoil was observed from the ground surface to a depth of approximately 4 inches in the hand auger boring. Below the topsoil, near-surface sand with clay (SP-SC) and clayey sands (SC) were generally observed to a depth of about 4 feet at the hand auger location. Beneath the near surface sands, silty CLAY (CL) was interpreted from the CPT sounding to a depth of about 23 feet.

In our experience, the on-site upper sandy material (SP-SC, SC) is suitable for use as structural fill.

### 5.2.2 Compaction

**Structural Fill Compaction:** Structural fill within the expanded building limits should be moisture conditioned as necessary to within -3 and +3 % of the soil's optimum moisture content and be compacted with suitable equipment to a dry density of at least 95% of the Modified Proctor maximum dry density (ASTM D1557) or at least 98% of the Standard Proctor maximum dry density (ASTM D698). In landscape or non-structural areas, compaction of at least 90% of the Modified Proctor maximum dry density should be achieved. ECS should document that proper fill compaction has been achieved.

**Fill Compaction Control:** The expanded limits of the proposed construction areas should be well defined, including the limits of the fill zones for the planned construction at the time of fill placement. Grade controls should be maintained throughout the filling operations. Filling operations should be observed on a full-time basis by ECS to determine that the minimum

compaction requirements are being achieved. Field density testing of fills should be performed at the frequencies shown in the table below, but not less than 1 test per lift.

**Table 5-2** Frequency of Compaction Tests in Fill Areas

Location	Frequency of Tests
Building Area	1 test per 2,500 sq. ft.
Utility Trenches	1 test per 200 lineal ft.
Pavement Areas	1 test per 5,000 sq. ft.

**Compaction Equipment:** Compaction equipment suitable to the soil type being compacted should be used to compact the subgrades and fill materials. Sheepsfoot compaction equipment should be suitable for the fine-grained soils (Clays and Silts). A vibratory steel drum roller should be used for compaction of coarse-grained soils (Sands and Gravels) as well as for sealing compacted surfaces.

The maximum loose lift thickness depends upon the type of compaction equipment used. For isolated excavations around footing locations or within utility excavations, a hand tamper will likely be required. We recommend the following maximum loose lift thickness based on the utilized compaction equipment:

**Table 5-3** Lift Thickness Recommendations

Equipment	Maximum Loose Lift Thickness (inches)
Large, Self-Propelled Equipment	12
Small, Self-Propelled or Remote Controlled (Rammax, etc.)	8
Hand Operated (Plate Tampers, Jumping Jacks, Wacker-Packers)	6

**Fill Placement Considerations:** Fill materials should not be placed on excessively wet soils. Borrow fill materials should not be excessively wet at the time of placement. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

At the end of each work day, fill areas should be graded to facilitate drainage of any precipitation and the surface should be sealed by use of a smooth-drum roller to limit infiltration of surface water.

Drying and compaction of wet soils is typically difficult during the winter months. Accordingly, earthwork should be performed during the drier/warmer times of the year, if practical. Proper drainage should be maintained during the earthwork phases of construction to prevent ponding of water which has a tendency to degrade subgrade soils.

We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. We do not anticipate significant problems in controlling moisture within the fill during dry weather, but moisture control may be difficult during winter months or extended periods of rain. The control of moisture content of higher plasticity soils is difficult when these soils become wet. Further, such soils are easily degraded by construction traffic when the moisture content is elevated.

### 5.3 GENERAL CONSTRUCTION CONSIDERATIONS

**Protection of Existing Foundations:** Construction operations in the vicinity of existing structures should not undermine or disturb existing foundations. Vibratory rolling should not be performed in the vicinity of existing structures. We recommend the structural engineer consider the zone of load influence from new construction on existing foundations and the potential to induce settlement or create bearing capacity issues.

**Moisture Conditioning:** During the wetter periods of the year, delays and additional costs should be anticipated. At these times, reduction of soil moisture may need to be accomplished by a combination of mechanical manipulation and the use of chemical additives, such as lime or cement, to lower moisture contents to levels appropriate for compaction. Alternatively, during the drier times of the year, moisture may need to be added to the soil to provide adequate moisture for successful compaction according to the project requirements.

**Subgrade Protection:** Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas.

**Surface Drainage:** Surface drainage conditions should be properly maintained. Surface water should be directed away from the construction area, and the work area should be sloped away from the construction area at a gradient of 1 percent or greater to reduce the potential of ponding water and the subsequent saturation of the surface soils. At the end of each work day, the subgrade soils should be sealed by rolling the surface with a smooth drum roller to minimize infiltration of surface water.

**Erosion Control:** The surface soils may be erodible. Therefore, the Contractor should provide and maintain good site drainage during earthwork operations to maintain the integrity of the surface soils. Erosion and sedimentation controls should be in accordance with sound engineering practices and local requirements.

## 6.0 CLOSING

ECS has prepared this report of findings, evaluations, and recommendations to guide geotechnical-related design and construction aspects of the project.

The description of the proposed project is based on information provided to ECS by Glick/Boehm & Associates, Inc. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

We recommend that ECS review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

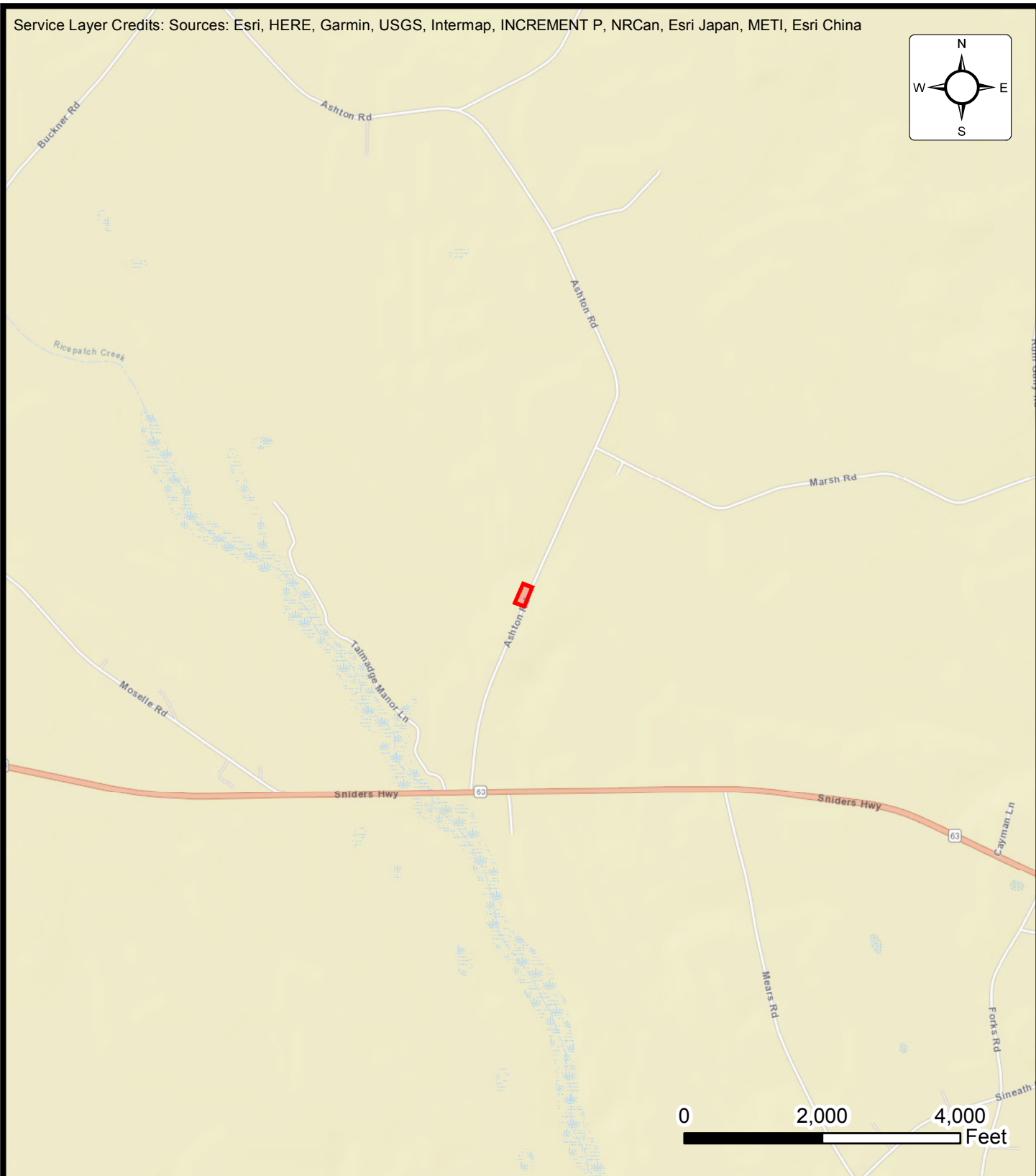
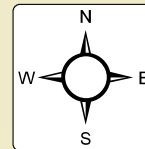
Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the Owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.



## **APPENDIX A – Drawings & Reports**

Site Location Diagram

Test Location Diagram

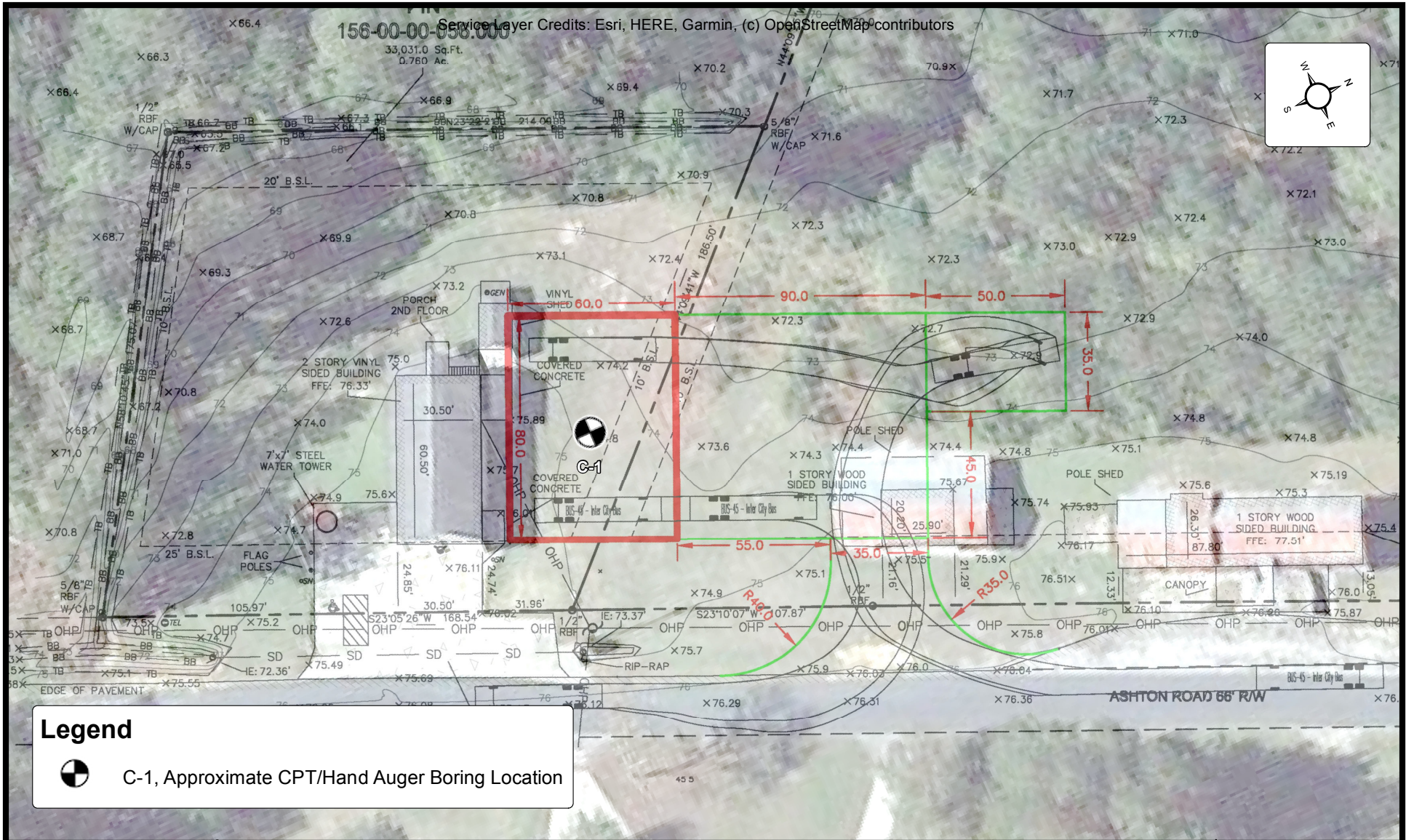


# SITE LOCATION DIAGRAM ISLANDTON FIRE STATION #15 ADDITION

547 ASHTON ROAD, ISLANDTON, SOUTH CAROLINA

GLICK BOEHM & ASSOCIATES, INC.

ENGINEER PDK
SCALE 1" = 2000'
PROJECT NO. 34:3775
FIGURE 1
DATE 10/2/2019



# BORING LOCATION DIAGRAM ISLANDTON FIRE STATION #15 ADDITION

547 ASHTON ROAD, ISLANDTON, SOUTH CAROLINA  
GLICK BOEHM & ASSOCIATES, INC.

ENGINEER PDK
SCALE NTS
PROJECT NO. 34:3775
FIGURE 2
DATE 10/2/2019



## **APPENDIX B – Field Operations**

Reference Notes for Cone Penetration Test (CPT) Soundings

CPT Sounding

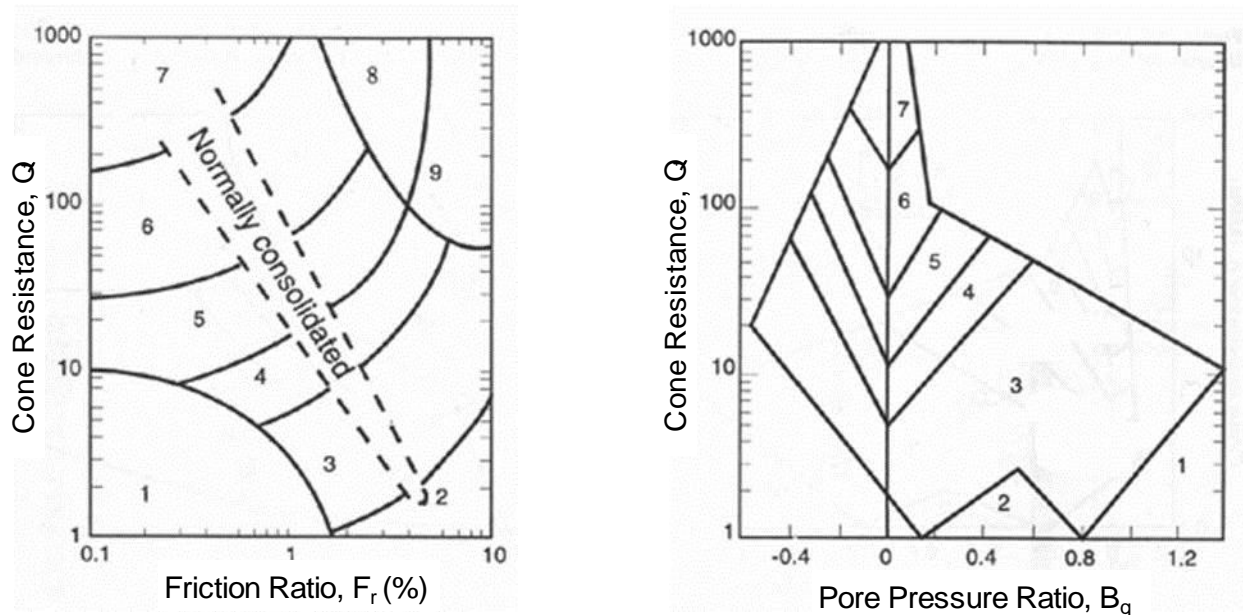
Reference Notes for Boring Logs

Hand Auger Log



## REFERENCE NOTES FOR CONE PENETRATION TEST (CPT) SOUNDINGS

In the CPT sounding procedure (ASTM-D-5778), an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance ( $q_c$ ), pore water pressure ( $u_2$ ), and sleeve friction ( $f_s$ ). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, preconsolidation pressure, and undrained shear strength. The graphs below represent one of the accepted methods of CPT soil behavior classification (Robertson, 1990).



- 1. Sensitive, Fine Grained
- 2. Organic Soils-Peats
- 3. Clays; Clay to Silty Clay
- 4. Clayey Silt to Silty Clay
- 5. Silty Sand to Sandy Silt

- 6. Clean Sands to Silty Sands
- 7. Gravelly Sand to Sand
- 8. Very Stiff Sand to Clayey Sand
- 9. Very Stiff Fine Grained

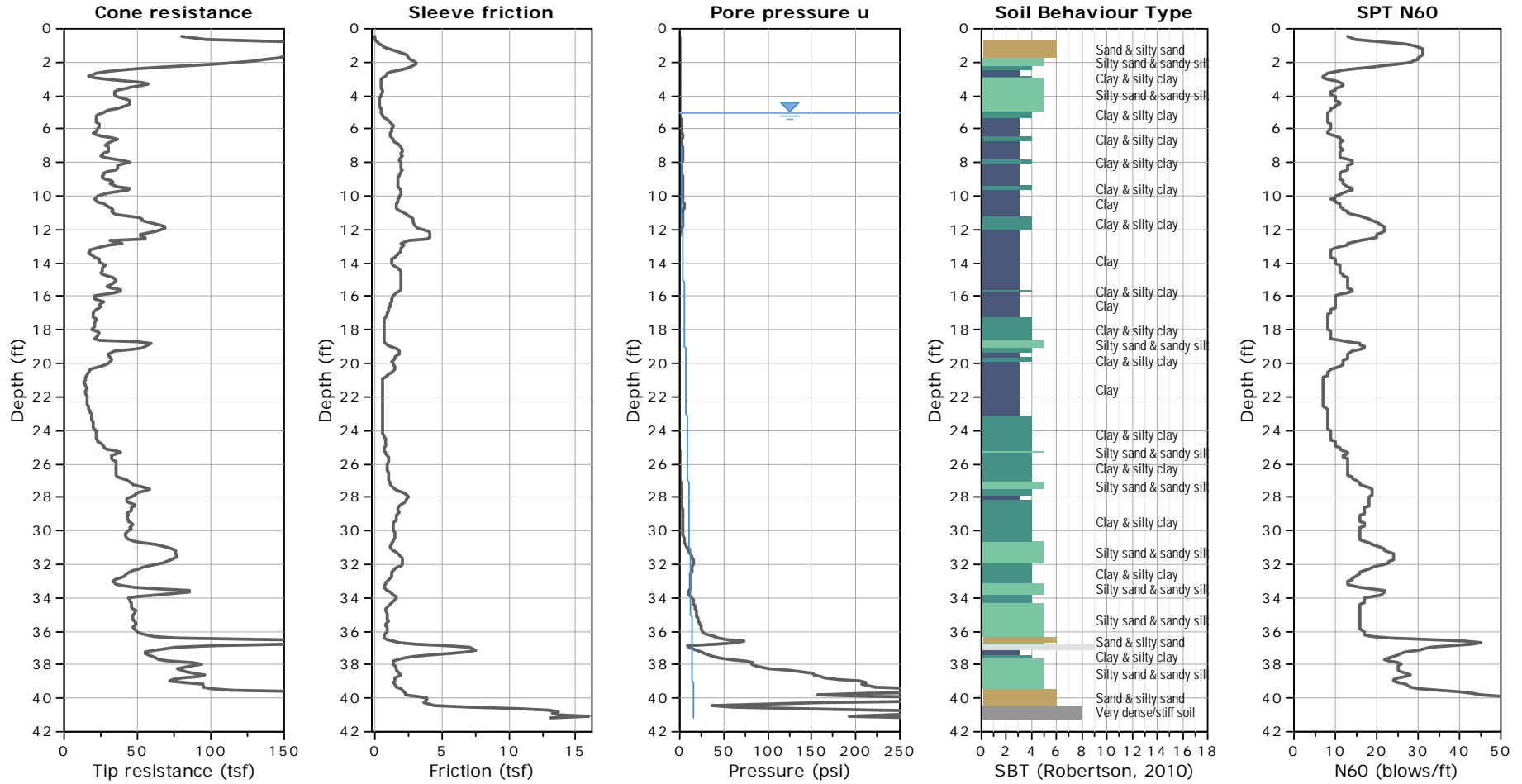
The following table presents a correlation of corrected cone tip resistance ( $q_t$ ) to soil consistency or relative density:

SAND		SILT/CLAY	
Corrected Cone Tip Resistance ( $q_t$ ) (tsf)	Relative Density	Corrected Cone Tip Resistance ( $q_t$ ) (tsf)	Relative Density
<20	Very Loose	<5	Very Soft
20-40	Loose	5-10	Soft
40-120	Medium Dense	10-15	Medium Stiff
		15-30	Stiff
120-200	Dense	30-45	Very Stiff
>200	Very Dense	45-60	Hard
		>60	Very Hard



**Project:** Islandton Fire Station #15 Addition (ECS Project # 34:3775)  
**Location:** 547 Ashton Road, Islandton, South Carolina

Total depth: 41.20 ft, Date: 10/8/2019  
 Cone Type: Vertek S4 15 cm2  
 Cone Operator: Longview Explorations, LLC



**SBTn legend**

- |   |   |   |
|---|---|---|
| <span style="color: red;">■</span> 1. Sensitive fine grained  | <span style="color: teal;">■</span> 4. Clayey silt to silty clay      | <span style="color: orange;">■</span> 7. Gravelly sand to sand        |
| <span style="color: brown;">■</span> 2. Organic material      | <span style="color: lightgreen;">■</span> 5. Silty sand to sandy silt | <span style="color: grey;">■</span> 8. Very stiff sand to clayey sand |
| <span style="color: darkblue;">■</span> 3. Clay to silty clay | <span style="color: tan;">■</span> 6. Clean sand to silty sand        | <span style="color: lightgrey;">■</span> 9. Very stiff fine grained   |



# REFERENCE NOTES FOR BORING LOGS

MATERIAL <sup>1,2</sup>	
	<b>ASPHALT</b>
	<b>CONCRETE</b>
	<b>GRAVEL</b>
	<b>TOPSOIL</b>
	<b>VOID</b>
	<b>BRICK</b>
	<b>AGGREGATE BASE COURSE</b>
	<b>FILL<sup>3</sup> MAN-PLACED SOILS</b>
	<b>GW WELL-GRADED GRAVEL</b> gravel-sand mixtures, little or no fines
	<b>GP POORLY-GRADED GRAVEL</b> gravel-sand mixtures, little or no fines
	<b>GM SILTY GRAVEL</b> gravel-sand-silt mixtures
	<b>GC CLAYEY GRAVEL</b> gravel-sand-clay mixtures
	<b>SW WELL-GRADED SAND</b> gravelly sand, little or no fines
	<b>SP POORLY-GRADED SAND</b> gravelly sand, little or no fines
	<b>SM SILTY SAND</b> sand-silt mixtures
	<b>SC CLAYEY SAND</b> sand-clay mixtures
	<b>ML SILT</b> non-plastic to medium plasticity
	<b>MH ELASTIC SILT</b> high plasticity
	<b>CL LEAN CLAY</b> low to medium plasticity
	<b>CH FAT CLAY</b> high plasticity
	<b>OL ORGANIC SILT or CLAY</b> non-plastic to low plasticity
	<b>OH ORGANIC SILT or CLAY</b> high plasticity
	<b>PT PEAT</b> highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS			
SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION	
DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	¾ inch to 3 inches (19 mm to 75 mm)
Gravel: Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Sand: Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Sand: Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS		
UNCONFINED COMPRESSIVE STRENGTH, Q <sub>p</sub> <sup>4</sup>	SPT <sup>5</sup> (BPF)	CONSISTENCY <sup>7</sup> (COHESIVE)
<0.25	<3	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Medium Stiff
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT <sup>7</sup>	COARSE GRAINED (%) <sup>8</sup>	FINE GRAINED (%) <sup>8</sup>
Trace	≤5	≤5
Dual Symbol (ex: SW-SM)	10	10
With	15 - 20	15 - 25
Adjective (ex: "Silty")	≥25	≥30

GRAVELS, SANDS & NON-COHESIVE SILTS	
SPT <sup>5</sup>	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS <sup>6</sup>		
	WL	Water Level (WS)(WD) (WS) While Sampling (WD) While Drilling
	SHW	Seasonal High WT
	ACR	After Casing Removal
	SWT	Stabilized Water Table
	DCI	Dry Cave-In
	WCI	Wet Cave-In

<sup>1</sup>Classifications and symbols per ASTM D 2488-09 (Visual-Manual Procedure) unless noted otherwise.

<sup>2</sup>To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

<sup>3</sup>Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].


<sup>4</sup>Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

<sup>5</sup>Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf).

<sup>6</sup>The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

<sup>7</sup>Minor deviation from ASTM D 2488-09 Note 16.

<sup>8</sup>Percentages are estimated to the nearest 5% per ASTM D 2488-09.

PROJECT NAME: Islandton Fire Station #15 Addition					HAND AUGER # C-1			
CLIENT: Glick Boehm & Associates, Inc.			Job #: 34:3775		SURFACE ELEVATION			
DEPTH (FT.)	ELEV. (FT.)	LOCATION: 547 Ashton Road, Islandton, SC	ARCH./ENG:	EXCAV. EFFORT	DCP	QP (TSF)	SAMPLE NO.	MOIST. CONT. (%)
DESCRIPTION OF MATERIAL								
0		Topsoil Thickness [4.0"]		E				
		(SP-SC) SAND WITH CLAY, brownish gray, moist, trace rootlets					S-1	
1		(SP-SC) SAND WITH CLAY, orangeish brown, moist					S-2	
2		(SC) CLAYEY SAND, orange and brown, moist					S-3	
3		(SC) CLAYEY SAND, orange and gray, moist					S-4	
4		END OF HAND AUGER @ 4'						
5								
6								
REMARKS:								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.								
GROUND WATER: While Drilling $\nabla$ After Drilling $\nabla$ SHWT $\nabla$				EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT				
ECS REP.:	DATE:	UNITS:	Cave-in Depth:	Groundwater While Drilling:	Groundwater After Drilling:	Seasonal High Water Table:		
JC	10/03/19	Feet		Not Encountered				

**SECTION 02 41 00**  
**DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Selective demolition of building elements for alteration purposes.

**1.02 SUBMITTALS**

- A. Follow submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers.
  - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 6. Do not close or obstruct roadways or sidewalks without permit.
  - 7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Protect existing structures and other elements that are not to be removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

**3.02 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions.

- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 3. Verify that abandoned services serve only abandoned facilities before removal.
  - 4. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch as specified for patching new work.

### **3.03 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



**SECTION 06 20 00**  
**CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Carpentry items.
- B. Wood casings and moldings.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 90 00 – Painting and Coatings: Painting and finishing of finish carpentry items.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

**1.04 SUBMITTALS**

- A. Follow submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect work from moisture damage.

**PART 2 PRODUCTS**

**2.01 CARPENTRY ITEMS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Interior Woodwork Items:
  - 1. Miscellaneous Trim: Pressure treated trim as noted on the drawings
  - 2. Plywood: 3/4" pressure treated plywood.

**2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

**2.03 FASTENINGS**

- A. Fasteners: Of size and type to suit application.

**2.04 ACCESSORIES**

- A. Wood Filler: Solvent base, tinted to match surface finish color.

**2.05 FABRICATION**

- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.

### **3.02 INSTALLATION**

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for custom grade installation.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

### **3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 90 00.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

### **3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

**SECTION 06 20 00**  
**FINISH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Finish carpentry items.
- B. Wood casings and moldings.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 90 00 – Painting and Coatings: Painting and finishing of finish carpentry items.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

**1.04 SUBMITTALS**

- A. Follow submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect work from moisture damage.

**PART 2 PRODUCTS**

**2.01 FINISH CARPENTRY ITEMS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Interior Woodwork Items:
  - 1. Bases, Sills, Aprons and Miscellaneous Trim: Poplar; prepare for paint finish.

**2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

**2.03 FASTENINGS**

- A. Fasteners: Of size and type to suit application.

**2.04 ACCESSORIES**

- A. Primer: Alkyd primer sealer.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

**2.05 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.

- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.

#### **3.02 INSTALLATION**

- A. Install work in accordance with AWI/AWMACWI (AWS) requirements for custom grade installation.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

#### **3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 90 00.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

#### **3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

**SECTION 07 90 05**  
**JOINT SEALERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sealants and joint backing.

**1.02 REFERENCE STANDARDS**

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with other sections referencing this section.

**1.04 SUBMITTALS**

- A. Follow submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, and substrate preparation.
- C. Manufacturer's Installation Instructions: Indicate surface preparation.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

**1.06 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

**1.07 WARRANTY**

- A. Provide Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

**PART 2 PRODUCTS**

**2.01 SEALANTS**

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
  - 1. Color: Match adjacent finished surfaces.
- B. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
  - 1. Applications: Use for:
    - a. Concealed sealant bead in sheet metal work.
    - b. Concealed sealant bead in siding overlaps.
- C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
  - 1. Color: Match adjacent finished surfaces.

**2.02 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.



- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

#### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

#### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

#### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

#### **3.05 PROTECTION**

- A. Protect sealants until cured.

**END OF SECTION**

**SECTION 08 11 13**  
**HOLLOW METAL DOORS & FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - DOOR HARDWARE.
- B. Section 09 90 00 - Painting and Coating: Field painting.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

**1.04 SUBMITTALS**

- A. Follow submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## **PART 2 PRODUCTS**

### **2.01 FRAMES**

- A. Requirements for All Frames:
  - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
  - 4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  - 5. Zinc Coating for Typical Interior and Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
  - 6. Finish: Factory primed, for field finishing.

### **2.02 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire Rated:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
  - 2. Door Thickness: 1-3/4 inch, nominal.

### **2.03 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. General:
  - 1. Finish: Factory primed, for field finishing.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  - 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
- D. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

### **2.04 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

### **2.05 ACCESSORIES**

- A. Glazing: Fully tempered float glass, clear, 1/4 inch thick.
- C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## **2.06 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 08 71 00.
- E. Comply with glazing installation requirements of Section 08 80 00.
- F. Touch up damaged factory finishes.

### **3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

### **3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

### **3.06 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

SECTION 08 71 00  
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work under this section includes furnishing and the installation of finish and security hardware specified herein and noted on drawings for a complete and operational system, including any electrified door hardware components including finish and security hardware and auto operators for entrance doors.

Items include, but are not limited to:

1. Hinges/Continuous Hinges
2. Locksets and Cylinders
3. Thresholds, Gasketing and Door Bottoms
4. Silencers
5. Miscellaneous Trim and Accessories

- B. RELATED SECTIONS:

1. Section 08 11 00 – Metal Doors and Frames

1.02 REFERENCES

- A. The following references are used in this section.

1. Installation Guide for Doors and Hardware, DHI, 1984.
2. ANSI / BHMA A156.18, Materials and Finishes, 2006.

1.03 GENERAL REQUIREMENTS

- A. Provide items, articles, materials, operations and methods listed, mentioned or scheduled herein or on drawings, in quantities as required to complete project. Provide hardware that functions properly. Prior to furnishing hardware, advise Architect of items that will not operate properly, are improper for conditions, or will not remain permanently anchored.

- B. DESCRIPTION OF WORK

1.04 SUBMITTALS

- A. Hardware Schedule: Submit 5 copies of hardware schedule in vertical format as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Schedules which do not comply will be returned for correction before checking.

- B. Hardware schedule shall clearly indicate architect's hardware group and manufacturer of each item proposed.

- C. The schedule shall be reviewed prior to submission by a certified Architectural Hardware Consultant (AHC), who shall affix his or her seal attesting to the completeness and correctness of the schedule.

1. Provide 2 copies of illustrations from manufacturer's catalogs and data in brochure form.
2. Check specified hardware for suitability and adaptability to details and surrounding conditions. Indicate unsuitable or incompatible items and proposed substitutions in hardware schedule.
3. Provide listing of manufacturer's template numbers for each item of hardware in hardware schedule.
4. Furnish other Contractors and Subcontractors concerned with copies of final approved hardware schedule. Submit necessary templates and schedules as soon as possible to hollow metal, wood door, and aluminum door fabricators in accordance with schedule they require for fabrication.



- D. Installation Instructions: Provide manufacturer's written installation and adjustment instructions for finish hardware. Send installation instructions to site with hardware.
- E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
- F. Contract Closeout Submittals:
  - 1. Operating and maintenance manuals: Submit 3 sets containing the following:
  - 2. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
  - 3. Catalog pages for each product.
  - 4. Name, address, and phone number of local representative for each manufacturer.
  - 5. Parts list for each product.
  - 6. Copy of final approved hardware schedule, edited to reflect "As installed".
  - 7. Copy of final keying schedule.
  - 8. One complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

#### 1.05 QUALITY ASSURANCE

- A. General Contractor's Investigation: Prior to Contract Execution, the General Contractor shall have thoroughly investigated the entities that will be performing work or supplying materials, products, equipment, or systems for this project, to ensure that they comply with all of the qualifications and requirements mentioned or implied in the Contract Documents. If it is later determined that any of the previously mentioned entities do not comply with the qualifications and requirements specified in the Contract Documents, the General Contractor will be required to replace that entity with a qualified entity at no increase in Contract Sum or Contract Time.
- B. Manufacturer: Obtain each type of hardware (ie. latch and locksets, hinges, closers) from single manufacturer, although several may be indicated as offering products complying with requirements.
- C. Qualifications of the Hardware Supplier: The Supplier shall be responsible for proper coordination of all finish hardware items and access control items with related sections to insure compatibility of products.
  - 1. Hardware supplier must be an authorized, direct factory distributor of all door hardware products specified herein to insure compliance and service of these products.
  - 2. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- D. Qualifications of Installer: The hardware installer shall have documented experience in the installation of hardware of similar quantities and types as required for this project. The installer's qualifications shall be submitted to the architect, in writing, for approval by the architect before any work shall commence.
- E. Substitutions: Equal or better products are acceptable.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is the responsibility of the supplier. As material is received by the hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set numbers to match the set numbers of the approved hardware schedule. Two or more identical sets may be packed in the same container.
- C. The door hardware supplier shall deliver all individually packaged hardware items in a timely fashion to the place of installation (Shop or Project Site); direct factory shipments are not

acceptable unless agreed upon beforehand. Hardware supplier shall coordinate delivery times and schedules with the contractor.

- D. The General Contractor, door hardware supplier, access control supplier, and installers shall count, coordinate, and store all door hardware and access control items herein, verifying complete counts of all items scheduled and furnished. The contractor must report all shortages (discrepancies with shipping documents) within five (5) working days. The manufacturers' and Owner's representatives will inspect the installation of the door hardware and access control items during that phase of construction. Any deficiencies in installation of all materials included herein shall be corrected before installation continues.
- E. The General Contractor shall provide a secure lock-up for the door hardware and security equipment delivered to the Project, but not yet installed. Control handling and installation of the hardware items that are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

#### 1.07 WARRANTY

- A. All materials must be warranted against defects in workmanship and materials for a period of one (1) year from date of acceptance of this project, unless otherwise noted. Any evidence of misuse or abuse voids all warranties. These warranties shall be each manufacturers' standard written warranty.
- B. Special Warranties:
  - 1. Continuous Geared Hinges: Life of the Door Opening.
  - 2. Mortise Latchsets and Locksets: Three (3) Year Period.
  - 3. Exit Devices: Three (3) Year Period.
  - 4. Door Closers: Fifteen (15) Year Period.
  - 5. Saddle Thresholds, Bumper Thresholds, Door Sweeps, Self-Adhesive Gasketing, Perimeter Seals, Astragal Seals, Self-Adhesive Astragal Gasketing, Mullion Seals, Interlocking Seals, and Drip Strips: Five (5) Year Period.
- C. Any manufacturer whose standard written warranty does not equal or exceed the requirements listed above must provide a letter stating that they will extend their warranty to comply with the requirements of this specification.
- D. All of the manufacturer's fasteners and attachments supplied with each hardware item must be installed to maintain the manufacturer's fire listing and/or warranty.

#### 1.08 MAINTENANCE

- A. Maintenance Tools and Instructions: General Contractor shall furnish a complete set of specialized tools and maintenance instructions as needed for the Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

### PART 2 PRODUCTS

#### 2.1 BUTTS AND HINGES

- A. Acceptable Manufacturers:

Ives	Bommer	Stanley
3CB1	LB8002	CB1900R
3CB1	LB8000	CB1960R
3CB1HW	LB8006	CB1901R

3CB1HW	LB8004	CB1961R
5BB1SCHW	BB5024	FBB268
5BB1	BB5000	FBB179
5BB1	BB5001	FBB191
5BB1HW	BB5004	FBB168
5BB1HW	BB5005	FBB199

B. Application:

1. Provide NRP (non-removable pins) at out-swinging lockable doors.

C. Quantity:

1. Two hinges per leaf for openings through 60 inches high.
2. One additional hinge per leaf for each additional 30 inches in height or fraction thereof.
3. Four hinges for Dutch doors up to 90 inches in height.

2.2 LOCKSETS – CYLINDRICAL – GRADE 1

A. Acceptable Manufacturer and Series:

Schlage	Corbin	Best
ND Series x SPA	CL3300 x NZD	93K x 14D

B. Provide lock functions specified in Hardware Groups, with following provisions:

1. Cylinders: Refer to "KEYING" article, herein.
2. Locks shall meet UL A label; to have a minimum listing for single doors 4' x 8'.
3. Locks shall have the ability to incorporate either a rigid or free-wheeling lever when in a locked mode.
4. Levers shall be bi-directional.
5. Levers shall be solid. Manufacturers utilizing lever fillers are not acceptable.
6. Furnish "Knurled" or "Tactile" outside levers as indicated in the door Hardware Sets. "Abrasive" outside levers shall not be acceptable.
7. Lockset adjustment plate shall be threaded for door thickness adjustment for doors 1 5/8" to 2 1/8" thickness. The adjustment plate shall have visual chassis marking for doors 1 3/4" thick.
8. Locks shall have field reversible handing.
9. Latchbolt to be steel with minimum 1/2" throw latch; 3/4" throw latch on pairs of fire rated doors.
10. Strikes shall have curved lip of sufficient length to clear trim.

2.3 KEYING

- A. Master key or Grand master key cylinders and key in groups, unless otherwise specified. Factory masterkey with manufacturer retaining permanent keying records.
- B. Provide 6 masterkeys for each masterkey set. Provide 3 change keys for each lock. Provide 2 control keys for core removal. Stamp keys "DO NOT DUPLICATE."
- C. Submit proposed keying schedule to Architect. If requested, meet with Owner and Architect to review schedule.
- D. Provide removable core cylinders, with patented key control, for each lock with temporary keyed brass construction cores. Permanent cores shall be installed upon completion of the project.

2.4 THRESHOLDS

A. Acceptable Manufacturers and Product:

National Guard	Reese	Zero
896V	S483A	65A

- B. Where thresholds are specified in hardware groups, provide 425E thresholds unless detailed otherwise.
- C. Refer to drawings for special details. Provide accessories, shims and fasteners.
- D. Where thresholds occur at openings with one or more mullions, they shall be cut for the mullions and extended continuously for the entire opening.

## 2.5 WEATHERSTRIPPING

- A. Acceptable Manufacturers and Product:

	National Guard	Reese	Zero
Sweeps	201NA	323C	39A
Jambs	700SA	755C	429A
Rain Drips	16A	R201C	142A

- B. Where weatherstripping is specified in hardware groups, provide 700SA unless detailed otherwise.
- C. Provide self-tapping fasteners for weatherstripping being applied to hollow metal frames.
- D. Where sweeps are specified in hardware groups, provide 201NA unless detailed otherwise.
- E. Where rain drips are specified in hardware groups, provide 16A x full frame width, unless detailed otherwise.

## 2.6 GASKETING

- A. Acceptable Manufacturers:

National Guard	Reese	Zero
5050	F-797B	188S

- B. Where smoke gasket is specified in hardware groups, provide 188S, unless detailed otherwise.
- C. Provide gaskets for 20-minute doors and doors designated for smoke and draft control.
- D. Where frame applied intumescent seals are required by the manufacturer, provide gaskets that comply with UBC 7-2, 1997 and UL 10C positive pressure tests.

## 2.7 SILENCERS

- A. Acceptable Manufacturers and types:

Ives	Steelcraft	Don-Jo
SR64	Q146	1608

- B. Provide grey rubber silencers featuring pneumatic design that, once installed, forms an air pocket to absorb shock and reduce noise of door closing.
- C. Provide three (3) silencers per hollow metal strike jamb; two (2) per hollow metal double door head. Omit at doors scheduled to receive perimeter weatherstripping or smoke gasket.
- D. Silencers shall meet ANSI/BHMA A156.16, L03011

## 2.8 FASTENERS

- A. Including, but not limited to, wood or machine screws, bolts, nuts, anchors, etc. of proper type, material, and finish required for installation of hardware.
- B. Use phillips head for exposed screws. Do not use aluminum screws to attach hardware.
- C. Provide self-tapping (TEC) screws for attachment of sweeps and stop-applied weatherstripping only.

## 2.9 TYPICAL FINISHES AND MATERIALS

- A. Finishes, unless otherwise specified:
  - 1. Butts: Outswinging Exterior Doors
    - a. US32D (BHMA 630) on Stainless Steel
  - 2. Butts: Interior Doors and Inswinging Exterior Doors
    - a. US26D (BHMA 652) on Steel
  - 3. Continuous Hinges:
    - a. US28 (BHMA 628) on Aluminum
  - 4. Flush Bolts:
    - a. US26D (BHMA 626) on Brass or Bronze
  - 5. Exit Devices:
    - a. US26D (BHMA 626) on Brass or Bronze
  - 6. Locks and Latches:
    - a. US26D (BHMA 626) on Brass or Bronze
  - 7. Push Plates, Pulls and Push Bars:
    - a. US32D (BHMA 630) on Stainless Steel
  - 8. Coordinators:
    - a. USP (BHMA 600) on Steel
  - 9. Kick Plates, Armor Plates, and Edge Guards:
    - a. US32D (BHMA 630) on Stainless Steel
  - 10. Overhead Stops and Holders:
    - a. US26D (BHMA 626) on Brass or Bronze
  - 11. Closers: Surface mounted.
    - a. Sprayed Aluminum Lacquer.
  - 12. Latch Protectors:
    - a. US32D (BHMA 630) on Stainless Steel
  - 13. Miscellaneous Hardware:
    - a. US26D (BHMA 626) on Brass or Bronze

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine doors, frames, and related items for conditions that would prevent the proper application of finish hardware. Do not proceed until defects are corrected.

### 3.2 INSTALLATION

- A. Mount hardware units at heights indicated in the following applicable publications, except as specifically indicated or required to comply with governing regulations and, except as otherwise indicated, by the Architect.
  - 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Sets units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Where scheduled, door pulls shall be through-bolted with bolt heads concealed behind push plates.



- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds, for exterior and interior doors, in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 07 - Joint Sealers.
- G. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

### 3.3 FIELD QUALITY CONTROL

- A. After installation has been completed, provide services of qualified hardware consultant to check Project to determine proper application of finish hardware according to schedule. Also check operation and adjustment of hardware items.
- B. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

### 3.4 ADJUSTING AND CLEANING

- A. At final completion, hardware shall be left clean and free from disfigurement. Make final adjustment to door closers and other items of hardware. Where hardware is found defective repair or replace or otherwise correct as directed.
- B. Adjust door closers to meet opening force requirements of Uniform Federal Accessibility Standards.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area, return to work during week prior to acceptance or occupancy, and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.
- D. Instruct Owner's personnel in proper adjustment and maintenance of door hardware and hardware finishes.
- E. Clean adjacent surfaces soiled by hardware installation.

### 3.5 PROTECTION

- A. Provide for proper protection of items of hardware until Owner accepts Project as complete.

### 3.6 HARDWARE GROUPS

- A. The following schedule of hardware groups shall be considered a guide only, and the supplier is cautioned to refer to general conditions, special conditions, and the preamble to this section. It shall be the hardware supplier's responsibility to furnish all required hardware.
- B. Refer to the door schedule for hardware group required at each door opening.

### HARDWARE SET NO. 1

FOR USE ON MARK/DOOR #(S):  
STORAGE RM

### EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD	626	SCH
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 2

FOR USE ON MARK/DOOR #(S):  
EXTERIOR DOORS 4, 5 & 6

Provide Grade 1 hardware for door number 101 main entry door, as follows:

- 1) Hinges: BHMA A156.1. Three antifriction-bearing, standard-weight, full-mortise, stainless-steel, template-type hinges; 4-1/2 by 4-1/2 inches, with nonremovable pin.
- 2) Lockset: Kaba Access Control, 1000 Series Pushbutton Lock. Heavy-duty cylindrical lock, cast front housing, unified trim plate & ADA compliant levers. 626 – Satin Chrome finish.
- 3) Threshold: BHMA A156.21. Extruded aluminum.
- 4) Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
- 5) Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
- 6) Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.

**END OF SECTION**

**SECTION 09 22 16**  
**NON-STRUCTURAL METAL FRAMING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

**1.03 REFERENCE STANDARDS**

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015, with Editorial Revision (2016).
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

**1.04 SUBMITTALS**

- A. Follow submittal procedures.
- B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

**PART 2 PRODUCTS**

**2.01 FRAMING MATERIALS**

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
  - 1. Studs: C shaped with flat or formed webs with knurled faces.
  - 2. Runners: U shaped, sized to match studs.
  - 3. Ceiling Channels: C shaped.
  - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.

- D. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.
- E. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.
- F. Fasteners: ASTM C1002 self-piercing tapping screws.
- G. Anchorage Devices: Powder actuated.

## **2.02 FABRICATION**

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.

### **3.02 INSTALLATION OF STUD FRAMING**

- A. Comply with requirements of ASTM C754.
- B. Extend partition framing to structure where indicated and to ceiling in other locations.
- C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- E. Align and secure top and bottom runners at 24 inches on center.
- F. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- G. Install studs vertically at 16 inches on center.
- H. Align stud web openings horizontally.
- I. Secure studs to tracks using crimping method. Do not weld.
- J. Fabricate corners using a minimum of three studs.
- K. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- L. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- M. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.
- N. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches.

### **3.03 CEILING AND SOFFIT FRAMING**

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

**3.04 TOLERANCES**

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

**END OF SECTION**



**SECTION 09 90 00  
PAINTING AND COATING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Exposed surfaces of steel lintels and ledge angles.
  - 3. Mechanical and Electrical:
    - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. In finished areas, paint shop-primed items.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Floors, unless specifically so indicated.
  - 6. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 7. Metal Composite Material Wall Panels
  - 8. Glass.
  - 9. Concrete masonry in utility, mechanical, and electrical spaces.
  - 10. Concealed pipes, ducts, and conduits.
  - 11. Double wall metal ductwork, round or square.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Color coding scheme for items to be painted under this section.
- B. Section 23 05 53 - Identification for HVAC Piping and Equipment: Color coding scheme for items to be painted under this section.
- C. Section 26 05 53 - Identification for Electrical Systems: Color coding scheme for items to be painted under this section.

**1.03 DEFINITIONS**

- A. Conform to ASTM D16 for interpretation of terms used in this section.

**1.04 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

### 1.05 SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- B. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
  - 2. Label each container with color in addition to the manufacturer's label.

### 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

### 1.08 DELIVERY, STORAGE, AND HANDLINGNIGHT

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

### 1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
  - 1. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.

- C. Paints:
  - 1. Duron, Inc: [www.duron.com](http://www.duron.com).
  - 2. ICI
  - 3. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
  - 4. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 5. Rose Talbert.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Block Fillers: Same manufacturer as top coats.
- F. Substitutions: Not permitted.

## 2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
  - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  - 4. Supply each coating material in quantity required to complete entire project's work from a single production run.
  - 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
  - 1. Provide coatings that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
    - b. Architectural coatings VOC limits of the State in which the Project is located.
  - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Chemical Content: The following compounds are prohibited:
  - 1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
  - 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- E. Flammability: Comply with applicable code for surface burning characteristics.
- F. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- G. Colors: As indicated on drawings
  - 1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
  - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

## 2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint ME-OP-3L – Ferrous Metals, Unprimed, Latex, 3 coat.
  - 1. One coat of latex primer.
  - 2. Semi-gloss: Two coats of latex enamel.

- B. Paint ME-OP-2L – Ferrous Metals, Unprimed, Latex, 2 coat.
  - 1. Touch-up with rust-inhibitive primer..
  - 2. Semi-gloss: Two coats of latex enamel.

#### **2.04 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP - All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry, wood, uncoated steel, shop primed steel, and galvanized steel.
  - 1. Two top coats and one coat primer.
  - 2. Satin: MPI gloss level 4; use this sheen for gypsum board ceilings.
  - 3. Semi-Gloss: MPI gloss level 4; use this sheen for all walls, CMU and gypsum board, door frames and metal doors.
  - 4. Primer(s): As follows unless other primer is required or recommended by manufacturer of top coats:
    - a. Gypsum Board: MPI #50, Interior Latex Primer Sealer.
    - b. Concrete Masonry: MPI #4, Latex Block Filler; heavy coat squeegeed into pores.
    - c. Wood: MPI #45, Interior Alkyd Primer Sealer.
    - d. Steel, Uncoated: MPI #107, Rust-Inhibitive Water Based Primer.
    - e. Steel -- Shop Primer: MPI #76, Quick Dry Alkyd Primer for Metal.
    - f. Galvanized Steel: MPI #134, Water Based Galvanized Primer.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
  - 1. Medium duty applications include doors, door frames, and exposed steel.
  - 2. Two top coats and one coat primer.
  - 3. Top Coats: INT 5.1S Institutional Low Odor/Low VOC Latex system.
  - 4. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
- C. Paint I-OP-MD-WC - Medium Duty Vertical/Overhead: Including gypsum board and concrete masonry.
  - 1. Two top coats and one coat primer.
  - 2. CMU Top Coats: INT 4.2A Latex
  - 3. Gypsum Board Top Coats: INT 9.2A Latex
  - 4. Satin: MPI gloss level 4; use this sheen at all gypsum board ceilings.
  - 5. Flat finish for ceilings and soffits.
  - 6. Primer(s): As recommended by manufacturer of top coats.

#### **2.05 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Gypsum Wallboard: 12 percent.

2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- G. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- H. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- I. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- K. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### **3.05 PROTECTION**

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.



**3.06 SCHEDULE - COLORS**

- A. See Finish Schedule on Drawings

**END OF SECTION**

**SECTION 10 44 00**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Provide wood blocking as required for installation.

**1.03 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide; current edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

**1.04 SUBMITTALS**

- A. Product Data: Provide extinguisher operational features.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

**PART 2 PRODUCTS**

**2.01 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
  - 1. Stored Pressure Operated: Deep Drawn.
  - 2. Class: A:B:C type.
  - 3. Size: 10 pound.
  - 4. Finish: Polished chrome.

**2.02 FIRE EXTINGUISHER BRACKET**

- A. Provide wall mounted fire extinguisher bracket for size and weight of the fire extinguisher provided.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinet plumb and level.
- C. Installation Height: Fire extinguisher handle shall be 3'-10" above finished floor.
- D. Secure rigidly in place.

**END OF SECTION**

13 34 19

## METAL BUILDING SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Structural-steel framing.
  - 2. Metal roof panels.
  - 3. Metal wall panels.
  - 4. Metal soffit panels.
  - 5. Thermal insulation.
  - 6. Accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
  - 1. Provide product data/cut sheets for all door hardware.
  - 2. Provide product data/cut sheets for windows.
- B. Shop Drawings: For metal building system components. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Provide drawing details for door frame installation and window installation.
- C. Delegated-Design Submittal: Provide metal building systems complying with performance requirements and design criteria, provide analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.
- C. Metal Building System Certificates: For each type of metal building system, from manufacturer.
  - 1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
    - a. Name and location of Project.
    - b. Order number.
    - c. Name of manufacturer.
    - d. Name of Contractor.

- e. Building dimensions including width, length, height, and roof slope.
- f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
- g. Governing building code and year of edition.
- h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
- i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
- j. Building-Use Category: Indicate category of building use and its effect on load importance factors.

- D. Material test reports.
- E. Source quality-control reports.
- F. Field quality-control reports.
- G. Warranties: Sample of special warranties.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A qualified manufacturer.
  - 1. Accreditation: According to the International Accreditation Service's AC472.
  - 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

#### **1.5 WARRANTY**

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

1. Warranty Period: 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 METAL BUILDING SYSTEM PERFORMANCE**

- A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Metal building systems shall be designed according to procedures in MBMA's "Metal Building Systems Manual."
  1. Design Loads: As indicated on Drawings.
  2. Design Loads: As required by ASCE/SEI 7.
  3. Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than the following:
    - a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
    - b. Girts: Horizontal deflection of 1/240 of the span.
    - c. Metal Roof Panels: Vertical deflection of 1/240 of the span.
    - d. Metal Wall Panels: Horizontal deflection of 1/240 of the span.
    - e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
  4. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:
    - a. Lateral Drift: Maximum of 1/400 of the building height.
  5. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: 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 calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient.
- E. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft.
- F. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of 1.57 lbf/sq. ft.

- G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft.
- H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a wind-load design pressure of not less than 2.86 lbf/sq. ft.
- I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

## **2.2 STRUCTURAL-STEEL FRAMING**

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
  - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.
  - 2. Frame Configuration: Single gable.
  - 3. Exterior Column Type: Tapered.
  - 4. Rafter Type: Tapered.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly.
- C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating.
- D. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated or hot-dip galvanized bolts for structural-framing components that are galvanized.
- E. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

## **2.3 METAL ROOF PANELS**

- A. Vertical-Rib or Trapezoidal-Rib, Standing-Seam Metal Roof Panels: Formed with 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.
  - 1. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch nominal thickness.
    - a. Exterior Finish: Three-coat fluoropolymer.
    - b. Color: Silver.
  - 2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from Aluminum-zinc alloy-coated or stainless-steel sheet.
  - 3. Joint Type: Mechanically seamed, folded according to manufacturer's standard.
  - 4. Panel Coverage: 16 inches.
  - 5. Uplift Rating: UL 90.



## 2.4 METAL WALL PANELS

- A. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
1. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch nominal thickness.
    - a. Exterior Finish: Three-coat fluoropolymer.
    - b. Color: Match existing metal wall panel color.
  2. Major-Rib Spacing: Match existing.
  3. Panel Coverage: 36 inches.

## 2.5 THERMAL INSULATION

- A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch- wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

## 2.6 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
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.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
- D. Flashing and Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
- E. Gutters: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters.
  2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Formed from 0.022-inch (0.56-mm) nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to

match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

## **2.7 SOURCE QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to evaluate product.
- B. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.
  1. Special inspections will not be required if fabrication is performed by manufacturer registered and approved by authorities having jurisdiction to perform such Work without special inspection.
    - a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.
- C. Testing: Test and inspect shop connections for metal buildings according to the following:
  1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. Product will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

## **2.8 FABRICATION**

- A. General: Design components and field connections required for erection to permit easy assembly.
  1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

- C. Primary Framing: Shop fabricate framing components to size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- D. Secondary Framing: Shop fabricate framing components to size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

### **PART 3 - EXECUTION**

#### **3.1 ERECTION OF STRUCTURAL FRAMING**

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
  - a. Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
  1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  2. Locate and space wall girts to suit openings such as doors and windows.
  3. Locate canopy framing as indicated.
  4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Steel Joists: Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.
  1. Before installation, splice joists delivered to Project site in more than one piece.
  2. Space, adjust, and align joists accurately in location before permanently fastening.
  3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  4. Bolt joists to supporting steel framework using carbon-steel bolts unless high-strength structural bolts are required by the manufacturer.
  5. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
  6. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  1. Tighten rod and cable bracing to avoid sag.
  2. Locate interior end-bay bracing only where indicated.
- J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

### **3.2 METAL PANEL INSTALLATION, GENERAL**

- A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
  3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
  6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- B. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### **3.3 METAL ROOF PANEL INSTALLATION**

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
  2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Install clips to supports with self-drilling or 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 that clip, metal roof panel, and factory-applied sealant are completely engaged.
  5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
  6. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.

- C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
  2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
  3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
  4. At metal panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

### **3.4 METAL WALL PANEL INSTALLATION**

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  2. Shim or otherwise plumb substrates receiving metal wall panels.
  3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.
  4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
  6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  7. Install screw fasteners in predrilled holes.
  8. Install flashing and trim as metal wall panel work proceeds.
  9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
  10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
  11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

### **3.5 THERMAL INSULATION INSTALLATION**

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
  2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
  3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.



- B. Blanket Roof Insulation: Comply with the following installation method:
1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.
  2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.
  3. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
    - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
  4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
    - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
  5. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
  2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

### 3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  - 1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) 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 (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) 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.

### **3.7 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections. Special requirements are on the structural drawings.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

**END OF SECTION**

**SECTION 22 00 00**  
**BASIC PLUMBING MATERIALS AND METHODS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 IMPOSED REGULATIONS**

- A. Applicable provisions of the State and Local Codes and codes and standards in addition to those listed elsewhere in the contract documents are hereby imposed on a general basis for plumbing work.

**1.03 SCOPE OF WORK**

- A. Provide all labor, materials, equipment and supervision to construct complete and operable plumbing systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

**1.04 RELATED DOCUMENTS AND OTHER INFORMATION**

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.

**1.05 PRODUCT WARRANTIES**

- A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceeds the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

**1.06 PRODUCT SUBSTITUTIONS**

- A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Architect at least 14 days prior to opening of bids. Refer to the general conditions for the substitution request form and required documentation.

**PART 2 NOT USED.**

**PART 3 EXECUTION**

**3.01 PRODUCT INSTALLATION, GENERAL:**

- A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.
- B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during

shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.

- C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Architect five days in advance of any testing.

**END OF SECTION**

**SECTION 22 05 10  
PLUMBING COORDINATION**

**PART 1 GENERAL**

**1.01 QUALITY ASSURANCE:**

- A. Plumbing Coordination Drawings: Prepare a set of coordination drawings showing the coordination of the major elements, components, and systems of the Plumbing work, and showing the coordination of Plumbing work with other work. Prepare drawings at accurate scale and sufficiently large to show locations of every item, including clearances for installing, maintaining, insulating, breaking down equipment, replacing motors and similar requirements. Drawings shall indicate coordination with all other trades including, but not limited to, lighting, structural, plumbing, and architectural items. Prepare drawings to include plans, elevations, sections and details as needed to conclusively show successful coordination and integration of the work. Submit drawings for review by the Architect/Engineer and Owner.
  - 1. Plans shall include dimensioned locations of all Floor Drains
  - 2. Plans shall include locations of all ceiling and wall access panels required for equipment access (valves, for example).
- C. Record Drawings: During construction operations, the Plumbing contractor shall faithfully make a record of all approved changes from the contract drawings, including accurate dimensions where applicable, and shall also record accurate dimensions locating all below-grade outside Plumbing utilities (whether changed or not) with reference to permanent above-grade objects. A minimum of two (2) dimensions from building reference points shall be provided and a bury depth indicated. At completion of the work, all such changes shall be recorded neatly with red ink by the Plumbing contractor on an unused set of the Plumbing contract drawings supplied by the architect.
- D. Photographs: For all below-grade plumbing piping, photograph installation of trenches before backfilling. Submit to A/E for review and include in closeout documents to the Owner.

**1.02 RELATED DOCUMENTS AND OTHER INFORMATION:**

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.
- B. Section 019100 - General Commissioning Requirements.
- C. Commissioning Plan.

**PART 2 PRODUCTS**

**2.01 PLUMBING PRODUCT COORDINATION**

- A. Power Characteristics: Refer to the electrical sections of the specifications and the electrical drawings for the power characteristics available for the operation of each power driven item of Plumbing equipment. The electrical design was based on the power requirements of the Plumbing equipment manufacturer scheduled or specified as "basis of design." Any modifications to the electrical system that are required due to the use of an approved equivalent manufacturer shall be made at no additional cost to the owner. All changes must be clearly documented and submitted for review by the Architect/Engineer prior to purchasing equipment. Coordinate purchases to ensure uniform interface with electrical work. Refer to Division 26 specifications for additional coordination requirements.

- B. Coordination of Options and Substitutions: When the contract documents permit the selection from several product options and it becomes necessary to authorize a substitution, do not proceed with purchase until coordination of interface to equipment has been checked and satisfactorily established.

### **PART 3 EXECUTION**

#### **3.01 INSPECTION AND PREPARATION**

- A. Substrate Examination: The Installer of each element of the Plumbing work must examine the condition of the substrate to receive the work, the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Do not proceed with the installation of sleeves, anchors, hangers, roof penetrations and similar work until Plumbing coordination drawings have been processed and released for construction. Where work must be installed prior to that time in order to avoid a project delay, review proposed installation in a project coordination meeting including all parties involved with the interfacing of the work.

#### **3.02 CUTTING AND PATCHING**

- A. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Architect's or Engineer's written authorization. Authorization will be granted only where there is no other reasonable method for completing the Plumbing work, and where the proposed cutting clearly does not materially weaken the structure.
- B. Where authorized, cut opening through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.
- C. Other work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate Plumbing work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
- D. Where patching is required to restore other work, because of either cutting or other damage inflicted during the installation of Plumbing work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Architect. Engage the original Installer to complete patching of the following categories of work:
  - 1. Exposed concrete finishes.
  - 2. Exposed masonry.
  - 3. Waterproofing and vapor barriers.
  - 4. Roofing, flashing and accessories.
  - 5. Interior exposed finishes and casework, where judged by the Architect to be difficult to achieve an acceptable match by other means

#### **3.03 COORDINATION OF PLUMBING INSTALLATION**

- A. General: Sequence, coordinate and integrate the various elements of Plumbing work so that the Plumbing system will perform as indicated and be in harmony with the other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:



1. Install piping and similar services straight and true, aligned with other work and with overhead structures and allowing for insulation. Conceal where possible.
  2. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
  3. Give the right-of way to piping systems required to slope for drainage (over other service lines). Piping shall be located to avoid interference with ductwork and light fixtures.
- B. Drawings: Conform with the arrangement indicated by the contract documents to the greatest extent possible, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of the conflict.
- C. Electrical Work: Coordinate the Plumbing work with electrical work, and properly interface with the electrical service. In general, and except as otherwise indicated, install Plumbing equipment ready for electrical connection. Refer to the electrical sections of the specifications for electrical connection of Plumbing equipment.
- D. Utility Connections: Coordinate the connection of Plumbing systems with exterior underground utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies.
1. Provide a single connection for each service except where multiple connections are indicated. Water, tap, meter, and vault cost shall be incurred by the Contractor.

#### **3.04 COORDINATION OF PLUMBING START-UP**

- A. Seasonal Requirements: Adjust and coordinate the timing of Plumbing system start-ups with seasonal variations, so that demonstration and testing of specified performance can be observed and recorded. Exercise proper care in off-season start-ups to ensure that systems and equipment will not be damaged by the operation.

**END OF SECTION**

**SECTION 22 05 11**  
**COMMON WORK RESULTS FOR PLUMBING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 DESCRIPTION**

- A. The requirements of this Section apply to all sections of Division 22.
- B. Definitions:
  - 1. Exposed: Piping and equipment exposed to view in finished rooms.
  - 2. Option or optional: Contractor's choice of an alternate material or method.

**1.03 RELATED WORK**

- A. Section GENERAL CONDITIONS.
- B. Section GENERAL REQUIREMENTS.
- C. Section SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- D. Excavation and Backfill: Section EARTH MOVING.
- E. Concrete and Grout: Section CAST-IN-PLACE CONCRETE.
- F. Flashing for Wall and Roof Penetrations: Section FLASHING AND SHEET METAL.
- G. Section JOINT SEALANTS.
- H. Section PAINTING.
- I. Section PLUMBING PIPING INSULATION.
- J. Section REQUIREMENTS FOR ELECTRICAL INSTALLATIONS
- K. Section GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.

**1.04 QUALITY ASSURANCE**

- A. Products Criteria:
  - 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years. See other specification sections for any exceptions.
  - 2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 100 miles of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Submit names, mail and e-mail addresses and phone numbers of service organizations providing service under these conditions for (as applicable to the project): pumps, critical instrumentation, computer workstation and programming.
  - 3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
  - 4. Conform to codes and standards as required by the specifications. Conform to local codes, if required by local authorities such as the natural gas supplier, if the

- local codes are more stringent than those specified. Refer any conflicts to the Architect.
5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
  6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
  7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
  8. Asbestos products or equipment or materials containing asbestos shall not be used.
- B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
  2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
  3. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
- C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.
- D. Execution (Installation, Construction) Quality:
1. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Architect for resolution. Provide written hard copies or computer files of manufacturer's installation instructions to the Architect at least two weeks prior to commencing installation of any item.
  2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, control devices. Prior to commencing installation work, refer conflicts between this requirement and contract drawings to the Architect for resolution.
  3. Provide complete layout drawings required by Paragraph, SUBMITTALS. Do not commence construction work on any system until the layout drawings have been approved.

#### **1.05 SUBMITTALS**

- A. Submit in accordance with Division 1 specifications.
- B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION COMMON WORK RESULTS FOR PLUMBING", with applicable "Group" number.

- C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
- D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.
- E. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.
- F. Upon request by Owner, provide lists of previous installations for selected items of equipment. Include contact persons who will serve as references, with telephone numbers and e-mail addresses.
- G. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.
  - 1. Submit electric motor data and variable speed drive data with the driven equipment.
  - 2. Equipment and materials identification.
  - 3. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
  - 4. Wall, floor, and ceiling plates.
- H. Maintenance Data and Operating Instructions:
  - 1. Maintenance and operating manuals in accordance with Division 1 specifications for systems and equipment.
  - 2. Video documentation of piping under slabs in accordance with Section 22 13 16.
  - 3. Provide a listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment. Include in the listing belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Protection of Equipment:
  - 1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Owner has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
  - 2. Place damaged equipment in first class, new operating condition; or, replace same as determined and directed by the Architect. Such repair or replacement shall be at no additional cost to the Owner.
  - 3. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
  - 4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
- B. Cleanliness of Piping and Equipment Systems:
  - 1. Exercise care in storage and handling of equipment and piping material to be

- incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
  3. Clean interior of all tanks prior to delivery for beneficial use by the Owner.
  4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

### **1.07 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. 2015 International Building Code
- C. 2015 International Fire Code
- D. 2015 International Plumbing Code
- E. 2015 International Mechanical Code
- F. 2009 International Energy Conservation Code
- G. 2015 International Fuel Gas Code
- H. 2011 National Electrical Code
- I. American Society of Mechanical Engineers (ASME):
- J. Boiler and Pressure Vessel Code (BPVC):  
SEC IX-98 Qualifications Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators
- K. American Society for Testing and Materials (ASTM):  
A36/A36M-08 Carbon Structural Steel  
A575-96(2007) Steel Bars, Carbon, Merchant Quality, M-Grades R (2002)  
E84-09 Standard Test Method for Burning Characteristics of Building Materials  
E119 08a Standard Test Method for Fire Tests of Building Construction and Materials  
Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:  
SP 58 93 Pipe Hangers and Supports-Materials, Design and Manufacture  
SP 69-2003 Pipe Hangers and Supports-Selection and Application
- L. National Electrical Manufacturers Association (NEMA):  
MG1-2003, Rev. 1-2004 Motors and Generators
- M. National Association of Plumbing Heating Cooling Contractors (NAPHCC):

## **PART 2 PRODUCTS**

### **2.01 FACTORY-ASSEMBLED PRODUCTS**

- A. Provide maximum standardization of components to reduce spare part requirements.
- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
  1. All components of an assembled unit need not be products of same manufacturer.
  2. Constituent parts that are alike shall be products of a single manufacturer.
  3. Components shall be compatible with each other and with the total assembly for intended service.
  4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified

performance of the complete assembly.

- C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment, which serve the same function, must be the same make and model. Exceptions will be permitted if performance requirements cannot be met.

## **2.02 COMPATIBILITY OF RELATED EQUIPMENT**

- A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational plant that conforms to contract requirements.

## **2.03 SAFETY GUARDS**

- A. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gage sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 6 mm (1/4-inch) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.

## **2.04 LIFTING ATTACHMENTS**

- A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

## **2.05 ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING**

- A. All material and equipment furnished and installation methods shall conform to the requirements of GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT; Section LOW-VOLTAGE MOTOR STARTERS; and, Section LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW). Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems. Provide special energy efficient motors as scheduled. Unless otherwise specified for a particular application use electric motors with the following requirements.
- B. Special Requirements:
  - 1. Where motor power requirements of equipment furnished deviate from power shown on plans, provide electrical service designed under the requirements of NFPA 70 without additional time or cost to the Owner.
  - 2. Assemblies of motors, starters, controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.
  - 3. Wire and cable materials specified in the electrical division of the specifications shall be modified as follows:
    - a. Wiring material located where temperatures can exceed 71 degrees C (160 degrees F) shall be stranded copper with Teflon FEP insulation with jacket. This includes wiring on the boilers.
    - b. Other wiring at boilers and to control panels shall be NFPA 70



- designations THWN.
- c. Provide shielded conductors or wiring in separate conduits for all instrumentation and control systems where recommended by manufacturer of equipment.
- 4. Select motor sizes so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
- 5. Motors utilized with variable frequency drives shall be rated "inverter-ready" per NEMA Standard, MG1, Part 31.4.4.2.
- C. Motor Efficiency and Power Factor: All motors, when specified as "high efficiency" by the project specifications on driven equipment, shall conform to efficiency and power factor requirements in Section GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT, with no consideration of annual service hours. Motor manufacturers generally define these efficiency requirements as "NEMA premium efficient" and the requirements generally exceed those of the Energy Policy Act of 1992 (EPACT). Motors not specified as "high efficiency" shall comply with EPACT.
- D. Single phase Motors: Capacitor start type for hard starting applications. Motors for centrifugal fans and pumps may be split phase or permanent split capacitor (PSC).
- E. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type. Each two-speed motor shall have two separate windings. Provide a time- delay (20 seconds minimum) relay for switching from high to low speed.
- F. Rating: Continuous duty at 100 percent capacity in an ambient temperature of 40 degrees centigrade (104 degrees F); minimum horsepower as shown on drawings; maximum horsepower in normal operation not to exceed nameplate rating without service factor.
- G. Insulation Resistance: Not less than one half meg-ohm between stator conductors and frame, to be determined at the time of final inspection.

## 2.06 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

- A. Type Numbers Specified: MSS SP 58. For selection and application refer to MSS SP 69.
- B. For Attachment to Concrete Construction:
  - 1. Concrete insert: Type 18, MSS SP 58.
  - 2. Self drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 102 mm (four inches) thick when approved by the Architect for each job condition.
  - 3. Power driven fasteners: Permitted in existing concrete or masonry not less than 102 mm (four inches) thick when approved by the Architect for each job condition.
- C. For Attachment to Steel Construction: MSS SP 58.
  - 1. Welded attachment: Type 22.
  - 2. Beam clamps: Types 20, 21, 28 or 29. Type 23 C clamp may be used for individual copper tubing up to 23mm (7/8 inch) outside diameter.
- D. For Attachment to Wood Construction: Wood screws or lag bolts.
- E. Hanger Rods: Hot rolled steel, ASTM A36 or A575 for allowable load listed in MSS SP 58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn buckles shall provide 38 mm (1 1/2 inches) minimum of adjustment and incorporate locknuts. All thread rods are acceptable.

- F. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 41mm by 41mm (1 5/8 inches by 1 5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts. Not permitted for steam supply and condensate piping.
1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).
  2. Guide individual pipes on the horizontal member of every other trapeze hanger with 6 mm (1/4 inch) U bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 13mm (1/2 inch) galvanized steel bands, or preinsulated calcium silicate shield for insulated piping at each hanger.
- G. Pipe Hangers and Supports: (MSS SP 58), use hangers sized to encircle insulation on insulated piping. To protect insulation, provide Type 39 saddles for roller type supports or preinsulated calcium silicate shields. Provide Type 40 insulation shield or preinsulated calcium silicate shield at all other types of supports and hangers including those for preinsulated piping.
1. General Types (MSS SP 58):
    - a. Standard clevis hanger: Type 1; provide locknut.
    - b. Riser clamps: Type 8.
    - c. Wall brackets: Types 31, 32 or 33.
    - d. Roller supports: Type 41, 43, 44 and 46.
    - e. Saddle support: Type 36, 37 or 38.
    - f. Turnbuckle: Types 13 or 15. preinsulate
    - g. U bolt clamp: Type 24.
    - h. Copper Tube:
    - i. Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, plastic coated or taped with non adhesive isolation tape to prevent electrolysis.
    - j. For vertical runs use epoxy painted or plastic coated riser clamps.
    - k. For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.
    - l. Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.
    - m. Supports for plastic or glass piping: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp. b. Spring Supports (Expansion and contraction of vertical piping):
      - n. Movement up to 20 mm (3/4 inch): Type 51 or 52 variable spring unit with integral turn buckle and load indicator.
      - o. Movement more than 20 mm (3/4 inch): Type 54 or 55 constant support unit with integral adjusting nut, turn buckle and travel position indicator.
  2. Plumbing Piping (Other Than General Types):
    - a. Horizontal piping: Type 1, 5, 7, 9, and 10.
    - b. Chrome plated piping: Chrome plated supports.
    - c. Hangers and supports in pipe chase: Prefabricated system ABS self extinguishing material, not subject to electrolytic action, to hold piping, prevent vibration and compensate for all static and operational conditions.
    - d. Blocking, stays and bracing: Angle iron or preformed metal channel shapes, 1.3 mm (18 gage) minimum.

- H. Pre-insulated Calcium Silicate Shields:
  - 1. Provide 360 degree water resistant high density 965 kPa (140 psi) compressive strength calcium silicate shields encased in galvanized metal.
  - 2. Pre-insulated calcium silicate shields to be installed at the point of support during erection.
  - 3. Shield thickness shall match the pipe insulation.
  - 4. The type of shield is selected by the temperature of the pipe, the load it must carry, and the type of support it will be used with.
    - a. Shields for supporting chilled or cold water shall have insulation that extends a minimum of 1 inch past the sheet metal. Provide for an adequate vapor barrier in chilled lines.
    - b. The pre-insulated calcium silicate shield shall support the maximum allowable water filled span as indicated in MSS-SP 69. To support the load, the shields may have one or more of the following features: structural inserts 4138 kPa (600 psi) compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36) wear plates welded to the bottom sheet metal jacket.
  - 5. Shields may be used on steel clevis hanger type supports, roller supports or flat surfaces.

## 2.07 PIPE PENETRATIONS

- A. Install sleeves during construction for all pipe penetrations.
- B. To prevent accidental liquid spills from passing to a lower level, provide the following:
  - 1. For sleeves: Extend sleeve 25 mm (one inch) above finished floor and provide sealant for watertight joint.
  - 2. For blocked out floor openings: Provide 40 mm (1 1/2 inch) angle set in silicone adhesive around opening.
  - 3. For drilled penetrations: Provide 40 mm (1 1/2 inch) angle ring or square set in silicone adhesive around penetration.
- C. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of Project Engineer.
- D. Sheet Metal, Plastic, or Moisture resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- E. Cast Iron or Zinc Coated Pipe Sleeves: Provide for pipe passing through exterior walls below grade. Make space between sleeve and pipe watertight with a modular or link rubber seal. Seal shall be applied at both ends of sleeve.
- F. Sleeves are not required for wall hydrants for fire department connections or in drywall construction.
- G. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation.
- H. Sealant and Adhesives: Shall be as specified in Section JOINT SEALANTS.

## 2.08 TOOLS AND LUBRICANTS

- A. Furnish, and turn over to the Architect, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.
- C. Tool Containers: Hardwood or metal, permanently identified for intended service and mounted, or located, where directed by the Architect.
- D. Lubricants: A minimum of 0.95 L (one quart) of oil, and 0.45 kg (one pound) of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application.

## **2.09 WALL, FLOOR AND CEILING PLATES**

- A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.
- B. Thickness: Not less than 2.4 mm (3/32 inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025-inch) for up to 80 mm (3 inch pipe), 0.89 mm (0.035-inch) for larger pipe.
- C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Use also where insulation ends on exposed water supply pipe drop from overhead. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

## **2.10 ASBESTOS**

- A. Materials containing asbestos are not permitted.

## **PART 3 EXECUTION**

### **3.01 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING**

- A. Coordinate location of piping, sleeves, inserts, hangers, and equipment, access provisions, and work of all trades.. Locate piping, sleeves, inserts, hangers, and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Prepare equipment layout drawings to coordinate proper location and personnel access of all facilities.
- B. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- C. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the drawings.
- D. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
- E. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- F. Cutting Holes:

1. Cut holes through concrete and masonry by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Architect where working area space is limited.
  2. Locate holes to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by Architect. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to Architect for approval.
  3. Do not penetrate membrane waterproofing.
- G. Interconnection of Instrumentation or Control Devices: Generally, electrical and pneumatic interconnections are not shown but must be provided.
- H. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
- I. Protection and Cleaning:
1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Architect. Damaged or defective items in the opinion of the Architect, shall be replaced.
  2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
  3. Concrete and Grout: Use concrete and shrink compensating grout 25 MPa (3000 psi) minimum, specified in Section CAST-IN-PLACE CONCRETE.
- J. Install gages, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
- K. Electrical and Pneumatic Interconnection of Controls and Instruments: This generally not shown but must be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments and computer workstations. Comply with NFPA-70.

### **3.02 PIPE AND EQUIPMENT SUPPORTS**

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with prior approval of the Architect.
- B. Use of chain, wire or strap hangers; wood for blocking, stays and bracing; or, hangers suspended from piping above will not be permitted. Replace or thoroughly clean rusty products and paint with zinc primer.
- C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 15 mm (1/2 inch) clearance between pipe or piping covering and adjacent work.
- D. Plumbing horizontal and vertical pipe supports, refer to the International Plumbing Code.
- E. Overhead Supports:

1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
  2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
  3. Tubing and capillary systems shall be supported in channel troughs.
- F. Floor Supports:
1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Anchor and dowel concrete bases and structural systems to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
  2. Do not locate or install bases and supports until equipment mounted thereon has been approved. Size bases to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Refer to structural drawings. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
- G. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.

### 3.03 LUBRICATION

- A. Lubricate all devices requiring lubrication prior to initial operation. Field-check all devices for proper lubrication.
- B. Equip all devices with required lubrication fittings or devices. Provide a minimum of one liter (one quart) of oil and 0.5 kg (one pound) of grease of manufacturer's recommended grade and type for each different application; also provide 12 grease sticks for lubricated plug valves. Deliver all materials to Owner in unopened containers that are properly identified as to application.
- C. Provide a separate grease gun with attachments for applicable fittings for each type of grease applied.
- D. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.

### 3.04 CLEANING AND PAINTING

- A. Prior to final inspection and acceptance of the building for beneficial use by the Owner, the building facilities, equipment and systems shall be thoroughly cleaned and painted. Refer to Section "PAINTING."
- B. In addition, the following special conditions apply:
  1. Cleaning shall be thorough. Use solvents, cleaning materials and methods recommended by the manufacturers for the specific tasks. Remove all rust prior to painting and from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.
  2. Material And Equipment Not To Be Painted Includes:
    - a. Motors, controllers, control switches, and safety switches.
    - b. Control and interlock devices.
    - c. Regulators.
    - d. Pressure reducing valves.
    - e. Control valves and thermostatic elements.



- f. Lubrication devices and grease fittings.
  - g. Copper, brass, aluminum, stainless steel and bronze surfaces.
  - h. Valve stems and rotating shafts.
  - i. Pressure gauges and thermometers.
  - j. Glass.
  - k. Name plates.
3. Control and instrument panels shall be cleaned, damaged surfaces repaired, and shall be touched-up with matching paint obtained from panel manufacturer.
  4. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same color as utilized by the pump manufacturer
  5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats.
  6. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment if necessary to achieve this.

### **3.05 STARTUP AND TEMPORARY OPERATION**

- A. Start up equipment as described in equipment specifications. Verify that vibration is within specified tolerance prior to extended operation.

### **3.06 OPERATING AND PERFORMANCE TESTS**

- A. Prior to the final inspection, perform required tests as specified in Section GENERAL REQUIREMENTS, and submit the test reports and records to the Architect.
- B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Owner.
- C. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then make performance tests for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work.

### **3.07 OPERATION AND MAINTENANCE MANUALS**

- A. Provide four bound copies. Deliver to Owner not less than 30 days prior to final inspection.
- B. Include all new and temporary equipment and all elements of each assembly.
- C. Data sheet on each device listing model, size, capacity, pressure, speed, horsepower, impeller size, other data.
- D. Manufacturer's installation, maintenance, repair, and operation instructions for each device. Include assembly drawings and parts lists. Include operating precautions and reasons for precautions.
- E. Lubrication instructions including type and quantity of lubricant.
  1. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications.
  2. Set points of all interlock devices.
  3. Trouble-shooting guide for control systems.
  4. Operation of the any control system.
  5. Emergency procedures.

**END OF SECTION**

**SECTION 220523**  
**GENERAL-DUTY VALVES FOR PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Brass ball valves.
  - 2. Bronze ball valves.
- B. Related Sections:
  - 1. Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
  - 2. Section 221116 "Domestic Water Piping" for valves applicable only to this piping.

**1.03 DEFINITIONS**

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

**1.04 ACTION SUBMITTALS**

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

**1.05 QUALITY ASSURANCE**

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
  - 2. ASME B31.1 for power piping valves.
  - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, and weld ends.
  - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS FOR VALVES**

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
  - 1. Handlever: For quarter-turn valves NPS 6 and smaller.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
  - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
  - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
  - 2. Solder Joint: With sockets according to ASME B16.18.
  - 3. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

### **2.02 BRASS BALL VALVES**

- A. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Valve.
    - b. Hammond Valve.
    - c. NIBCO 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: Forged brass.
    - f. Ends: Threaded.
    - g. Seats: PTFE or TFE.
    - h. Stem: Stainless steel.
    - i. Ball: Stainless steel, vented.
    - j. Port: Full.

### **2.03 BRONZE BALL VALVES**

- A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Valve.
    - b. Hammond Valve.
    - c. NIBCO 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: Stainless steel.
- i. Ball: Stainless steel, vented.
- j. Port: Full.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

#### **3.02 VALVE INSTALLATION**

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

#### **3.03 ADJUSTING**

- A. 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.

#### **3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS**

- A. If valve applications are not indicated, use the following:
  - 1. Shutoff Service: Ball valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
  - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

#### **3.05 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE**

- A. Pipe NPS 3 and Smaller:
  - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
  - 2. Ball Valves: Two piece, full port, bronze or brass with stainless-steel trim.

**END OF SECTION**

**SECTION 22 05 29**  
**HANGERS AND SUPPORTS FOR**  
**PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Metal pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Metal framing systems.
  - 4. Thermal-hanger shield inserts.
  - 5. Pipe stands.
  - 6. Pipe positioning systems.
  - 7. Equipment supports.
- B. Related Sections:
  - 1. Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

**1.03 DEFINITIONS**

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE 7.
  - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
  - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
  - 3. Design seismic-restraint hangers and supports for piping and equipment.

**1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
  - 1. Trapeze pipe hangers.
  - 2. Metal framing systems.
  - 3. Pipe stands.
  - 4. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

#### **1.06 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

#### **1.07 QUALITY ASSURANCE**

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

### **PART 2 PRODUCTS**

#### **2.01 METAL PIPE HANGERS AND SUPPORTS**

- A. Carbon-Steel Pipe Hangers and Supports:
  1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel or stainless steel.
- B. Copper Pipe Hangers:
  1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
  2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

#### **2.02 TRAPEZE PIPE HANGERS**

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

#### **2.03 PIPE POSITIONING SYSTEMS**

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

#### **2.04 MISCELLANEOUS MATERIALS**

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

### **PART 3 EXECUTION**

#### **3.01 HANGER AND SUPPORT INSTALLATION**

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods,



- nuts, washers, and other accessories.
- D. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
  - E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
  - F. Install lateral bracing with pipe hangers and supports to prevent swaying.
  - G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
  - H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
  - I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
  - J. Insulated Piping:
    - 1. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - 2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - 3. Shield Dimensions for Pipe: Not less than the following:
      - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
      - b. NPS 4: 12 inches long and 0.06 inch thick.
      - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
      - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
      - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
    - 4. Pipes NPS 8 and Larger: Include reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

### 3.02 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.03 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

### 3.04 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

### 3.05 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 a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

### 3.06 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
  - 2. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
  - 3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 5. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 6. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
  - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
- N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
  8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    - a. Horizontal (MSS Type 54): Mounted horizontally.
    - b. Vertical (MSS Type 55): Mounted vertically.
    - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

**END OF SECTION**

**SECTION 220533  
HEAT TRACING FOR PLUMBING PIPING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes plumbing piping heat tracing for freeze prevention with the following electric heating cables:
  - 1. Self-regulating, parallel resistance.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
  - 2. Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.
- B. Shop Drawings: For electric heating cable.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.
- B. Sample Warranty: For special warranty.

**1.05 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.

**1.06 WARRANTY**

- B. Special Warranty: Manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Three years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.01 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES**

- 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. Nelson Heat Trace
  - 2. Raychem
  - 3. Thermon Americas Inc.
- B. Comply with IEEE 515.1.
- C. Heating Element: Pair of parallel No. 16 AWG, nickel-coated, stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory-assembled, nonheating leads with connectors at one end, and seal the opposite end watertight. Cable shall be capable of crossing over itself once without overheating.
- D. Electrical Insulating Jacket: Flame-retardant polyolefin.

- E. Cable Cover: Tinned-copper braid and polyolefin outer jacket with ultraviolet inhibitor.
- F. Maximum Operating Temperature (Power On): 150 deg F.
- G. Maximum Exposure Temperature (Power Off): 185 deg F.
- H. 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.
- I. Capacities and Characteristics:
  - 1. Maximum Heat Output: 3 W/ft.
  - 2. Piping Diameter: See drawings.
  - 3. Number of Parallel Cables: 2.
  - 4. See Electrical Drawings for voltage requirements.

## 2.02 CONTROLS

- A. Pipe-Mounted Thermostats for Freeze Protection:
  - 1. A bimetallic pipewall sensing thermostat preset at 40°F with a switch rating of 22 amps at 120 VAC based on current loads for each circuit.
  - 2. Corrosion-resistant, waterproof control enclosure.

## 2.03 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer.
- B. Warning Labels: Refer to Section 220553 "Identification for Plumbing Piping and Equipment."
- C. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 3 mils thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.
  - 1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.
  - 2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install electric heating cable across expansion, construction, and control joints according to manufacturer's written instructions; use cable-protection conduit and slack cable to allow movement without damage to cable.
- B. Electric Heating-Cable Installation for Freeze Protection for Piping:
  - 1. Install electric heating cables after piping has been tested and before insulation is installed.
  - 2. Install electric heating cables according to IEEE 515.1.
  - 3. Install insulation over piping with electric cables according to Section 220719 "Plumbing Piping Insulation."
  - 4. Install warning tape on piping insulation where piping is equipped with electric heating cables.



- C. Set field-adjustable switches and circuit-breaker trip ranges.

**3.03 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
  - 2. Test cables for electrical continuity and insulation integrity before energizing.
  - 3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- C. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.
- D. Cables will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

**3.04 PROTECTION**

- A. Protect installed heating cables, including nonheating leads, from damage during construction.
- B. Remove and replace damaged heat-tracing cables.

**END OF SECTION**

**SECTION 22 05 48**  
**VIBRATION AND SEISMIC CONTROLS**  
**FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUBMITTALS**

- A. Submit signed and sealed shop drawings from a professional engineer. Shop drawings to include project specific details, sketches, product data cut sheets.
- B. See drawings for additional requirements.

**PART 2 NOT USED.**

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Refer to the details and notes on the construction documents.

**3.02 FIELD QUALITY CONTROL**

- A. Inspect installation after installation and submit report.

**END OF SECTION**

**SECTION 220553**  
**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Warning signs and labels.
  - 3. Pipe labels.
  - 4. Valve tags.
  - 5. Warning tags.

**1.02 ACTION 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.

**1.04 COORDINATION**

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

**PART 2 - PRODUCTS**

**2.01 EQUIPMENT LABELS**

- A. Plastic Labels for Equipment:
  - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
  - 2. Letter Color: Black .
  - 3. Background Color: White.
  - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 7. Fasteners: Stainless-steel rivets or self-tapping screws.
  - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where

equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## **2.02 WARNING SIGNS AND LABELS**

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: Yellow.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

## **2.03 PIPE LABELS**

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.
  - 3.

## **2.04 VALVE TAGS**

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
  - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  - 2. Fasteners: Brass beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  - 1. Valve-tag schedule shall be included in operation and maintenance data.

## **2.05 WARNING TAGS**

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
  - 1. Size: 3 by 5-1/4 inches minimum.
  - 2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

#### **3.02 EQUIPMENT LABEL INSTALLATION**

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

#### **3.03 PIPE LABEL INSTALLATION**

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  1. Near each valve and control device.
  2. Near each branch connection, excluding short takeoffs for fixtures 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. Compressed-Air Piping:
    - a. Background Color: Yellow.
    - b. Letter Color: Black.
  2. Natural Gas and Propane Piping:
    - a. Background Color: Yellow.
    - b. Letter Color: Black.
  3. Domestic Cold, Hot, and Return Water Piping:
    - a. Background Color: Green.
    - b. Letter Color: White.
  4. Sanitary Waste and Storm Drainage and Vent Piping:
    - a. Background Color: Green.
    - b. Letter Color: White.

#### **3.04 VALVE-TAG INSTALLATION**

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape: 1-1/2 inches round
2. Valve-Tag Color: Natural
3. Letter Color: Black
  - a.

**3.05 WARNING-TAG INSTALLATION**

- A. Write required message on, and attach warning tags to, equipment and other items where required.

**END OF SECTION**



**SECTION 22 07 19**  
**PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes insulating the following plumbing piping services:
  - 1. Domestic cold-water piping.
  - 2. Domestic hot-water piping.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

**1.04 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.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

**1.06 COORDINATION**

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

**1.07 SCHEDULING**

- A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

**PART 2 PRODUCTS**

**2.01 INSULATION MATERIALS**

- A. Comply with requirements in "Piping Insulation Schedule, General" article 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. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA, Inc.; Aerocel.
    - b. Armacell LLC; AP Armaflex.
    - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.
- E. Mineral-Fiber, Preformed Pipe Insulation:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Johns Manville; Micro-Lok.
    - b. Knauf Insulation; 1000-Degree Pipe Insulation.
    - c. Owens Corning; Fiberglas Pipe Insulation.
  - 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.

## 2.02 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. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA, Inc.; Aero seal.
    - b. Armacell LLC; Armaflex 520 Adhesive.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
    - d. K-Flex USA; R-373 Contact Adhesive.
  - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
    - b. Eagle Bridges - Marathon Industries; 225.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
    - d. Mon-Eco Industries, Inc.; 22-25.
  - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.03 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, provide one of the following:
    - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B.

- Fuller Company; 30-80/30-90.
    - b. Vimasco Corporation; 749.
  - 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 indoor use on below-ambient services.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
    - b. Eagle Bridges - Marathon Industries; 501.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
    - d. Mon-Eco Industries, Inc.; 55-10.
  - 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
  - 3. Service Temperature Range: 0 to 180 deg F.
  - 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
  - 5. Color: White.
- D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
    - b. Eagle Bridges - Marathon Industries; 550.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
    - d. Mon-Eco Industries, Inc.; 55-50.
    - e. Vimasco Corporation; WC-1/WC-5.
  - 2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
  - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 4. Solids Content: 60 percent by volume and 66 percent by weight.
  - 5. Color: White.

## 2.04 SEALANTS

- A. Metal Jacket Flashing Sealants:
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    - b. Eagle Bridges - Marathon Industries; 405.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    - d. Mon-Eco Industries, Inc.; 44-05.
  - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
  - 3. Fire- and water-resistant, flexible, elastomeric sealant.
  - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
  - 5. Color: Aluminum.
  - 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.05 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

## 2.06 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. Metal Jacket:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H.B. Fuller Company; Metal Jacketing System.
    - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    - c. RRR Products, Inc.; Insul-Mate.
  - 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
    - a. Sheet and roll stock ready for shop or field sizing.
    - b. Finish and thickness are indicated in field-applied jacket schedule.
    - c. Moisture Barrier for Indoor Applications: 1-mil thick, heat-bonded polyethylene and kraft paper.
    - d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
    - e. Factory-Fabricated Fitting Covers:
      - 1) Same material, finish, and thickness as jacket.
      - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      - 3) Tee covers.
      - 4) Flange and union covers.
      - 5) End caps.
      - 6) Beveled collars.
      - 7) Valve covers.
      - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

## 2.07 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  - 1. Products: Subject to compliance with requirements, 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.
  - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
  2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

### 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. 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. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over Adhere and

- seal patches similar to butt joints.
- O. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
  2. Testing agency labels and stamps.
  3. Nameplates and data plates.
  4. Cleanouts.

### 3.04 PENETRATIONS

- A. Insulation Installation at 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 below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation inside wall 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 wall flashing and overlap wall flashing at least 2 inches.
  4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
  2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section "Penetration Firestopping."

### 3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints,

- seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
  7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
  8. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
  9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

### **3.06 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION**

- 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 Flanges:
  1. Install pipe insulation to outer diameter of pipe flange.
  2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
  3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
  4. Secure insulation to flanges 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 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.
- D. 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.

### **3.07 INSTALLATION OF MINERAL-FIBER INSULATION**

- 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. Seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
- B. Insulation Installation on Pipe Flanges:
  1. Install preformed pipe insulation to outer diameter of pipe flange.
  2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
  3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
  4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. 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.
- D. 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.

### **3.08 FIELD-APPLIED JACKET INSTALLATION**

- A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

### **3.09 FINISHES**

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section "Exterior Painting" and Section "Interior Painting."
  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. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

### **3.10 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### **3.11 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. Domestic Cold Water:
  - 1. Above grade: Insulation shall be the following:
    - a. Flexible Elastomeric: 1/2 inch thick.
- C. Domestic Hot Water:
  - 1. All pipe sizes: Indoor Insulation shall be the following:
    - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

### **3.12 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE**

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping:
  - 1. Aluminum, Corrugated 0.024 inch thick.

**END OF SECTION**

**SECTION 22 11 16**  
**DOMESTIC WATER PIPING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

**1.03 ACTION SUBMITTALS**

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

**1.04 INFORMATIONAL SUBMITTALS**

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

**PART 2 PRODUCTS**

**2.01 PIPING MATERIALS**

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61.

**2.02 COPPER TUBE AND FITTINGS**

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
  - 1. MSS SP-123.
  - 2. Cast-copper-alloy, hexagonal-stock body.
  - 3. Ball-and-socket, metal-to-metal seating surfaces.
  - 4. Solder-joint or threaded ends.

**2.03 PIPING JOINING MATERIALS**

- A. Solder Filler Metals: ASTM B 32, lead-free alloys.
- B. Flux: ASTM B 813, water flushable.
- C. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

**2.04 TRANSITION FITTINGS**

- A. General Requirements:
  - 1. Same size as pipes to be joined.
  - 2. Pressure rating at least equal to pipes to be joined.
  - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping

system fitting.

## 2.05 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
    - b. Central Plastics Company.
    - c. Hart Industries International, Inc.
    - d. Jomar International.
    - e. Matco-Norca.
    - f. McDonald, A. Y. Mfg. Co.
    - g. Watts; a division of Watts Water Technologies, Inc.
    - h. Wilkins; a Zurn company.
  - 2. Standard: ASSE 1079.
  - 3. Pressure Rating: 125 psig minimum at 180 deg F.
  - 4. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Nipples:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Elster Perfection Corporation.
    - b. Grinnell Mechanical Products; Tyco Fire Products LP.
    - c. Matco-Norca.
    - d. Precision Plumbing Products, Inc.
    - e. Victaulic Company.
  - 2. Standard: IAPMO PS 66.
  - 3. Electroplated steel nipple complying with ASTM F 1545.
  - 4. Pressure Rating and Temperature: 300 psig at 225 deg F.
  - 5. End Connections: Male threaded or grooved.
  - 6. Lining: Inert and noncorrosive, propylene.

## PART 3 EXECUTION

### 3.01 EARTHWORK

- A. Comply with requirements in Section "Earth Moving" for excavating, trenching, and backfilling.

### 3.02 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 copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

- D. Install shutoff valve immediately upstream of each dielectric fitting.
- E. Install domestic water piping level and plumb. Provide lead-free drain with hose fitting at all low points where possible.
- F. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- H. 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.
- I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- J. Install piping to permit valve servicing.
- K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- L. Install piping free of sags and bends.
- M. Install fittings for changes in direction and branch connections.
- N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- O. Install pressure gages on suction and discharge piping for each plumbing pump.
- P. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."
- Q. Install thermometers on inlet and outlet piping from each water heater.
- R. Install sleeves for piping penetrations of floors.
- S. Install sleeve seals for piping penetrations of concrete walls and slabs.
- T. Install escutcheons for exposed piping penetrations of walls, ceilings, and floors.

### 3.03 JOINT CONSTRUCTION

- A. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- B. 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.
- C. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- E. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

### 3.04 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.

### 3.05 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.

### 3.06 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  - 6. NPS 6: 10 feet with 5/8-inch rod.
  - 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### 3.07 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  - 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
  - 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

### 3.08 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and

- installation in Section 220553 "Identification for Plumbing Piping and Equipment."  
B. Label pressure piping with system operating pressure.

### 3.09 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
1. Piping Inspections:
    - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
    - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
  2. Piping Tests:
    - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
    - c. 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.
    - d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    - e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
    - f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.10 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
  2. Open shutoff valves to fully open position.
  3. Open throttling valves to proper setting.



4. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
7. Check plumbing specialties and verify proper settings, adjustments, and operation.

### 3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
  1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    - d. Repeat procedures if biological examination shows contamination.
    - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Clean non-potable domestic water piping as follows:
  1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

### 3.12 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. Under-building-slab, domestic water piping shall be the following:
  1. Soft copper tube, ASTM B 88, Type K.

- D. Aboveground domestic water piping shall be the following:
  - 1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

### **3.13 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 or gate valves for piping NPS 2 and smaller.
  - 2. Throttling Duty: Use ball valves for piping NPS 2 and smaller.
  - 3. Drain Duty: Hose-end drain valves.

**END OF SECTION**

**SECTION 22 11 19**  
**DOMESTIC WATER PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Vacuum breakers.
  - 2. Backflow preventers.
  - 3. Drain valves.
  - 4. Water-hammer arresters.
  - 5. Trap-seal primer valves.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
  - 1. Include diagrams for power, signal, and control wiring.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.

**1.05 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES**

- A. Potable-water piping and components shall comply with NSF 61.

**2.02 PERFORMANCE REQUIREMENTS**

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

**2.03 VACUUM BREAKERS**

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
    - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
  - 2. Standard: ASSE 1001.
  - 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
  - 4. Body: Bronze.
  - 5. Inlet and Outlet Connections: Threaded.
  - 6. Finish: Rough bronze or Chrome plated.
- B. Hose-Connection Vacuum Breakers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. MIFAB, Inc.
    - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    - c. Woodford Manufacturing Company; a division of WCM Industries, Inc.
    - d. Zurn Industries, LLC
  - 2. Standard: ASSE 1011.

3. Body: Bronze, nonremovable, with manual drain.
  4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
  5. Finish: Chrome or nickel plated.
- C. Pressure Vacuum Breakers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
    - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    - c. Zurn Industries, LLC
  2. Standard: ASSE 1020.
  3. Operation: Continuous-pressure applications.
  4. Pressure Loss: 5 psig maximum, through middle third of flow range.
  5. Accessories:
    - a. Valves: Ball type, on inlet and outlet.

#### 2.04 BACKFLOW PREVENTERS

- A. Dual-Check-Valve Backflow Preventers:
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. Cash Acme; a division of Reliance Worldwide Corporation.
    - b. Conbraco Industries, Inc.
    - c. FEBCO; a division of Watts Water Technologies, Inc.
    - d. Flomatic Corporation.
    - e. Ford Meter Box Company, Inc. (The).
    - f. Honeywell International Inc.
    - g. Legend Valve.
    - h. McDonald, A. Y. Mfg. Co.
    - i. Mueller Co. Ltd.; a subsidiary of Mueller Water Products Inc.
    - j. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    - k. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
  2. Standard: ASSE 1024.
  3. Operation: Continuous-pressure applications.
  4. Size: size shall match size of supply tubing.
  5. Body: Bronze with union inlet.

#### 2.05 DRAIN VALVES

- A. Ball-Valve-Type, Hose-End Drain Valves:
1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
  2. Pressure Rating: 400-psig minimum CWP.
  3. Size: NPS 3/4.
  4. Body: Copper alloy.
  5. Ball: Chrome-plated brass.
  6. Seats and Seals: Replaceable.
  7. Handle: Vinyl-covered steel.
  8. Inlet: Threaded or solder joint.
  9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

#### 2.06 WATER-HAMMER ARRESTERS

- A. Water-Hammer Arresters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AMTROL, Inc.

- b. Josam Company.
  - c. Precision Plumbing Products, Inc.
  - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - e. Watts Drainage Products.
  - f. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASSE 1010 or PDI-WH 201.
  3. Type: Metal bellows.
  4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

### 2.07 TRAP-SEAL PRIMER DEVICE

- A. Supply-Type, Trap-Seal Primer Device:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. MIFAB, Inc.
    - b. Precision Plumbing Products, Inc.
    - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    - d. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
  2. Standard: ASSE 1018.
  3. Pressure Rating: 125 psig minimum.
  4. Body: Bronze.
  5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
  6. Gravity Drain Outlet Connection: NPS 1/2 solder joint.
  7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- B. Inline-Type, Waterless Trap-Seal Device:
  1. Basis of Design Product: see Drawings for basis of design
  2. Standard: ASSE 1072
  3. Construction: High density polyethylene with heavy duty silicone diaphragm and soft EPDM rubber sealing gasket.
  4. Size: match the size of the drain.

### 2.08 SPECIALTY VALVES

- A. Comply with requirements for general-duty metal valves in Section 220523 "General-Duty Valves for Plumbing Piping."

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
  1. Locate backflow preventers in same room as connected equipment or system.
  2. Install drain for backflow preventers with atmospheric-vent drain separation of at least two pipe diameters in drain piping and pipe to hub drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
  3. Do not install bypass piping around backflow preventers.
- B. Install water-hammer arresters in water piping according to PDI-WH 201.
- C. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to trench-drain body, trap, or inlet fitting. Adjust valve for proper flow.

### 3.02 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

### **3.03 LABELING AND IDENTIFYING**

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
  - 1. Pressure vacuum breakers.
  - 2. Dual-check-valve backflow preventers.
  - 3. Supply-type, trap-seal primer valves.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

**END OF SECTION**

**SECTION 221316  
SANITARY WASTE AND VENT PIPING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Pipe, tube, and fittings.
  - 2. Specialty pipe fittings.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE 7-10.

**1.04 ACTION SUBMITTALS**

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

**1.05 INFORMATIONAL SUBMITTALS**

- A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

**1.06 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

**1.07 PROJECT CONDITIONS**

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

**PART 2 PRODUCTS**

**2.01 PIPING MATERIALS**

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

**2.02 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS**

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Caulking Materials: ASTM B 29, pure lead and oakum or hemp fiber.



### 2.03 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Heavy-Duty, Hubless-Piping Couplings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ANACO-Husky.
    - b. Charlotte Pipe & Foundry.
    - c. MIFAB, Inc.
    - d. Mission Rubber Company; a division of MCP Industries, Inc.
    - e. Tyler Pipe.
    - f. Or approved equal.
  - 2. Standards: 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.

### 2.04 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- 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."

### 2.05 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. Shielded, Nonpressure Transition Couplings:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cascade Waterworks Mfg. Co.
      - 2) Mission Rubber Company; a division of MCP Industries, Inc.
      - 3) Or approved equal.
    - b. Standard: ASTM C 1460.
    - c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Dielectric Fittings:
  - 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
  - 2. Dielectric Unions:

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Capitol Manufacturing Company.
    - 2) Central Plastics Company.
    - 3) Hart Industries International, Inc.
    - 4) Jomar International Ltd.
    - 5) Matco-Norca, Inc.
    - 6) McDonald, A. Y. Mfg. Co.
    - 7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 8) Wilkins; a Zurn company.
    - 9) Or approved equal.
  - b. Description:
    - 1) Standard: ASSE 1079.
    - 2) Pressure Rating: 125 psig minimum at 180 deg F.
    - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Capitol Manufacturing Company.
    - 2) Central Plastics Company.
    - 3) Matco-Norca, Inc.
    - 4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 5) Wilkins; a Zurn company.
    - 6) Or approved equal.
  - b. Description:
    - 1) Standard: ASSE 1079.
    - 2) Factory-fabricated, bolted, companion-flange assembly.
    - 3) Pressure Rating: 125 psig minimum at 180 deg F.
    - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Advance Products & Systems, Inc.
    - 2) Calpico, Inc.
    - 3) Central Plastics Company.
    - 4) Pipeline Seal and Insulator, Inc.
    - 5) Or approved equal.
  - b. Description:
    - 1) Nonconducting materials for field assembly of companion flanges.
    - 2) Pressure Rating: 150 psig.
    - 3) Gasket: Neoprene or phenolic.
    - 4) Bolt Sleeves: Phenolic or polyethylene.
    - 5) Washers: Phenolic with steel backing washers.
5. Dielectric Nipples:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Elster Perfection.
    - 2) Grinnell Mechanical Products.
    - 3) Matco-Norca, Inc.
    - 4) Precision Plumbing Products, Inc.
    - 5) Victaulic Company.
    - 6) Or approved equal.
  - b. Description:
    - 1) Standard: IAPMO PS 66
    - 2) Electroplated steel nipple.

- 3) Pressure Rating: 300 psig at 225 deg F.
- 4) End Connections: Male threaded or grooved.
- 5) Lining: Inert and noncorrosive, propylene.

### **PART 3 EXECUTION**

#### **3.01 PIPING INSTALLATION**

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- K. 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.
- L. 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.
- M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
  1. Sanitary Drainage Piping: 1/4" per foot downward in direction of flow for piping NPS 2 and smaller; 1/8" per foot downward in direction of flow for piping NPS 3 and larger.
  2. Vent Piping: 1/8" per 1' down toward vertical fixture vent or toward vent stack.
- N. 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."
- O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- P. Install aboveground PVC piping according to ASTM D 2665.
- Q. Install underground PVC piping according to ASTM D 2321.
- R. Install engineered soil and waste drainage and vent piping systems as follows:
  1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
- S. Plumbing Specialties:
  1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."
- T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

### 3.02 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with caulked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. 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.
- E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- G. 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.

### 3.03 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: Shielded, nonpressure transition couplings.
- B. Dielectric Fittings:
  1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
  2. Dielectric Fittings for **NPS 2** and Smaller: Use dielectric **nipples** or **unions**.
  3. Dielectric Fittings for **NPS 2-1/2 to NPS 4**: Use dielectric **flanges**, **flange kits**, or **nipples**.

### 3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
  - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
  - 2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
  - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 4. Install individual, straight, horizontal piping runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. 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.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
  - 2. NPS 3: 48 inches with 1/2-inch rod.
  - 3. NPS 4: 48 inches with 5/8-inch rod.
- I. Install supports for vertical PVC piping every 48 inches.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

### 3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect 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.
  - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
  - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
  - 5. Comply with requirements for cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
  - 6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
- 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.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

### **3.06 IDENTIFICATION**

- A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### **3.07 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.

### **3.08 CLEANING AND PROTECTION**

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

**3.09 PIPING SCHEDULE**

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping 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; heavy-duty hubless-piping couplings; and coupled joints.
  - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- C. Aboveground, vent piping 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; heavy-duty hubless-piping couplings; and coupled joints.
  - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- D. Underground, soil, waste, and vent piping shall be the following:
  - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
  - 2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  - 3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

**END OF SECTION 221316**



**SECTION 22 13 19**  
**SANITARY WASTE PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Cleanouts.
  - 2. Flashing materials.

**1.03 DEFINITIONS**

- A. FRP: Fiberglass-reinforced plastic.
- B. HDPE: High-density polyethylene plastic.
- C. PE: Polyethylene plastic.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories.
- B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.
  - 1. Wiring Diagrams: Power, signal, and control wiring.

**1.05 INFORMATIONAL SUBMITTALS**

- A. Manufacturer Seismic Qualification Certification: Submit certification that accessories and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

**1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

**1.07 QUALITY ASSURANCE**

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

- 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 NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

#### 1.08 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

### PART 2 PRODUCTS

#### 2.01 CLEANOUTS

- A. Exposed Metal Cleanouts CO:
  - 1. ASME A112.36.2M, Cast-Iron Cleanouts:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Josam Company.
      - 2) Smith, Jay R. Mfg. Co.
      - 3) Zurn Plumbing Products Group.
  - 2. Standard: ASME A112.36.2M for cleanout test tee.
  - 3. Size: Same as connected drainage piping
  - 4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
  - 5. Closure: Countersunk, brass plug.
  - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
  - 7. Closure: Stainless-steel plug with seal.
- B. Metal Floor Cleanouts FCO:
  - 1. ASME A112.36.2M, Cast-Iron Cleanouts:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Josam Company.
      - 2) Smith, Jay R. Mfg. Co.
      - 3) Zurn Plumbing Products Group.
  - 2. Standard: ASME A112.36.2M.
  - 3. Size: Same as connected branch.
  - 4. Body or Ferrule: Cast iron.
  - 5. Closure: Brass plug.
  - 6. Adjustable Housing Material: Cast iron.
  - 7. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
  - 8. Frame and Cover Shape: Square for tile, round for all others.
  - 9. Top Loading Classification: Medium Duty.
  - 10. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
  - 11. Standard: ASME A112.3.1.
  - 12. Size: Same as connected branch.
- C. Cast-Iron Wall Cleanouts:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Josam Company;

- b. Smith, Jay R. Mfg. Co.
- c. Zurn Plumbing Products Group.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated stainless-steel cover plate with screw.

## 2.02 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
  1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
  2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
  3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:
  1. General Applications: 12 oz./sq. ft..
  2. Vent Pipe Flashing: 8 oz./sq. ft..
- C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Do not install any penetrations through the roof including roof drains and vents through roof (VTR). VTR's shall be sidewall as indicated on the drawings.
- B. Equipment Mounting:
  1. Comply with requirements for vibration isolation and seismic control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
- C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
  1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  2. Locate at each change in direction of piping greater than 45 degrees.
  3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
  4. Locate at base of each vertical soil and waste stack.

- D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  - 1. Position trench drains for easy access and maintenance.
  - 2. Set trench 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 trench-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 trench drains connected to sanitary building drain, unless otherwise indicated.
- G. Assemble open drain fittings and install with top of hub 1 inch above floor.
- H. Install deep-seal traps on trench drains.
- I. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- J. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

### 3.02 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.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Conductors and Cables."

### 3.03 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
  - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
  - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors with waterproof membrane.
  - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.

2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
  3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors in solid coating of bituminous cement.
  - D. Secure flashing into sleeve and specialty clamping ring or device.
  - E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

#### **3.04 FIELD QUALITY CONTROL**

- A. Tests and Inspections:
  1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

#### **3.05 PROTECTION**

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

**END OF SECTION**

**SECTION 22 40 00  
PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUBMITTALS**

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes in accordance with Section 013300.
- B. Manufacturer's Instructions: Indicate installation methods and procedures.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.03 QUALITY ASSURANCE**

- A. ANSI Standards: Comply with ANSI Standards pertaining to plumbing fixtures and systems.
- B. ANSI Standards: Comply with ANSI A117.1 standard pertaining to plumbing fixtures for handicapped.
- C. PDI Compliance: Comply with standards established by Plumbing and Drainage institute (PDI) pertaining to plumbing fixture supports.
- D. Federal Standards: Comply with applicable Federal Standard FS WW-P-541/Series sections pertaining to plumbing fixtures.

**PART 2 PRODUCTS**

**2.01 PLUMBING FIXTURES**

- A. General: Provide factory-fabricated fixtures of the type, style and material indicated in contract documents. For each type of fixture, unless otherwise specified, provide fixture manufacturer's standard trim, carrier seats and valves as indicated by their published product information, either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation.

**2.02 MATERIALS**

- A. General: Unless otherwise specified, comply with applicable Federal Specification WW-P-541/series sections pertaining to plumbing fixtures, fittings, trim, metals and finishes. Comply with requirements of WW-P-541/specification relative to quality of ware, glazing, enamel, composition and finish of metals, air gaps and vacuum breakers, even though some plumbing fixtures specified in this section are not described in WW-P-541.
- B. Provide materials that have been selected for their surface flatness and smoothness. Exposed surface which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration or other surface imperfections on finished units are not acceptable.
- C. Where fittings, trim and accessories are exposed or semi-exposed, provide bright

chrome-plated or polished stainless steel units.

- D. Unless noted otherwise, provide solid heavy chrome plated cast brass (17 gauge) P-Trap with 2" minimum water seal and cast brass slip nut. Exposed P-Traps shall be fitted with cleanout plug.
- E. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and speck; glaze exposed surfaces and test for crazing resistance in accordance with ASTM C 554. Vitreous China and Enamel Iron Fixtures shall be white.
- F. Lavatory stop valves shall be polished chrome-plated heavy cast construction and shall be installed with chrome-plated brass threaded nipple.
  - 1. Manufacturers: McGuire, EBC, or approved equal.
- G. Comply with additional fixture requirements contained in the fixture schedule.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install plumbing fixtures of types indicated where shown and at indicated heights or where not shown in accordance with manufacturer's written instruction, roughing-in drawings and with recognized industry practices.
- B. Fasten plumbing fixtures securely to indicated supports or building structure, and ensure that fixtures are level and plumb and tight against mounting surface.
- C. Seal the outer perimeter of wall mounted lavatories and urinals and water closets to the wall and floor mounted water closets to the floor with a smooth bead of white silicone compound.

#### **3.02 FIELD QUALITY CONTROL**

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test and adjust fixtures for proper operation.

**END OF SECTION**



**SECTION 230000**  
**BASIC MECHANICAL MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.01 IMPOSED REGULATIONS:**

- A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for mechanical work: codes and standards listed on the mechanical drawings.

**1.02 SCOPE OF WORK:**

- A. Provide all labor, materials, equipment and supervision to construct complete and operable mechanical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

**1.03 RELATED DOCUMENTS AND OTHER INFORMATION:**

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.
- B. It is recognized that separate sub-contracts may be instituted by THIS CONTRACT'S GENERAL CONTRACTOR with others. It is the responsibility of THIS CONTRACT'S GENERAL CONTRACTOR to completely inform, coordinate and advise those sub-contractors as to all of the requirements, conditions and information associated with providing and installing their portion of the total job.

**1.04 EXISTING SERVICES AND FACILITIES:**

- A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.
- B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.
- C. Removed Materials: Existing materials made unnecessary by the new installation shall be stored on site. They shall remain the property of the Owner and shall be stored at a location and in a manner as directed by the Owner. If classified by the Owner's authorized representative as unsuitable for further use, the material shall become the property of the Contractor and shall be removed from the site at no additional cost to the owner.

**1.05 PRODUCT WARRANTIES:**

- A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceeds the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

**1.06 PRODUCT SUBSTITUTIONS:**

- A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Architect at least 10 days prior to opening of bids. Refer to the general

conditions for the substitution request form and required documentation.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL MECHANICAL PRODUCT REQUIREMENTS**

- A. Standard Products: Provide not less (quality) than manufacturer's standard products, as specified by their published product data. In addition to the indication that a particular product/model number is acceptable, comply with the specified requirements. Do not assume that the available off-the-shelf condition of a product complies with the requirements; as an example, a specific finish or color may be required.
- B. Uniformity: Where multiple units of a general product are required for the mechanical work, provide identical products by the same manufacturer, without variations except for sizes and similar variations as indicated.
- C. Product Compatibility, Options: Where more than one product selection is specified, either generically or proprietarily, selection is Purchaser's or Installer's option. Provide mechanical adaptations as needed for interfacing of selected products in the work.
- D. Equipment Nameplates: Provide a permanent operational data nameplate on each item of power operated mechanical equipment, indicating the manufacturer, product name, model number, serial number, speed, capacity, power characteristics, labels of tested compliance, and similar essential operating data.
- E. Locate nameplates in easy-to-read locations. When product is visually exposed in an occupied area of the building, locate nameplate in a concealed position (where possible) which is accessible for reading by service personnel.

## **PART 3 - EXECUTION**

### **3.01 PRODUCT INSTALLATION, GENERAL:**

- A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.
- B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.
- C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Architect five days in advance of any testing.

**END OF SECTION**

**SECTION 230510  
MECHANICAL COORDINATION**

**PART 1 - GENERAL**

**1.01 QUALITY ASSURANCE**

- A. Mechanical Coordination Drawings: Prepare a set of coordination drawings showing the coordination of the major elements, components and systems of the mechanical work, and showing the coordination of mechanical work with other work. Prepare drawings at accurate scale and sufficiently large to show locations of every item, including clearances for installing, maintaining, insulating, breaking down equipment, replacing motors and similar requirements. Drawings shall indicate coordination with all other trades including, but not limited to, lighting, structural, plumbing and architectural items. Prepare drawings to include plans, elevations, sections and details as needed to conclusively show successful coordination and integration of the work. Submit drawings for review by the Architect/Engineer.

**PART 2 - PRODUCTS**

**2.01 MECHANICAL PRODUCT COORDINATION:**

- A. Power Characteristics: Refer to the electrical sections of the specifications and the electrical drawings for the power characteristics available for the operation of each power driven item of mechanical equipment. The electrical design was based on the power requirements of the mechanical equipment manufacturer scheduled or specified as "basis of design." Any modifications to the electrical system that are required due to the use of an approved equivalent manufacturer shall be made at no additional cost to the owner. All changes must be clearly documented and submitted for review by the Architect/Engineer prior to purchasing equipment. Coordinate purchases to ensure uniform interface with electrical work. Refer to specification Div 26 for additional coordination requirements.
- B. Coordination of Options and Substitutions: When the contract documents permit the selection from several product options and it becomes necessary to authorize a substitution, do not proceed with purchase until coordination of interface to equipment has been checked and satisfactorily established.

**PART 3 - EXECUTION**

**3.01 INSPECTION AND PREPARATION:**

- A. Substrate Examination: The Installer of each element of the mechanical work must examine the condition of the substrate to receive the work, the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Do not proceed with the installation of sleeves, anchors, hangers, roof penetrations and similar work until mechanical coordination drawings have been processed and released for construction. Where work must be installed prior to that time in order to avoid a project delay, review proposed installation in a project coordination meeting including all parties involved with the interfacing of the work.

**3.02 CUTTING AND PATCHING:**

- A. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Architect's or Engineer's written authorization. Authorization will be granted only where there is not other reasonable

- method for completing the mechanical work, and where the proposed cutting clearly does not materially weaken the structure.
- B. Where authorized, cut opening through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.
  - C. Other work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
  - D. Where patching is required to restore other work, because of either cutting or other damage inflicted during the installation of mechanical work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Architect. Engage the original Installer to complete patching of the following categories of work:
    - 1. Exposed concrete finishes.
    - 2. Exposed masonry.
    - 3. Waterproofing and vapor barriers.
    - 4. Roofing, flashing and accessories.
    - 5. Interior exposed finishes and casework, where judged by the Architect to be difficult to achieve an acceptable match by other means.

**3.03 COORDINATION OF MECHANICAL INSTALLATION:**

- A. General: Sequence, coordinate and integrate the various elements of mechanical work so that the mechanical plant will perform as indicated and be in harmony with the other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:
- B. Install piping, ductwork and similar services straight and true, aligned with other work and with overhead structures and allowing for insulation. Conceal where possible.
- C. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
- D. Give the right-of way to piping systems required to slope for drainage (over other service lines). Piping shall be located to avoid interference with ductwork and light fixtures.
- E. Drawings: Conform with the arrangement indicated by the contract documents to the greatest extent possible, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of the conflict.
- F. Electrical Work: Coordinate the mechanical work with electrical work, and properly interface with the electrical service. In general, and except as otherwise indicated, install mechanical equipment ready for electrical connection. Refer to the electrical sections of the specifications for electrical connection of mechanical equipment.
- G. Utility Connections: Coordinate the connection of mechanical systems with exterior underground utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. Provide a single connection for each service except where multiple connections are indicated.

**3.04 COORDINATION OF MECHANICAL START-UP:**

- A. Seasonal Requirements: Adjust and coordinate the timing of mechanical system start-ups

with seasonal variations, so that demonstration and testing of specified performance can be observed and recorded. Exercise proper care in off-season start-ups to ensure that systems and equipment will not be damaged by+

**END OF SECTION**

**SECTION 230529**  
**HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Metal pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Metal framing systems.
  - 4. Thermal-hanger shield inserts.
  - 5. Fastener systems.
  - 6. Pipe stands.
  - 7. Equipment supports.
- B. Related Sections:
  - 1. Section 230548 "Vibration and Seismic Controls for HVAC" for vibration isolation devices.
  - 2. Section 233113 "Metal Ducts" for duct hangers and supports.

**1.03 DEFINITIONS**

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
  - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
  - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

**1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
  - 1. Trapeze pipe hangers.
  - 2. Metal framing systems.
  - 3. Pipe stands.
  - 4. Equipment supports.

- C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
  - 2. Design Calculations: Calculate requirements for designing trapeze hangers.

#### **1.06 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

#### **1.07 QUALITY ASSURANCE**

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

### **PART 2 PRODUCTS**

#### **2.1 METAL PIPE HANGERS AND SUPPORTS**

- A. Stainless-Steel Pipe Hangers and Supports:
  - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  - 2. Padded Hangers: Hanger with pipe insulation pad or cushion to support bearing surface of piping.
  - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- B. Copper Pipe Hangers:
  - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
  - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel or stainless steel.

#### **2.02 TRAPEZE PIPE HANGERS**

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural stainless-steel shapes with MSS SP-58 stainless-steel hanger rods, nuts, saddles, and U-bolts.

#### **2.03 THERMAL-HANGER SHIELD INSERTS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Carpenter & Paterson, Inc.
  - 2. Clement Support Services.
  - 3. ERICO International Corporation.
  - 4. National Pipe Hanger Corporation.
  - 5. PHS Industries, Inc.
  - 6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
  - 7. Piping Technology & Products, Inc.
  - 8. Rilco Manufacturing Co., Inc.
  - 9. Value Engineered Products, Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.



- C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C with 100-psig, or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

#### **2.04 FASTENER SYSTEMS**

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

#### **2.05 PIPE STANDS**

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe.
- C. Low-Type, Single-Pipe Stand: One-piece plastic or stainless-steel base unit with rubber base.

#### **2.06 EQUIPMENT SUPPORTS**

- A. Description: Welded, shop- or field-fabricated equipment support made from structural stainless-steel shapes.

#### **2.07 MISCELLANEOUS MATERIALS**

- A. Structural Steel: ASTM A 36/A 36M, stainless-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
  - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.

### **PART 3 EXECUTION**

#### **3.01 HANGER AND SUPPORT INSTALLATION**

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for

- individual pipe hangers.
- 2. Field fabricate from ASTM A 36/A 36M, stainless-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- M. Insulated Piping:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on

rollers.

4. Shield Dimensions for Pipe: Not less than the following:
  - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
  - b. NPS 4: 12 inches long and 0.06 inch thick.
  - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
  - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
  - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### **3.02 EQUIPMENT SUPPORTS**

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### **3.03 METAL FABRICATIONS**

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

### **3.04 ADJUSTING**

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

### **3.05 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 a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting" Section 099123 "Interior Painting" and Section 099600 "High Performance Coatings."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply

galvanizing-repair paint to comply with ASTM A 780.

### 3.06 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use stainless-steel pipe hangers and supports, metal trapeze pipe hangers, and metal framing systems and attachments for general service applications.
- F. Use stainless-steel pipe hangers.
- G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.
- J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
  - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
  - 3. stainless-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
  - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
  - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
  - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
  - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
  - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
  - 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
  - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
  - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or stainless-

- steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or stainless-steel plate, and with U-bolt to retain pipe.
  16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
  17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
  18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
  19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
  20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
  21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
  2. Stainless-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
  - a. Horizontal (MSS Type 54): Mounted horizontally.
  - b. Vertical (MSS Type 55): Mounted vertically.
  - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

**END OF SECTION**



**SECTION 23 05 48**  
**VIBRATION AND SEISMIC CONTROLS FOR HVAC**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Elastomeric isolation pads.
  - 2. Elastomeric isolation mounts.
  - 3. Restrained elastomeric isolation mounts.
  - 4. Open-spring isolators.
  - 5. Housed-spring isolators.
  - 6. Restrained-spring isolators.
  - 7. Housed-restrained-spring isolators.
  - 8. Pipe-riser resilient supports.
  - 9. Resilient pipe guides.
  - 10. Elastomeric hangers.
  - 11. Spring hangers.
  - 12. Snubbers.
  - 13. Restraint channel bracings.
  - 14. Restraint cables.
  - 15. Seismic-restraint accessories.
  - 16. Mechanical anchor bolts.
  - 17. Adhesive anchor bolts.
- B. Related Requirements:
  - 1. Section 220548 "Vibration and Seismic Controls for Plumbing" for devices for plumbing equipment and systems.

**1.03 DEFINITIONS**

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
  - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.
    - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES or OSHPD or an agency acceptable to authorities having jurisdiction.

- b. Annotate to indicate application of each product submitted and compliance with requirements.
  3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Shop Drawings:
  1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
  2. 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. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.
  1. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, and seismic and wind forces required to select vibration isolators and seismic and wind restraints and for designing vibration isolation bases.
    - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
  3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
  4. Seismic- and Wind-Restraint Details:
    - a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
    - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
    - d. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES or OSHPD or an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

**1.05 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control reports.

**1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data

**1.07 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

**PART 2 - PRODUCTS**

**2.01 ELASTOMERIC ISOLATION PADS**

- A. Elastomeric Isolation Pads:
  - 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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  - 2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
  - 3. Size: Factory or field cut to match requirements of supported equipment.
  - 4. Pad Material: Oil and water resistant with elastomeric properties.
  - 5. Surface Pattern: Smooth or Ribbed or Waffle pattern.

6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.
8. Sandwich-Core Material: Resilient and elastomeric.
  - a. Surface Pattern: Smooth or Ribbed or Waffle pattern.
  - b. Infused nonwoven cotton or synthetic fibers.

## **2.02 ELASTOMERIC ISOLATION MOUNTS**

- A. Double-Deflection, Elastomeric Isolation Mounts:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  2. Mounting Plates:
    - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
  3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

## **2.03 RESTRAINED ELASTOMERIC ISOLATION MOUNTS**

- A. Restrained Elastomeric Isolation Mounts:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  2. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
    - a. Housing: Cast-ductile iron or welded steel.
    - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

#### 2.04 OPEN-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators:
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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  2. Outside 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. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
  7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

#### 2.05 HOUSED-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:
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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  2. Outside 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. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
    - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.

- b. Top housing with attachment and leveling bolt or threaded mounting holes and internal leveling device or elastomeric pad.

## 2.06 RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.
  2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
    - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    - b. Top plate with threaded mounting holes or elastomeric pad.
    - c. Internal leveling bolt that acts as blocking during installation.
  3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
  4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

## 2.07 HOUSED-RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Isolation.
    - h. Vibration Mountings & Controls, Inc.

2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable or non-adjustable snubbers to limit vertical movement.
  - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
  - b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

#### **2.08 PIPE-RISER RESILIENT SUPPORT**

- A. Description: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum 1/2-inch- thick neoprene.
  1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
  2. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.

#### **2.09 RESILIENT PIPE GUIDES**

- A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch- thick neoprene.
  1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

#### **2.10 ELASTOMERIC HANGERS**

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Isolation Technology, Inc.
    - d. Kinetics Noise Control, Inc.
    - e. Mason Industries, Inc.
    - f. Vibration Eliminator Co., Inc.
    - g. Vibration Mountings & Controls, Inc.
  2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.



3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

## 2.11 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:
  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. Ace Mountings Co., Inc.
    - b. California Dynamics Corporation.
    - c. Kinetics Noise Control, Inc.
    - d. Mason Industries, Inc.
    - e. Vibration Eliminator Co., Inc.
    - f. Vibration Isolation.
    - g. Vibration Mountings & Controls, Inc.
  2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
  3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
  8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
  9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

## 2.12 SNUBBERS

- 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. Kinetics Noise Control, Inc.
  2. Mason Industries, Inc.
  3. Vibration Mountings & Controls, Inc.
- B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
  1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
  2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
  3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

### 2.13 RESTRAINT CHANNEL BRACINGS

- 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. Cooper B-Line, Inc.
  - 2. Hilti, Inc.
  - 3. Mason Industries, Inc.
  - 4. Unistrut.
- B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

### 2.14 RESTRAINT CABLES

- 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. Kinetics Noise Control, Inc.
  - 2. Loos & Co., Inc.
  - 3. Vibration Mountings & Controls, Inc.
- B. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

### 2.15 SEISMIC-RESTRAINT 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. Cooper B-Line, Inc.
  - 2. Kinetics Noise Control, Inc.
  - 3. Mason Industries, Inc.
  - 4. TOLCO.
- B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.
- C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

**2.16 MECHANICAL ANCHOR BOLTS**

- 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. Cooper B-Line, Inc.
  - 2. Hilti, Inc.
  - 3. Kinetics Noise Control, Inc.
  - 4. Mason Industries, Inc.
  
- B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

**2.17 ADHESIVE ANCHOR BOLTS**

- 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. Hilti, Inc.
  - 2. Kinetics Noise Control, Inc.
  - 3. Mason Industries, Inc.
  
- B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

**2.18 VIBRATION ISOLATION EQUIPMENT BASES**

- 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. California Dynamics Corporation.
  - 2. Kinetics Noise Control.
  - 3. Mason Industries, Inc.
  - 4. Vibration Eliminator Co., Inc.
  - 5. Vibration Isolation.
  - 6. Vibration Mountings & Controls, Inc.
  
- B. Steel Rails: Factory-fabricated, welded, structural-steel rails.
  - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.
    - a. Include supports for suction and discharge elbows for pumps.
  - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Rails shall have shape to accommodate supported equipment.
  - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

- C. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.
  - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
    - a. Include supports for suction and discharge elbows for pumps.
  - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
  - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
- D. Concrete Inertia Base: Factory-fabricated or field-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.
  - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
    - a. Include supports for suction and discharge elbows for pumps.
  - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
  - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
  - 4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 APPLICATIONS**

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES or OSHPD or an agency acceptable to authorities having jurisdiction.
- B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

**3.03 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION**

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Equipment Restraints:
  - 1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
  - 2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
  - 3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES or OSHPD or an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- D. Piping Restraints:
  - 1. Comply with requirements in MSS SP-127.
  - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
  - 3. Brace a change of direction longer than 12 feet.
- E. Install cables so they do not bend across edges of adjacent equipment or building structure.
- F. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES or OSHPD or an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- H. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- I. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- J. Drilled-in Anchors:
  - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
  - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
  - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.

4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

### **3.04 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION**

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

### **3.05 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
  2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
  3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
  4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
  5. Test to 90 percent of rated proof load of device.
  6. Measure isolator restraint clearance.
  7. Measure isolator deflection.
  8. Verify snubber minimum clearances.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

### **3.06 ADJUSTING**

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

**END OF SECTION**

**SECTION 230553**  
**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Warning signs and labels.
  - 3. Pipe labels.
  - 4. Stencils.
  - 5. Warning tags.

**1.03 ACTION 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.

**1.04 COORDINATION**

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

**PART 2 - PRODUCTS**

**2.01 EQUIPMENT LABELS**

- A. Metal Labels for Equipment:
  - 1. Material and Thickness: Stainless steel, 0.025-inch, Aluminum, 0.032-inch and having predrilled or stamped holes for attachment hardware.
  - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  - 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
  - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.



- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.02 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

## 2.03 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 cover full 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.

## 2.04 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
  - 1. Stencil Material: Aluminum, Brass, Fiberboard, Fiberboard, or metal.
  - 2. Stencil Paint: Exterior, gloss, alkyd enamel or acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
  - 3. Identification Paint: Exterior, alkyd enamel or acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

## 2.05 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
  - 1. Size: 3 by 5-1/4 inches minimum, Approximately 4 by 7 inches.
  - 2. Fasteners: Brass grommet and wire.
  - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
  - 4. Color: Yellow background with black lettering.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.03 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting" Section 099600 "High Performance Coatings"
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1, on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. 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.
- D. Pipe Label Color Schedule:
  - 1. Refrigerant Piping:
    - a. Background Color: Orange.
    - b. Letter Color: Black.
  - 2. Condensate Piping:
    - a. Background Color: Green.

- b. Letter Color: White.

**3.04 WARNING-TAG INSTALLATION**

- A. Write required message on, and attach warning tags to, equipment and other items where required.

**END OF SECTION**

**SECTION 231126**  
**FACILITY LIQUEFIED-PETROLEUM GAS PIPING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Pipes, tubes, and fittings.
  - 2. Piping specialties.
  - 3. Piping and tubing joining materials.
  - 4. Valves.
  - 5. Pressure regulators.

**1.03 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, 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 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. LPG: Liquefied-petroleum gas.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Minimum Operating-Pressure Ratings:
  - 1. For Piping Containing Only Vapor:
    - a. Piping and Valves: 125 psig unless otherwise indicated.
  - 2. For Piping Containing Liquid:
    - a. Piping between Shutoff Valves: 350 psig unless otherwise indicated.
    - b. Piping Other Than Above: 250 psig unless otherwise indicated.
    - c. Valves and Fittings: 250 psig unless otherwise indicated.
- B. Delegated Design: Design restraints and anchors for LPG piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Seismic Performance: Vaporizers and storage container supports shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

**1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of the following:
  - 1. Piping specialties.
  - 2. Corrugated stainless-steel tubing with associated components.
  - 3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
  - 4. Pressure regulators. Indicate pressure ratings and capacities.

- B. Shop Drawings: For facility LPG piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- C. Delegated-Design Submittal: For LPG piping and equipment 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. Detail fabrication and assembly of seismic restraints.
  - 2. Design Calculations: Calculate requirements for selecting seismic restraints.

#### **1.06 INFORMATIONAL SUBMITTALS**

- A. Site Survey: Plans, drawn to scale, on which LPG piping is shown and coordinated with other services and utilities.
- B. Seismic Qualification Certificates: Submit certification that vaporizer, air mixer, storage container supports, accessories, and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Welding certificates.
- D. Field quality-control reports.

#### **1.07 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For LPG equipment and accessories to include in emergency, operation, and maintenance manuals.

#### **1.08 QUALITY ASSURANCE**

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- 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.

#### **1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Handling Flammable Liquids: Remove and dispose of liquids from existing LPG piping according to requirements of authorities having jurisdiction.
- B. 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.
- C. Store pipes and tubes with protective PE coating to avoid damaging coating and protect from direct sunlight.
- D. Protect stored PE pipes and valves from direct sunlight.

### 1.010 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing LPG Service: Do not interrupt LPG service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of LPG supply according to requirements indicated:
  - 1. Notify Owner no fewer than five days in advance of proposed interruption of LPG service.
  - 2. Do not proceed with interruption of LPG service without Owner's written permission.

### 1.011 COORDINATION

- C. Coordinate sizes and locations of concrete bases with actual equipment provided.
- D. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

## PART 2 - PRODUCTS

### 2.01 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedules 40 and 80, 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. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    - a. Material Group: 1.1.
    - b. End Connections: Threaded or butt welding to match pipe.
    - c. Lapped Face: Not permitted underground.
    - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground, and stainless steel underground.
  - 5. 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.
  - 6. Mechanical Couplings:
    - a. Steel flanges and tube with epoxy finish.
    - b. Buna-nitrile seals.
    - c. Steel bolts, washers, and nuts.
    - d. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
    - e. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

### 2.02 PIPING SPECIALTIES

- A. Flexible Piping Joints:
  - 1. Approved for LPG service.
  - 2. Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.

3. Minimum working pressure of 250 psig and 250 deg F operating temperature.
  4. Flanged- or threaded-end connections to match equipment connected and shall be capable of minimum 3/4-inch misalignment.
  5. Maximum 36-inch length for liquid LPG lines.
- 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 and smaller; flanged ends for NPS 2-1/2 and larger.
  3. Strainer Screen: 40-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.
  4. CWP Rating: 125 psig.
- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

### 2.03 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for LPG.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M.

### 2.04 MANUAL GAS SHUTOFF VALVES

- A. Metallic Valves, NPS 2 and Smaller for Liquid Service: Comply with ASME B16.33 and UL 842.
1. CWP Rating: 250 psig
  2. Threaded Ends: Comply with ASME B1.20.1.
  3. Socket ends for brazed joints.
  4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  5. Listing by CSA or agency acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
  6. Valves 1-1/4 inch and larger shall be suitable for LPG service, with "WOG" indicated on valve body.
- B. General Requirements for Metallic Valves, NPS 2 and Smaller for Vapor Service: 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. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
  6. Service Mark: Valves 1-1/4 inch to NPS 2 shall have initials "WOG" permanently marked on valve body.
- C. Two-Piece, Full-Port, Bronze Ball Valves with stainless steel Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.



2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig.
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for LPG service with "WOG" indicated on valve body.

## **2.06 PRESSURE REGULATORS**

- A. General Requirements:
  1. Single stage and suitable for LPG.
  2. Steel jacket and corrosion-resistant components.
  3. Elevation compensator.
  4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.
- B. Line Pressure Regulators: Comply with ANSI Z21.80.
  1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
  2. Springs: Zinc-plated steel; interchangeable.
  3. Diaphragm Plate: Zinc-plated steel.
  4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
  5. Orifice: Aluminum; interchangeable.
  6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
  7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
  8. Pressure regulator shall maintain discharge pressure setting downstream and not exceed 150 percent of design discharge pressure at shutoff.
  9. Overpressure Protection Device: Factory mounted on pressure regulator.
  10. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
- C. Appliance Pressure Regulators: Comply with ANSI Z21.18.
  1. Body and Diaphragm Case: Die-cast aluminum.
  2. Springs: Zinc-plated steel; interchangeable.
  3. Diaphragm Plate: Zinc-plated steel.
  4. Seat Disc: Nitrile rubber.
  5. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
  6. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
  7. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine roughing-in for LPG piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Close equipment shutoff valves before turning off LPG to premises or piping section.
- B. Inspect LPG piping according to NFPA 58 and the International Fuel Gas Code to determine that LPG utilization devices are turned off in piping section affected.
- C. Comply with NFPA 58 and the International Fuel Gas Code requirements for prevention of accidental ignition.

### 3.03 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 58 and the International Fuel Gas Code requirements for installation and purging of LPG piping.
- B. Install underground, LPG piping buried at least 36 inches (900 mm) below finished grade.
  - 1. If LPG piping is installed less than 36 inches below finished grade, install it in containment conduit.
- C. Install underground, PE, LPG piping according to ASTM D 2774.
- D. 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.
- E. Copper Tubing with Protective Coating:
  - 1. Apply joint cover kits over tubing to cover, seal, and protect joints.
  - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
- F. Install fittings for changes in direction and branch connections.
- G. Joints for connection to inlets and outlets on vaporizers, air mixers, regulators, and valves may be flanged or threaded to match the equipment.

### 3.04 INDOOR PIPING INSTALLATION

- A. Comply with the International Fuel Gas Code for installation and purging of LPG piping.
- 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, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- 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. Locate valves for easy access.
- F. Install LPG piping at uniform grade of 2 percent down toward drip and sediment traps.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Verify final equipment locations for roughing-in.
- J. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- K. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where readily 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.
- L. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- M. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- N. Connect branch piping from top or side of horizontal piping.
- O. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- P. Do not use LPG piping as grounding electrode.
- Q. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

### **3.05 VALVE INSTALLATION**

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install earthquake valves aboveground outside buildings according to listing.
- E. Install anode for metallic valves in underground PE piping.

### **3.06 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 ID 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.
- D. Welded Joints:
  1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
  2. Bevel plain ends of steel pipe.
  3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Ch. 22, "Pipe and Tube."
- F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for LPG service. Install gasket concentrically positioned.
- G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

- H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

### **3.07 HANGER AND SUPPORT INSTALLATION**

- A. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- B. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- C. 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.

### **3.08 CONNECTIONS**

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install LPG 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 (1830 mm) of each gas-fired appliances 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.

### **3.09 FIELD QUALITY CONTROL**

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Test, inspect, and purge LPG according to NFPA 58 and the International Fuel Gas Code and requirements of authorities having jurisdiction.
- C. LPG piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

### **3.010 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain LPG equipment.

### **3.011 OUTDOOR PIPING SCHEDULE**

- A. Underground LPG liquid piping shall be the following:
  - 1. Schedule 40 steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.
- B. Aboveground LPG liquid piping shall be one of the following:
  - 1. NPS 2 and Smaller: Schedule 40 steel pipe, malleable-iron threaded fittings and threaded joints. Coat pipe and fittings with protective coating for steel piping.
- C. Containment Conduit: Schedule 40, steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

### **3.012 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG**

- D. Aboveground, branch and distribution piping shall be one of the following:

1. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
2. Schedule 40, steel pipe with wrought-steel fittings and welded joints.

**3.013 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG**

- E. Aboveground, branch and distribution piping shall be one of the following:
1. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
  2. Schedule 40, steel pipe with steel welding fittings and welded joints.

**END OF SECTION 231126**

SECTION 233423  
HVAC POWER VENTILATORS

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Wall ventilators.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Project Altitude: Base fan-performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
  - 1. Certified fan performance curves with system operating conditions indicated.
  - 2. Certified fan sound-power ratings.
  - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
  - 4. Material thickness and finishes, including color charts.
  - 5. Dampers, including housings, linkages, and operators.
- 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. Delegated-Design Submittal: For unit hangars and supports 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. 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.
  - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

**1.05 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
  - 1. Ceiling suspension assembly members.
  - 2. Size and location of initial access modules for acoustical tile.
  - 3. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- B. Field quality-control reports.

### **1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

### **1.07 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.
- C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

### **1.08 COORDINATION**

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided.

## **PART 2 - PRODUCTS**

### **2.01 WALL VENTILATORS**

- A. Housing: Galvanized steel and bolted construction.
- B. Fan Wheel: Fabricated steel moderately pitched blades. Statically and dynamically balanced in accordance to AMCA Standard 204-05.
- C. Belt Drives:
  - 1. Resiliently mounted to housing.
  - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
  - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  - 4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
  - 5. Fan and motor isolated from exhaust airstream.
- D. Accessories:
  - 1. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
  - 2. Dampers: Backdraft dampers mounted in wall sleeve.

### **2.02 MOTORS**

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "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.
- B. Enclosure Type: Totally enclosed, fan cooled.

### **2.03 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**

#### **3.01 INSTALLATION**

- A. Install power ventilators level and plumb.
- B. Equipment Mounting:
- C. Support suspended units from structure using threaded steel rods and elastomeric hangers. Vibration-control devices are specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- D. Install units with clearances for service and maintenance.

#### **3.02 CONNECTIONS**

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

#### **3.03 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. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
  - 10. Shut unit down and reconnect automatic temperature-control operators.
  - 11. 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.

#### **3.04 ADJUSTING**

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.

- C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

**END OF SECTION**

**SECTION 235100**  
**BREECHINGS, CHIMNEYS, AND STACKS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes the following
  - 1. Listed double-wall vents.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Special gas vents.
- B. Shop Drawings: For vents. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and seismic restraints, and location and size of each field connection.
  - 2. For installed products indicated to comply with design loads, include calculations required for selecting seismic restraints and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Manufacturer Seismic Qualification Certification: Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
  - 2. Dimensioned Outline Drawings of Breeching, Chimneys, and Stacks: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of anchorage devices on which the certification is based and their installation requirements.
- B. Warranty: Special warranty specified in this Section.

**1.05 QUALITY ASSURANCE**

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

**1.06 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.

1. Warranty Period: 10 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 LISTED SPECIAL GAS VENTS**

- 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. Heat-Fab, Inc.
  2. Metal-Fab, Inc.
  3. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
  4. Z-Flex; Flexmaster Canada Limited.
- B. Description: Double-wall metal vents, Category III, tested according to UL 1738 and rated for 480 deg F continuously, with positive or negative flue pressure complying with NFPA 211.
- C. Construction: Inner shell and outer jacket separated by at least a 1/2-inch airspace.
- D. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
  1. Termination: Sidewall vent cap located 6" minimum from exterior wall.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and conditions 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.

### **3.02 APPLICATION**

- A. Listed Special Gas Vent: Non-Condensing gas appliances.

### **3.03 CLEANING**

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean vents internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of vents that are not completed or connected to equipment.

**END OF SECTION 235100**

SECTION 235533  
FUEL-FIRED UNIT HEATERS

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes gas fired unit heaters.
- B. Summary of Work
  - 1. Installation of the unit, miscellaneous or structural metal work (if required), field electrical wiring, cable, conduit, fuses and disconnect switches, other than those addressed in the installation scope of work, shall be provided by others. Consult the appropriate installation scope of work for information on the available factory installation options, overview of customer and installer responsibilities, and details on installation site requirements.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of fuel-fired unit heater indicated. Include rated capacities, operating characteristics, and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of fuel-fired unit heaters, as well as procedures and diagrams.
  - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
  - 3. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 4. Wiring Diagrams: Power, signal, and control wiring.

**1.03 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For fuel-fired unit heaters to include in emergency, operation, and maintenance manuals.

**1.04 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. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

**1.05 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of fuel-fired unit heater that fails in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.01 GAS-FIRED UNIT HEATERS**

- A. Description: Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.
- B. Fuel Type: Design burner for propane gas having characteristics same as those of gas available at Project site.
- C. Type of Venting: Separated combustion.

- A. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.
  - 1. External Casings and Cabinets: Baked enamel or Powder coating over corrosion-resistant-treated surface.
  - 2. Suspension Attachments: Reinforce suspension attachments at connection to fuel-fired unit heaters.
    - a. Seismic Fabrication Requirements: Fabricate suspension attachments of fuel-fired unit heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when fuel-fired unit heater is anchored to building structure.
- B. Heat Exchanger: Aluminized or Stainless steel.
- C. Burner Material: Aluminized steel with stainless-steel inserts or Stainless steel.
- D. Unit Fan: Formed-steel or Aluminum propeller blades riveted to heavy-gage steel spider bolted to cast-iron hub, dynamically balanced, and resiliently mounted.
  - 1. Fan-Blade Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
  - 2. General requirements for motors are specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    - a. Motors: Totally enclosed with internal thermal-overload protection and complying with Section 230513 "Common Motor Requirements for HVAC Equipment."
    - b. 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.
    - c. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.
- E. Unit Fan: Steel, centrifugal fan dynamically balanced and resiliently mounted.
  - 1. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
    - a. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
    - b. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
    - c. Pulleys: Cast-iron, adjustable-pitch motor pulley.
  - 2. General requirements for motors:
    - a. Motors: Totally enclosed with internal thermal-overload protection and complying with Section 230513 "Common Motor Requirements for HVAC Equipment."
    - b. 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.
    - c. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.
- F. 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.
  - 1. Gas Control Valve: Two stage.
  - 2. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
  - 3. Control transformer.
  - 4. High Limit: Thermal switch or fuse to stop burner.
  - 5. Thermostat: Single-stage, wall-mounting type with 50 to 90 deg F operating range and fan on switch.
- G. Discharge Louvers: Independently adjustable horizontal blades.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install and connect gas-fired unit 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. Install and connect oil-fired unit heaters and associated fuel and vent piping according to NFPA 31, applicable local codes and regulations, and manufacturer's written installation instructions.
- C. 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. Restrain the unit to resist code-required horizontal acceleration.

#### **3.02 CONNECTIONS**

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to fuel-fired unit heater to allow service and maintenance.
- C. Gas Piping: Comply with Section 231126 "Facility Liquefied-Petroleum Gas Piping. Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.
- D. Vent Connections: Comply with manufacturers requirements.
- E. Electrical Connections: Comply with applicable requirements in electrical Sections.
  - 1. Install electrical devices furnished with heaters but not specified to be factory mounted.

#### **3.03 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. Report results in writing.
- B. 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.
- C. 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.
- D. Remove and replace malfunctioning units and retest as specified above.

**END OF SECTION**

**SECTION 260500**  
**COMMON WORK RESULTS FOR ELECTRICAL**

**PART 1 - GENERAL**

**1.01 IMPOSED REGULATIONS**

- A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for electrical work: codes and standards listed on the electrical drawings.

**1.02 SCOPE OF WORK**

- A. Provide all labor, materials, equipment and supervision to construct complete and operable electrical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

**1.03 RELATED DOCUMENTS AND OTHER INFORMATION**

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.

**1.04 EXISTING SERVICES AND FACILITIES**

- A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.
- B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.
- C. Removed Materials: Existing materials made unnecessary by the new installation shall be stored on site. They shall remain the property of the Owner and shall be stored at a location and in a manner as directed by the Owner. If classified by the Owner's authorized representative as unsuitable for further use, the material shall become the property of the Contractor and shall be removed from the site at no additional cost to the owner.

**1.05 PRODUCT WARRANTIES**

- A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceeds the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

**1.06 PRODUCT SUBSTITUTIONS**

- A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Architect at least 10 days prior to opening of bids.

**1.07 ELECTRICAL DRAWINGS**

- A. Electrical contract drawings are diagrammatic and indicate the general arrangement of



- electrical equipment. Do not scale electrical plans. Obtain all dimensions from the Architect's dimensioned drawings and field measurements. The Contractor shall review Architectural plans for door swings and built-in equipment; conditions indicated on those plans shall govern for this work.
- B. Coordinate installation of electrical equipment with the structural and mechanical equipment and access thereto. Coordinate exterior electrical work with civil and landscaping work.
  - C. Discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions shall be installed to provide the better quality or greater quantity of work; or, comply with the more stringent requirement; either or both in accordance with the A/E's interpretation.

#### **1.08 SYSTEMS REQUIRING ROUGH-IN**

- A. Rough-in shall consist of all outlet boxes/raceway systems/supports and sleeves required for the installation of cables/devices by other Divisions and by the Owner. It shall be the responsibility of this Contractor to determine the requirements by reviewing the contract documents and meeting with the Superintendent of the trade involved and Owner's representative to review submittal data, shop drawings, etc.
- B. Sealing of all sleeves, to meet the fire rating of the assembly, whether active or not, is work of this Division.

#### **1.09 SUBMITTALS**

- A. Refer to section 260510

### **PART 2 - PRODUCTS**

#### **2.01 FIRESTOPPING:**

- A. Refer to section 078413 for additional requirements.
- B. A firestop system shall be used to seal penetrations of electrical conduits and cables through fire-rated partitions per the NEC. The firestop system shall be qualified by formal performance testing in accordance with ASTM E-814, or UL 1479.
- C. The firestop system shall consist of a fire-rated caulk type substance and a high temperature fiber insulation. It shall be permanently flexible, waterproof, non-toxic, smoke and gas tight and have a high adhesion to all solids so damming is not required. Only metal conduit shall be used in conjunction with this system to penetrate fire rated partitions. Install in strict compliance with manufacturer's recommendations. 3M, Hilti, STI or equal
- D. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- E. Comply with BICSI TDMM, "Firestopping Systems" Article.

### **PART 3 - EXECUTION**

#### **3.01 PRODUCT INSTALLATION, GENERAL**

- A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.
- B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared

- and protected by the manufacturer specifically for exterior storage.
- C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Architect five days in advance of any testing.
  - D. Install temporary protective covers over equipment enclosures, outlet boxes and similar items after interiors, conductors, devices, etc. are installed, to prevent the entry of construction debris and to protect the installation during finish work performed by others. Do not install device plates, equipment covers or trims until finish work is complete.
  - E. Clean all equipment, inside and out, upon completion of the work. Scratched or marred surfaces shall be touched-up with touch-up paint furnished by the equipment manufacturer.
  - F. Replace all equipment and materials that become damaged.
  - G. No more than three phase conductors, each of opposite phases for a three phase WYE system, shall be combined in a single raceway unless written approval is granted by the engineer or noted otherwise on the construction documents. (For 120 volt and 277 volt receptacle and lighting circuits are no more than 3 circuits unless written approval is granted by the engineer or noted otherwise on the construction documents.)

### **3.02 LOW VOLTAGE CABLING SEPARATION FROM EMI SOURCES**

- A. 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.
- B. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - 1. Electrical Equipment Rating Less Than 2 Kva: A minimum of 5 inches
  - 2. Electrical Equipment Rating between 2 and 5 Kva: A minimum of 12 inches
  - 3. Electrical Equipment Rating More Than 5 Kva: A minimum of 24 inches
- C. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - 1. Electrical Equipment Rating Less Than 2 Kva: A minimum of 2-1/2 inches
  - 2. Electrical Equipment Rating between 2 and 5 Kva: A minimum of 6 inches
  - 3. Electrical Equipment Rating More Than 5 Kva: A minimum of 12 inches
- D. 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:
  - 1. Electrical Equipment Rating Less Than 2 Kva: No requirement.
  - 2. Electrical Equipment Rating between 2 and 5 Kva: A minimum of 3 inches
  - 3. Electrical Equipment Rating More Than 5 Kva: A minimum of 6 inches
- E. Separation between Cables and Electrical Motors and Transformers, 5 Kva or HP and Larger: A minimum of 48 inches
- F. Separation between Cables and light fixtures: A minimum of 5 inches

### **3.03 EQUIPMENT PROTECTION**

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
- B. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.

- C. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
- D. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
- E. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
- F. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

**3.04 UTILITY CONNECTIONS:**

- A. Coordinate the connection of the electrical system with the local power company. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. Pay all utility fees and charges.

**3.05 ELECTRICAL WORK:**

- A. Electrical work shall be accomplished with all affected circuits or equipment de-energized.
- B. Nothing in the above shall impose any duty on the Architects and Architect's consultants, nor relieve the General Contractor and its subcontractors of its obligations, duties and responsibilities including but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending and coordinating the Electrical Work in accordance with the Contract Documents and any health or safety precautions required by any regulatory agencies.

**END OF SECTION**

**SECTION 260501  
ELECTRICAL DEMOLITION**

**PART 1 - GENERAL**

**1.01 Not Used**

**PART 2 - PRODUCTS**

**2.01 Not Used**

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. Field verify measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation.
- D. Report discrepancies to Engineer before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

**3.02 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction.
- C. When work must be performed on energized equipment or circuits, use personnel experienced in such operations, submit verification of compliance with the contractor's safety procedures to the Architect, and notify the Owner in writing a minimum of 24 hours prior to work.
- D. The existing television, telephone, computer data, intrusion detection and intercom system shall remain operable during construction. Plan and execute the work accordingly. Provide temporary wiring and facilities as may be required.

**3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Maintain electrical service to areas outside of the construction area.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- J. Remove all abandoned conductors and cables within the construction area.
- K. Support all existing communication cables within the construction area.
- L. Provide fire stopping for all existing communication conduit fire rated wall penetrations within the construction area.

**3.04 CONSTRUCTION PHASING**

- A. Plan and execute the work in accordance with the construction phasing indicated on the Architectural plans. Test and certify all systems, by phase of construction, so that "partial

occupancy” can be obtained.

### **3.05 REUSE OF EXISTING MATERIALS**

- A. Where new devices are to replace existing, it shall be permissible to reuse existing outlet boxes and branch circuit conduits. It shall be the responsibility of the Contractor to ensure that existing outlet boxes and conduits that are reused comply with requirements for new.
- B. The reuse of conduits (not remaining in place), conductors, and devices is not permitted.

### **3.06 CUTTING AND PATCHING**

- A. Structural Limitations: Do not cut structural framing, walls, floors, decks, and other members intended to withstand stress, except with the Engineer’s written authorization. Authorization will be granted only when there is no other reasonable method for completing the electrical work, and where the proposed cutting clearly does not materially weaken the structure.
- B. Cutting Concrete: Where authorized, cut openings through concrete (for conduit penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill. Prior to cutting of existing concrete walls, floors, or ceilings x-ray existing concrete to locate existing hidden utilities.
- C. Other Work: Do not endanger or damage other work through the procedures and process of cutting to accommodate electrical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
- D. Patching: Where patching is required to restore other work, because of cutting or other damage inflicted during the installation of electrical work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finished, as judged by the Engineer. Engage the original Installer to complete patching of various categories of work including: concrete and masonry finishing, waterproofing and roofing, exposed wall finishes, etc.

### **3.07 CLEANING AND REPAIR**

- A. Clean and repair existing materials and equipment that remain or that are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions.

### **3.08 LABELING**

- A. Provide typed circuit directory showing revised circuiting arrangement.
- B. Provide and install a new engraved nameplate for all electrical panels that have been modified during construction. Refer to the panelboard specification section for labeling requirements.

**END OF SECTION**

**SECTION 260502**  
**ELECTRICAL ACCEPTANCE TESTS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**1.02 References**

- A. ANSI/NETA ATS, "Standard for Acceptance Testing Specifications, current edition.

**1.03 SCOPE OF WORK**

- A. Acceptance tests shall be performed in accordance with the current version of ASNI/NETA ATS and by an independent testing agency.
- B. Tests shall be performed in accordance with applicable codes, standards, and equipment manufacturers' instruction.
- C. The Contractor shall provide all test equipment, materials and labor necessary to perform the tests, and shall coordinate with the other trades for necessary services, such as scaffolding and the uncoupling of motors.
- D. Tests shall consist of visual inspections, manual operations, and electrical testing under all normal and expected abnormal operating conditions.
- E. The Owner shall be notified at least 2 weeks in advance of all tests.
- F. Tests shall be witnessed by the Engineer unless such witnessing is waived in writing.
- G. The Engineer shall be provided with a written test report, signed and dated, for all tests. Acceptance testing shall be provided and reviewed by the Engineer prior to energizing of electrical equipment. Phasing may require multiple trips/tests/reports and after hours work.

**1.04 TESTING CRITERIA**

- A. High potential tests shall be performed at the AC or DC voltage listed in ASNI/NETA ATS unless specified otherwise herein. Do not perform more than one high potential test on any item without authorization from the Owner.
- B. Dielectric absorption tests shall be performed with a 2,500 volt DC megger.
- C. Megger tests shall be performed at a DC voltage of 1,000 volts for 600 volt rated equipment, and at a DC voltage of 500 volts for 120-300 volt rated equipment.
- D. Continuity checks shall be performed with a low voltage DC meter, light or bell.
- E. The resistance to ground shall be measured using either the three point method or the fall of potential method.
- F. Test instruments shall be calibrated to national standards to insure the accuracy of tests. These calibration reports shall be made available to the Owner when requested. Depending on frequency of use, the instruments shall be calibrated at least every 12 months.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.01 VISUAL INSPECTIONS**

- A. Prior to manual operation and electrical testing, verify the following:
  - 1. The equipment is free from damage and defects.
  - 2. The equipment has been lubricated.
  - 3. The ventilation louvers are open and unobstructed.
  - 4. Electrical connections have been tightened.

5. Voltages, phases, and rotation have been identified.
6. Terminations have been identified.
7. Equipment labels have been installed.
8. The equipment has been calibrated.
9. The equipment is ready to be electrically tested

### 3.02 MANUAL OPERATIONS

- A. Prior to electrical testing, verify the following:
  1. Mechanical components operate smoothly and freely.
  2. Mechanical stops, limit switches, etc., are properly adjusted.

### 3.03 ELECTRICAL ACCEPTANCE TESTS

- A. 600 Volt Power Cables
  1. A continuity check and a 1,000 volt DC megger test shall be performed on 600 volt power cables No. 4 AWG and larger. The megger test shall be performed between each pair of conductors and from each conductor to ground. Each test shall be performed for 15 seconds or until the insulation resistance value stabilizes.
  2. The insulation resistance between conductors, and from each conductor to ground, shall be 100 megohms minimum in one minute or less. In addition, the lowest insulation resistance value shall not differ from the highest value by more than 20 percent. If all megger readings for a given circuit are above 1000-megohms, the 20 percent balance requirement may be waived.
  3. Proper rotation shall be verified.
- B. **Control Cable**
  1. A continuity check shall be performed on control and instrumentation wiring.
- C. **Panelboards**
  1. A continuity check and a 1,000 volt DC megger test shall be performed on distribution and isolation transformers, and on line reactors.
  2. A 1,000 volt DC megger test shall be performed on buses, circuit breakers, and disconnect switches. This test may be combined with the power cable megger test by testing the devices and terminated cables together.
  3. Test all shunt trip and under voltage circuit breakers.
  4. Overpotential test on all high- and low-voltage windings-to-ground.
- D. **Infrared Scanning:** After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each ATS switch, panels, and enclosed Bus. Remove all access panels so joints and connections are accessible to portable scanner.
  1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- E. **Grounding**
  1. Upon completion of installation of electrical grounding system, test resistance of each ground rod installation using the "Fall of Potential" method. Ground resistances shall be measured in normally dry conditions not less than 48 hours after rainfall and at low tide. Where tests show resistance to ground is over the specified value, take appropriate action to reduce resistance by driving additional sections of ground rods and then retest to demonstrate compliance. Tests shall be conducted in the

presence of the Project Electrical Engineer. Provide forms to record the data as the tests are conducted. Forms shall be signed by the person conducting the test and included with project closeout documents.

**END OF SECTION**



**SECTION 260510**  
**ELECTRICAL SUBMITTALS**

**PART 1 - GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Comply with the applicable requirements of the Division 1 specifications (013300) and the requirements of this Division of the specifications.

**1.02 SUBMITTALS**

- A. Submit for review by the Engineer Architect a schedule with engineering data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive materials, i.e., catalog sheets, product data sheets, diagrams, performance curves and charts published by the manufacturer, warranties, etc., to show conformance to Specifications and Plan requirements; model numbers alone shall not be acceptable. Data submitted for review shall contain all information to indicate compliance with Contract Documents. Complete electrical characteristics shall be provided for all equipment. Submittals for lighting fixtures shall include Photometric Data. The Engineer reserves the right to require samples of any equipment to be submitted for review.
- B. The purpose of shop drawing review is to demonstrate to the Architect that the Contractor understands the design concept. The Architect's review of such drawings, schedules, or cuts shall not relieve the Contractor from responsibility for deviations from the drawings or specifications unless he has, in writing, called the Architect's attention to such deviation at the time of submission, and received written permission from the Architect for such deviations.
- C. Where cut sheets include an entire product family, mark all specific items to be utilized for this project on equipment cut sheets. Generic cut sheets with no indication of which items on the cut sheet shall be used will be rejected.
- D. Response to Submittals: Shop drawings shall be returned by the Electrical Engineer with the following classifications:
  - 1. "No Exceptions Taken": No corrections, no marks. Contractor shall submit copies for distribution
  - 2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission. Submit copies for distribution.
  - 3. "Amend and Resubmit": Minor corrections. Item may be ordered at the Contractor's risk. Contractor shall resubmit drawings with corrections noted.
  - 4. "Rejected – Resubmit": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.
- E. Prior Approvals and Shop Drawings must be hand delivered, received by mail, or email.
- F. Submittal data received by facsimile will not be reviewed.
- G. Equipment and materials requiring submittals:
  - 1. Section 260500 – Common Work Results for Electrical
    - a. Product Warranties
    - b. Firestopping Materials
    - c. Firestopping Installation Drawings for each conduit penetration, cable in metal sleeve penetration and blank metal sleeve penetration for each type of wall/floor construction encountered.
  - 2. Section 260502 – Electrical Acceptance Tests
    - a. Test Reports
    - b. Testing Company Qualifications.

3. Section 260511 – Electrical Work Closeout
  - a. Record Drawings
  - b. Record Manuals
  - c. Close out submittals
  - d. Training verification
4. Section 260512 – Electrical Coordination
  - a. Coordination Affidavit
  - b. Electrical Coordination Drawings
5. Section 260519 – Low-Voltage Electrical Conductors and Cables
  - a. Splice Kits
  - b. Waterproof Wire Connectors
  - c. Wire
  - d. Field Quality Control Test Reports
  - e.
6. Section 260526 – Grounding and Bonding for Electrical Systems
  - a. Ground Rods
  - b. Grounding Connections
  - c. Ground Wire
  - d. Field Quality Control Test Reports
  - e. Bonding Bushings
  - f. Bonding Jumper Braid
  - g. “Water Valve” Enclosures
  - h. Ground buss bars
7. Section 260533 – Raceway and Boxes for Electrical Systems
  - a. Raceway
  - b. Boxes
  - c. Enclosure ratings
  - d. Dimension data
  - e. Corrosion Protection
  - f. Hazardous Location Conduit Bodies, Fittings, Outlet Boxes, and Covers
  - g. Surface Metallic/Nonmetallic Raceway
  - h. Cast Outlet/Device Boxes
8. Section 260543 – Underground Ducts and Raceways for Electrical Systems
  - a. Raceway
  - b. Handholes
  - c. Warning Tape
9. Section 260548 – Vibration and Seismic Controls for Electrical Systems
  - a. Submit seismic force level (Fp) calculations from applicable building code.
  - b. Submit pre-approved restraint selections and installation details
  - c. Restraint selection and installation details shall be sealed by a professionally licensed engineer experienced in seismic restraint design.
  - d. Submit manufacturer’s product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).
  - e. Field reports
10. Section 260553 – Identification for Electrical Systems
  - a. Product data for all labeling products

- b. Samples of device name plates
- 11. Section 260574 – Short Circuit, Overcurrent Protection
  - a. Provide study per specification.
- 12. Section 260800 – Electrical Commissioning
- 13. Section 262400 –Panelboards
  - a. Product data
  - b. Enclosures
  - c. Dimensional Data
  - d. Circuit Directory
  - e. Circuit Breaker trip curves
  - f. Locks
  - g. Bussing Diagrams
  - h. Ground-Fault Protection
  - i. Schematic Wiring Diagram
  - j. Layout Drawings and elevations
  - k. Short Circuit Current Rating
  - l. Device nameplate data.
- 14. Section 262726 – Wiring Devices
  - a. Product data
  - b. Device Plates
  - c. Weatherproof Covers
  - d. Special Purpose Receptacles
  - e. Dimmer Switches
  - f. Device and device plate colors
- 15. Section 263600 – Transfer Switches
  - a. Front view, side view, and plan view of the assembly including weights, mounting details, conduit entry provisions.
  - b. Schematic diagram including equipment and device arrangements, elementary and interconnection wiring diagrams, and accessories.
  - c. Conduit space locations within the assembly.
  - d. Assembly ratings including:
    - 1) Withstand and Closing rating
    - 2) Voltage
    - 3) Continuous current rating
    - 4) Short-Time rating if applicable
    - 5) Short-circuit rating if ordered with integral protection
  - e. Cable terminal sizes
  - f. Product Data Sheets.
  - g. Complete nameplate data.
  - h. Busway connections.
  - i. Connection details between close-coupled assemblies.
  - j. Composite front view and plan view of close-coupled assemblies.
- 16. "Section 264300 – Surge Protective Devices
  - a. Unit dimensions
  - b. Installation instructions
  - c. Product data
  - d. Warranty statement
  - e. Current Ratings

- f. Clamping Voltages
- g. Response Time
- h. Enclosure
- 17. Section 265100 – Interior Lighting
  - a. Lighting Fixtures
  - b. Emergency Drivers
- 18. Section 265600 – Exterior Lighting
  - a. Lighting Fixtures
  - b. Emergency Drivers

## **PART 2 - PRODUCTS**

### **2.01 Not Used**

## **PART 3 - EXECUTION**

### **3.01 MANUFACTURER'S DATA**

- A. Include the manufacturer's comprehensive product data sheet and installation instructions. Where operating ranges are shown, mark data to show portion of range required for project application. Where pre-printed data sheet covers more than one distinct product-size, type, material, trim, accessory group or other variations, delete or mark-out portions of the pre-printed data which are not applicable.

### **3.02 EQUIPMENT LIST**

- A. Where more than one type of a product is being used (i.e. starters, disconnects, breakers, etc.) provide a list with each submittal correlating the type and size of product to the load served.

### **3.03 TEST REPORTS**

- A. Submit test reports which have been signed and dated by the firm performing the tests, and prepare in the manner specified in the standard or regulation governing the tests procedure as indicated.

**END OF SECTION**

**SECTION 260511**  
**ELECTRICAL WORK CLOSEOUT**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**1.02 RELATED SECTIONS**

- A. Refer to section 017839 for additional requirements.

**PART 2 - PRODUCTS**

**2.01 RECORD DRAWINGS**

- A. Except where otherwise indicated, electrical drawings prepared by Engineer are diagrammatic in nature and may not show locations accurately for various components of electrical system. Shop drawings, including coordination drawings, prepared by the Contractor show portions of work more accurately to scale and location, and in greater detail. It is recognized that actual layout of installed work may vary substantially from both Contractor drawings and shop drawings.
- B. The electrical superintendent shall maintain a white set of contract documents and shop drawings in clean, undamaged condition, for mark-up of actual installations which vary substantially from the work as shown. PDF or digital mark-ups is acceptable alternates Mark-up whatever drawings are most capable of showing installed conditions accurately. However, where shop drawings are marked, record a reference note on appropriate contract drawings. Mark with erasable pencil, and use multiple colors to aid in the distinction between work of separate electrical systems. These documents shall be used for no other purpose. In general, record every substantive installation of electrical work which previously is either not shown or shown inaccurately, but in any case record the following:
  - 1. Post all addenda prior to beginning work.
  - 2. Underground feeder conduits, both interior and exterior, drawn to scale and fully dimensioned.
  - 3. Work concealed behind or within other work, in a non-accessible arrangement.
  - 4. Mains and branches of wiring systems, with panelboards and control devices located and numbered, with concealed splices located, and with devices requiring maintenance located.
  - 5. Scope of each change order (C.O.), noting C.O. number.
- C. Upon each visit by the Architect/Engineer, the Contractor shall demonstrate that the record documents are being kept current, as specified hereinbefore.

**2.02 RECORD MANUALS**

- A. Record manuals shall include the following the following:
  - 1. Manufacturer's operation and maintenance manuals for:
    - a. Light Fixtures
    - b. Loadcenters, Panelboards and Circuit Breakers
    - c. Surge Protection Devices
    - d. Transfer switches
  - 2. Shop drawings, revised to reflect all review comments, supplemented with the installation instructions shipped with equipment.
  - 3. One copy of all panelboard directories.
  - 4. All field test Reports
  - 5. Electrical Contractor's Warranty

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- B. Submit record manuals in quantities and in the format prescribed in the Division 1 specifications.
- C. Submit copies of all Maintenance contracts including,

### **2.03 CLOSEOUT SUBMITTALS**

- A. Software and Firmware Operational Documentation:
  - 1. Software operating and upgrade manuals.
  - 2. Program Software Backup
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.

## **PART 3 - EXECUTION**

### **3.01 SITE VISITS**

- A. At all construction observations by the Architect/Engineer, the Contractor shall demonstrate to the Architect/ Engineer that all work is complete in accordance with the contract documents and that all systems have been tested and are fully operational. The Contractor shall furnish the personnel, tools and equipment required to inspect and test all systems.

**END OF SECTION**

**SECTION 260512  
ELECTRICAL COORDINATION**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**PART 2 - PRODUCTS**

**2.01 ELECTRICAL WORK SCHEDULE**

- A. After the award of contract, the Contractor shall prepare a detailed schedule (aka milestone chart) using "Microsoft Project" software or equivalent. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships. It will also detail manpower usage throughout the project.
- B. Electrical Work Schedule: Provide a Gantt chart for review by the Engineer and Owner at least 10-days prior to beginning work. The chart shall have color-coding to distinguish between demolition and renovation tasks as well as any other specific tasks. The Gantt chart shall include the following items:
1. Date of on-site arrival of electrical equipment and accessories required for system installation.
  2. Estimated dates and duration of all service outage times.
  3. Estimated start date and completion date for the demolition of each existing panelboard.
  4. Estimated start date and completion date for the installation of each panelboard.
  5. Estimated dates and duration of required work access to areas that are not in the current phase of work.

**2.02 ELECTRICAL COORDINATION DRAWINGS**

- A. Feeders over 100 Amps : The routing of main feeders is not shown on the drawings. Actual routing shall be determined by the contractor in accordance with the specifications and shall be coordinated with work by other trades. For underground lines, show all utility crossings.
- B. Drawing Format: Drawings shall be prepared at a scale of no less than 1/16"=1'-0" for feeder routes and 1/4"=1'-0" for electrical rooms/equipment yards. Drawing shall be titled to define Project Name, Drawing subject and date prepared. Drawings are to be prepared in AutoCAD 2007 or compatible software.

**2.03 EQUIPMENT REQUIRING ELECTRICAL SERVICE**

- A. Provide electrical connections for all electrically driven equipment. Final connections are electrical work, except as otherwise noted. Obtain a copy of the shop drawings of equipment. Review shop drawings to verify electrical characteristics and to determine rough-in requirements, final connection requirements, location of disconnect switch, etc. Notify the General Contractor if the information received is ambiguous or incomplete. Keep a copy of these shop drawings at the project site throughout the course of construction.
- B. Equipment to be connected includes, but is not limited to the following:
1. HVAC Equipment
- C. The design of circuits for electrically driven equipment is based on the product of one manufacturer and may not be representative of all acceptable manufacturers. If equipment

furnished has differing characteristics, make necessary adjustments to circuit components at no additional cost to the Owner, subject to the approval of the Engineer.

- D. Provide motor starters and disconnects for all mechanical equipment unless provided by the mechanical contractor.

**PART 3 - EXECUTION**

**3.01 COORDINATION OF MECHANICAL INSTALLATION:**

- A. Attachment Number 1 shall be filled out and returned with shop drawing submittals. The intent of Attachment Number 1 is to ensure that the electrical requirements for equipment have been reviewed and coordinated by the Contractor. No electrical equipment shall be ordered, nor shall rough-in begin, before this coordination has taken place. This document shall be returned appropriately marked whether or not any changes are deemed to be necessary by the contractor.

**ATTACHMENT NO. 1**

**SHOP DRAWING COORDINATION AFFIDAVIT**

I, the undersigned, certify that I have reviewed the equipment shop drawings for electrically driven equipment and that the accompanying electrical shop drawings reflect the requirements of the actual equipment to be furnished for use on this project. The following deviations from design drawings were required to serve the furnished equipment:

ITEM	CKT.DESIG.		BKR.SIZE		CONDUIT/WIRE		DISC.SIZE		STARTER		
	New	Old	New	Old	New	Old	New	Old	New	Old	



NOTE: If no deviations are required please indicate by circling the appropriate answer above your signature.

PROJECT: \_\_\_\_\_ DEVIATIONS: Yes / No

COMPANY: \_\_\_\_\_

TITLE: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_ DATE: \_\_\_\_\_

IT IS THE RESPONSIBILITY OF THE DIVISION 26 CONTRACTOR TO OBTAIN SHOP DRAWING INFORMATION FROM OTHER TRADES. FAILURE TO PERFORM THE WORK REQUIRED BY THIS AFFIDAVIT, PRIOR TO ORDERING MATERIALS OR ROUGHING-IN, MAY RESULT IN IMPROPER CONNECTIONS BEING PROVIDED. THE EXPENSE OF CORRECTIVE MEASURES, IF REQUIRED, SHALL BE BORNE BY THE CONTRACTOR.

NOTE:  
PANELBOARD SHOP DRAWINGS WILL NOT BE REVIEWED UNTIL THE ELECTRICAL CONTRACTOR COMPLETES AND SUBMITS THIS AFFIDAVIT TO THE ELECTRICAL ENGINEER.

**END OF SECTION**

**SECTION 260519**  
**LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes the requirements for the following:
  - 1. Wire and cable for 600 volts and less.
  - 2. Wiring connectors and connections.

**1.02 SUBMITTALS**

- A. Refer to section 260510.

**1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.04 REFERENCE STANDARDS**

- A. NECA 1 – Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- B. NETA STD ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.
- C. NFPA 70 – National Electrical Code; National Fire Protection Association, current edition.

**PART 2 - PRODUCTS**

**2.01 WIRING REQUIREMENTS**

- A. Concealed Dry Interior Locations: Use only THHN-2, THWN-2 or XHHW-2 wire in raceway.
- B. Exposed Dry Interior Locations: Use only THHN-2, THWN-2, or XHHW-2 in raceway.
- C. Above Accessible Ceilings: Use only THHN-2, THWN-2, or XHHW-2 in raceway.
- D. Wet or Damp Interior Locations: Use only THWN-2 or XHHW-2 in raceway.
- E. Exterior locations (above or below grade) THWN-2, XHHW-2 or USE in raceway.
- F. Use conductors not smaller than 12 AWG for power and lighting circuits.
- G. Use conductors not smaller than 14 AWG for control circuits.
- H. Metal Clad (MC) cable can be used for 20 Amp branch circuits, when installed in concealed indoor locations. And not used for home runs.

**2.02 BUILDING WIRE**

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Temperature Rating: 90° C.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Pull all conductors into raceway at same time.
- B. Use suitable wire pulling lubricant for building wire 4 AWG and larger. Do not exceed manufacturers recommended maximum pulling tensions and sidewall pressure values. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- C. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- D. Clean conductor surfaces before installing lugs and connectors.

- E. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- F. Use split bolt connectors or compression fittings for splices and taps on conductors 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- G. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- H. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- I. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values or UL 486A and UL 486B.
- J. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- K. For each electrical connection/termination, provide a complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other materials necessary to complete splices and terminations. Torque all connections according to installation instructions.
- L. Motor connections shall be made with compression connectors forming a bolted in-line or stub-type connection.
- M. Splicing of feeder conductors shall not be acceptable, unless specifically indicated on the drawing. Where splicing of feeder conductors is indicated, splices shall be made using compression type butt splice.
- N. All splices made underground or in the pipe basements shall be rated suitable for water immersion.
- O. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- P. All MC cable shall be installed perpendicular or parallel to building structure and supports at intervals of 5 feet or less.
- Q. Cable ties shall not be used to support MC cables.

### 3.02 LABELING

- A. Color Coding
  1. Color shall be green for grounding conductors and green with yellow stripe for isolated grounding conductors.
  2. The color of the circuit conductors shall be as follows:
  3. 120/240 volt, 1-phase
    - Phase A – Black
    - Phase B –Red
    - Neutral – White

### 3.03 FIELD QUALITY CONTROL

- R. Inspect and test in accordance with NETA STD ATS, except Section 4.
- S. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

**END OF SECTION**

**SECTION 260526**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Grounding and bonding components.
- B. Provide all components necessary to complete the grounding system(s) consisting of:
  - 1. Existing and new metal underground water pipe.
  - 2. Metal frame of the building.

**1.02 SUBMITTALS**

- A. Refer to section 260510.

**1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

**1.04 REFERENCES**

- A. NETA STD ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.
- B. NFPA 70 – National Electrical Code; National Fire Protection Association; current edition.
- C. NFPA 99 – Standard for Health Care Facilities; National Fire Protection Association; current edition.
- D. IEEE Standard 142 “Green Book” – Recommended Practices for Grounding of industrial and Commercial Power Systems; current edition.

**1.05 PERFORMANCE REQUIREMENTS**

- A. Maximum grounding system resistance: 15 ohms.
- B. Services at power company interface points shall comply with the power company ground resistance requirements.

**PART 2 - PRODUCTS**

**2.01 ELECTRODES**

- A. Sectionalized steel with copper-welded exterior, 3/4" dia. X 10'. One 10-foot section shall be required at each ground rod location, unless as otherwise directed in this specification.

**2.02 CONDUCTORS**

- A. Bonding Jumper Braid: Copper braided tape, sized for application.
- B. Electrical Grounding conductors: Unless otherwise indicated, provide bare or green insulated stranded copper electrical grounding conductors sized according to NEC or as shown or specified. Provide green insulated for conductors sized No. 10 AWG and smaller.

**2.03 GROUND CONNECTIONS**

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:
  - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lock washers.
  - 2. Ground Busbars: Two-hole compression type lugs using tin-plated copper or copper alloy bolts and nuts.
  - 3. Rack and Cabinet Ground Bars: one-hole compression-type lugs using zinc-plated or copper alloy fasteners.

- C. Install exothermic connectors and terminals as recommended by the connector and terminal manufacturer for intended applications.
- D. Bolted clamp will not be accepted between grounding rods and ground conductors.

#### **2.04 EQUIPMENT RACK AND CABINET GROUND BARS**

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 3/8 inch x 3/4 inch unless noted otherwise.
- B. Busbar Connectors: Cast silicon bronze, solderless, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.
- C. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.
- D. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

#### **2.05 GROUND TERMINAL BLOCKS**

- E. At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions prior to beginning work.
- B. Verify that final backfill and compaction has been completed before driving rod electrodes.

#### **3.02 CONDUCTIVE PIPING**

- C. Bond all conductive piping systems (excluding fuel gas piping), interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- D. Install braided type bonding jumpers with ground clamps on water meter piping to electrically bypass meter where the main is metallic on both sides of the meter. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.

#### **3.03 CORROSION INHIBITORS**

- A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.
- B. Where concrete penetration is necessary, non-metallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground wire and the opening shall be sealed with a suitable compound after installation of the ground wire.

### 3.04 SECONDARY EQUIPMENT AND CIRCUITS

- A. Panelboards, and Disconnects Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
- B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits, sized in accordance with Article 250 of NFPA 70.
- C. Boxes, Cabinets, Enclosures, and Panelboards:
  - 1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
  - 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
  - 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- D. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.
- E. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- F. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- G. Metallic Conduit: Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground bus.

### 3.05 INSTALLATION

- A. Install ground electrodes at locations indicated. Provide additional electrodes as required to achieve specified resistance to ground.
- B. Install nominal 10" diameter x 18" long fiberglass "water valve" type enclosure, with cover, over each ground rod. The top of ground rods shall be 12" below finished grade. The rod and exothermic connection to the grounding electrode conductor shall be accessible from within enclosure. Fill the lower 3" of enclosure with crushed rocks. Top of enclosure shall be flush with finished grade.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing.
- D. Bond together metal siding not attached to grounded structure; bond to ground.

**3.06 FIELD QUALITY CONTROL**

- A. Inspect and test in accordance with NETA STD ATS except Section 4.
- B. Perform inspections and tests listed in NETA STD ATS, Section 7.13.
- C. Upon completion of installation of electrical grounding system, test resistance of each ground rod installation using the "Fall of Potential" method. Ground resistances shall be measured in normally dry conditions not less than 48 hours after rainfall and at low tide. Where tests show resistance to ground is over the specified value, take appropriate action to reduce resistance by driving additional sections of ground rods and then retest to demonstrate compliance. Tests shall be conducted in the presence of the Project Electrical Engineer. Provide forms to record the data as the tests are conducted. Forms shall be signed by the person conducting the test and included with project closeout documents.
- D. Test the effectiveness of the grounding system in patient care areas as required by NFPA 99.

**END OF SECTION**

**SECTION 260533**  
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510

**1.02 QUALITY ASSURANCE**

- A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 – American National Standard for Electrical Rigid Steel Conduit (ERSC); current edition
- B. ANSI C80.3 – American National Standard for Steel Electrical Metallic Tubing (EMT); current edition
- C. ANSI C80.5 – American National Standard for Electrical Rigid Aluminum Conduit (ERAC); current edition
- D. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition
- E. NECA 101 – Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; current edition
- F. NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; current edition

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Accept conduit on site. Inspect for damage
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

**PART 2 - PRODUCTS**

**2.01 CONDUIT REQUIREMENTS**

- A. Conduit Size: Comply with NFPA 70.
  - 1. Minimum Size: 3/4 inch
- B. Wet and Damp Locations:
  - 1. Exterior above ground and in pipe basements: RMC, IMC, or LTFMC (LTFMC shall be only used with restrictions, see conduit installation)
  - 2. Exterior below ground: RNC schedule 40 Interior: RMC, IMC, or LTFMC (LTFMC shall be only used with restrictions, see conduit installation)
  - 3. Interior below grade: RNC schedule 40
  - 4. Where RNC Schedule 40 is installed below grade or under floor slabs, the elbows required to turn the raceway up through the slab shall be RMC.
- C. Dry Locations:
  - 1. Concealed: Use EMT or FMC (FMC shall be only used with restrictions, see conduit installation)
  - 2. Exposed: Use EMT or FMC (FMC shall be only used with restrictions, see conduit installation)
  - 3. Interior below grade: RNC schedule 40
- D. Area subject to physical damage: RMC, IMC, or LTFMC (LTFMC shall be only used with restrictions, see conduit installation)



1. "Areas subject to physical damage" shall be defined as the most stringent of the following:
  - a. Exposed conduit below eight feet above finished floor.
  - b. As interpreted by the authority having jurisdiction (AHJ).

## **2.02 METAL CONDUIT**

- A. Rigid Steel Galvanized Conduit (RMC): ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): ANSI C80.6.
- C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.
  1. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
  2. Standard threaded couplings, locknuts, bushings, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
  3. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
  4. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
  5. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
  6. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

## **2.03 FLEXIBLE METAL CONDUIT**

- A. FLEXIBLE METAL CONDUIT (FMC) Description: Interlocked steel construction. Flexible metal conduit shall conform to UL 1.
- B. Fittings: NEMA FB 1.
  1. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
  2. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
  3. Clamp type, with insulated throat.

## **2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT**

- A. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LTFMC) Description: Interlocked steel construction with PVC jacket. Liquid-tight flexible metal conduit: Shall Conform to UL 360.
- B. Fittings: UL 514B and ANSI/ NEMA FB1.
  1. Only steel or malleable iron materials are acceptable.
  2. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
  3. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
  4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

## 2.05 ELECTRICAL METALLIC TUBING

- A. ELECTRICAL METALLIC TUBING (EMT) Description: ANSI C80.3
- B. Fittings and Conduit Bodies: NEMA FB 1; steel compression type.
  - 1. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
  - 2. Only steel or malleable iron materials are acceptable.
  - 3. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
  - 4. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 50mm (2 inches) and smaller. Use set screw type couplings with four set screws each for conduit. Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
  - 5. Indent type connectors or couplings are prohibited.

## 2.06 NONMETALLIC CONDUIT

- A. RIGID NONMETALLIC CONDUIT (RNC): Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
- B. RNC: NEMA TC 2, schedule 40 PVC
- C. Fittings shall meet the requirements of UL 514C and NEMA TC3
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

## 2.07 EXPANSION AND DEFLECTION COUPLINGS

- A. Conform to UL 467 and UL 514B.
- B. Accommodate, 0.75 inch deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
- C. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
- D. Jacket: Flexible, corrosion resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

## 2.08 CORROSION PROTECTION

- A. Corrosion protection for conduits passing through concrete slabs shall be by one of the following means: field-wrapped with 3M Scotchrap No. 50, 2-inch wide (minimum), with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify routing and termination locations of conduit prior to rough-in.
- B. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to provide a complete wiring system.

### 3.02 CONDUIT INSTALLATION

- A. All fire alarm cable shall be installed in metallic conduit. Coordinate with fire alarm system manufacturer for cable routing and quantities.
- B. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 101.
- C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
- D. Arrange supports to prevent misalignment during wiring installation.

- E. Arrange conduit to maintain headroom and present neat appearance.
- F. Route exposed conduit parallel and perpendicular to walls.
- G. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- H. Route conduit in and under slab from point-to-point.
- I. Maintain adequate clearance between conduit and piping.
- J. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- K. Cut conduit square using saw or pipecutter; de-burr cut ends.
- L. Bring conduit to shoulder of fittings; fasten securely.
- M. For power conduits install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.
- N. For communication conduits install no more than the equivalent of two 90 degree bends between pull points. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.
- O. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- P. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
- Q. Seal the inside of all conduits where conduit passes below floor or outside of the building.
- R. Provide suitable pull string in each empty conduit except sleeves and nipples.
- S. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- T. Do not install FMC or LTFMC in lengths over 6'.
- U. Use LTFMC or FMC only to connect to equipment subject to vibration or to suspended light fixtures.
- V. Wherever possible, install horizontal raceway runs above water and drain piping. Give the right-of-way in confined spaces to piping that must slope for drainage and to larger HVAC ductwork and similar services that are less conformable than electrical services.
- W. Complete the installation of electrical raceways before starting installation of cables within raceways.
- X. Raceways shall not be installed exposed in finished spaces. Install concealed in walls, ceilings, below slab-on-grade or embedded in slabs above grade.

### 3.03 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
  - 1. Flush mounted.
  - 2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 24 inch, center-to-center lateral spacing shall be maintained between boxes.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.
- F. Clean all debris out of floor boxes.

**3.04 IDENTIFICATION**

- A. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1"
- B. On all concealed junction box covers, identify the circuits with black marker. For exposed junction boxes use printed labels.

**END OF SECTION**

**SECTION 260543  
UNDERGROUND DUCTS AND RACEWAYS  
FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS:**

- A. Refer to section 260510.

**PART 2 - PRODUCTS**

- A. **2.01 UNDERGROUND DUCTS** Any grouping of conduits underground shall be considered a duct bank.
- B. Ducts shall be 2" diameter minimum, type EB40 for encased burial.
- C. Fittings for raceways shall be designed specifically for use with the type of raceway installed. All couplings or other connections shall be made tight and sealed to exclude water and concrete.
- D. Top, intermediate and bottom spacers of plastic, or other approved non-organic material, shall be provided to maintain a separation between raceways of not less than that shown on drawings. Spacers shall be of the type specifically intended for encased installations.

**2.02 HANDHOLES**

- E. Handholes shall be constructed of steel reinforced 3,000 pound, 28-day strength concrete, or reinforced polymer concrete manufactured in molded structural shapes, on undisturbed or thoroughly compacted earth and shall conform with details and dimensions indicated on the drawings. Neoprene or other suitable water-stops shall be provided at all concrete construction joints.
- F. Locations of handholes shall be as dimensioned. Where no locating dimensions are given, handholes shall be approximately where shown, with possible interferences with other utilities, etc.
- G. Frames and covers for handholes shall be heavy duty, top quality, close grained gray cast iron or reinforced polymer concrete, both being milled to provide a true fit. Covers shall be equipped with drop lift handles and with the word "ELECTRIC" cast thereon. Type and style of frames and covers shall be as indicated on the drawings.
- H. Hardware shall be of gray cast iron or hot-dip galvanized steel.
- I. Water, mud, and trash shall be periodically pumped or otherwise removed from handholes by the Contractor until final acceptance of the work.
- J. Metal Frames and Covers: Shall be made of cast iron. Cast iron frames and covers shall meet Fed Spec. RR-F-621. Covers shall be rated AASHTO H20. The words "electric" shall be cast in the top face of the covers.

**2.03 WARNING TAPE**

- A. Provide a plastic warning tape in the backfill above all underground cables, conduits and duct banks. The tape shall be 3 inches wide, shall be bright, fade-resistant yellow in color, and shall include an imprinted legend, ""WARNING – BURIED HIGH VOLTAGE LINE", "WARNING – BURIED FIBER OPTIC LINE" or "WARNING – BURIED TELEPHONE LINE", as applicable., repeated continuously throughout the entire length. Tape shall be buried 12 inches below top of trench.

**PART 3 - EXECUTION**

**3.01 GENERAL**

- A. Layout of underground ducts is the responsibility of the Contractor. Coordinate layout with existing site conditions, the elevation of manhole openings and work by other trades. Duct lines shall be sloped to drain towards manholes and pull boxes, with a pitch of not less than 3 inches in 100 feet. For lines run between adjacent manholes or pull boxes, high point may occur in the middle of run.
- B. Excavation, Trenching and Backfilling: Provide as required to install underground ducts in the manner indicated on the drawings.
- C. Provide barricades with warning lights, around all trenches. Barricades shall be orange mesh

- type supported by rods driven into the earth. Barricades shall remain in place at all times, not just at night. Maintain the integrity and appearance of the barricades until the trenches have been backfilled and compacted.
- D. Clearance from Other Utilities: Do not install lines installed under this contract in the same trenches with other utilities. Maintain horizontal and vertical separation as required by ANSI C2.

### 3.02 INSTALLATION

- E. During construction, partially completed duct lines shall be protected from the entrance of debris such as mud, sand and dirt, by means of suitable conduit plugs. As each section of a duct line is completed from manhole to manhole, a testing mandrel not less than 12 inches long with a diameter 1/4-inch less than the size of the conduit, shall be drawn through each conduit, after which a brush having the diameter of the conduit, and having stiff bristles, shall be drawn through until the conduit is clear of all particles of earth, sand, and/or gravel; conduit plugs shall then be immediately installed.
- A. Bends: Except at conduit risers, changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet. Sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 48".
- B. Connections to Handholes: Connections shall be constructed to have a flared section adjacent to the manhole to provide shear strength. Underground structures shall be constructed to provide for keying the concrete envelope of the duct line into the wall of the structure. Vibrators shall be used when this portion of the envelope is poured to assure a seal between the envelope and the wall of the structure. Conduits shall terminate in end-bells where duct lines enter manholes.

### 3.03 RECONDITIONING OF SURFACES

- A. Ground covering and vegetation disturbed during installation, shall be restored to original elevation and condition.
- B. Sod or topsoil shall be preserved carefully and replaced after the backfilling is completed. Sod that is damaged shall be replaced by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, the restored surface shall be re-seeded with the same quantity and formula of seed as that use in the original seeding.

### 3.04 CABLE PULLING

- A. Pull cables down grade with the feed-in point at the handhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through the handhole opening and into the conduit. Cable slack shall be accumulated at each handhole where space permits. Minimum allowable bending radii shall be maintained.
- B. Lubricants: For assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.
- C. Cable Pulling Tensions: Shall not exceed the maximum pulling tension recommended by the cable manufacturer.
- D. Grounding Conductor: Secondary cable runs, 600 volts and less, in non-metallic conduit shall, although not indicated, include an insulated copper equipment grounding conductor sized as required by the rating of the overcurrent device supplying the phase conductors.

**END OF SECTION**

**SECTION 260548**  
**VIBRATION AND SEISMIC CONTROLS**  
**FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**1.02 QUALITY ASSURANCE**

- B. Submittals must be signed and sealed shop drawings from a professional engineer licensed in the state that the project is located in. Shop drawings to include project specific details, sketches, product data cut sheets.
- C. The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.
- D. System Supports/Restraints Manufacturers shall be firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

**PART 2 - PRODUCT**

**2.01 SEISMIC BRACING**

- A. General:
  - 1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
  - 2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
  - 3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
  - 4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the details and notes on the construction documents
- B. Friction from gravity loads shall not be considered resistance to seismic forces.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data
- B. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
- D. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building.
- E. Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
- F. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
- G. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.

- H. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
- I. Provide reinforced clevis bolts where required.
- J. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.
- K. Do not brace a system to two independent structures such as a ceiling and wall.
- L. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement.
- M. Provide seismic controls as required for all existing electrical items exposed during renovations.

### **3.02 FIELD QUALITY CONTROL**

- N. Inspect all seismic supports after installation and submit a report from a professional engineer licensed in the state that the project is located in.

**END OF SECTION**



**SECTION 260553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**PART 2 - PRODUCTS**

**2.01 NAMEPLATES AND LABELS**

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background unless noted otherwise.
- B. Locations:
  - 1. Each electrical distribution and control equipment enclosure.
- C. Letter Size:
  - 1. Use 1/4 inch (6 mm) letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch (5 mm) white letters on black background. Use only for identification of individual wall switches, receptacles, and control device stations. Labels shall identify the panel and circuit number (Ex: PANEL: CIRCUIT).
- E. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
  - 5. Color: burgundy.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Degrease and clean surfaces to receive nameplates and labels.

**3.02 INSTALLATION**

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using corrosion resistant screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Provide name plates on all disconnects, panels, switchboards, switchgear, and motor starters.
- E. Provide labels on all receptacles, light switches, and wall mounted occupancy sensors.

**END OF SECTION**

**SECTION 262400**  
**SWITCHBOARDS AND PANELBOARDS**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. See section 260510.

**1.02 QUALITY ASSURANCE**

- B. Where panelboards are used as service entrance equipment, they shall comply with all NEC and UL requirements for service entrance and a UL service entrance label shall be provided.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.03 REFERENCE STANDARDS**

- D. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- E. NEMA PB 1 – Panelboards; National Electrical Manufacturers Association; current edition.
- F. NEMA PB 1.1 – General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; current edition.
- G. NETA STD ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Eaton Electrical/Cutler-Hammer
- B. GE Industrial
- C. Square D
- D. Siemens

**2.02 PANELBOARDS**

- A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- B. Panelboard Bus: Copper (98% conductivity).
- C. Provide copper ground bus in each panelboard
- D. Enclosure: Interior – NEMA 1, Exterior locations – gasketed NEMA 4X, Kitchen - Stainless NEMA 1
- E. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel. Paint all hallway panels to match wall finish.
- F. All panelboards shall be hinged "door in door" type with:
  - 1. Interior hinged door with hand operated latch or latches as required to provide access to circuit breaker operating handles only, not to energized ports.
  - 2. Outer hinged door shall be securely mounted to the panelboard box with factory bolts, screws, clips or other fasteners requiring a tool for entry, hand operated latches are not acceptable.
  - 3. Push inner and outer doors shall open left to right.
- G. All panelboard shall have bolt-on style breakers.

- H. Provisions for future breakers shall be fully bussed complete with all necessary mounting hardware.

### 2.03 CIRCUIT BREAKERS

- A. For circuit breakers over 200 amps provide –Adjustable Trip molded case, solid state adjustable trip type circuit breakers.
  - 1. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-Ma trip). (where indicated)
  - 2. Trip units shall have field adjustable tripping characteristics as follows:
    - a. Ampere setting (continuous).
    - b. Long time band.
    - c. Short time trip point.
    - d. Short time delay.
    - e. Instantaneous trip point.
- B. For all circuit breakers 200 amps and smaller provide – Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers.
  - 1. Type SWD for lighting circuits.
  - 2. Type HACR for air conditioning equipment circuits.
  - 3. Class A ground fault interrupter circuit breakers where scheduled.
  - 4. Do not use tandem circuit breakers.
  - 5. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration for all residential applications.
  - 6. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-Ma trip). (where indicated)

### 2.04 CONTROL WIRING:

- A. Control wiring shall be 600 volt class B stranded SIS. Install all control wiring complete at the factory adequately bundled and protected. Wiring across hinges and between shipping units shall be Class C stranded. Size in accordance with NEC. Provide control circuit fuses. Provide integral power supply in switchgear for control power.

### 2.05 SHORT CIRCUIT CURRENT RATING:

- A. Devices which achieve the level of fault protection indicated by means of “series” or “integrated” rating shall not be acceptable unless specifically indicated on the drawings. All panelboards shall be fully rated.
- B. Minimum SSCR
  - 1. 240 Volt Panelboards: Minimum 10,000 amperes rms symmetrical unless noted otherwise on plans.
  - 2. Match existing equipment short circuit current ratings.

## PART 2 - EXECUTION

### 3.01 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
- B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.
- C. Height: 6 feet (1800 mm) to top of panelboard; install panelboards taller than 6 feet (1800 mm) with bottom no more than 4 inches (100 mm) above floor.
- D. Provide filler plates for unused spaces in panelboards.

- E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- F. Provide engraved plastic nameplates on all switchboard and panelboards.
- G. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
  - 1. Minimum spare conduits: 6 empty 1 inch conduits.
- H. Ground and bond panelboard enclosure according to Section 26 05 26.
- I. Do not splice conductors in panelboard or switchboard enclosure.
- J. "Each section of two section panels shall contain only those conductors which originate in that section. Do not use panel as a wireway.
- K. piggy-back or tandem type breakers shall not be used.
- L. Multi-pole breakers shall be common trip, with a single handle.

### 3.02 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA STD ATS, except Section 4.
- B. Perform inspections and tests listed in NETA STD ATS, Section 7.5 for switches, Section 7.6 for circuit breakers.

### 3.03 ADJUSTING

- A. Adjust the breaker trip set points per the values provided by the engineer, per an Overcurrent protective device study provided by the contractor.
- B. Touch-up scratched or marred surfaces to match original finish.
- C. Clean all debris from panel interiors.

### 3.04 LABELING

- A. Provide nameplates on all electrical panels that new circuits are modified or installed. Indicate the following information:
  - 1. Panel name
  - 2. Panel fed from
  - 3. Normal (Black with white letters)
  - 4. Voltage, phase, wire
  - 5. Available fault circuit (main only)
  - 6. Date installed
- B. Provide a typed legend for all modified or new electrical panels. Update the panel board schedules after load balancing.
- C. Identify load served and location by room names assigned by user, not by room numbers on floor plans. Note spares and spaces as such.
- D. Provide a laminated 11x17 one line in the main electrical room mounted to the wall or main electrical panel.

### 3.05 CLEARANCE AND WORKSPACE

- A. Maintain workspace and clearances as required by the NEC for the voltage encountered. No pipes or ducts shall pass above the outline of the panelboard. It shall be the responsibility of this Contractor to make sure that other trades do not encroach on this space.

**END OF SECTION**

**SECTION 262726  
WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This section includes the requirements for the following:
  - 1. Receptacles.
  - 2. Device plates.
  - 3. Ceiling fan controllers
  - 4. Wall switches.
  - 5. Wall dimmers.

**1.2 SUBMITTALS**

- A. Refer to section 260510.

**1.3 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.4 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; current edition).
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; current edition.

**PART 2 - PRODUCTS**

**2.1 APPROVED MANUFACTURERS**

- A. Acceptable manufacturers, contingent upon compliance with the contract documents, are as listed below. Bidders shall carefully review the requirements listed in the technical specifications and only submit products that are equal or better. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed in the front end specifications and approved by the A/E. Bidders shall carefully review the front end documents and submit all information required to allow the A/E the ability to make a fully informed decision.
  - 1. Cooper Wiring Devices
  - 2. GE Industrial
  - 3. Leviton Manufacturing, Inc
  - 4. Hubbell, Inc
  - 5. Lutron Electronics Inc
  - 6. Wattstopper Inc
  - 7. Schneider Electric
  - 8. Legrand – Pass & Seymour
  - 9. C.W. Cole & Company
  - 10. Acuity Brands Lighting, Inc

## **2.2 RECEPTACLES**

- A. Receptacles: Fed spec listed complying with NEMA WD 6 and WD 1.
  - 1. Device Body: color by architect plastic, or Red for emergency power devices.
  - 2. Configuration: NEMA WD 6, type as specified and indicated.
  - 3. Type 5-20.
- B. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Feed through GFCI devices shall not be used. GFCI devices shall contain self-testing feature with power lockout if self-test fails.
- C. Wet Location: A receptacle installed in a wet location shall be GFCI listed weather-resistant type.

## **2.3 WALL PLATES**

- A. Cover Plates: Provide one piece wall plates for wiring devices, with ganging and cutouts as required. Provide blank wall plates for all un-used outlet boxes. Provide with metal screws for securing plates to devices, screw heads colored to match finish of plate. All plates shall be standard size Impact resistant Nylon
- B. Weatherproof Cover Plates: All devices installed outdoors and indoor devices specifically indicated, shall be provided with weatherproof covers. Covers shall be of the type that maintains weatherproof integrity when in-use and not in-use. Covers shall be listed and identified as "extra duty" type.

## **2.4 CEILING FAN CONTROLLERS**

- A. Adjustable speed control slider switch for fan speed.

## **2.5 WALL SWITCHES**

- A. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
  - 1. Body and Handle: color by architect plastic with toggle handle, or red for emergency power devices.
  - 2. Locator Light: Lighted handle type switch; red color handle.
  - 3. Ratings: Match branch circuit and load characteristics.
- B. Switch Types: Single pole, double pole, 3-way, and 4-way.

## **2.6 WALL DIMMERS**

- A. Electronic Wall Dimmers: Coordinate with electronic dimming ballast requirements.
  - 1. Body and Handle: plastic with slide adjuster.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that outlet boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

### **3.2 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

### **3.3 INSTALLATION**

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install devices plumb and level.
- C. Do NOT utilize back wiring on any wiring device.
- D. Install receptacles with grounding pole on top.
- E. Do not install receptacles within 6" of the edge of sinks.
- F. Connect wiring device ground terminal to outlet box with bonding jumper.
- G. All receptacles installed as listed below shall be GFCI type.
  - 1. Receptacles installed outdoors.
  - 2. Receptacles installed within six feet of sinks.
  - 3. Receptacles designated for electric drinking fountains.
  - 4. Receptacles designated for vending machines.
  - 5. Any other receptacles specifically indicated on the drawings.
  - 6. Receptacles installed in residential mechanical rooms.
- H. Install decorative plates in finished areas.
- I. Connect wiring devices by wrapping conductor around screw terminal.
- J. Provide screenprinted nylon wall plates that indicate the branch circuit to which the associated device is connected. Use 1/8" high black letters.
- K. Install switches with OFF position down.
- L. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- M. Do not share neutral conductor on load side of dimmers.

### **3.4 FIELD QUALITY CONTROL**

- A. Perform all field inspection, testing, and adjusting specified in NETA STD ATS
- B. Inspect each wiring device for defects.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Operate each wall switch with circuit energized and verify proper operation.

### **3.5 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.
- B. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

### **3.6 CLEANING**

- A. It is anticipated that painting and other finish work may occur after device installation. Device plates shall not be installed until these activities are completed. Protect device and conductors by installing molded plastic cover.
- B. Clean exposed surfaces to remove splatters and restore finish.

**END OF SECTION**

**SECTION 263600  
TRANSFER SWITCHES**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. See section 260510.

**1.02 QUALITY ASSURANCE**

- A. Furnish and install the low voltage transfer switches having ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.
- B. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years.
- D. Factory authorized representative shall maintain a service center capable of providing emergency maintenance and repair services at the project site within 4 hour maximum response time.
- E. Automatic transfer switch, bypass/isolation switch shall be products of same manufacturer.

**1.03 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only:
- B. Institute of Electrical and Electronic Engineers (IEEE):
  - 446-95..... Recommended Practice for Design and Maintenance of Emergency and Standby Power Systems
  - C37.90.1-02 ..... IEEE Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
- C. National Electrical Manufacturers Association (NEMA):
  - 250-03..... Enclosure for Electrical Equipment (1000 Volts Maximum).
  - ICS 6-01 ..... Industrial Control and Systems Enclosures
  - IC3 4 ..... Industrial Control and Systems: Terminal Blocks
  - MG 1-03..... Motors and Generators, Revision 1
- D. National Fire Protection Association (NFPA):
  - 70-05..... National Electrical Code (NEC)
  - 110 ..... Emergency and Standby Power Systems
- E. Underwriters Laboratories, Inc. (UL):
  - 50-03..... Enclosures for Electrical Equipment
  - 508-02..... Industrial Control Equipment
  - 891-03..... Dead-Front Switchboards
  - 1008-03..... Transfer Switch Equipment

**PART 2 - PRODUCTS**

**2.01 AUTOMATIC TRANSFER SWITCHES**

- A. General:
  - 1. Comply with UL, NEMA, NEC, ANSI and NFPA.
  - 2. Automatic transfer switches are to be electrically operated, mechanically held open contact type, without integral overcurrent protection. Transfer switches utilizing automatic or non-automatic molded case circuit breakers as switching mechanisms are not acceptable.
  - 3. The unit shall be completely factory-assembled and wired so that only external circuit connections are required in the field. The unit shall include, but not be limited to, operating mechanism, main contacts, auxiliary contacts, timers, pilot lights, switches, and auxiliary sensing devices.
  - 4. Acceptable manufacturers
    - a. GE
    - b. Square D



- c. ASCO
  - d. Siemens
  - e. Cutler Hammer
  - f. Russ Electric
  - g. Cummins (when provided with associated generator)
  - h. Caterpillar (when provided with associated generator)
  - i. Generac (when provided with associated generator)
- B. Ratings, Markings and Tests:
- 1. Ratings:
    - a. Phase, voltage, ampere rating, number of poles, withstand rating shall be as shown on the drawings. The ampere rating shall be for 100 percent continuous load current.
    - b. Transfer switches are to be rated for total system transfer on emergency systems.
    - c. Ratings shall be with non-welding of contacts during the performance of withstand and closing tests.
  - 2. Markings:
    - a. Markings shall be in accordance with UL 1008.
    - b. Markings for the additional withstand test hereinafter specified shall be included in the nameplate data.
  - 3. Tests:
    - a. Transfer switches shall be tested in accordance with UL 1008. The contacts of the transfer switch shall not weld during the performance of withstand and closing tests when used with the upstream overcurrent device.
- C. Housing:
- 1. Enclose transfer switches in steel cabinets in accordance with UL 508, or in a switchboard assembly in accordance with UL 891, as shown on the drawings. NEMA ICS 6 Type.
  - 2. Doors: Shall have three-point latching mechanism.
  - 3. Padlocking Provisions: Provide chain for attaching a padlock. Attach chain to the cabinet by welding or riveting.
  - 4. Finish: Cabinets shall be given a phosphate treatment, painted with rust inhibiting primer, and finish painted with the manufacturer's standard enamel or lacquer finish.

## 2.02 FEATURES

- A. Transfer switches shall include the following features:
- 1. Operating Mechanism:
    - a. Service entrance rated with circuit breakers for utility and generator feeds.
    - b. Shall be three-pole, open transition.
    - c. Actuated by an electrical operator.
    - d. Electrically and mechanically interlocked so that the main contact cannot be closed simultaneously in both normal and emergency position.
    - e. Normal and emergency main contacts shall be mechanically locked in position by the operating linkage upon completion of transfer. Release of the locking mechanism shall be possible only by normal operating action.
    - f. Shall not include a neutral position.
    - g. Contact transfer time shall not exceed six cycles.
    - h. Do not use as a current carrying part. Components and mechanical interlocks shall be insulated or grounded.
  - 2. Contacts:
    - a. For switches 400 amperes and larger, protect main contacts by separate arcing contacts and magnetic blowouts for each pole. Arc quenching provisions equivalent to magnetic blowouts will be considered acceptable.
    - b. Current carrying capacity of arcing contacts shall not be used in the determination of the transfer switch rating, and shall be separate from the main contacts.

- c. Main and arcing contacts shall be visible for inspection with cabinet door open and barrier covers removed.
- 3. Manual Operator:
  - a. Capable of operation in either direction under no load.
  - b. Capable of operation by one person.
  - c. Provide a warning sign to caution against operation when energized.
- 4. Replaceable Parts:
  - a. Include the main and arcing contact individually or as units, relays, and control devices.
  - b. Switch contacts and accessories are to be replaceable from the front without removing the switch from the cabinet and without removing main conductors.
- 5. Sensing Relays:
  - a. Provide voltage-sensing relays in each phase of the normal power supply.
  - b. Provide adjustable voltage and frequency sensing relays in one phase of the auxiliary power supply.
- 6. Controls:
  - a. Control module shall provide indication of switch status –emergency, normal, and be equipped with alarm diagnostic circuitry.
  - b. Control module shall control operation of the transfer switch. The sensing and the logic shall be controlled by a microprocessor equipped with digital communication and battery backup. The control shall comply with IEEE 472.

### 2.03 ACCESSORIES

- A. Transfer switches shall include the following accessories:
  - 1. Indicating Lights of different colors:
    - a. Green Signal light for normal source position.
    - b. Red Signal light for emergency source position.
  - 2. Laminated black phenolic nameplates with white letters to indicate transfer switch position.
  - 3. Power, voltage, and current phase and 3 phase digital meters.
- B. Manual Test Switch for simulating normal source failure.
- C. Engine starting contacts.
- D. Time delay relay to accomplish the function as specified.
- E. Remote Indicators:
  - 1. Provide remote pilot lamps to show transfer switch position.
  - 2. Provide remote manual test switch to simulate normal source failure.
- F. In-Phase Band Monitor: Monitor shall control the operation of the transfer switch. It shall monitor the voltage and frequency of the normal and emergency voltage //.

### 2.04 TRANSFER SWITCH OPERATION

- G. A voltage decrease in one or more phases of the normal power source to less than 70 percent of normal shall initiate the transfer sequence. The transfer switch shall start the engine-generator unit after a time delay of two or three seconds to permit override of momentary dips in the normal power source. The time-delay shall be field adjustable from zero to fifteen seconds.
- H. The transfer switch shall transfer the load from normal to emergency source when the frequency and voltage of the engine-generator unit have attained 90 percent of rated value.
- I. The transfer switch shall retransfer the load from emergency to normal source upon restoration of normal supply in all phases to 90 percent or more of normal voltage, and after a time delay. The time delay shall be field adjustable from five to twenty-five minutes (preset for twenty-five minutes). Should the emergency source fail during this time, the transfer switch shall immediately transfer to the normal source whenever it becomes available. After restoring to normal source, the generator shall continue to run for five minutes unloaded before shut down. Time delay shall be adjustable from zero to fifteen minutes. //
- J. Engine Start: A voltage decrease, at any transfer switch, in one or more phases of the normal power source to less than 70 percent of normal shall start the engine-generator unit after a

- time delay of two to three seconds. The time delay shall be field adjustable from zero to fifteen seconds.
- K. Exercise Mode: Transfer to emergency power source shall be accomplished by remote manual test switches on a selective basis.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install automatic transfer switch(s) in accordance with the NFPA and as shown on the drawings.
- B. Level and anchor the automatic transfer(s) switch to floor or wall.
- C. Ground equipment as shown on the drawings and as required by NFPA 70.

#### **3.02 START UP AND TESTING**

- D. After the complete system has been installed, and before energizing the system, check all components of the system, including insulation resistance, phase to phase and phase to ground, complete electrical circuitry and safety features according to the manufacturer's written instructions
- E. After energizing circuits, test the interlocking sequence and operation of the complete system, including time delays of transfer from normal source to emergency and back to normal source, pick-up and voltage drop, and function of bypass/isolation switch (if applicable) in the presence of the Engineer prior to the final inspection.
- F. When any defects are detected, correct the defects and repeat the test as requested by the Engineer, at no additional cost to the owner.

**END OF SECTION**

**SECTION 264300**  
**SURGE PROTECTIVE DEVICES**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to section 260510.

**1.02 QUALITY ASSURANCE**

- A. Reference Standard: Comply with the latest edition of the applicable provisions and recommendations of the following, except as otherwise stated in this document:
  1. UL 1449 3<sup>rd</sup> Edition 2009 Revision
  2. UL 1283.
  3. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
  4. ANSI/IEEE C62.45, Guide for Surge Testing for equipment connected to Low-Voltage AC Power Circuits.
  5. IEEE 1100 Emerald Book.
  6. National Fire Protective Association (NFPA 70: National Electrical Code).

**1.03 WARRANTY**

- A. Provide a 5 year product warranty

**PART 2 - PRODUCTS**

**2.01 BASIS OF DESIGN**

- A. Acceptable manufacturers, contingent upon compliance with the contract documents, are as listed below. Bidders shall carefully review the requirements listed in the technical specifications and only submit products that are equal or better. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed in the front end specifications and approved by the A/E. Bidders shall carefully review the front end documents and submit all information required to allow the A/E the ability to make a fully informed decision.

1. Current Technology – or equal
2. Acceptable Manufacturers: Current Technology, Liebert, & Schneider.

~~{Designer note: As of 11/2015, CCSD does not allow TVSS devices integral to panel assembly.}~~

**2.02 ELECTRICAL REQUIREMENTS**

- A. Declared Maximum Continuous Operating Voltage (MCOV) shall be greater than 115 percent of the nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL1449 3<sup>rd</sup> Edition, section 37.7. MCOV values claimed based on the component's value or on the 30-minute 115% operational voltage test, section 38 in UL1449 will not be accepted.
- B. Unit shall have not more than 10% deterioration or degradation of the UL1449 3<sup>rd</sup> Edition Voltage Protective Rating (VPR) due to repeated surges. Unit shall have a monitoring option available to be able to test and determine the percentage of protective available at all times.

- C. Protection Modes: SVR(6Kv, 500A) and UL1449 3<sup>rd</sup> Edition VPR(6Kv, 3Ka) for grounded WYE/delta and High Leg Delta circuits with voltages of (480Y/277), (208Y/120), (600Y/347) 3-Phase/4 wire and (120/240) Split phase/3 wire circuits shall be as follows and comply with test procedures outlined in UL1449 3<sup>rd</sup> Edition section 37.6.

System Voltage	Mode	MCOV	B3 Ringwave	C3 Comb. Wave	UL 1449 Second Edition SVR Rating	UL 1449 Third Edition VPR Rating
120/240	L-N	150	325/375	650/775	400/400	700/700
120/208	L-G	150	400/450	650/825	500/500	700/700
	N-G	150	350/350	500/500	500/500	900/900
	L-L	300	400/500	950/1250	700/700	900/900
277/480	L-N	320	550/600	1125/1225	900/900	1000/1000
	L-G	320	850/875	1075/1225	1000/1000	1200/1200
	N-G	320	700/700	900/900	800/800	1200/1200
	L-L	550	650/750	1950/2200	1500/1500	1800/1800

- D. Electrical Noise Filter- each unit shall include a high performance EMI/RFI noise rejection filter. Noise attenuation for electric noise shall be as follows using the MIL-STD-220B insertion loss test method.
1. 100 kHz at 44 db or better.
  2. All other frequencies should be 32 db or better.
- E. Each fuse shall be individually sealed in a manner that eliminates the potential for cross arcing.
- F. Each unit shall provide the following features:
1. Phase Indicator lights, Form C dry contacts, surge counter and audible alarm.
  2. Field testable while installed.
  3. Measuring capability to indicate the percent protective available in SPD.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. SPD shall be installed per manufacturer’s installation instructions with lead lengths as short (less than 24”) and straight as possible. Gently twist conductors together.
- B. Provide a circuit breaker in the electrical panel in accordance with manufacturer’s installation instructions.
- C. The UL 1449 Voltage Protective Rating (VPR) shall be permanently affixed to the SPD unit.
- D. The UL 1449 Nominal Discharge Surge Current Rating shall be a minimum of 20kA.
- E. ~~Surge Current Rating of device shall be as noted on drawings.~~
- F. The SCCR rating of the SPD shall be 200kAIC without requiring an upstream protective device for safe operation.
- G. The unit shall be listed as a Type 1 SPD, suitable for use in both Type 1 and Type 2 locations per UL1449 3<sup>rd</sup> Edition.
- H. The SPD manufacturer’s technician shall perform a system checkout and start-up in the field to assure proper installation, operation and to initiate the warranty of the system. The technician will be required to do the following:
  1. Verify voltage clamping levels using the DTS-2 test equipment.
  2. Verify N-G connection when applicable.
  3. Record information to product signature card for each product installed.

**END OF SECTION**

**SECTION 265100  
LIGHTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes the requirements for the following:
  - 1. Interior luminaires and accessories.
  - 2. Emergency lighting units.
  - 3. Exit signs.
  - 4. Lamps.
  - 5. Luminaire accessories.

**1.02 SUBMITTALS**

- A. Refer to section 260510.

**1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70 and NFPA 101.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.04 REFERENCE STANDARDS**

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; current edition.
- B. ANSI C78.377 – American National Standard for Electric Lamps – Specifications for the Chromaticity of Solid State Lighting Products.
- C. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; current edition.
- D. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; current edition.
- E. IESNA LM-79-08 – Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.
- F. IESNA LM-80-08 – Approved Method: Measuring Lumen Maintenance of LED Light Sources.
- G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; current edition.
- H. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; current edition.
- I. NFPA 70 - National Electrical Code; National Fire Protection Association, current edition.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of design is as scheduled on drawings.. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed elsewhere in the Bid Documents and approved by the A/E.
- B. Prior Approved Equal Manufacturer(s) are listed in lighting fixture schedule on drawings.
- C. LM-79 reports must be submitted with all proposed LED substitutions from Basis of Design,

regardless of whether manufacturer is listed as an approved equal.

## **2.02 LUMINAIRES**

- A. Furnish products as indicated in Schedule on plans.

## **2.03 EMERGENCY LED DRIVERS**

- A. Regardless of catalogue number shown in fixture schedule, all fixtures indicated to be emergency type shall be provided with emergency type driver battery packs conforming to the following:
  - 1. Fixture Using Integral Emergency Driver/Battery Pack: Provide emergency driver installed within the fixture. The charging light and test switch shall be accessible/visible from below. Driver/Battery must be capable of operating fixture at required emergency lumens for a minimum of 90 minutes. Drivers/batteries shall have full 5-year warranty.
- B. Integral emergency drivers/batteries shall be factory installed whenever possible.
- C. Drivers/batteries installed in fixtures located outdoors or unheated spaces shall be suitable for the ambient temperatures encountered or remotely located in a nearby accessible space.

## **2.04 LAMPS**

- A. Lamp Types: As specified for each luminaire.
- B. Use lamp colors as indicated on the plans or to match existing lamp colors.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Install recessed luminaires to permit removal from below.
- F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- G. Install clips to secure recessed grid-supported luminaires in place.
- H. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.
- I. Install accessories furnished with each luminaire.
- J. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

### **3.02 FIELD QUALITY CONTROL**

- A. Perform field inspection in accordance with Section 01 40 00.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

**3.03 ADJUSTING**

- A. Aim and adjust luminaires as indicated.
- B. Position exit sign directional arrows as indicated.

**3.04 CLEANING**

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

**3.05 CLOSEOUT ACTIVITIES**

- A. Demonstrate luminaire operation for minimum of two hours.

**3.06 PROTECTION**

- A. Replace/Repair luminaires that have failed at Substantial Completion.

**END OF SECTION**



**SECTION 265600  
EXTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Refer to Section 260510.

**1.02 QUALITY ASSURANCE**

- B. Conform to requirements of NFPA 70 and NFPA 101.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.03 REFERENCE STANDARDS**

- D. ANSI C78.379 – American National Standard for Electric Lamps – Reflector Lamps – Classification of Beam Patterns; current edition.
- E. NFPA 70 – National Electrical Code; National Fire Protection Association, current edition.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. As scheduled or listed on the contract documents. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed elsewhere in the Bid Documents and approved by the A/E.

**2.02 LUMINAIRES**

- B. Furnish products as indicated in Schedule on the contract documents.
- C. UL 1598 and NEMA C136.17. Luminaires shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping.
- D. Lenses shall be frame-mounted heat-resistant, borosilicate glass, prismatic refractors. Attach the frame to the luminaire housing by hinges or chain. Use heat and aging resistant resilient gaskets to seal and cushion lenses and refractors in luminary doors.
- E. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.
- F. IESNA Cutoff Category: cutoff

**2.03 LAMPS**

- G. Lamp Types: As specified for each luminaire, provide low mercury lamps.
- H. Use lamp colors as indicated on the plans or to match existing lamp colors.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations.
- B. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- C. Install accessories furnished with each luminaire.
- D. Connect luminaires and exit signs to branch circuit outlets provided under Section 26 05 37 using flexible conduit.
- E. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- F. Bond products and metal accessories to branch circuit equipment grounding conductor.
- G. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

### **3.02 GROUNDING**

- H. Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 26 05 26. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable and listed for this purpose.

### **3.03 FIELD QUALITY CONTROL**

- I. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

### **3.04 ADJUSTING**

- J. Aim and adjust luminaires as indicated.
- K. Position exit sign directional arrows as indicated.

### **3.05 CLEANING**

- L. Clean electrical parts to remove conductive and deleterious materials.
- M. Remove dirt and debris from enclosures.
- N. Clean photometric control surfaces as recommended by manufacturer.
- O. Clean finishes and touch up damage.

### **3.06 CLOSEOUT ACTIVITIES**

- P. Demonstrate luminaire operation for minimum of two hours.

### **3.07 PROTECTION**

- A. Replace/Repair luminaires that have failed at Substantial Completion.

**END OF SECTION**