



COLLETON COUNTY
SOUTH CAROLINA

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

BID: CPST-13
Tax Payer Service Center

Due: Thursday, February 18, 2021 at 11:00am

EMAIL RESPONSE TO:

Kaye B. Syfrett, Procurement Manager at ksyfrett@colletoncounty.org

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END OF SECTION

Advertisement for Bid

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

Bid: CPST-13 Colleton County Tax Payer Service Center will be submitted *via email to: Kaye B. Syfrett, Procurement Manager at ksyfrett@colletoncounty.org* until **11:00am, Thursday, February 18, 2021**. The work to be completed as a part of this project consists of providing all required materials, equipment and labor necessary to complete the construction of the new Colleton County Tax Payer Service Center and associated road resurfacing located at, 118 Benson Street, Walterboro, South Carolina, with the following approximate quantities:

Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro, South Carolina 29488. Approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling and resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling and construction of parking spaces in front of the Jessie Padgett Building, bordering Klein Street consisting of approximately 784sy.

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 him/herself 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 Procurement Manager. 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 intended use of the facility 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, 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 **No Pre-bid Meeting**. Contractors & Sub-contractors are encouraged to inspect the site.

- 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 have been completed for the project by ECS Southeast LLP, dated October 25, 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 via email to; 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 and time 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 Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro, South Carolina 29488. Approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling and resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling and construction of parking spaces in front of the Jessie Padgett Building, bordering Klein Street consisting of approximately 784sy. to be completed within Three Hundred Thirty (330) 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)
- 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 submit one (1) original copy of the “Bid Forms”. The Original Bid Forms shall contain the Bid security.**
- 14.02 A Bid must be submitted via email no later than the date and the official time prescribed in the Advertisement or Invitation to Bid and shall be accompanied by the Bid security and other required documents. A Bid must be submitted via email to:

Kaye B. Syfrett, Procurement Manager at ksyfrett@colletoncounty.org
- 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, emailed bids will be accepted 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 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 indicated in the Advertisement or Invitation to Bid. 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 the 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 seven (7) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within seven (7) 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, and 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 29488

(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:

Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro, South Carolina 29488. Approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling and resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling and construction of parking spaces in front of the Jessie Padgett Building, bordering Klein Street consisting of approximately 784sy.

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:

Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro, South Carolina 29488. Approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling and resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling and construction of parking spaces in front of the Jessie Padgett Building, bordering Klein Street consisting of approximately 784sy.

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

Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro, South Carolina 29488. Approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling and resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling and construction of parking spaces in front of the Jessie Padgett Building, bordering Klein Street consisting of approximately 784sy to be completed within Three Hundred Thirty (330) 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	\$ 200,000.00
Lighting (as noted in documents)	LS	1	\$10,000.00

C. 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 01 - GENERAL RERQUIREMENTS
DIVISION 02 - SITE CONSTRUCTION
DIVISION 03 - CONCRETE
DIVISION 04 - MASONARY
DIVISION 06 - WOOD AND PLASTICS
DIVISION 07 - THERMAL AND MOISTURE PROTECTION
DIVISION 08 - DOORS AND WINDOWS
DIVISION 09 - FINISHES
DIVISION 10 - SPECIALTIES
DIVISION 12 - FURNISHINGS
DIVISION 22 - PLUMBING
DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING
DIVISION 26 - ELECTRICAL
DIVISOIN 28 - ELECTRONIC SAFTEY AND SECURITY
DIVISION 31 - EARTHWORK
DIVISION 32 - EXTERIOR IMPROVEMENTS
DIVISION 33 - UTILTIES
EXHIBIT "A" - PLANS
EXHIBIT "B" - SPECIFICATIONS & REPORTS
EXHIBIT "C" - ROAD PAVING
EXHIBIT "D" - ADDITIONAL PARKING AREA

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

- A. 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 _____, 2021 (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)



REFERENCE FORMS

1- BOND FORMS

Bond Requirements

- a. 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.
- b. Bonding Companies shall submit as proof of good standing, a copy of the A.M Rating along with the Bond.
- c. Bonding/Surety Companies shall use the Bonds provided in the Bid/Proposal Packet CPST-13.
- d. 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.
- e. Bonding companies shall note the warranty periods as outlined in the Proposal Document CPST-13 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 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: CPST-13

Date: _____

Amount: _____

Description (Name and Location): **Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY**

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

Company: _____

Signature: _____

Name and Title:

SURETY

Surety's Name and Corporate Seal

By: _____

Signature and Title
(Attach Power of Attorney)

Attest: _____

Signature and Title

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

CONTRACTOR AS PRINCIPAL

Company: _____

Signature: _____

Name and Title:

SURETY

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: CPST-13

Date: _____

Amount: _____

Description (Name and Location): Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY

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:

- 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.
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

Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY	Project Owner: Colleton County, 109 Benson Street, Walterboro, South Carolina	Architects Project No.: 1904 Owner Project Number: CPST-13
Contract: <u>CPST-13 Tax Payer Service Center</u>		Date of Contract:
Contractor:		

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

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

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:

Contractor's Amended Responsibilities:

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

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: **Construction of the Tax Payer Service Center located at 118 Benson Street, Walterboro SC 29488.**

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 foregoing
(Officer's Name)

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 _____, 2021

(Seal)

Notary Public for the State of _____

My Commission Expires: _____

FIELD ORDER

No. _____

Date of Issuance: _____

Effective Date: _____

<p>Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY</p>	<p>Project Owner: Colleton County, 31 Klein Street, Walterboro, SC 29488</p>	<p>Architects Project No.: 1904 Owner Project Number: CPST-13</p>
<p>Contract: <u>CPST-13 Tax Payer Service Center</u></p>		<p>Date of Contract:</p>
<p>Contractor:</p>		

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.

Re _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Construction Coordinator: Doug Clark, Glick Boehm Architecture Inc.

<p>Receipt Acknowledged by (Contractor):</p>	<p>Date:</p>
--	--------------

WORK CHANGE DIRECTIVE

No. _____

Date of Issuance: _____

Effective Date: _____

<p>Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY</p>	<p>Project Owner: Colleton County, 31 Klein Street, Walterboro, SC 29488</p>	<p>Architects Project No.: 1904 Owner Project Number: CPST-13</p>
<p>Contract: <u>CPST-13 Tax Payer Service Center</u></p>		<p>Date of Contract:</p>
<p>Contractor:</p>		

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.

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

CHANGE ORDER No. _____

Date of Issuance: _____

Effective Date: _____

Project Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY	Project Owner: Colleton County, 31 Klein Street, Walterboro, SC 29488	Architects Project No.: 1904 Owner Project Number: CPST-13
Contract: <u>CPST-13 Tax Payer Service Center</u>		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:

CHANGE IN CONTRACT TIMES:

Original Contract Price:
 \$ _____

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. _____:
 \$ _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:
 Substantial completion (days): _____
 Ready for final payment (days): _____

Contract Price prior to this Change Order:
 \$ _____

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:
 \$ _____

[Increase] [Decrease] of this Change Order:
 Substantial completion (days or date): _____
 Ready for final payment (days or date): _____

Contract Price incorporating this Change Order:
 \$ _____

Contract Times with all approved Change Orders:
 Substantial completion (days or date): _____
 Ready for final payment (days or date): _____

RECOMMENDED:	APPROVED:	APPROVED:
By: _____	By: _____	By: _____
Contractor (Authorized Signature)	Colleton County Administrator, J. Kevin Griffin	Colleton County Project Director: John T Stieglitz III
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable): _____		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 to all requirements of the Contract Documents.

Submitted by: _____

NOTICE OF AWARD

Dated _____

Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY	Project Owner: Colleton County, 31 Klein Street, Walterboro, SC 29488	Architects Project No.: 1904 Owner Project Number: CPST-13
Contract: <u>CPST-13 Tax Payer Service Center</u>		
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 Mable T. Willis Blvd. Fire Station #1 located at 229 Mable T. Willis Blvd., 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 (10) days of the date you receive this Notice of Award.

1. Deliver to the Owner Two (2) 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 _____, 2021.

 Contractor
 By: _____
 Authorized Signature

 Title

NOTICE TO PROCEED

Dated _____

Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY	Project Owner: Colleton County, 31 Klein Street, Walterboro, SC 29488	Architects Project No.: 1904 Owner Project Number: CPST-13
Contract: <u>CPST-13 Tax Payer Service Center</u>		
Contractor:		
Contractor's Address: [send Certified Mail, Return Receipt Requested]		

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.

_____ Contractor	_____ Colleton County Owner
by: _____ Authorized Signature	Given by: _____ John T. Stieglitz
_____ Title	_____ Capital Projects Director Title
_____ Date	_____ Date

Colleton County
APPLICATION FOR PAYMENT

Contractor's Application for Payment No. _____

To (Owner): Colleton County, 31 Klein Street, Walterboro, SC	Application Period:	Application Date:
Owner Project Number: CPST-13	From (Contractor):	Via (Construction Coordinator) Doug Clark, Glick Boehm Arch.
Architects Project No.: 1904	Contractor's Project No.:	
Project: Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY	Contract: On	
	Schedule: Yes _____ No _____	
	Original days: 330 Revised: _____	
	Remaining: _____	

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE	\$	
2. Net change by Change Orders	\$	
3. CURRENT CONTRACT PRICE (Line 1 ± 2).....	\$	
4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)	\$	
5. RETAINAGE:		
a. 10% x \$ _____ Work Completed	\$	
b. 10% x \$ _____ Stored Material.....	\$	
c. Total Retainage (Line 5a + Line 5b)	\$	
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c).....	\$	
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application).....	\$	
8. AMOUNT DUE THIS APPLICATION	\$	
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)	\$	

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner Indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Payment of:	\$ _____	(Line 8 or other - attach explanation of another amount)
is recommended by:	_____	_____ (Date)
	Doug Clark, Glick Boehm Arch., Construction Coordinator	
Payment of:	\$ _____	(Line 8 or other - attach explanation of another amount)
is approved by:	_____	_____ (Date)
	John T. Stieglitz III, Capital Projects Director	

For (contract): CPST-13 Tax Payer Service Center Application Number:

Application Period: Application Date:

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

Progress Estimate

Contractor's Application

For (contract): <u>CPST-13 Tax Payer Service Center</u>							Application Number:					
Application Period:							Application Date:					
A				B	C	D	E	F		G	H	
Item			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
Bid Item No.	Description											
Totals												

Stored Material Summary

Contractor's Application

For contract <u>CPST-13 Tax Payer Service Center</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 – CPST-13 Tax Payer Service Center. Bidder to apply quantities to each description

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Unit Price</i>	<i>Bid Price</i>
General					
	Mobilization	LS	1	\$	\$
	Bonds	%	1	\$	\$
	Insurance	LS	1	\$	\$
	Permitting	LS	1	\$	\$
	Utilities	LS	1	\$	\$
	Rental Equipment	LS	1	\$	\$
	Site Superintendent/Supervision	HR	1	\$	\$
	Overhead and Profit	%	1	\$	\$
	Temporary Facility Rental and Set Up	LS	1	\$	\$
	Temporary Power	LS	1	\$	\$
	Warranties	LS	1	\$	\$
Demolition-General Cost					
	Temporary partitions	SF	1	\$	\$
	Barricades / signs	LS	1	\$	\$
	Haul and dump	CY		\$	\$
	Dump charges	CY		\$	\$
Concrete Prices Include Finishing					
	Footings	SF		\$	\$
	Slab on Grade	SF		\$	\$
	Porches	SF		\$	\$
	Lines and Batters	LF		\$	\$
	Wire Fabric	SF		\$	\$
	Rebar	LF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
Architecture					
	Gutters	LF		\$	\$
	Framing	SF		\$	\$
	Exterior Siding	LF		\$	\$
	Interior Siding	LF		\$	\$
	Downspouts	LF		\$	\$
	Wooden Base Board	LF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
Doors and Windows					
	Exterior Entry Doors, Complete	EA		\$	\$
	Wood Interior Doors, Complete	EA		\$	\$
Door Hardware Includes installation					
	Hardware Set 01	LS		\$	\$
	Hardware Set 02	EA		\$	\$
	Hardware Set 03	EA		\$	\$
	Hardware Set 04	EA		\$	\$
	Hardware Set 05	EA		\$	\$
	Hardware Set 06	EA		\$	\$
	Hardware Set 07	EA		\$	\$
	Hardware Set 08	EA		\$	\$

	Hardware Set 09	EA		\$	\$
	Hardware Set 10	EA		\$	\$
	Hardware Set 11	EA		\$	\$
	Hardware Set 12	EA		\$	\$
	Hardware Set 13	EA		\$	\$
	Hardware Set 14	EA		\$	\$
	Hardware Set 15	EA		\$	\$
	Hardware Set 16	EA		\$	\$
	Hardware Set 17	EA		\$	\$
	Hourly Rate	HR	1		XXXXXXXXXXXXXXXXXXXX
	Finishes				
	Paint Flat Surface	SF		\$	\$
	Paint Doors	SF		\$	\$
	Paint Exterior	LS		\$	\$
	LVT Flooring	SF		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	Specialties				
	Fire Extinguisher w/cabinet, complete	EA		\$	\$
	Door Access System	LS		\$	\$
	Toilet Accessories	LS		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	Plumbing				
	Water Supply-Complete	LS		\$	\$
	Sanitary sewer supply, Complete	LS		\$	\$
	Interior Domestic Water, Complete	LS		\$	\$
	Interior Wastewater, Complete	LS		\$	\$
	Floor Drain	EA		\$	\$
	Wall/ Floor Cleanout	EA		\$	\$
	Plumbing rough in	LS		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	HVAC				
	HVAC #1 complete	LS	1	\$	\$
	HVAC #2 complete	LS	1	\$	\$
	HVAC #3 complete	LS	1	\$	\$
	HVAC #4 complete	LS	1	\$	\$
	HVAC #5 complete	LS	1	\$	\$
	Controls	LS		\$	\$
	Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
	Electrical				
	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		\$	\$
	Building Exterior Lighting	LF		\$	\$
	Ceiling Fan	EA		\$	\$

Switch	EA		\$	\$
Switch 3 way	EA		\$	\$
Branch Circuit	EA		\$	\$
Grounding System	EA		\$	\$
Parking Lot Lighting	EA		\$	\$
Fire Alarm System	LS		\$	\$
Hourly Rate	HR	1	\$	XXXXXXXXXXXXXXXXXXXX
Site Work				
Unsuitable Soil Removal	CY		\$	\$
Fillable Soil	CY		\$	\$
Construction Entrance	LS	1	\$	\$
Concrete Paving Sidewalks	CY		\$	\$
Concrete Curbing	LF		\$	\$
Silt Fencing	LF		\$	\$
Top Soil strip and store	CY		\$	\$
Site Survey-Layout & Elevations	LS		\$	\$
Fine Grading	LS		\$	\$
Hydro Seeding	SF		\$	\$
Site clearing and debris removal	LS	1	\$	\$
Tax Payer Service Center Asphalt Paving	LS	1	\$	\$
40 Klein Street Asphalt Paving	LS	1	\$	\$
Klein & Benson Street Asphalt Paving -Complete	LS	1	\$	\$
Parking Blocks	EA		\$	\$
Parking and driveway Striping				XXXXXXXXXXXXXXXXXXXX
Tax Payer Service Center	LS	1	\$	\$
40 Klein Street				
Conduit Sleeves under Sidewalk or Asphalt	LF	1	\$	\$
Storm drain system				
8" H.D.P.E.	LF		\$	\$
Drop inlets	EA		\$	\$
Curb Inlet	EA		\$	\$
Retention Pond Outlet Control - Complete	LS	1	\$	\$
Retention Pond	LS	1	\$	\$
Landscape & Irrigation				
Irrigation System Complete	LS	1	\$	\$
SOD	SF		\$	\$
Trees	EA		\$	\$
Plants	EA		\$	\$
Mulch	CY		\$	\$
Owners Allowances at Owners Discretion				
Unfounded issues	LS	1	\$200,000.00	\$200,000.00
Lighting (as noted in documents)	LS	1	\$10,000.00	\$10,000.00
			Total:	\$

* Total should match the bid price*



COLLETON COUNTY
SOUTH CAROLINA
CPST-13 BID SUBMITTAL

Bids are to be submitted via email to:

Kaye B. Syfrett, Procurement Manager at ksyfrett@colletoncounty.org

=====

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

Remainder of this page intentionally left blank

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-25

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.

Registered contractor with SAM's Yes No

Cage Code _____

DUN's Number _____

Remainder of this page intentionally left blank

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)

Remainder of this page intentionally left blank

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.

	Class of Work to be Performed	Subcontractor
1)	Site Work	_____
2)	Electrical	_____
3)	Mechanical	_____
4)	Plumbing	_____
5)	Architectural	_____
6)	Roofing	_____
7)	Paving	_____
8)	Cement	_____
9)	Painting	_____

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: **CPST-13**

Bid Due Date: **Thursday, February 18, 2021 at 11:00am**

Project (Brief Description Including Location): **Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building bordering Klein Street consisting of Approximately 784 SY.**

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.
9. 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 Construction of the new Colleton County Tax Payer Service Center, consisting of an approximately 6027sf facility to include a drive thru teller, two (2) parking areas, parking lot lighting, and the milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, to be completed within Three Hundred Thirty (330) calendar days after the "Notice to Proceed" has been issued.

4.02 Bidder accepts the provisions of the Agreement as to liquidate 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 _____, 2021.

State Contractor License No. _____

Remainder of this page intentionally left blank

6 – BASIS OF BID

BASE BID & ALTERNATE BID LS PRICES

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.

- a. Bidder will complete the Work in accordance with the Contract Documents and the following Allowances are established for this project.

<u>Owner’s Allowance - Construction of the new Colleton County Tax Payer Service Center located at 118 Benson Street Walterboro SC 29488, consisting of an approximately 6027sf facility to include a drive thru teller, adjacent parking area, parking lot lighting, milling & resurfacing of approximately 3675sy of asphalt along Benson Street and Klein Street, and the milling & construction of parking spaces in front of the Jessie Padgett Building located at 40 Klein Street consisting of Approximately 784 SY.</u>			
Unfounded issues	LS	1	\$ 200,000.00
Lighting (as noted in the documents)	LS	1	\$10,000.00

7 - BASE BID ALTERNATES

- 7.01 **Asphalt paving of Benson and Klein Street along with the Asphalt paving work at 40 Klein Street will be used as alternates to the bid.**

Remainder of this page intentionally left blank

8 - Base Bid

8.01 BID BREAKDOWN This section must be completed. Bid breakdown total should match the bid proposal. **Failure to complete the bid breakdown will result in the submitted bid being disqualified.**

Unfounded issues Allowance	LS	1	\$ 200,000.00
Lighting (as noted in the documents) Allowance	LS	1	\$ 10,000.00
Benson & Klein Street Asphalt Paving	LS	1	\$
40 Klein Street Asphalt Work	LS	1	\$
Tax Payer Service Center Complete	LS	1	\$
		Total	\$

8.02 BASE BID PROPOSAL: Bidder/Proposer agrees to perform all of the work described in the solicitation document CPST-13 to include the Specifications, General Conditions, including allowances, and items shown on the drawings, as totaled in 8.01 for the sum of:

_____ \$ _____
(Amount in words) (Numerical)

Company Name: _____

Contact Person: _____

Address: _____

City/State/Zip: _____

Phone Number: _____

Cell Phone Number: _____

E-mail Address: _____
(Please print)

Signature: _____

End of Base Bid

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END OF SECTION

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 Construction Coordinator, 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 have not been conducted. 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: See S&ME report attached as exhibit "A".

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 under 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
 - h. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor and the Construction Coordinator with 30 days' written notice to each other additional insured to whom a certificate of insurance has been issued.
 2. Contractor shall be responsible for any deductible or self-insured retention.
 3. The policies of insurance required to be purchased and maintained by Contractor in accordance with this Paragraph SC-5.06 A, shall comply with the requirements of paragraph 5.06.C of the General Conditions.

- B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Construction Coordinator, and any other individuals or entities identified, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least thirty (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 will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 Waiver of Rights

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Construction Coordinator, and all other individuals or entities identified to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and the Construction Coordinator, and all other individuals or entities identified to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- 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.

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. Nonwithstanding 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 wrongfully 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-builds 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.

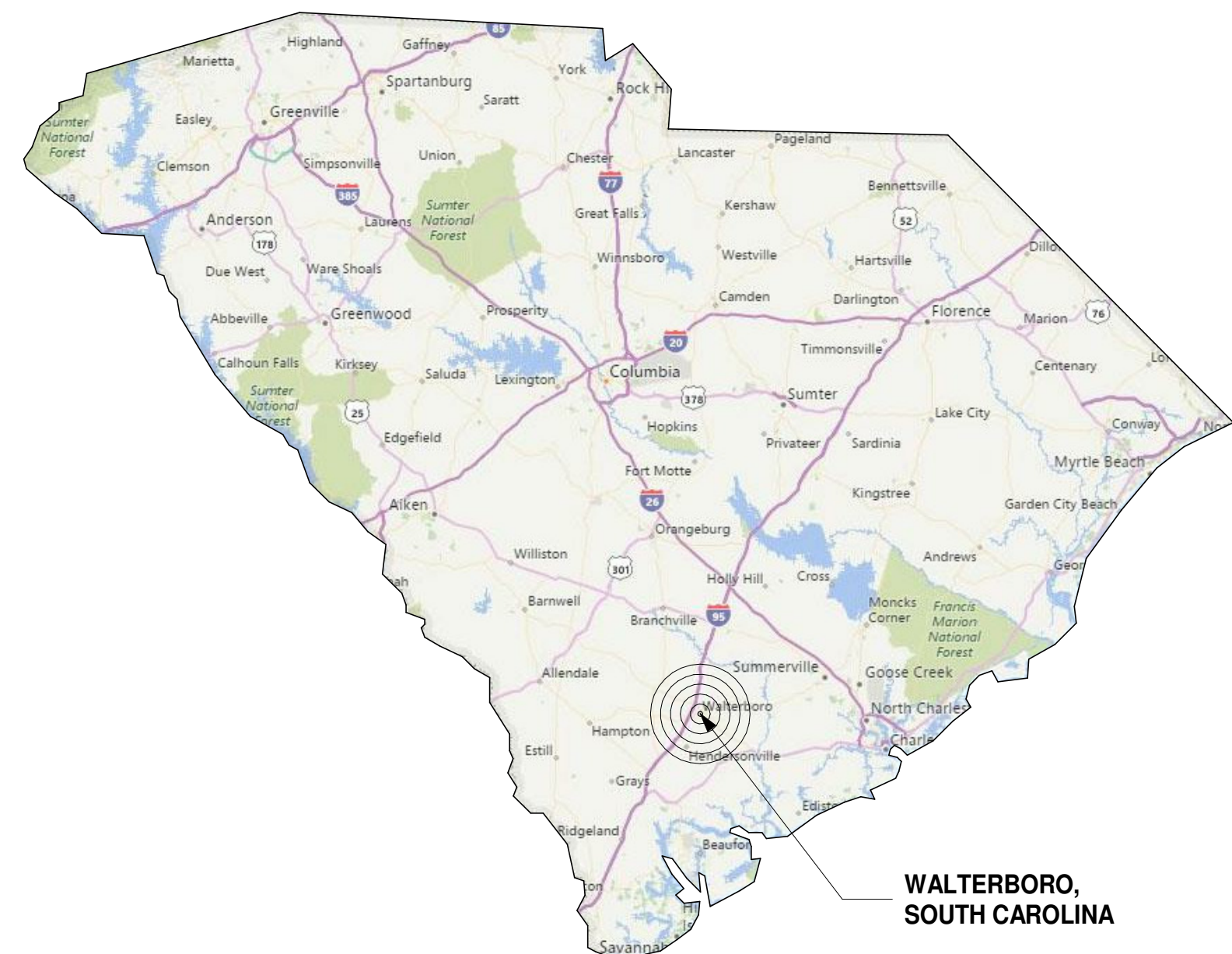
17.05 Controlling Law

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

17.06 Headings

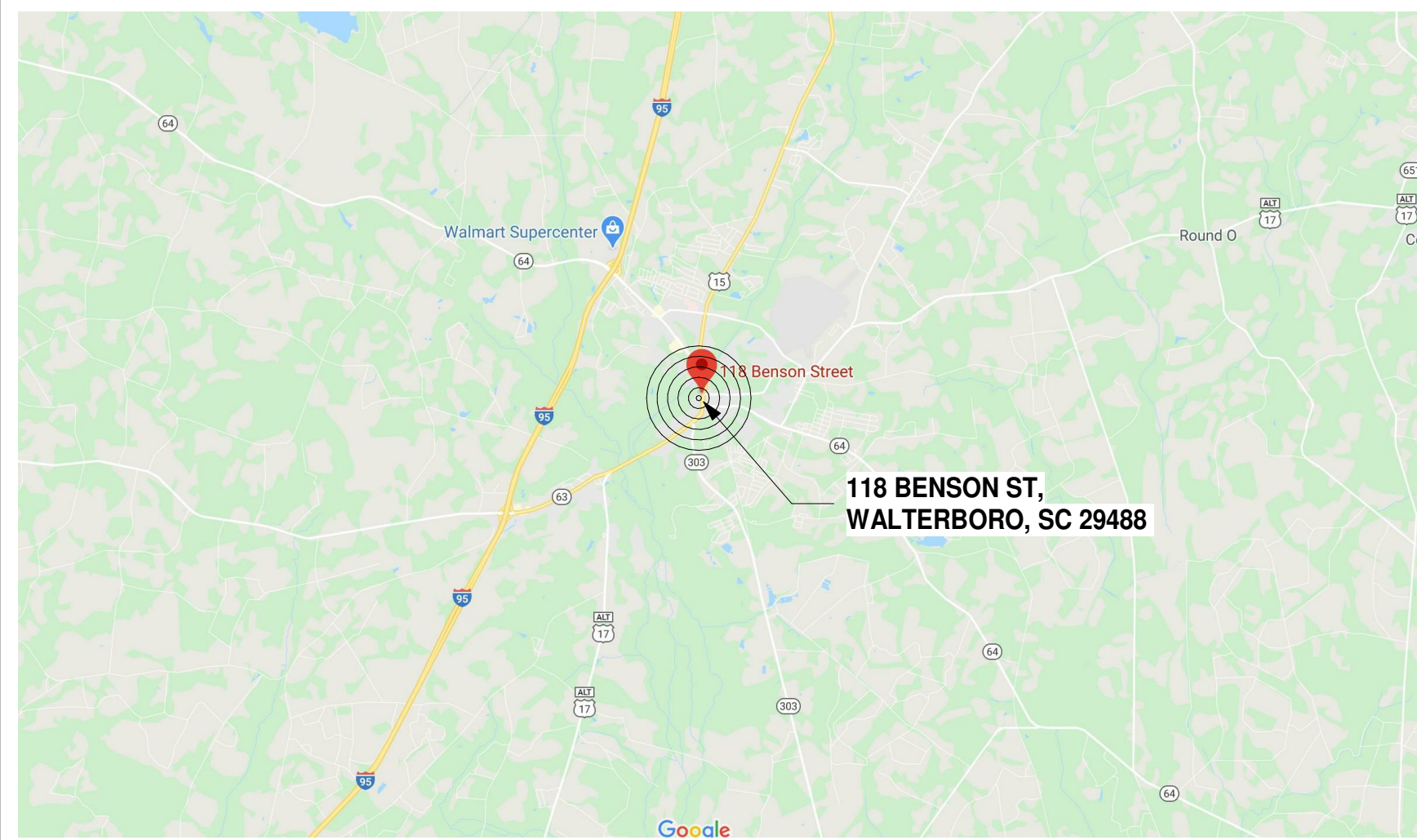
- A. Part and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SOUTH CAROLINA MAP



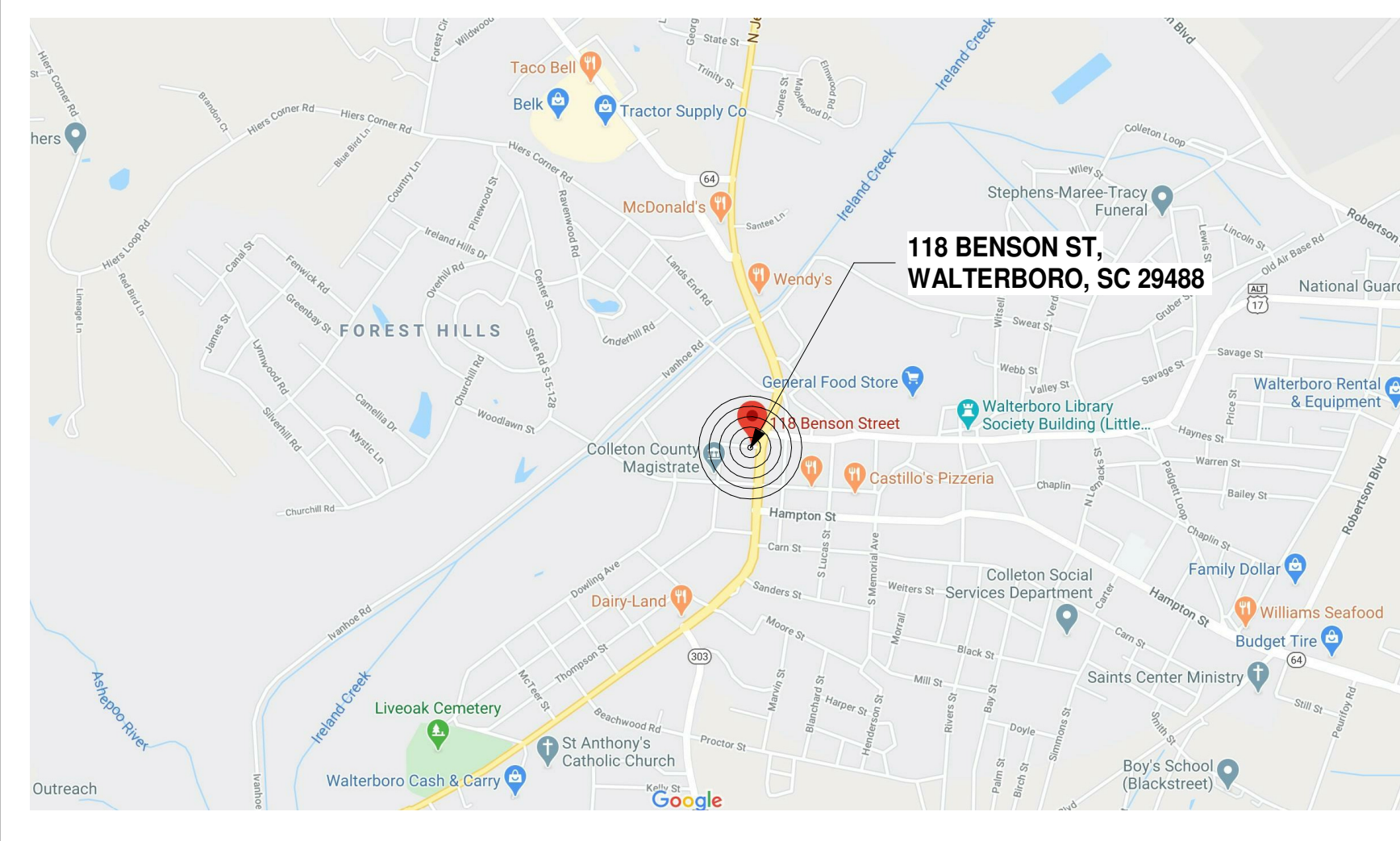
WALTERBORO, SOUTH CAROLINA

PROJECT LOCATION MAP



118 BENSON ST, WALTERBORO, SC 29488

HISTORIC WALTERBORO MAP



118 BENSON ST, WALTERBORO, SC 29488

GENERAL PROJECT NOTES

- 1 PROVIDE ACCESS PANELS WHERE NEEDED TO ACCESS VALVES, EQUIPMENT, FILTERS, ETC EVEN IF NOT NOTED IN THE DRAWINGS.
- 2 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.
- 3 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 PROCSS 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.
- 4 CONSTRUCTION MATERIALS OR PROCESSES WHICH ARE HAZARDOUS TO WORKERS OR FUTURE OCCUPANTS ARE NOT PERMITTED.
- 5 REFER TO CIVIL, LANDSCAPE, STRUCTURAL MECHANICAL, ELECTRICAL, PLUMBING OR FIRE PROTECTION DRAWINGS FOR ADDITIONAL NOTES AND REFERENCES.
- 6 GENERAL CONTRACTOR AND APPLICABLE SUB CONTRACTORS SHALL VERIFY ALL DIMENSIONS IN FIELD PRIOR TO COMMENCING DEMOLITION AND NEW CONSTRUCTION. DO NOT SCALE DRAWINGS.
- 7 GENERAL CONTRACTOR TO COORDINATE WITH OWNER ON ALL OWNER PROVIDED EQUIPMENT AND FURNISHINGS.
- 8 AN INTERIOR WORKSTATION MOCKUP WITH PLEXIGLASS FACIAL SCREEN IS TO BE PROVIDED FOR TELLER STATION "T-9" FOR APPROVAL IN ADVANCE OF FABRICATION OR INSTALLATION OF ANY OF THE INTERIOR WORKSTATION AREAS.

DRAWING LIST

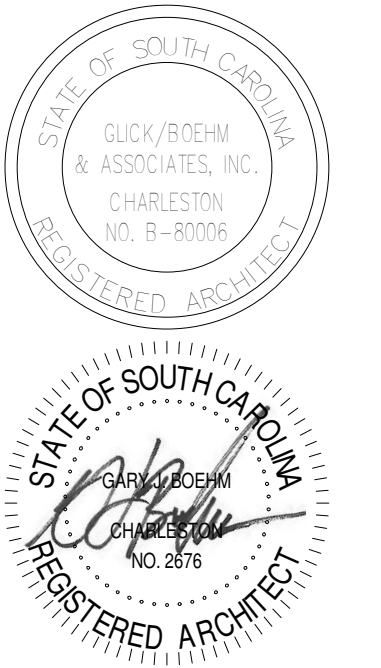
SHEET NO.	SHEET TITLE
GENERAL	
G000	COVER SHEET
G100	DRAWING LIST & PROJECT LOCATION
G110	GENERAL PROJECT & BUILDING CODE INFORMATION
G111	FIRST FLOOR CODE PLAN
CIVIL	
C102	TOPOGRAPHIC SURVEY
C201	DEMOLITION & EROSION CONTROL PLAN
C301	NEW SITE PLAN
C401	GRADING, DRAINAGE, & UTILITY PLAN
C501	CONSTRUCTION DETAILS
C502	CONSTRUCTION DETAILS
C503	CONSTRUCTION DETAILS
C504	CONSTRUCTION DETAILS
C505	CONSTRUCTION DETAILS
C506	CONSTRUCTION DETAILS
LANDSCAPE	
L101	LANDSCAPE PLANTING PLAN
L102	PLANT SCHEDULE/ DETAILS
STRUCTURAL	
S100	GENERAL NOTES & DETAILS
S101	FOUNDATION/SLAB PLAN
S102	ROOF FRAMING PLAN
S201	DETAILS
S202	TOWER FRAMING DETAILS
ARCHITECTURAL	
A000	GENERAL ARCHITECTURAL INFORMATION
A100	FLOOR PLAN
A110	DIMENSION FLOOR PLAN
A120	REFLECTED CEILING PLAN
A130	ROOF PLANS
A140	FINISH FLOOR PLAN
A200	EXTERIOR ELEVATIONS
A300	BUILDING SECTIONS
A310	WALL SECTIONS
A311	WALL SECTIONS
A312	WALL SECTIONS
A313	WALL SECTIONS
A314	WALL SECTIONS
A315	WALL SECTIONS
A400	ENLARGED PLANS - RESTROOMS
A401	ENLARGED PLANS - RESTROOMS
A402	ENLARGED PLANS - SAFE & BREAK ROOM
A410	ENLARGED PLANS - TOWER
A411	ENLARGED PLANS & DTLS - TREASURER
A412	ENLARGED PLANS & DTLS - DELIQUENT TAX & AUDITOR
A420	INTERIOR ELEVATIONS - PUBLIC BUSINESS AREA
A500	WALL DETAILS
A501	TYP. MOUNTING HEIGHTS & WALL BLOCKING
A510	EXTERIOR WALL PLAN DETAILS
A520	EXTERIOR WALL SECTION DETAILS
A521	EXTERIOR WALL SECTION DETAILS
A530	METAL ROOF DETAILS
A570	TYPICAL CEILING & SEISMIC DETAILS
A600	DOOR SCHEDULE AND FRAME ELEVATIONS
A610	STOREFRONT SCHEDULE & DETAILS
A700	CASEWORK DETAILS

DRAWING LIST

SHEET NO.	SHEET TITLE
MECHANICAL	
M001	HVAC NOTES & LEGENDS
M002	HVAC SCHEDULES
M003	HVAC DETAILS
M004	HVAC DETAILS
M010	MECHANICAL ISOMETRIC & SECTION
M101	MECHANICAL PLAN
M201	MECHANICAL AIR DISTRIBUTION PLAN
PLUMBING	
P001	PLUMBING NOTES & LEGENDS
P002	PLUMBING DETAILS
P101	DOMESTIC WATER PLAN
P201	SANITARY & VENT PLAN
ELECTRICAL	
E001	ELECTRICAL NOTES
E002	ELECTRICAL SCHEDULES & DETAILS
E003	ELECTRICAL DETAILS
E004	ELECTRICAL DETAILS
E005	LIGHTNING PROTECTION DETAILS
E010	ELECTRICAL RISER DIAGRAM & SCHEDULES
E100	ELECTRICAL SITE PLAN
E101	POWER PLAN
E201	TELECOM PLAN
E301	LIGHTING PLAN
E401	SYSTEMS PLAN



REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

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 GLICK/BOEHM & ASSOCIATES, INC.
 JOB NUMBER: 1904
 PROJECT MGR.: SM
 DRAWN BY: MCM
 CHECKED BY: SM
 APPROVED BY: GB
 DATE ISSUED FOR: CD's 11/23/2020

DRAWING LIST & PROJECT LOCATION

G100

GENERAL PROJECT INFORMATION

BUILDING DESIGN & CODE INFORMATION

PROJECT SCOPE

CONSTRUCTION OF NEW TAXPAYER FACILITY FOR HISTORIC WALTERBORO.

SPECIAL INSPECTIONS

- SPECIAL INSPECTIONS ARE REQUIRED
 SPECIAL INSPECTIONS ARE NOT REQUIRED

IF SPECIAL INSPECTIONS ARE REQUIRED, THE OWNER SHALL EMPLOY ONE OR MORE SPECIAL INSPECTORS TO PROVIDE INSPECTION SERVICES DURING THE CONSTRUCTION PHASE IN ACCORDANCE WITH CHAPTER 17 OF IBC 2015. SEE SPECIFICATION SECTION 01 45 33 FOR THE ACTUAL REQUIREMENTS OF WORK SUBJECT TO SPECIAL INSPECTIONS FOR THIS PROJECT.

SOILS & SITE

GEOTECHNICAL INVESTIGATIONS: REFER TO SPECIFICATIONS

LEADERSHIP THROUGH ENERGY AND ENVIROMENTAL DESIGN (LEED)

- NOT REQUIRED - LEED RATING WILL NOT BE PURSUED.
 LEED RATING IS REQUIRED.

EROSION AND SEDIMENT REDUCTION / STORMWATER MANAGEMENT

- NOT REQUIRED - NO SITE WORK
 NOTE: SEE SITE PLANS FOR DESIGNER'S CERTIFICATION.

BASIC PROJECT INFO

PROJECT NAME: TAXPAYER SERVICE CENTER
 PROJECT ADDRESS: 118 BENSON ST. WALTERBORO, SC 29488

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
- 2017 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

DESIGN TEAM

ARCHITECT
GLICK/BOEHM & ASSOCIATES, INC.
 493 KING ST. STE 100
 CHARLESTON, SC 29403
 843.577.6377

CIVIL ENGINEER
FORSBERG ENGINEERING
 1587 SAVANNAH HWY. STE B.
 CHARLESTON, SC 29417
 843.571.2622

STRUCTURAL ENGINEER

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

PLUMBING ENGINEER

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

MECHANICAL ENGINEER

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

ELECTRICAL ENGINEER

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

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	BUSINESS	6,702 GSF	150 GSF	45	
(Add additional rows as needed for each Function Type on this story)					
Subtotal Design Occupant Load for this Story: (5)					45

Add or delete rows as needed for each story & level of building (including mezzanine)

Total Building Design Occupant Load: (6) **45**

Footnotes:

- Provide the complete name of the Function of space using the left column of Table 1004.1.2 of the IBC.
- Design Area per each occupant of this function on this floor in either Gross or Net square footage.
- Allowed Floor Areas in SF per Occupant per right column in Table 1004.1.2 of the IBC.
- Divide Column A (2) by Column B (3) for each function and enter the result, rounded up to the nearest whole person.
- Subtotal all Column C values for this floor to yield the Design Occupant Load.
- Total Building Design Occupant Load - sum of all Column D value

FIRE PROTECTION REQUIREMENTS

SEPARATIONS			
Fireblocking Required	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	per IBC Section 718.2	
Draftstopping Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IBC Section 718.3	
Smoke Control System Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IBC Section 909	
Smoke Barriers Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IBC Sections 407 and 408	
Smoke Partitions Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IBC Section 407	
Fire Partition Required	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	per IBC Section 708	
Fire Barrier Required (As Shaft)	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IBC Section 707	

ALARM & DETECTION		
Fire Alarm System Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC Section 907
Emergency Alarm System Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC 908

SUPPRESSION		
Standpipes Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC Section 905
Sprinklers Required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC Section 903
Sprinklers Provided	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
Portable extinguishers required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC 906
Other suppression systems required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC 904
Smoke & heat vents required	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	per IFC 910

Other: (Indicate other provided fire and life safety features not listed above, if any)

BUILDING HEIGHT

	AS DESIGNED		AS ALLOWED BY IBC	
	In Feet	In Stories	In Feet (TABLE 504.3)	In Stories (TABLE 504.4)
Without any Allowable Increase	22'-2"	1	40'-0"	2

BUILDING AREA

AREA LIMIT BY TABLE 506.2 OF IBC	9,000 (area limitation per story)	SF
AREA MODIFICATION FROM EQUATION 5-2 OF IBC (IBC 506.2.3) (Insert equation from IBC 506.2.3 with completed calculations in this box) (Equation 5-2) $Aa = [At + (NS \times If)] \times Sa$ where: Aa = Allowable area (square feet). At = Tabular allowable area factor in accordance with Table 506.2. If = Area increase factor due to frontage (percent) as calculated in accordance with Section 506.3. NS = Tabular allowable area factor in accordance with Section 506.2 for a nonsprinklered building. Sa = Actual number of building stories above grade plane not to exceed three. For buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2, use the actual number of building stories above gradeplane, not to exceed four. $Aa = [9,000 + (9,000 \times 0.75)] \times 1$	15,750 (maximum modified area per story)	SF
TOTAL ALLOWED AREA OF BUILDING (Summary of all stories)	15,750	SF
TOTAL DESIGNED AREA OF BUILDING	6,702	SF

BASIC BUILDING CODE INFORMATION

CONSTRUCTION CLASSIFICATION	Type VB	(IBC 602)
OCCUPANCY GROUP (indicate all)	Business Group B	(IBC 302)
OCCUPANCY GROUP (indicate most restrictive)	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) xxx SF xxx %
Mixed Occupancy	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	(IBC 508)
Non separated	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	(IBC 508.3)
Separated	<input checked="" type="checkbox"/> No <input 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.)

FIRE RATING OF BUILDING ELEMENTS

BUILDING ELEMENT	Rating As Required (in hours)	Rating As Designed (in hours)	Testing Agency & Design No. (UL, FM, etc.)	Designers Wall / Partition Key Code
Structural Frame (per IBC Table 601)	0	0	N/A	
Bearing Walls Exterior Interior (per IBC Table 601)	0	0	N/A N/A	N/A N/A
Nonbearing Walls & Partitions Exterior Interior (per IBC Table 601 & 602)	0	0	N/A N/A	N/A N/A
Floor Construction including supporting beams & joists (per IBC Table 601)	N/A	N/A	N/A	
Roof Construction including supporting beams & joists (per IBC Table 601)	0	0	N/A	
Fire Walls (per IBC Section 706)	N/A	N/A	N/A	N/A
Fire Barriers (per IBC Section 707)	N/A	N/A	N/A	N/A
Shaft Enclosures (per IBC Section 713)	N/A	N/A	N/A	N/A
Fire Partitions (per IBC Section 708)	1	1	---	N/A
Opening & Protective Listing by Category (fire shutters, doors, etc. (per IBC Section 715)	0	1	N/A	N/A
Others as required by Designer	N/A	N/A	N/A	N/A

PLUMBING INFORMATION

MINIMUM PLUMBING FIXTURES (per IPC Section 403 & Table 403.1)				
	Male-Required	Male-Provided	Female-Req'd	Female-Provided
Water Closets	1	1	1	3
Lavatories	1	1	1	2
Urinals*	--	1		
OTHER FIXTURES (per IPC Section 403 & Table 403.1)				
	Required	Provided		
Drinking Fountains	1	1		
Unisex toilet	--	1		
Service Sink	1	1		
Others (list)	--	--		

*Urinals - See IPC 419.2

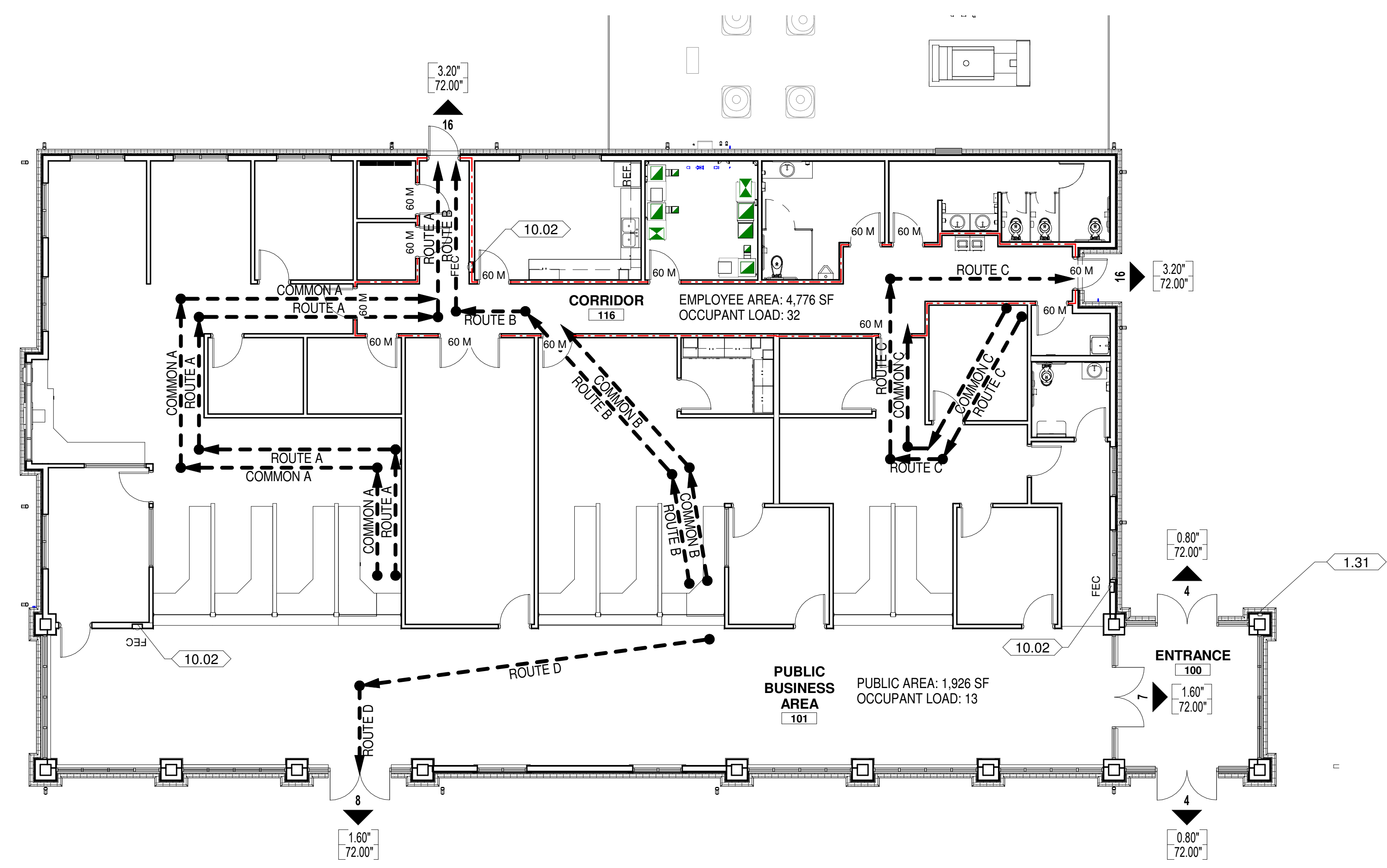
NOTE: Where mixed Occupancies occur within buildings, expand this table to indicate Occupant loads for each. The minimum required toilet fixtures are calculated for the total Design Occupant Load indicated in BUILDING DESIGN OCCUPANT LOAD.

OCCUPANCY CLASSIFICATION		
FUNCTION OF SPACE	OCCUPANT LOAD FACTOR	OCCUPANCY GROSS OR NET
BUSINESS AREA	150.00 SF	GROSS

COMMON PATH OF EGRESS TRAVEL	
OCCUPANCY	TRAVEL DISTANCE (WITHOUT SPRINKLER)
B	200'-0" IBC TABLE 1017.2 EXIT ACCESS TRAVEL DISTANCE
B	75'-0" IBC TABLE 1006.2.1 MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE

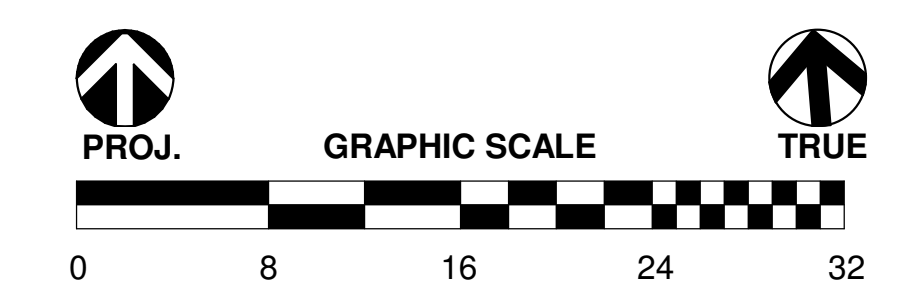
EGRESS DISTANCES	
ROUTE TYPE	DISTANCE
COMMON A	73' - 7"
COMMON B	30' - 11"
COMMON C	28' - 10"
ROUTE A	85' - 8"
ROUTE B	55' - 5"
ROUTE C	58' - 6"
ROUTE D	44' - 7"

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
1.31	KNOX BOX #3200 WITH RECESSED MOUNTING KIT, TO BE INSTALLED AT 6'-0" O.C. ABOVE SIDEWALK. REFER TO DETAIL ON A500.
10.02	FIRE EXTINGUISHER CABINET

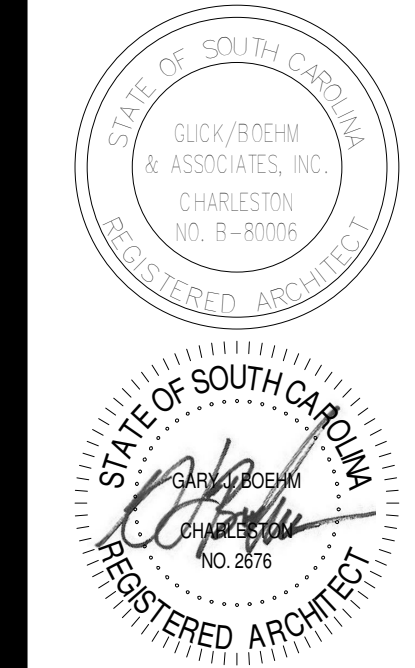


LEGEND & SYMBOLS	
	1 HOUR FIRE RATED WALL: REFER TO WALL TYPES ON A500
	FIRE RATED DOORS 20 = 1/3 HR 45 = 3/4 HR 60 = 1 HR 90 = 1-1/2 HR 180 = 3 HR
	COMMON PATH OF TRAVEL / TRAVEL DISTANCE
	DIRECTION OF EGRESS W/ OCCUPANCY TOTAL
	REQ'D EGRESS WIDTH ACTUAL EGRESS WIDTH
	FIRE EXTINGUISHER CABINET

1 FIRST FLOOR LIFE SAFETY PLAN
G111 SCALE: 1/8" = 1'-0"



REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
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118 BENSON STREET
WALTERBORO, SC 29488

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PROJECT MGR.: SM
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CHECKED BY: SM
APPROVED BY: GB
DATE ISSUED FOR: CD's 11/23/2020

FIRST FLOOR CODE PLAN

G111

TUNG WING M & YIM FONG WONG

TMS 163-11-00-243
DB 604 PG 24
PB 13 PG 84

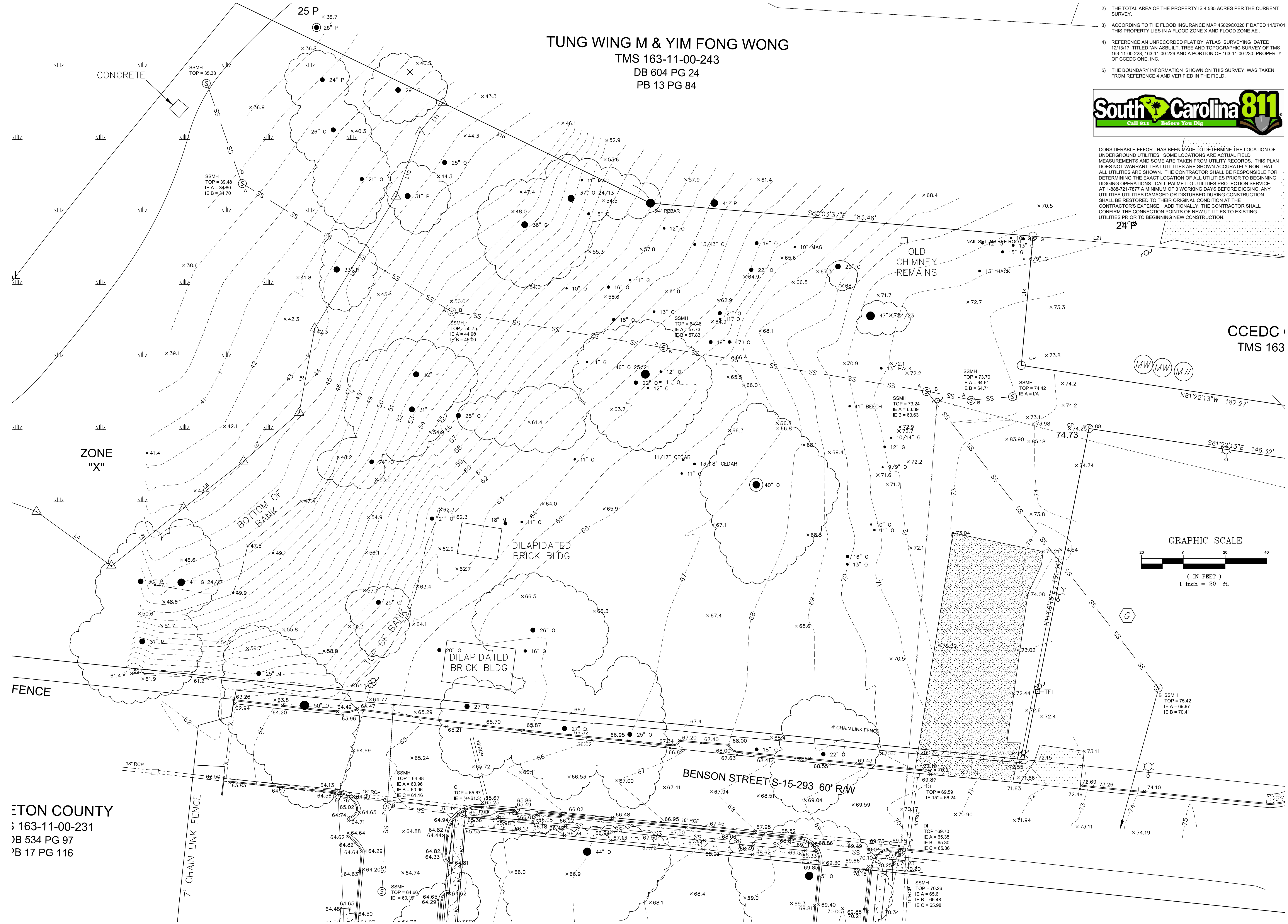
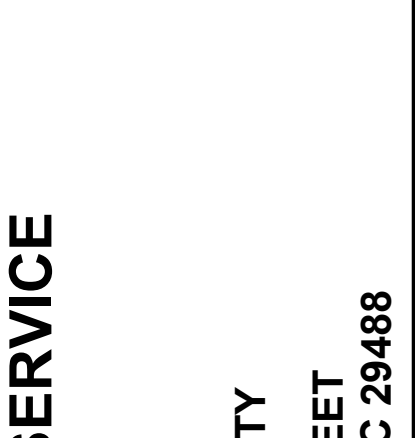
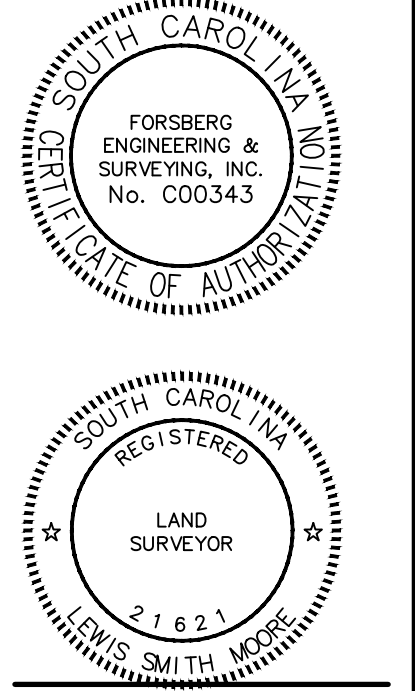
- NOTES
- 1) THE PROPERTY IS OWNED BY CCEDC ONE INC.
 - 2) THE TOTAL AREA OF THE PROPERTY IS 4.535 ACRES PER THE CURRENT SURVEY.
 - 3) ACCORDING TO THE FLOOD INSURANCE MAP 45029C0320 F DATED 11/07/01 THIS PROPERTY LIES IN A FLOOD ZONE X AND FLOOD ZONE AE.
 - 4) REFERENCE AN UNRECORDED PLAT BY ATLAS SURVEYING DATED 12/13/17 TITLED "AN ABSULT, TREE AND TOPOGRAPHIC SURVEY OF TMS 163-11-00-228, 163-11-00-229 AND A PORTION OF 163-11-00-230, PROPERTY OF CCEDC ONE, INC.
 - 5) THE BOUNDARY INFORMATION SHOWN ON THIS SURVEY WAS TAKEN FROM REFERENCE 4 AND VERIFIED IN THE FIELD.



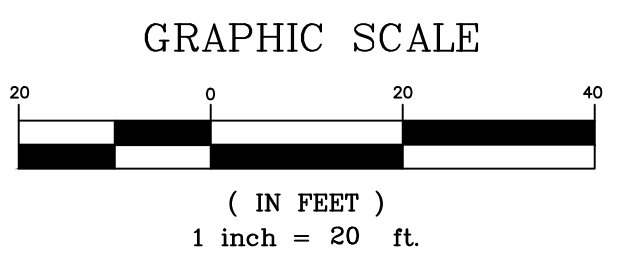
CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS. THIS PLAN DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE 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.



REV.	DATE	DESCRIPTION



CCEDC TMS 163



COLLETON COUNTY
163-11-00-231
DB 534 PG 97
PB 17 PG 116

TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

2020
GLICKBOEHM & ASSOCIATES, INC.
JOB NUMBER: 1904
PROJECT MGR.: SM
DRAWN BY: Author
CHECKED BY: Checker
APPROVED BY: Approver
DATE ISSUED FOR: CDS
11/23/2020

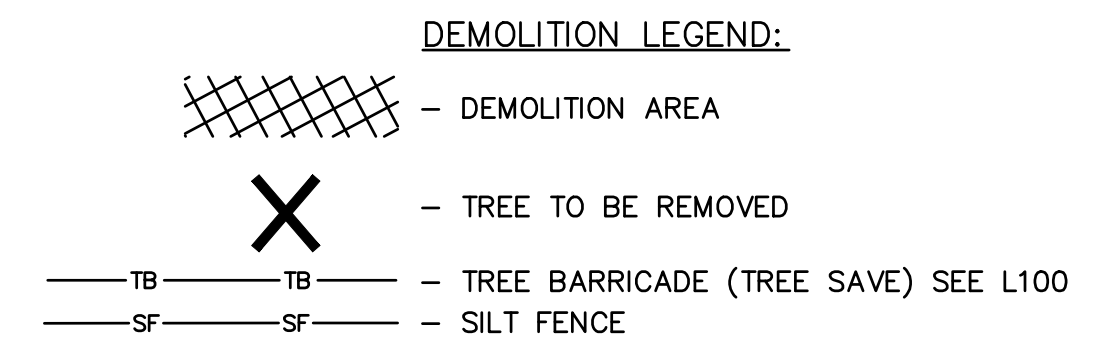
TOPOGRAPHIC SURVEY

C102

4/22/2020 2:10:18 PM

TUNG WING M & YIM FONG WONG

TMS 163-11-00-243
DB 604 PG 24
PB 13 PG 84



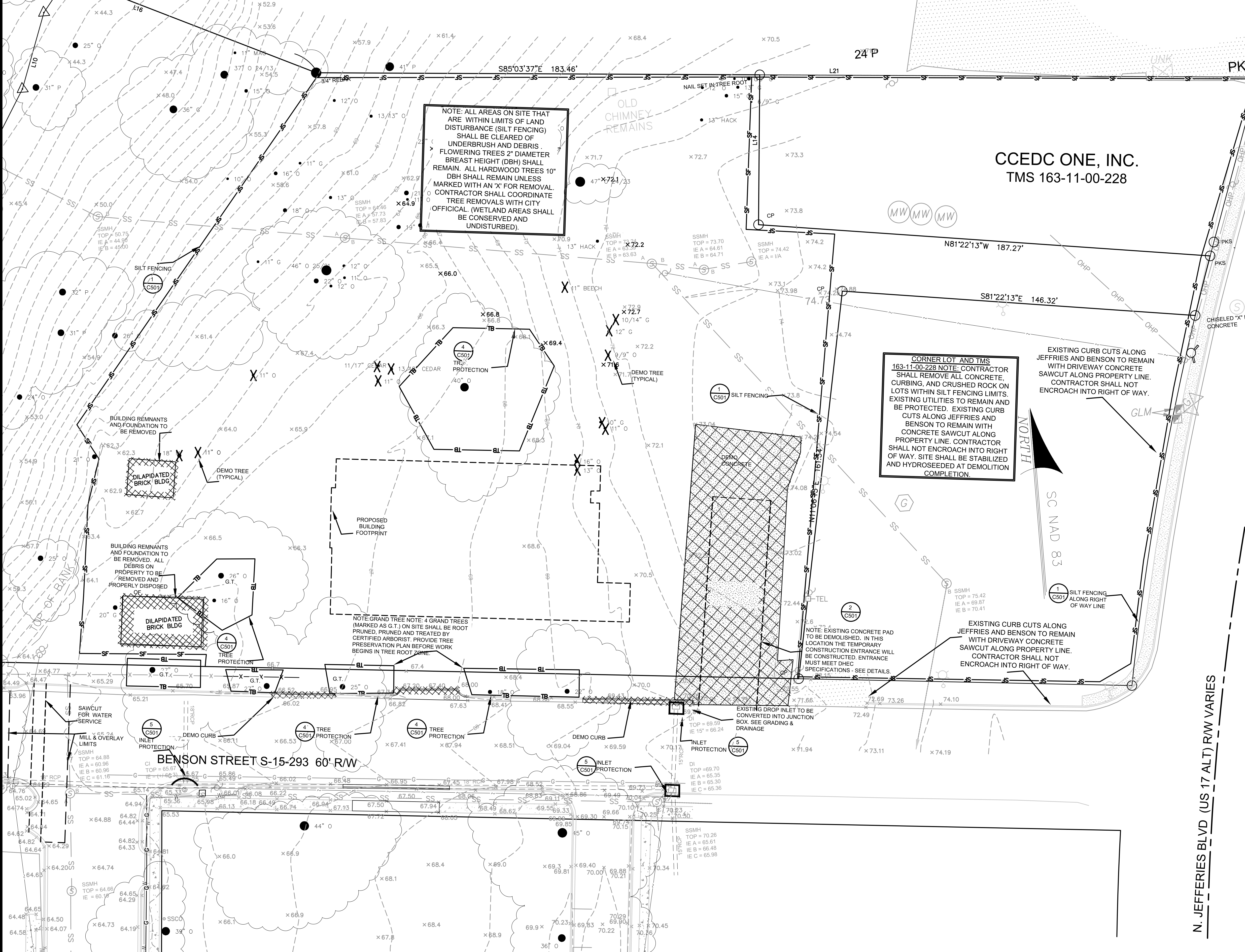
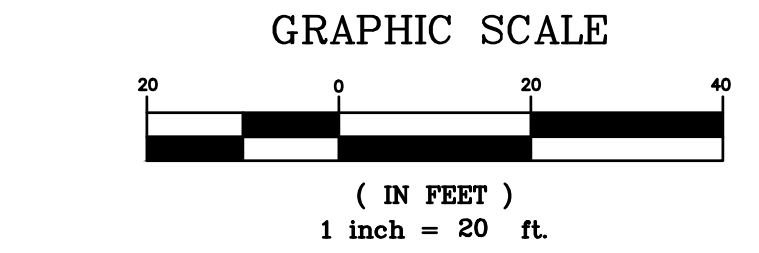
- ### DEMOLITION NOTES:
- 1) THE CONTRACTOR TO INSTALL ALL SILT FENCING & TREE BARRICADES BEFORE STARTING ANY WORK. CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL MEASURES. SEE EROSION CONTROL NOTES.
 - 2) THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL SWPPP INSPECTIONS, REPORTS, AS-BUILT DRAWINGS, MEETINGS, 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.
 - 3) 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.
 - 4) ACCESS TO THE CONSTRUCTION SITE SHALL BE MAINTAINED DURING CONSTRUCTION.
 - 5) 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.
 - 6.) SEE SPECIFICATION SECTION 024113 FOR ADDITIONAL DEMOLITION NOTES.

"I HAVE PLACED MY SIGNATURE AND SEAL ON THE DESIGN DOCUMENTS SUBMITTED SIGNIFYING THAT I ACCEPT RESPONSIBILITY FOR THE DESIGN OF THE SYSTEM. FURTHER, I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THE DESIGN IS CONSISTENT WITH THE REQUIREMENTS OF TITLE 48, CHAPTER 14 OF THE CODE OF LAWS OF SC, 1976 AS AMENDED, PURSUANT TO REGULATION 72-306 LET SEQ. (IF APPLICABLE), AND IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF SCR100000."

CONSTRUCTION SEQUENCE

- 1) CONTRACTOR TO INSTALL PERIMETER CONTROLS AND CONSTRUCTION ACCESS POINTS. CONTRACTOR TO ENSURE EXISTING EROSION CONTROL DEVICES REMAIN INTACT DURING PROJECT DURATION.
- 2) CLEARING, GRUBBING, AND DEMOLITION. CLEAR UNDERGROWTH IN WOODED AREA OF SITE.
- 3) ROUGH GRADING AND INSTALLATION OF STORM DRAINAGE LINES AND STRUCTURES.
- 4) INSTALL SEDIMENT CONTROLS AT ALL STRUCTURES WITHIN 5 DAYS OF STRUCTURE INSTALLATION.
- 5) PAVING AND FINAL SITE GRADING.
- 6) LANDSCAPE PLANTING, SODDING, AND GRASSING.
- 7) REMOVE ALL TEMPORARY EROSION & SEDIMENT CONTROL BMP FOLLOWING FINAL INSPECTIONS.
- 8) SUBMIT AS-BUILT SURVEY TO PROJECT ENGINEER AS REQUIRED. CONTRACTOR TO PROVIDE DIGITAL AS BUILTS TO OWNER AND ENGINEER.
- 9) PERMANENT MAINTENANCE COVENANTS AND AS-BUILT DRAWINGS FOR STORMWATER FACILITIES IN ACCORDANCE WITH DHEC SPECIFICATIONS NEEDS TO BE SUBMITTED AND ACCEPTED BEFORE N.O.T. IS ISSUED.

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 UTILITY PROTECTION SERVICE AT 888-721-8777 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.



NOTE: ALL AREAS ON SITE THAT ARE WITHIN LIMITS OF LAND DISTURBANCE (SILT FENCING) SHALL BE CLEARED OF UNDERBRUSH AND DEBRIS. FLOWERING TREES 2" DIAMETER BREST HEIGHT (DBH) SHALL REMAIN. ALL HARDWOOD TREES 10" DBH SHALL REMAIN UNLESS MARKED WITH AN 'X' FOR REMOVAL. CONTRACTOR SHALL COORDINATE TREE REMOVALS WITH CITY OFFICIALS. WETLAND AREAS SHALL BE CONSERVED AND UNDISTURBED.

CORNER LOT AND TMS 163-11-00-228 NOTE: CONTRACTOR SHALL REMOVE ALL CONCRETE, CURBING, AND CRUSHED ROCK ON LOTS WITHIN SILT FENCING LIMITS. EXISTING UTILITIES TO REMAIN AND BE PROTECTED. EXISTING CURB CUTS ALONG JEFFRIES AND BENSON TO REMAIN WITH CONCRETE SAWCUT ALONG PROPERTY LINE. CONTRACTOR SHALL NOT ENCRoACH INTO RIGHT OF WAY. SITE SHALL BE STABILIZED AND HYDROSEED AT DEMOLITION COMPLETION.

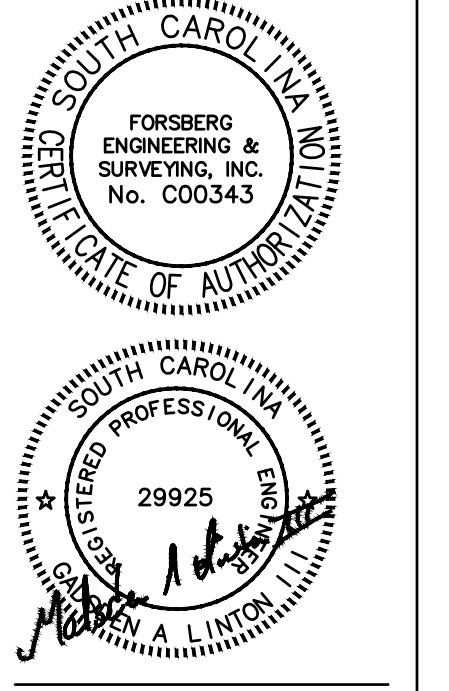
EXISTING CURB CUTS ALONG JEFFRIES AND BENSON TO REMAIN WITH DRIVEWAY CONCRETE SAWCUT ALONG PROPERTY LINE. CONTRACTOR SHALL NOT ENCRoACH INTO RIGHT OF WAY.

EXISTING CURB CUTS ALONG JEFFRIES AND BENSON TO REMAIN WITH DRIVEWAY CONCRETE SAWCUT ALONG PROPERTY LINE. CONTRACTOR SHALL NOT ENCRoACH INTO RIGHT OF WAY.

EXISTING DROP INLET TO BE CONVERTED INTO JUNCTION BOX. SEE GRADING & DRAINAGE.



REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

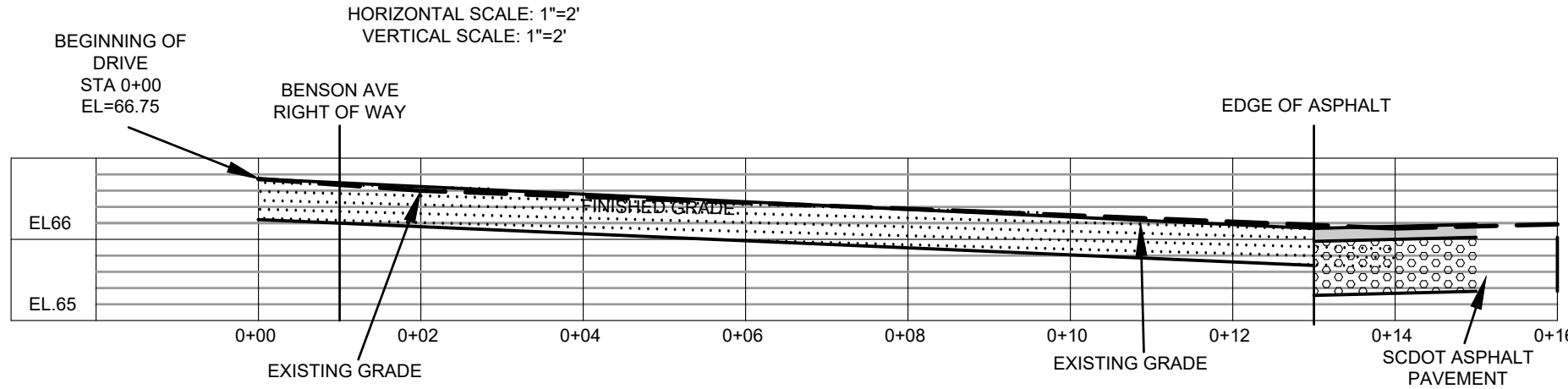
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APPROVED BY: TL
DATE ISSUED FOR: CDS
11/23/2020

DEMOLITION & EROSION CONTROL PLAN

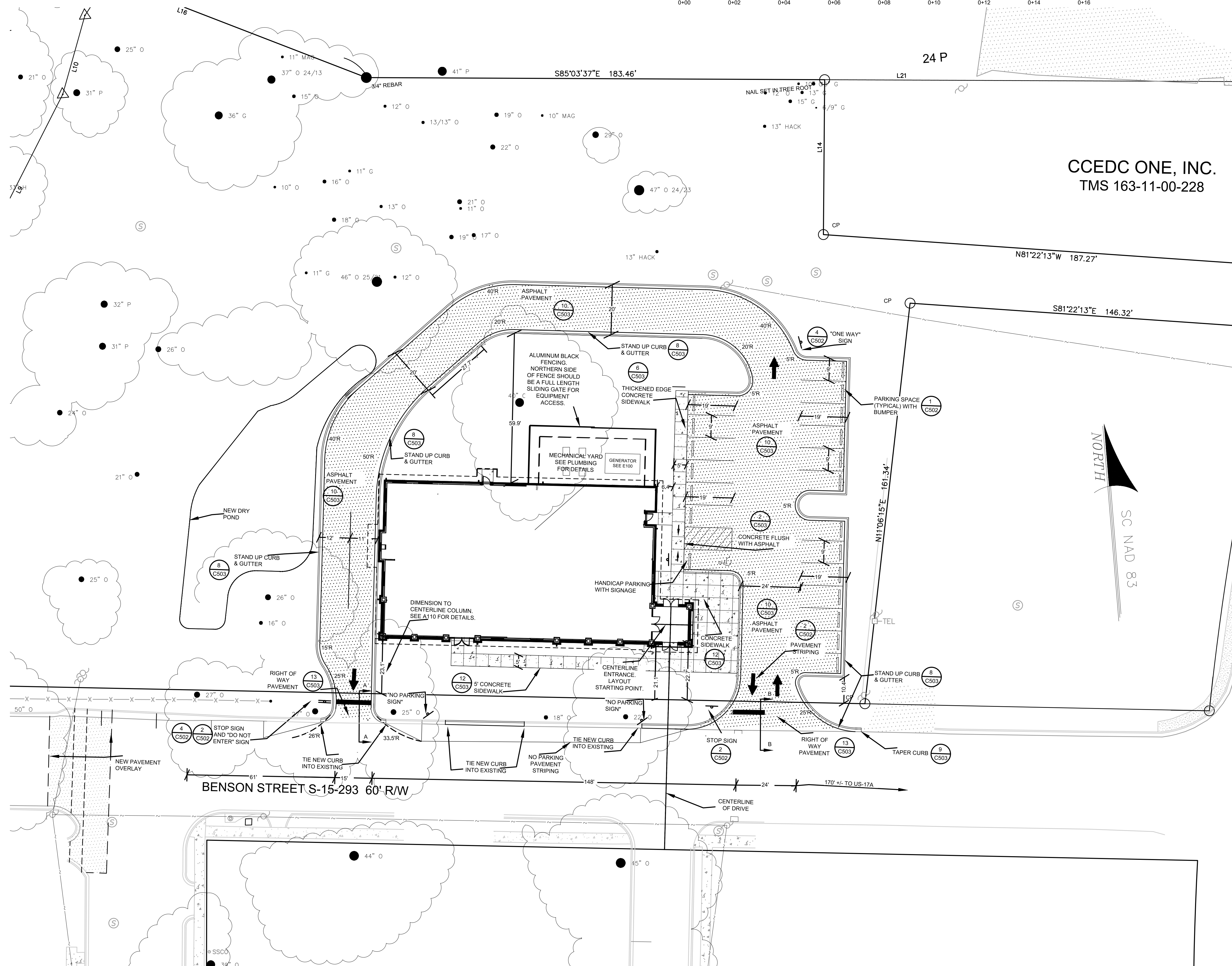
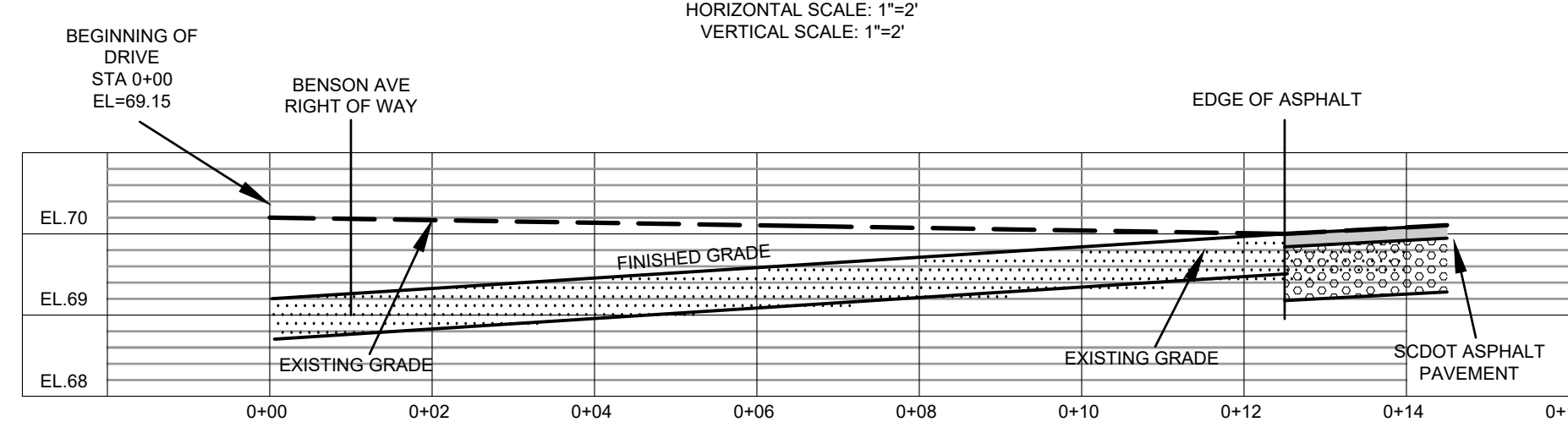
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SCDOT DRIVEWAY CROSS SECTION A-A



SCDOT DRIVEWAY CROSS SECTION B-B



CCEDC ONE, INC.
TMS 163-11-00-228

SITE DATA:

- 1) THE PROPERTY ADDRESS IS 118 BENSON STREET.
2) TMS No. : 163-11-00-230
3) TOTAL AREA OF TRACT = 4.535 ACRES
4) ZONED COMMERCIAL - NO SETBACKS.
5) BLDG. HEIGHT: 19' 6" - SEE ARCHITECTURAL
6) PROPOSED BUILDING FOOTPRINTS = 14,300 S.F. = 0.3AC.
7) ACCORDING TO FEMA FLOOD INSURANCE RATE MAP45029C03186 DATED DECEMBER 21, 2017 THIS PROPERTY APPEARS TO LIE IN ZONE AE AND X.
8) CADD FILES WILL BE PROVIDED TO SUCCESSFUL BIDDER FOR THEIR USE IN THE LAYOUT OF THE PROJECT.

SPECIAL RW 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 RW 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/doinq/ed_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
DO NOT ENTER - R5-1
ONE-WAY SIGN - R6-1L-36
NO PARKING - R8-3 W/ R7 201P
SPEED LIMIT - R2-1
RIGHT TURN ONLY - R3-5R

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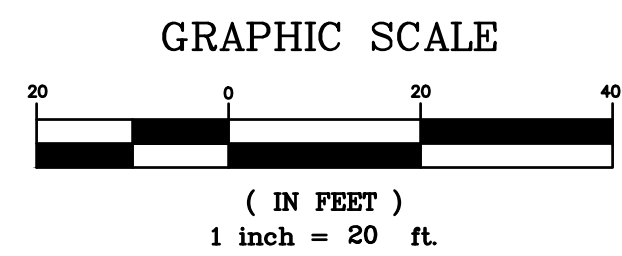
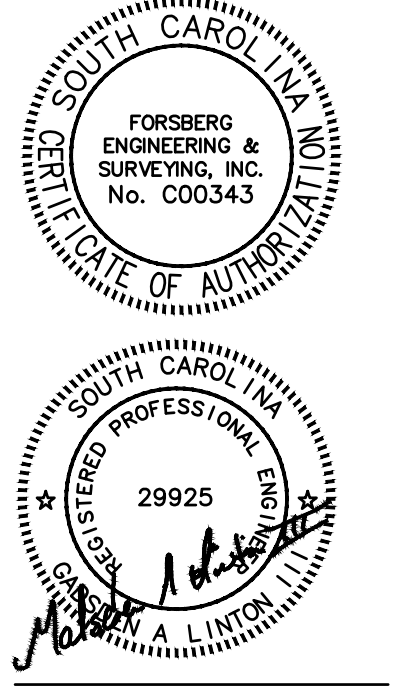


Table with columns for REV, DATE, and DESCRIPTION.



TAXPAYER SERVICE CENTER
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118 BENSON STREET
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NEW SITE PLAN

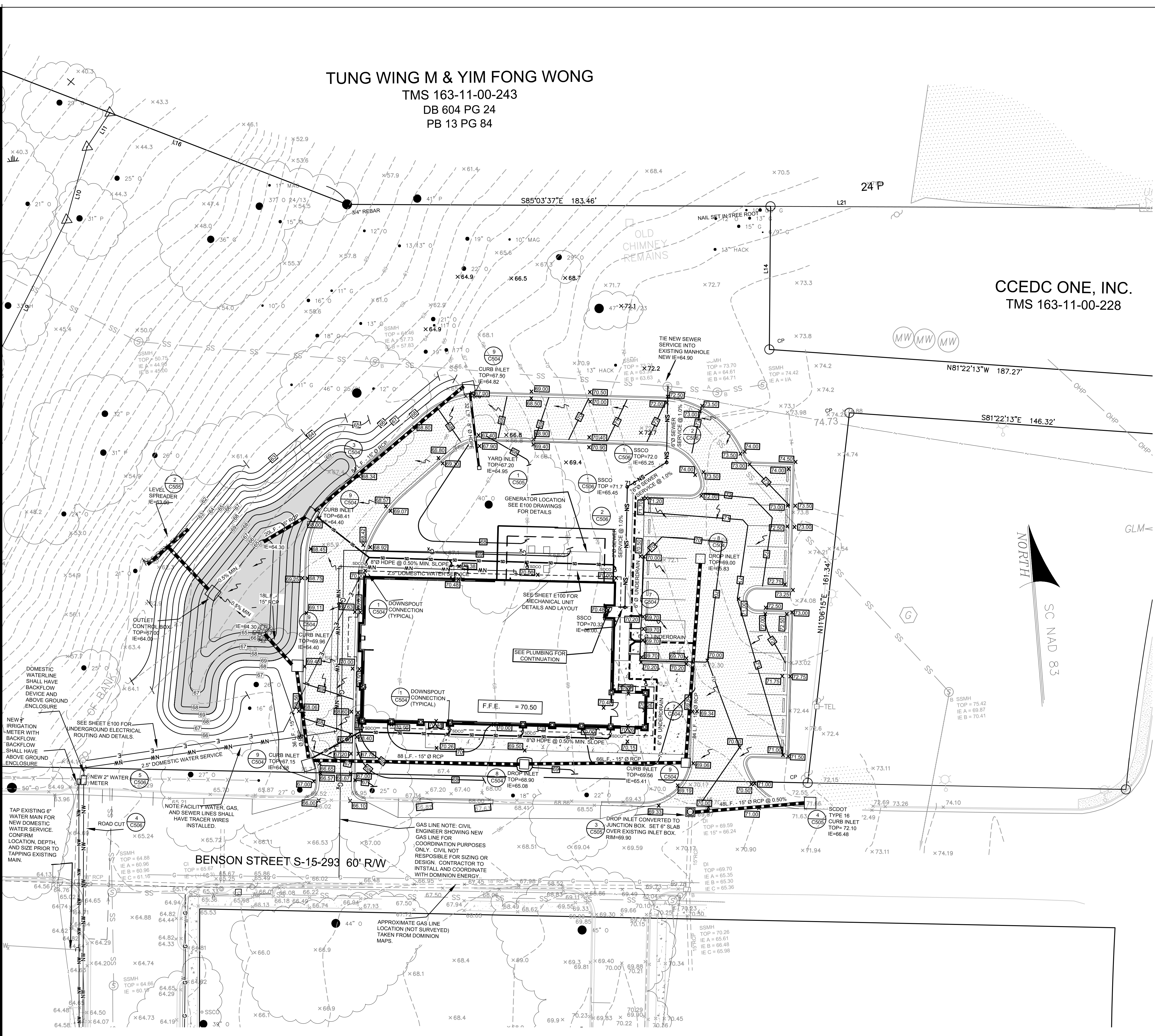
C301

\\small\Projects\1904 - Colleton County Tax Payer Service Center\1 Rev\11904_Colleton County Tax Payer Service Center.dwg

TUNG WING M & YIM FONG WONG

TMS 163-11-00-243
DB 604 PG 24
PB 13 PG 84

CCEDC ONE, INC.
TMS 163-11-00-228



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 TO BE LOCATED BY OTHERS
- - - NEW SANITARY SEWER GRAVITY
- - - NEW POTABLE WATER

GRADING NOTES:

- 1) NEW STORM DRAINAGE AND SANITARY SEWER LINES SHALL BE LAID UPGRAD AFTER CONFIRMATION OF EXISTING INVERT ELEVATIONS.
- 2) SEE SHEET C101 FOR SWPPP PLAN AND SEQUENCE OF CONSTRUCTION NOTES.
- 3) SEE LANDSCAPE PLANS AND TREE LOCATIONS & HARDSCAPE LAYOUT.
- 4) SEE SHEET C507 FOR SEWER NOTES.
- 5) SEE SHEET C506 FOR WATER SYSTEM NOTES.
- 6) ALL WORK INVOLVING CPWS LINES AND STRUCTURES SHALL BE DONE BY A CONTRACTOR FROM CPWS "APPROVED CONTRACTORS" LIST.
- 7) CONTRACTOR SHALL EXCAVATE EXISTING SANITARY SEWER LINE TO CONFIRM LOCATION & DEPTH.
- 8) SEE LANDSCAPE PLANS FOR SIDEWALK DETAILS.
- 9) SEE ARCHITECTURAL PLANS FOR FINAL BUILDING DIMENSIONS AND LAYOUT.
- 10) CONTRACTOR IS RESPONSIBLE OF ALL SWPPP AS-BUILTS.
- 11) EXISTING AND NEW SSMH, WM, WV, DRAINAGE, FIRE HYDRANTS, INLETS ETC. MUST BE ADJUSTED TO FINAL FINISHED GRADES. MINOR ADJUSTMENT MAY BE NECESSARY.
- 12) PRIOR TO PAVING, CONTRACTOR SHALL VERIFY THAT FINE GRADED BASE COURSE MEETS REQUIRED GRADES SUCH AS TO AVOID "BIRD BATH" AREAS ON FINAL PAVEMENT.
- 13) LANDSCAPING AND IRRIGATION RESPONSIBILITY OF CONTRACTOR.

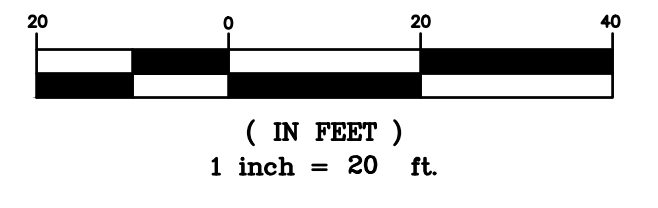
PRE VERSUS POST TABLE

YEAR	PRE(cfs)	POST(cfs)	ELEV.
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10	4.2	3.6	67.9
25	5.8	5.6	68.5
100	9.1	9.7	69.3

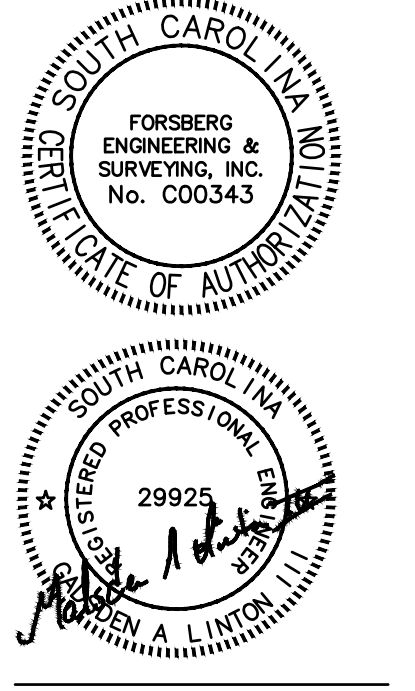
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GRAPHIC SCALE



REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

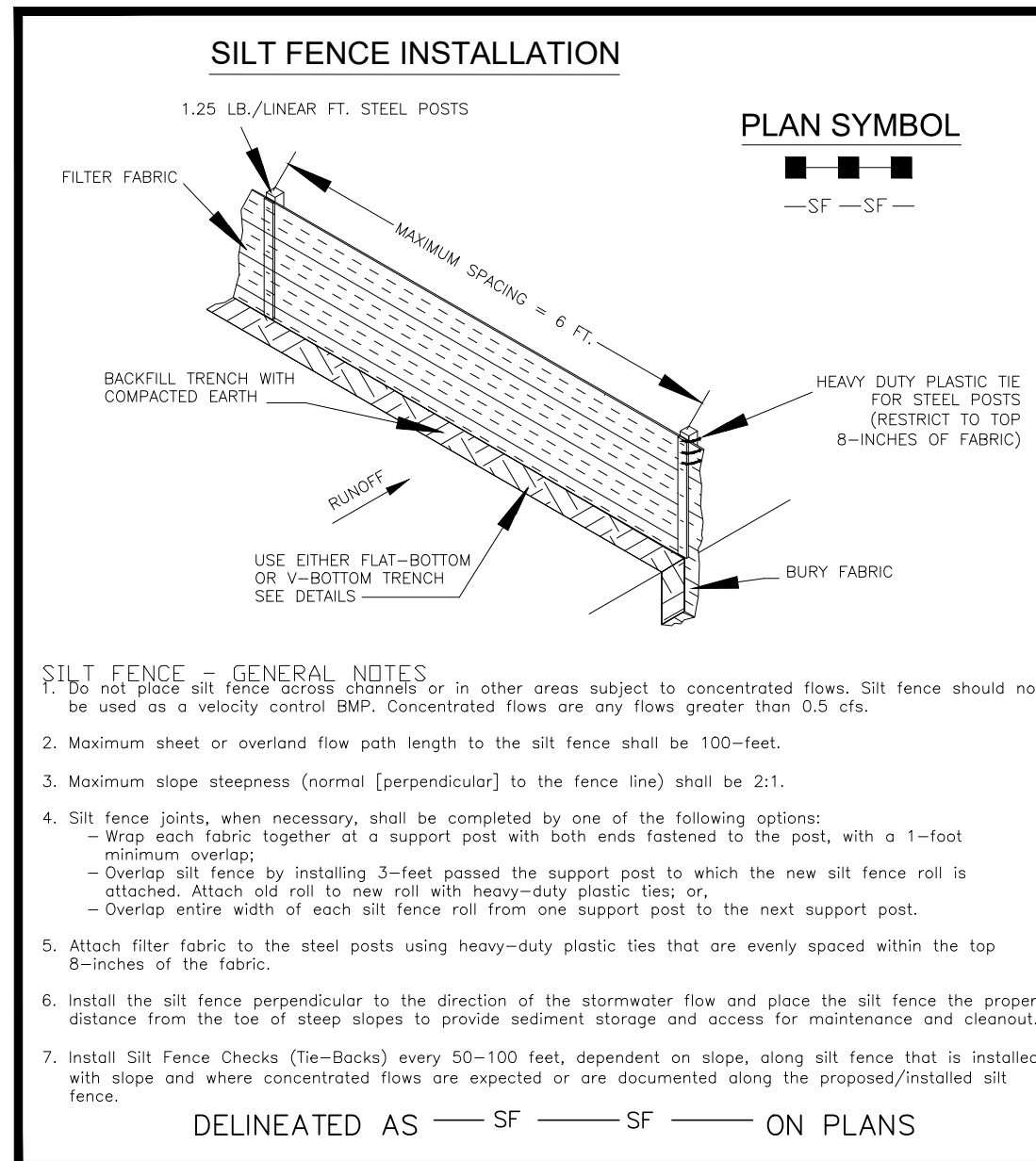
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GRADING, DRAINAGE, & UTILITY PLAN

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 14-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, 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 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 PLAN IN ACCORDANCE WITH S.C. REG. 72-300 ET SEQ. AND SCDHEC0000.
- TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM SLOPE 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 CANNOT 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, INSPECTION 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 DURING 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.



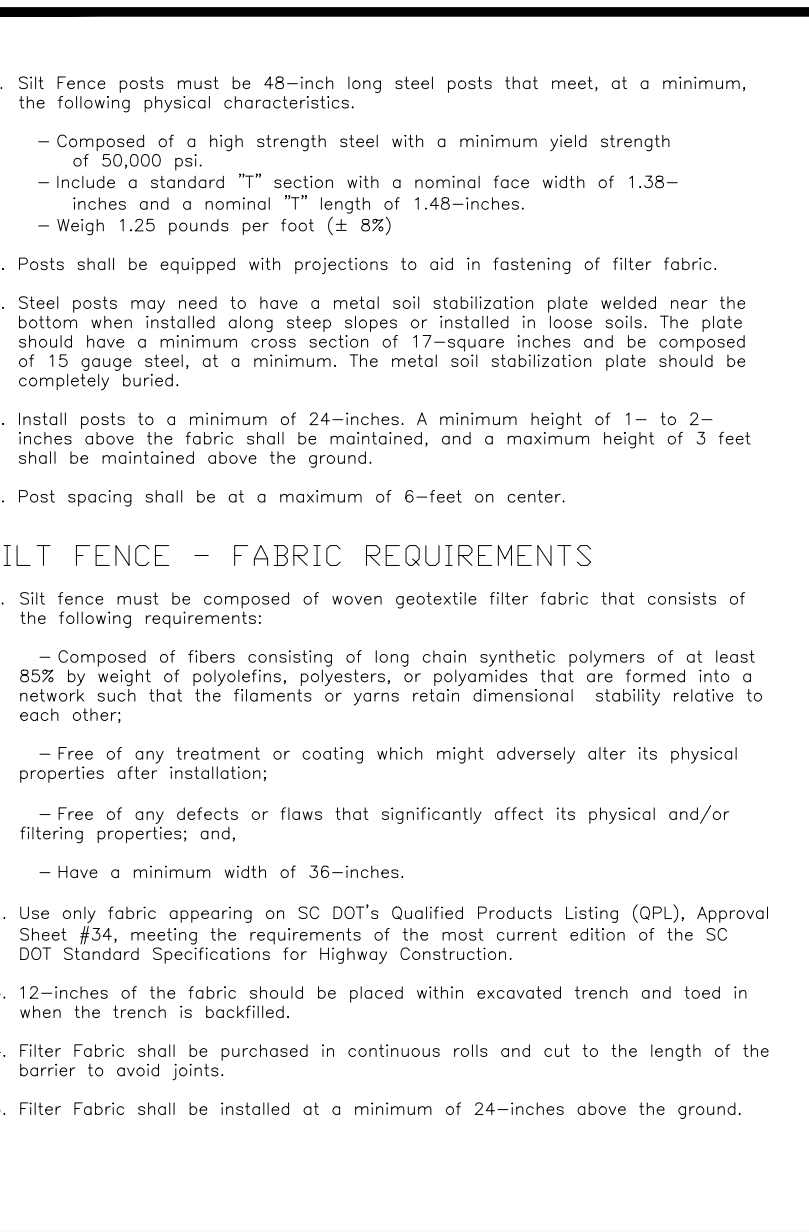
South Carolina Department of Health and Environmental Control

SILT FENCE

STANDARD DRAWING NO. SC-03 PAGE 1 OF 2

NOT TO SCALE

FEBRUARY 2014 DATE



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 reinstall 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.

South Carolina Department of Health and Environmental Control

SILT FENCE

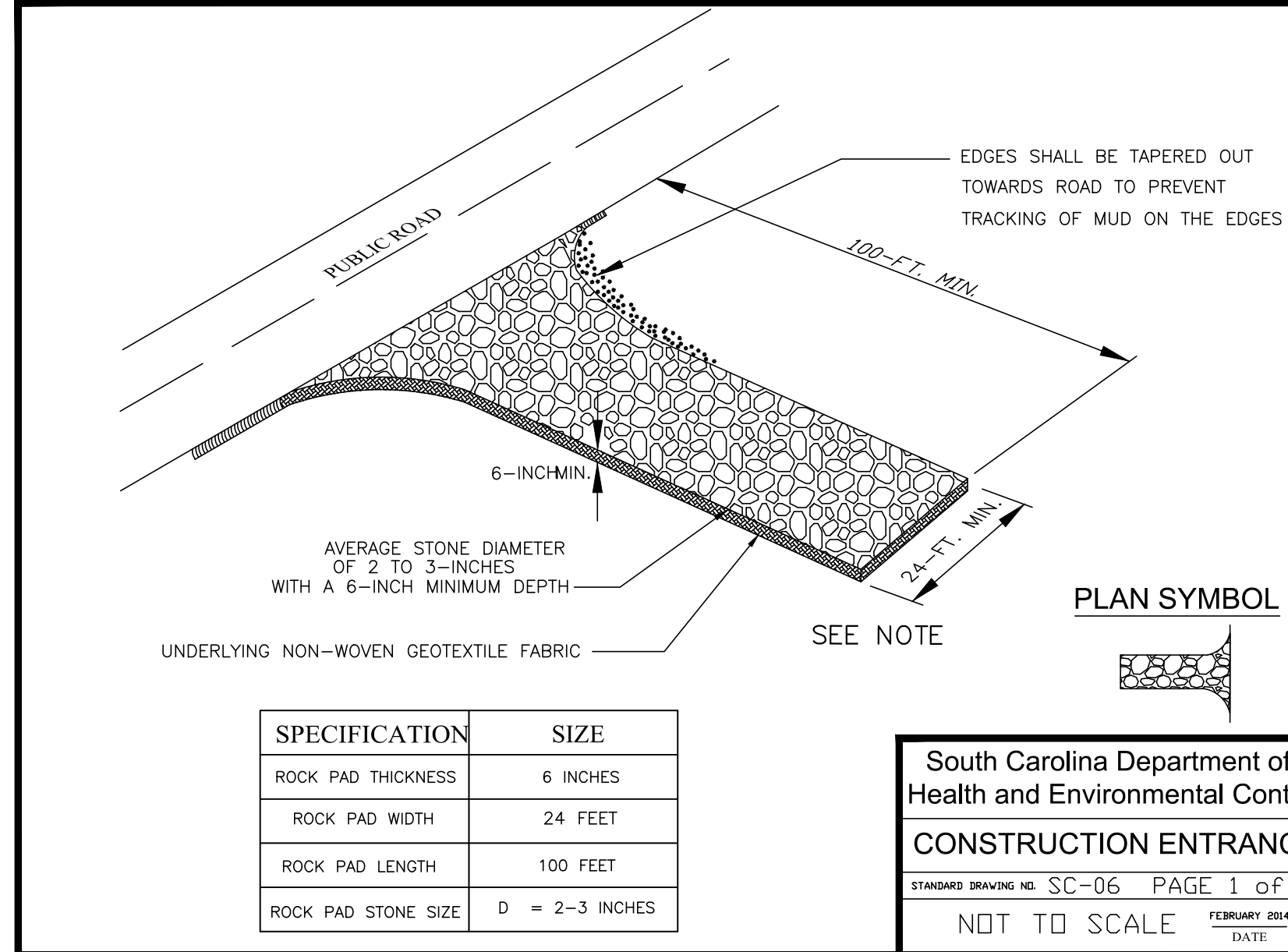
STANDARD DRAWING NO. SC-03 PAGE 2 OF 2

GENERAL NOTES

FEBRUARY 2014 DATE

SILT FENCE PROTECTION

1 C501



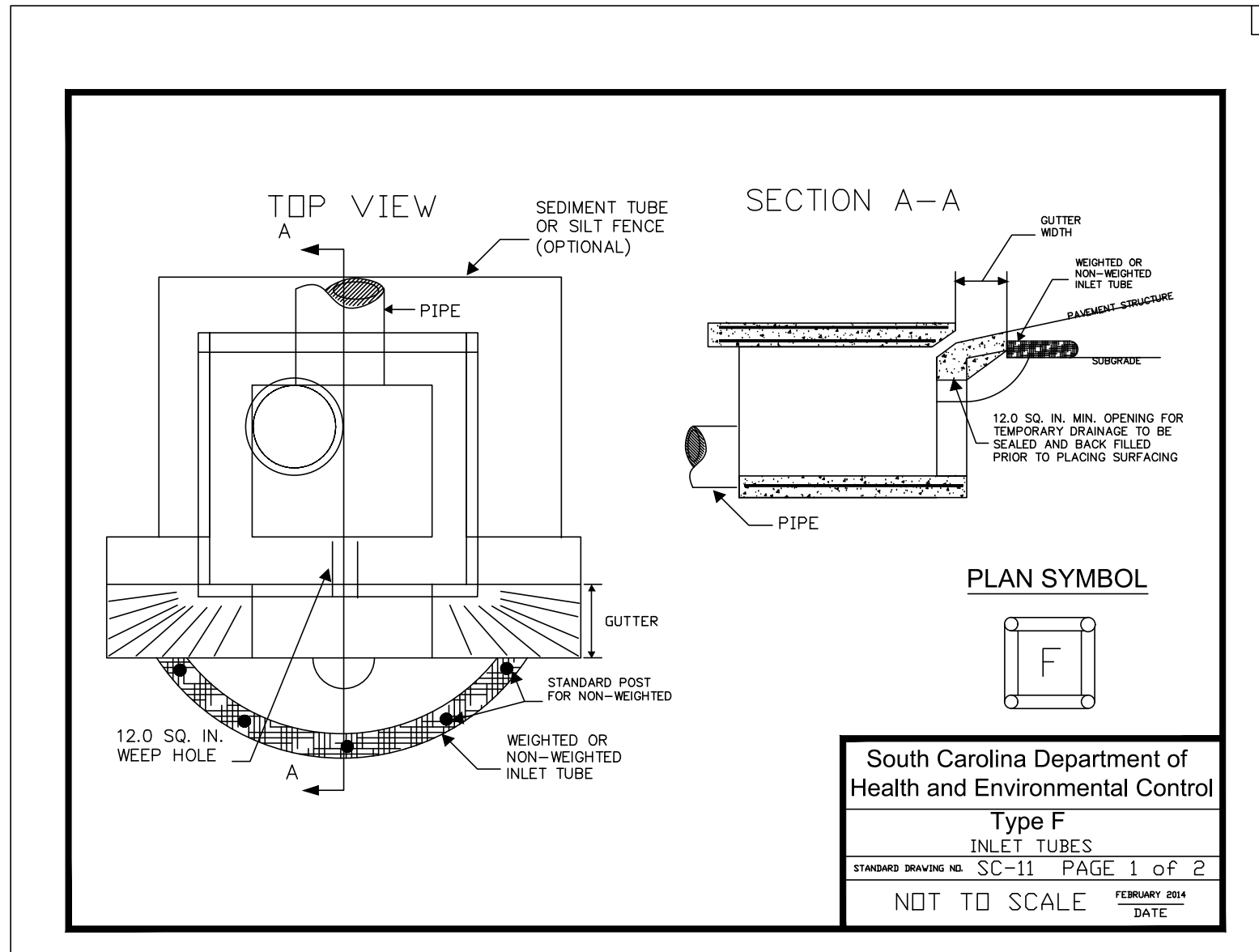
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CONSTRUCTION ENTRANCE

STANDARD DRAWING NO. SC-06 PAGE 2 OF 2

GENERAL NOTES

FEBRUARY 2014 DATE



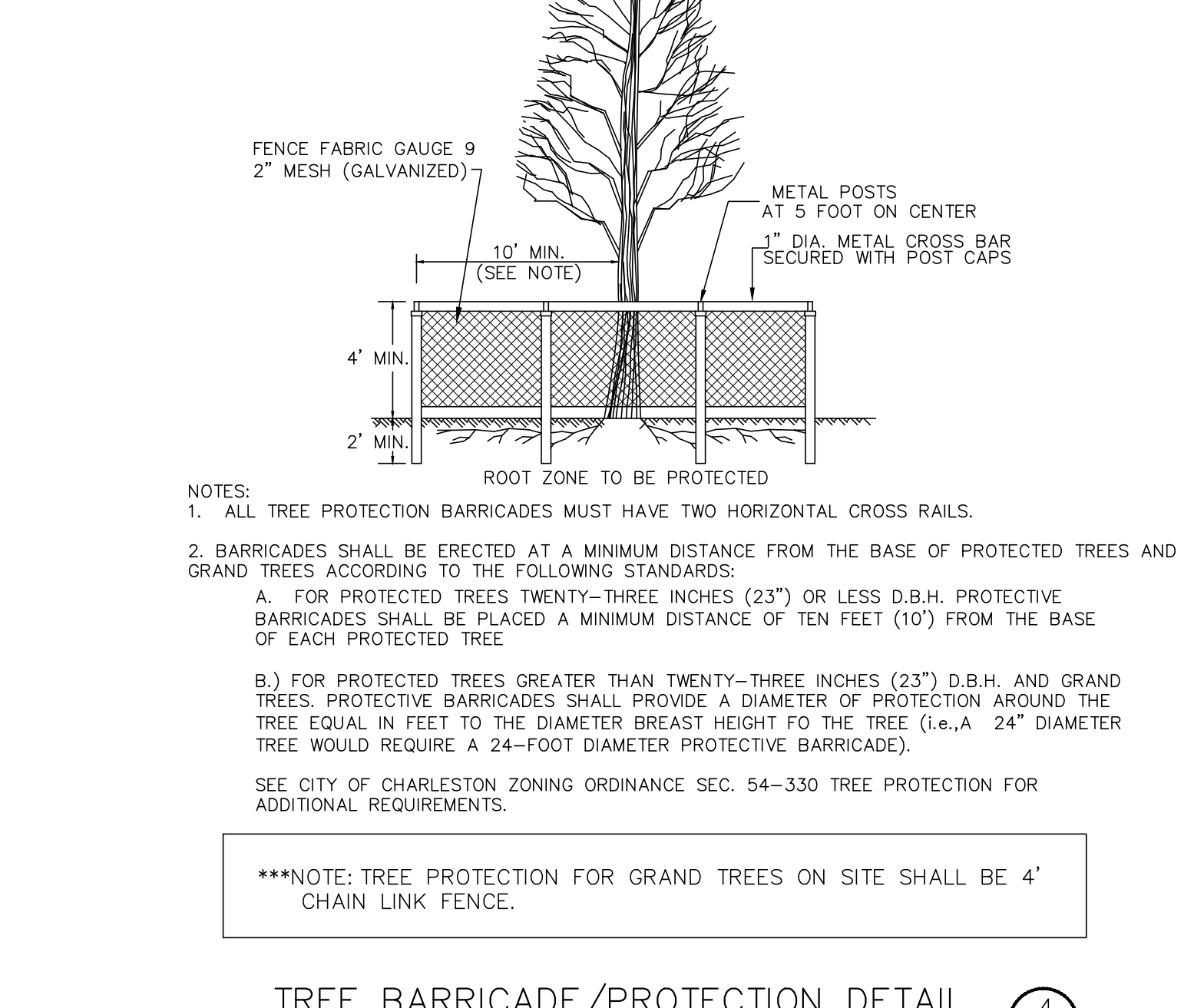
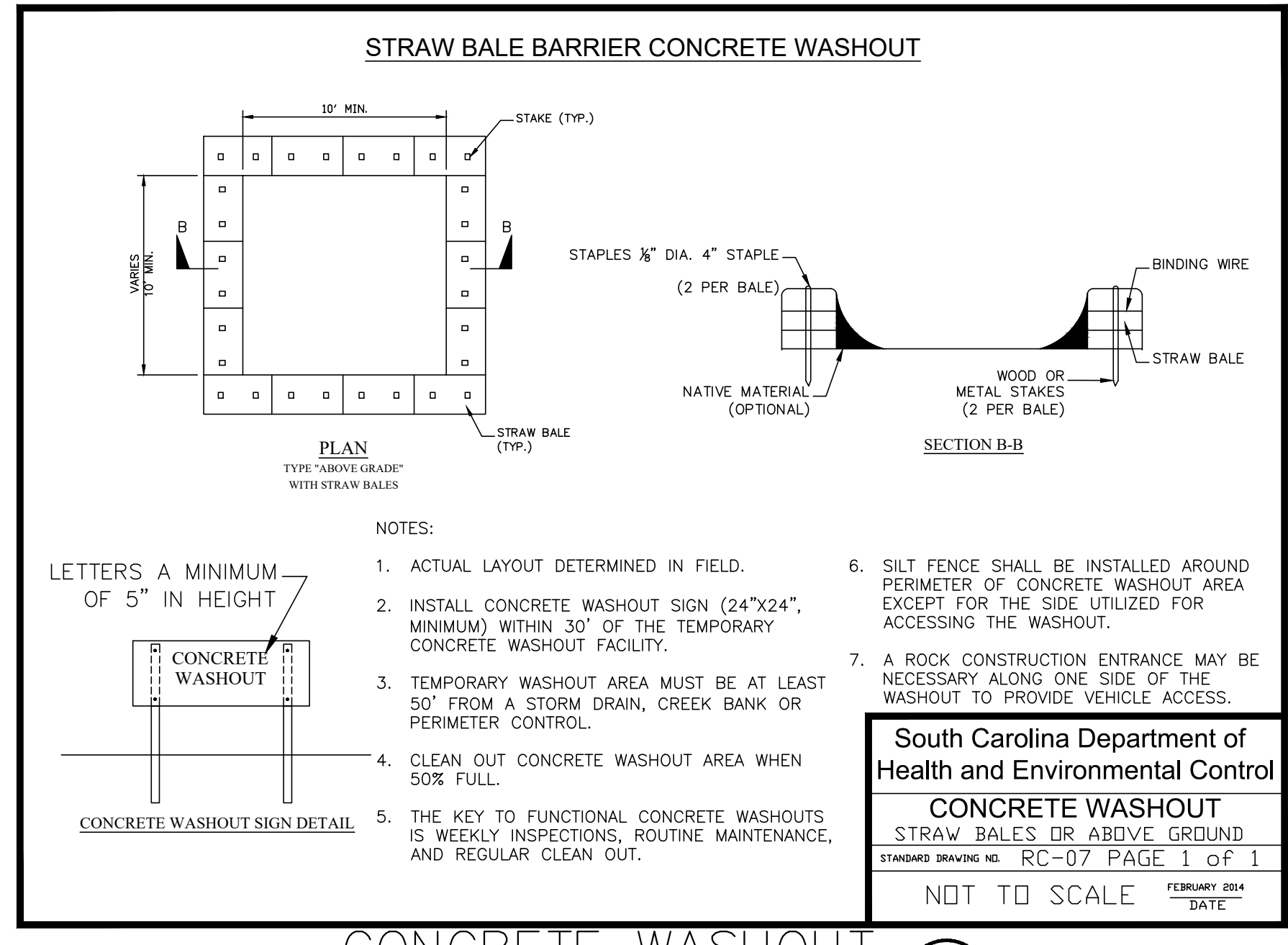
South Carolina Department of Health and Environmental Control

TYPE F INLET TUBES

STANDARD DRAWING NO. SC-11 PAGE 2 OF 2

GENERAL NOTES

FEBRUARY 2014 DATE



GBA

GLICK BOEHM ARCHITECTURE

PLANNING INTERIOR DESIGN

ARCHITECTURE PLANNING INTERIOR DESIGN

493 King Street, Suite 100 Charleston, South Carolina 29403

F:843.772.1768 www.gbaarch.com

REV.	DATE	DESCRIPTION

FORSEBERG ENGINEERING & SURVEYING, INC.

NO. C00343

STATE OF SOUTH CAROLINA

REGISTERED PROFESSIONAL ENGINEER

29925

FEBRUARY 2014 DATE

TAXPAYER SERVICE CENTER

COLLETON COUNTY

118 BENSON STREET

WALTERBORO, SC 29488

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JOB NUMBER: 1904

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11/23/2020

CONSTRUCTION DETAILS

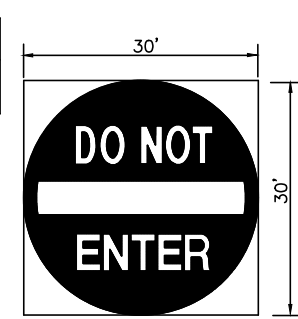
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SPECIAL R/W NOTES FOR SCDOT PROJECTS:

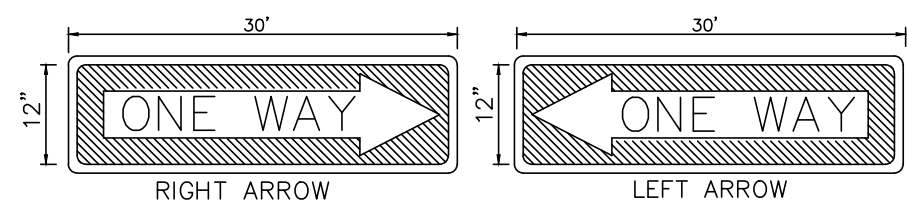
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- 6) THE DETAILS SHOWN ON THIS PLAN ARE FOR REFERENCE ONLY. FULL SIZE DETAILS ARE AVAILABLE ON THE SCDOT WEBSITE AT http://www.scdot.org/doing/sd_Book.aspx

NUMBER	SIZE	CLASS
*R5-1-30	30" X 30"	STANDARD

(REFERENCE: THE SOUTH CAROLINA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS)
LEGEND AND BACKGROUND: WHITE REFLECTORIZED.
CIRCLE: RED-REFLECTORIZED.



"DO NOT ENTER" SIGN



RIGHT ARROW

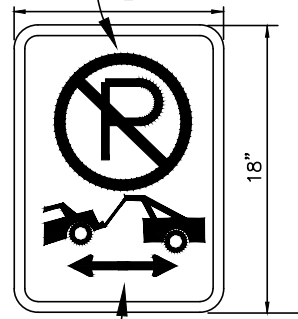
TYPE	NUMBER	SIZE	CLASS
RIGHT ARROW	*R6-1R-36	36" X 12"	STANDARD
LEFT ARROW	*R6-1L-36	36" X 12"	STANDARD

WHITE BACKGROUND - BLACK LETTERS WITH BLACK BORDER (REFERENCE: THE SOUTH CAROLINA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS)

"ONE WAY" SIGN

NUMBER	SIZE	CLASS
*R8-3	12" X 18"	STANDARD

(REFERENCE: THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS)

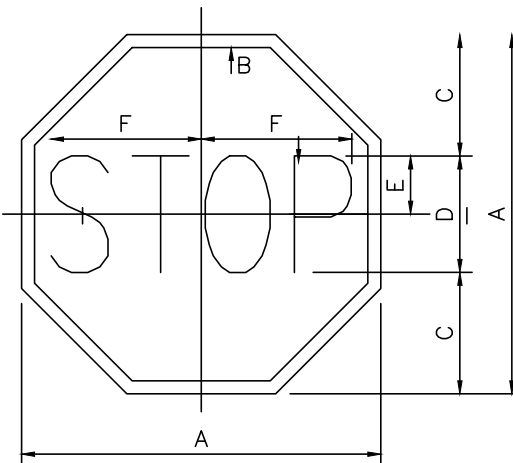


"NO PARKING PLZ"

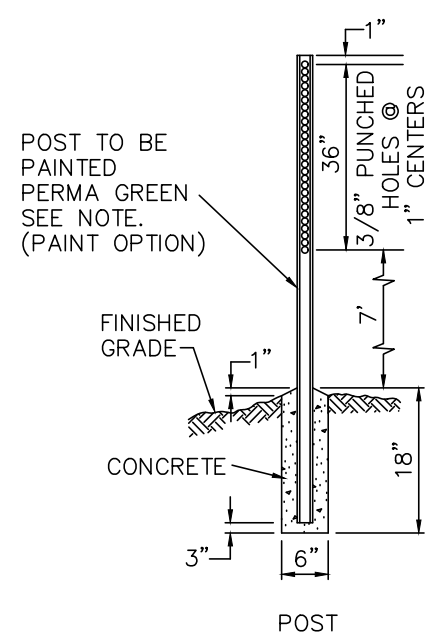
SIGN	DIMENSION (INCHES)					
	A	B	C	D	E	F
STD.	30	3/4	10	10C	5	12-1/2

LETTER INDICATES STANDARD ALPHABET SERIES

COLORS:
LEGEND - WHITE REFLECTORIZED PAINT
BACKGROUND - RED REFLECTORIZED PAINT



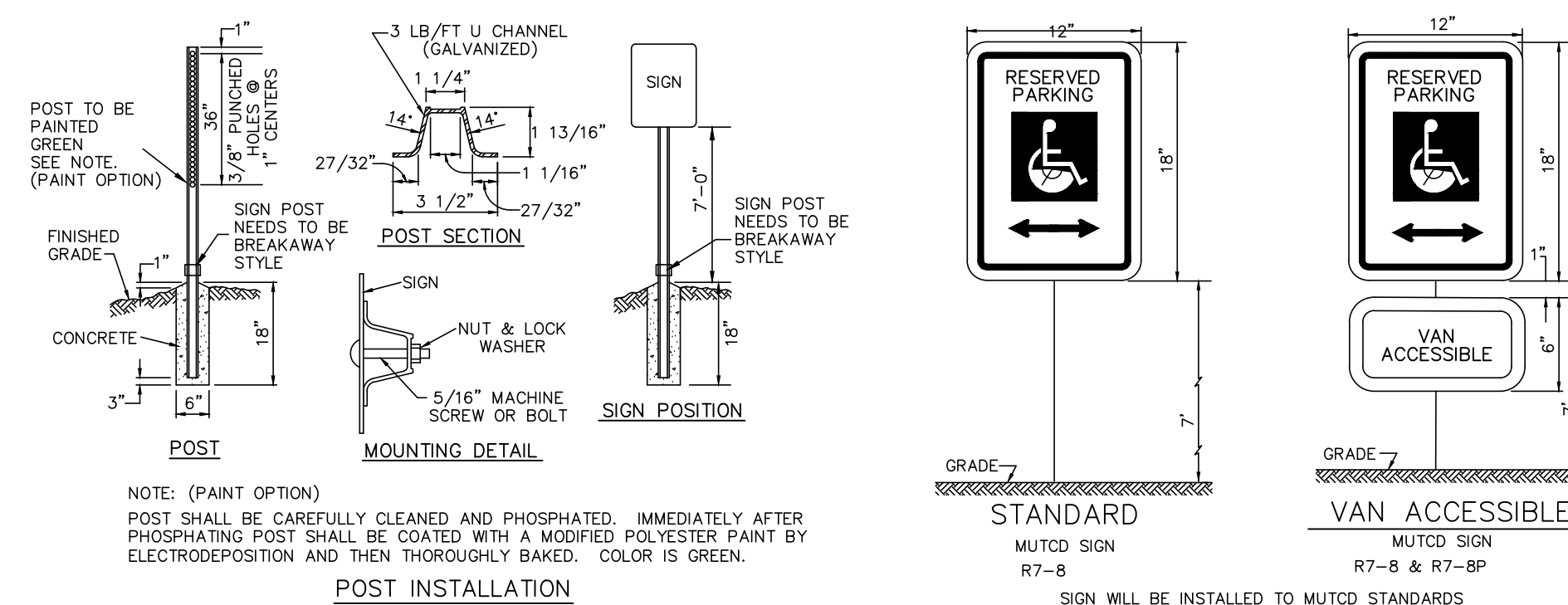
STOP SIGN DETAIL



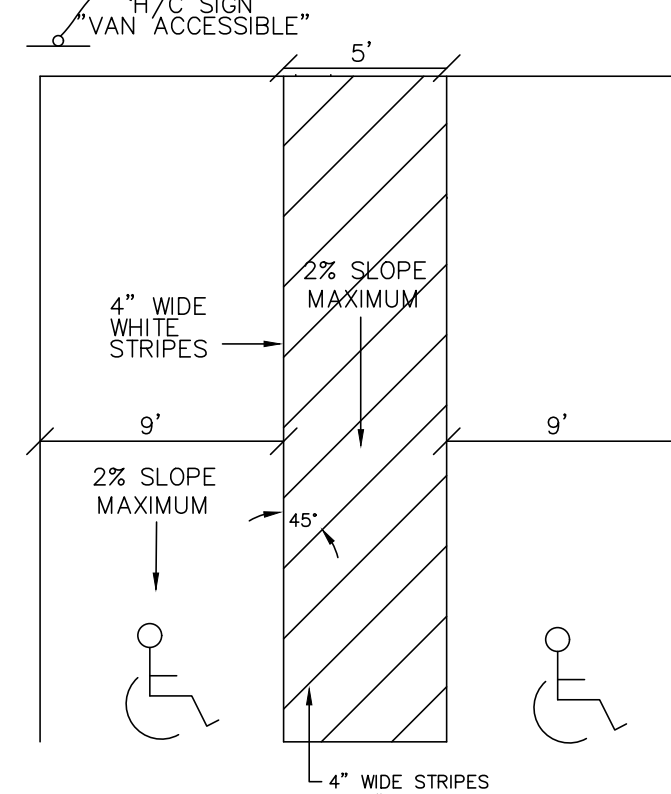
NOTE: (PAINT OPTION)
POST SHALL BE CAREFULLY CLEANED AND PHOSPHATED. IMMEDIATELY AFTER PHOSPHATING POST SHALL BE COATED WITH A MODIFIED POLYESTER PAINT BY ELECTRODEPOSITION AND THEN THOROUGHLY BAKED. COLOR IS PERMA-GREEN PER FEDERAL STANDARD 595-A COLOR NUMBER 14109 (DARK LIME V-).

STOP SIGN & POST DETAIL

4
C502



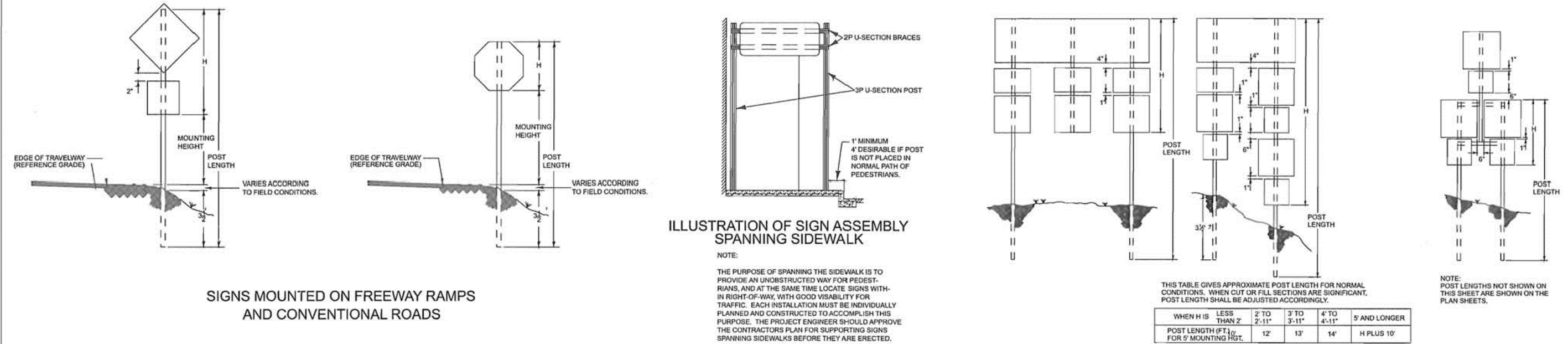
HANDICAPPED PARKING SIGN



HANDICAP PARKING DETAIL

3
C502

FLAT SHEET SIGN MOUNTING DETAILS



SIGNS MOUNTED ON FREEWAY RAMP AND CONVENTIONAL ROADS

ILLUSTRATION OF SIGN ASSEMBLY SPANNING SIDEWALK

REFERENCES

SIGNING AND MARKING ENGINEER

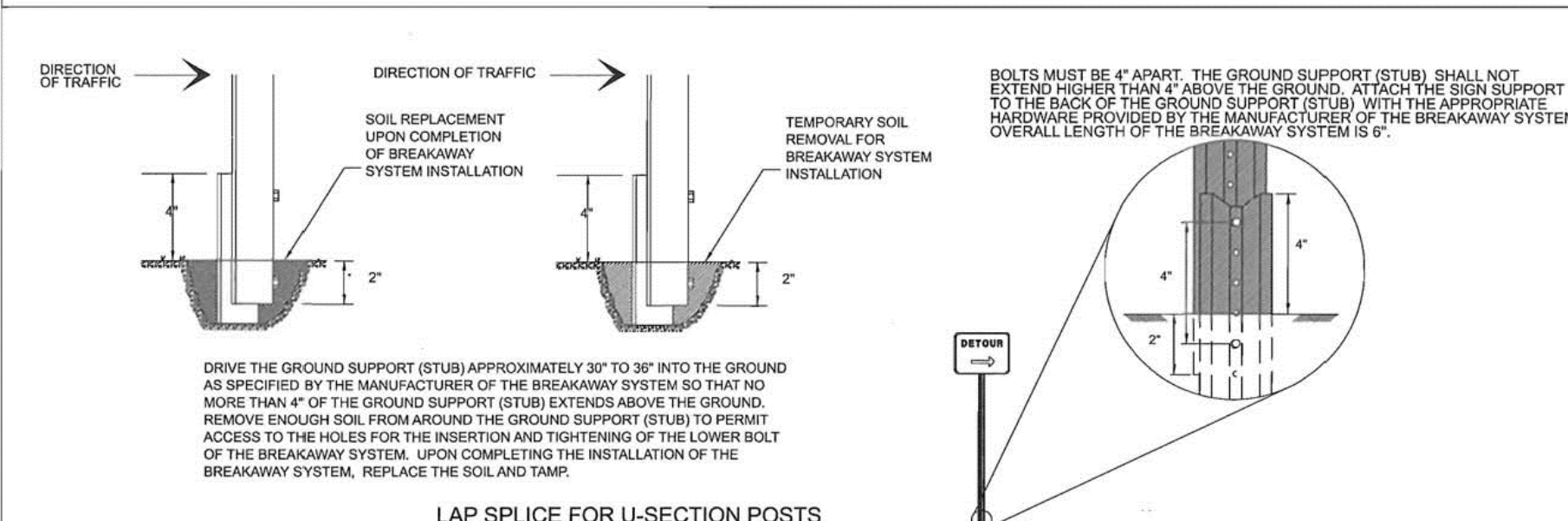


DATE: 2-11-08

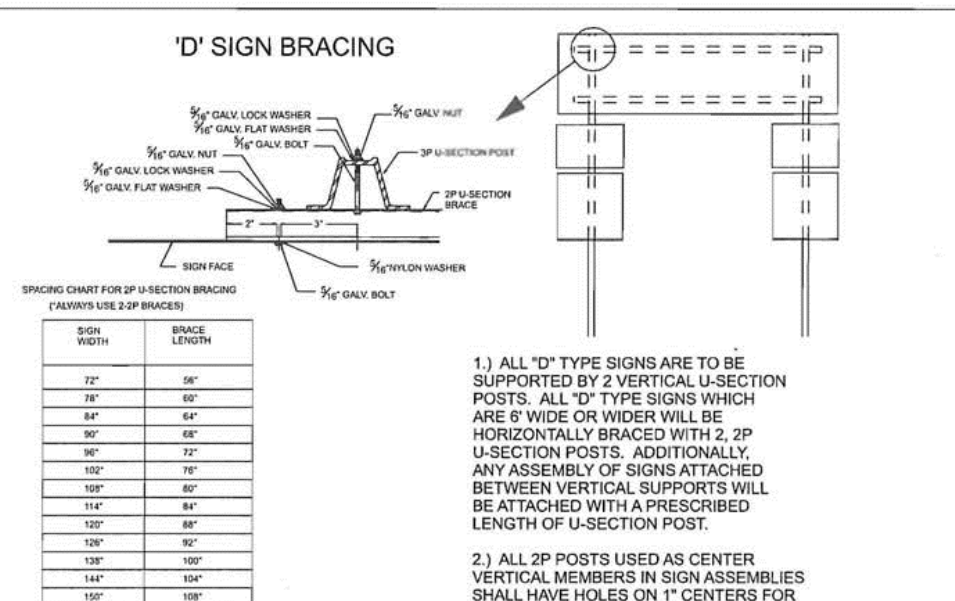


STANDARD DRAWING

FLAT SHEET MOUNTING DETAILS
651-110-00
EFFECTIVE LETTING DATE: MAY 2008



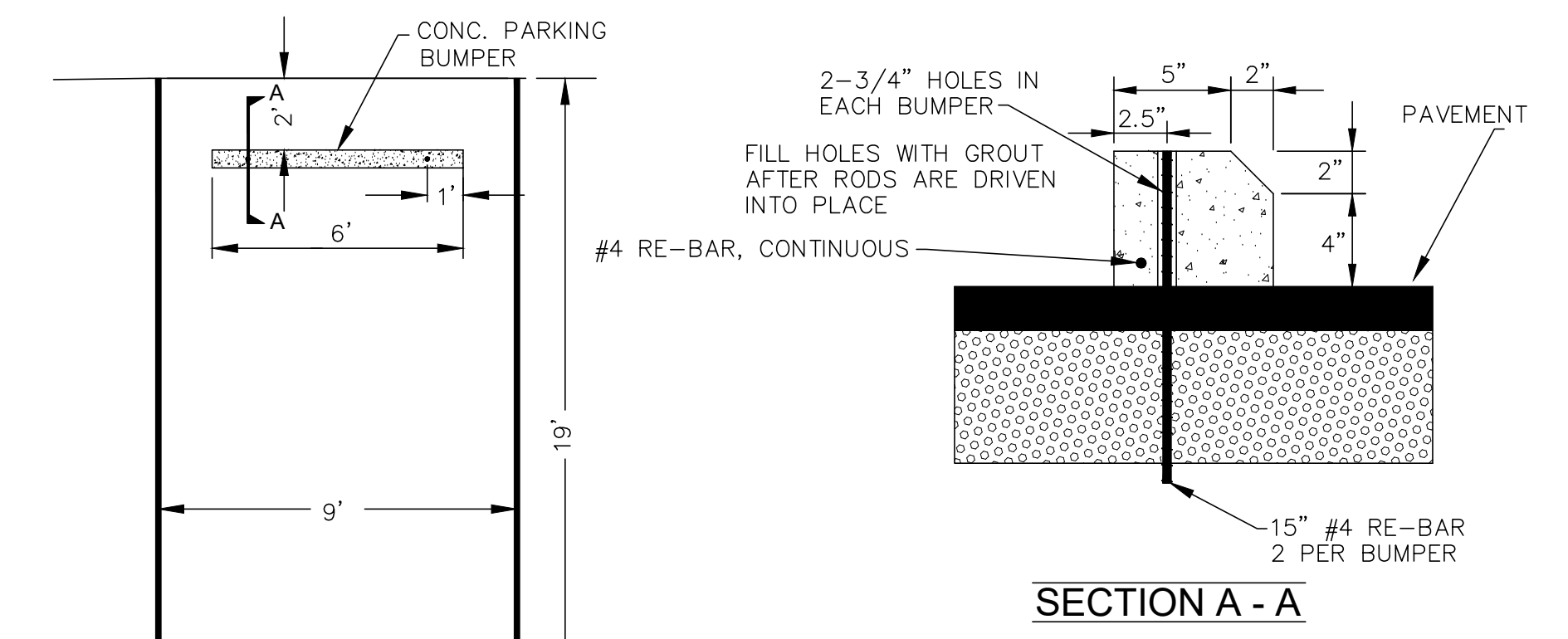
LAP SPLICE FOR U-SECTION POSTS



"D" SIGN BRACING

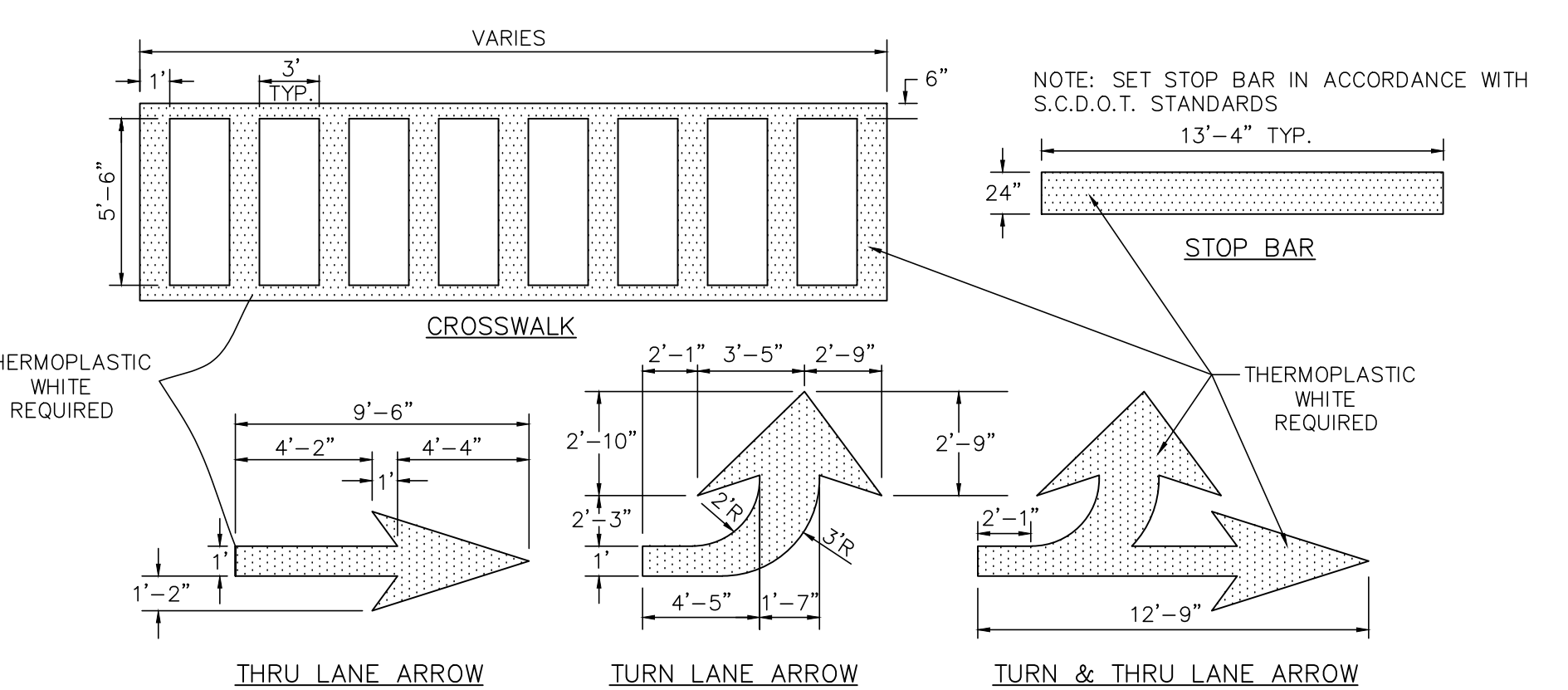
SIGN NO.	POST NO.	POST SIZE				POST QUANTITY PER SIGN	POST LENGTH (INCHES)	POST DIA. (INCHES)	POST WEIGHT (LBS)	POST CLASS
		W	H	T	D					
80110	1	12	12	12	1	12	1.315	1.315	12	
80112	1	12	12	12	1	12	1.315	1.315	12	
80114	1	12	12	12	1	12	1.315	1.315	12	
80116	1	12	12	12	1	12	1.315	1.315	12	
80118	1	12	12	12	1	12	1.315	1.315	12	
80120	1	12	12	12	1	12	1.315	1.315	12	
80122	1	12	12	12	1	12	1.315	1.315	12	
80124	1	12	12	12	1	12	1.315	1.315	12	
80126	1	12	12	12	1	12	1.315	1.315	12	
80128	1	12	12	12	1	12	1.315	1.315	12	
80130	1	12	12	12	1	12	1.315	1.315	12	
80132	1	12	12	12	1	12	1.315	1.315	12	
80134	1	12	12	12	1	12	1.315	1.315	12	
80136	1	12	12	12	1	12	1.315	1.315	12	
80138	1	12	12	12	1	12	1.315	1.315	12	
80140	1	12	12	12	1	12	1.315	1.315	12	
80142	1	12	12	12	1	12	1.315	1.315	12	
80144	1	12	12	12	1	12	1.315	1.315	12	
80146	1	12	12	12	1	12	1.315	1.315	12	
80148	1	12	12	12	1	12	1.315	1.315	12	
80150	1	12	12	12	1	12	1.315	1.315	12	
80152	1	12	12	12	1	12	1.315	1.315	12	
80154	1	12	12	12	1	12	1.315	1.315	12	
80156	1	12	12	12	1	12	1.315	1.315	12	
80158	1	12	12	12	1	12	1.315	1.315	12	
80160	1	12	12	12	1	12	1.315	1.315	12	
80162	1	12	12	12	1	12	1.315	1.315	12	
80164	1	12	12	12	1	12	1.315	1.315	12	
80166	1	12	12	12	1	12	1.315	1.315	12	

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

1
C502



PAVEMENT MARKING DETAIL

2
C502

S.C.D.O.T. SIGNING ASSEMBLY DETAIL

5
C502

GBA
GLICK BOEHM ARCHITECTURE
ARCHITECTURE PLANNING INTERIOR DESIGN
493 King Street, Suite 100 Charleston, South Carolina 29403
784.577.0377 www.gbaarch.com

REV.	DATE	DESCRIPTION

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
FORSEBERG ENGINEERING & SURVEYING, INC.
No. C00343
STATE OF SOUTH CAROLINA

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
29925
STATE OF SOUTH CAROLINA

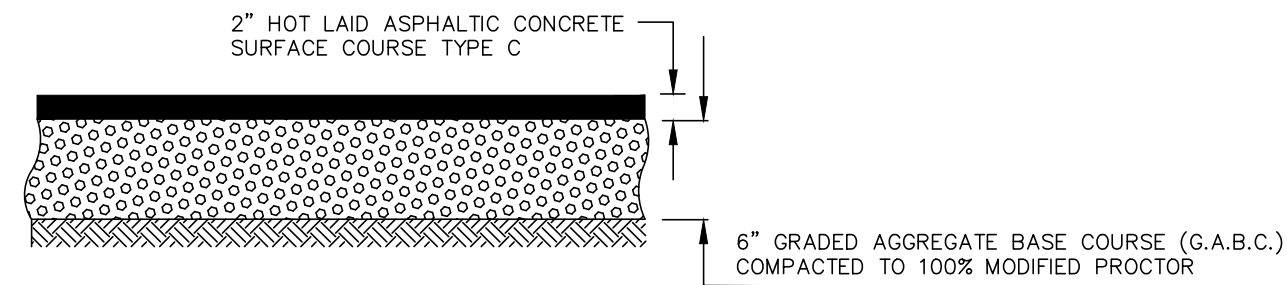
TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

DATE ISSUED FOR: CD5 11/23/2020

CONSTRUCTION DETAILS

2020
GLICKBOEHM & ASSOCIATES, INC.
JOB NUMBER: 1904
PROJECT MGR: SH
DRAWN BY: TL
CHECKED BY: GL
APPROVED BY: TL
DATE ISSUED FOR: CD5 11/23/2020

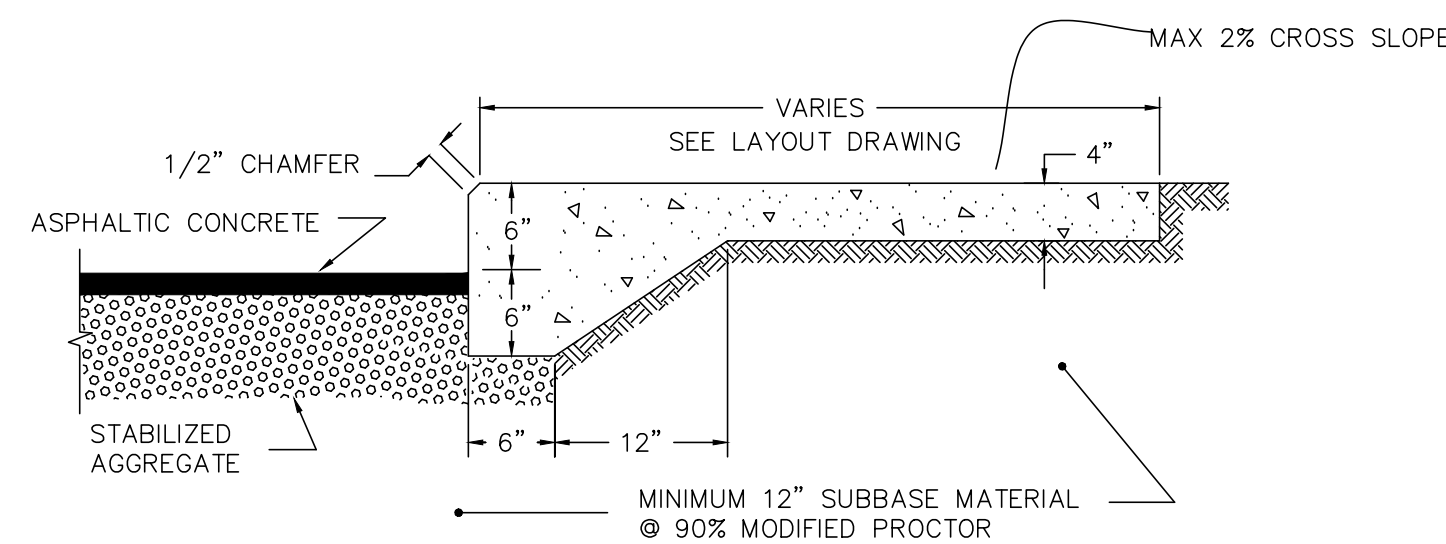
C502



***SEE CIVIL PAVEMENT AND BASE COURSE SPECIFICATION FOR DETAILED INFORMATION.

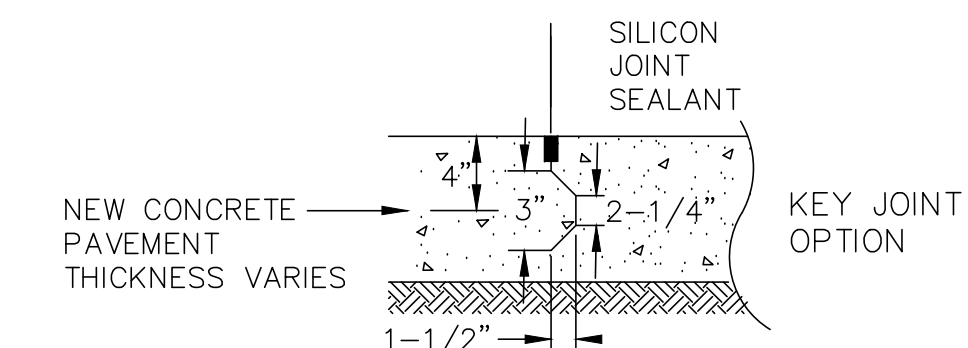
TYPICAL PAVEMENT SECTION
NOT TO SCALE

10
C503

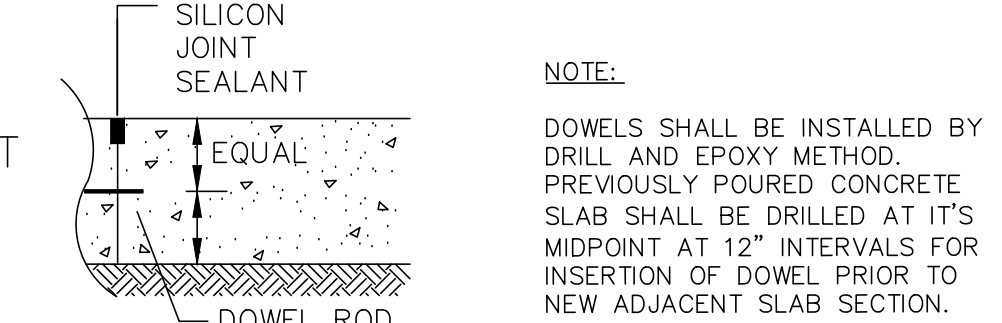


THICKENED EDGE SIDEWALK SECTION
NOT TO SCALE

6
C503



KEY JOINT OPTION



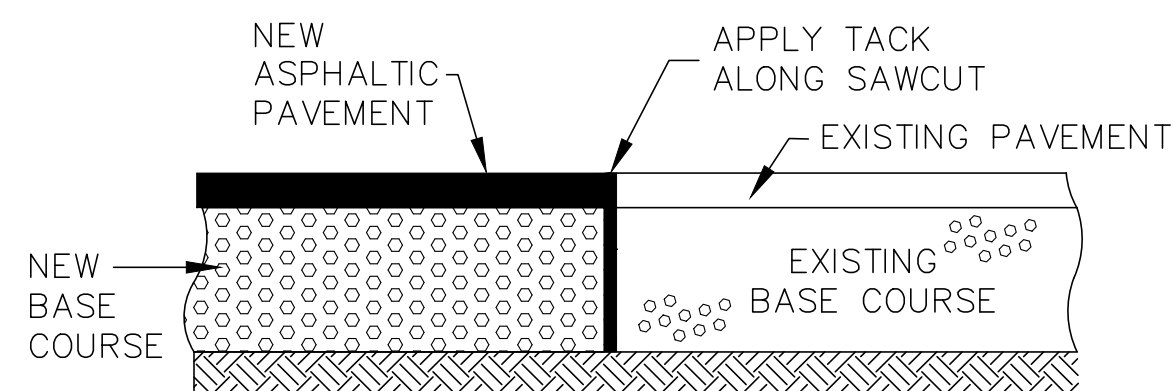
DOWEL JOINT OPTION

NOTE:
DOWELS SHALL BE INSTALLED BY DRILL AND EPOXY METHOD. PREVIOUSLY POURED CONCRETE SLAB SHALL BE DRILLED AT IT'S MIDPOINT AT 12" INTERVALS FOR INSERTION OF DOWEL PRIOR TO NEW ADJACENT SLAB SECTION.

CONSTRUCTION JOINT DETAIL

NOT TO SCALE

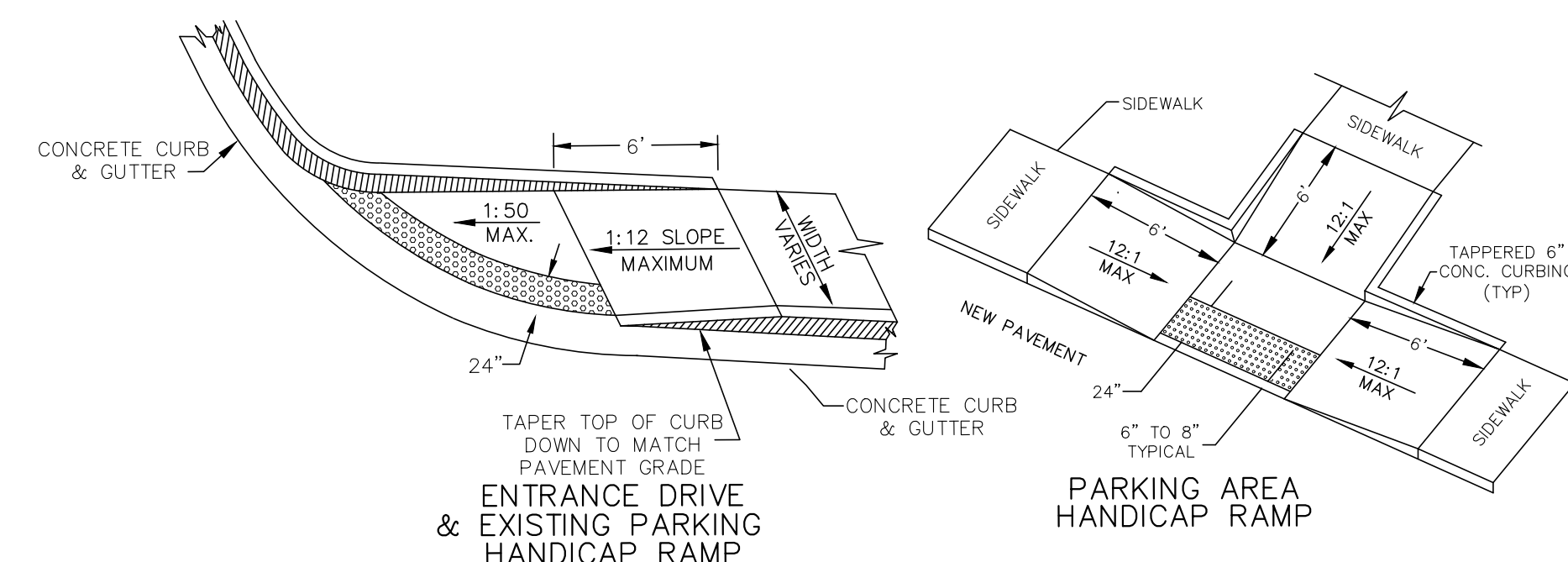
1
C503



PAVEMENT JOINING DETAIL

NOT TO SCALE

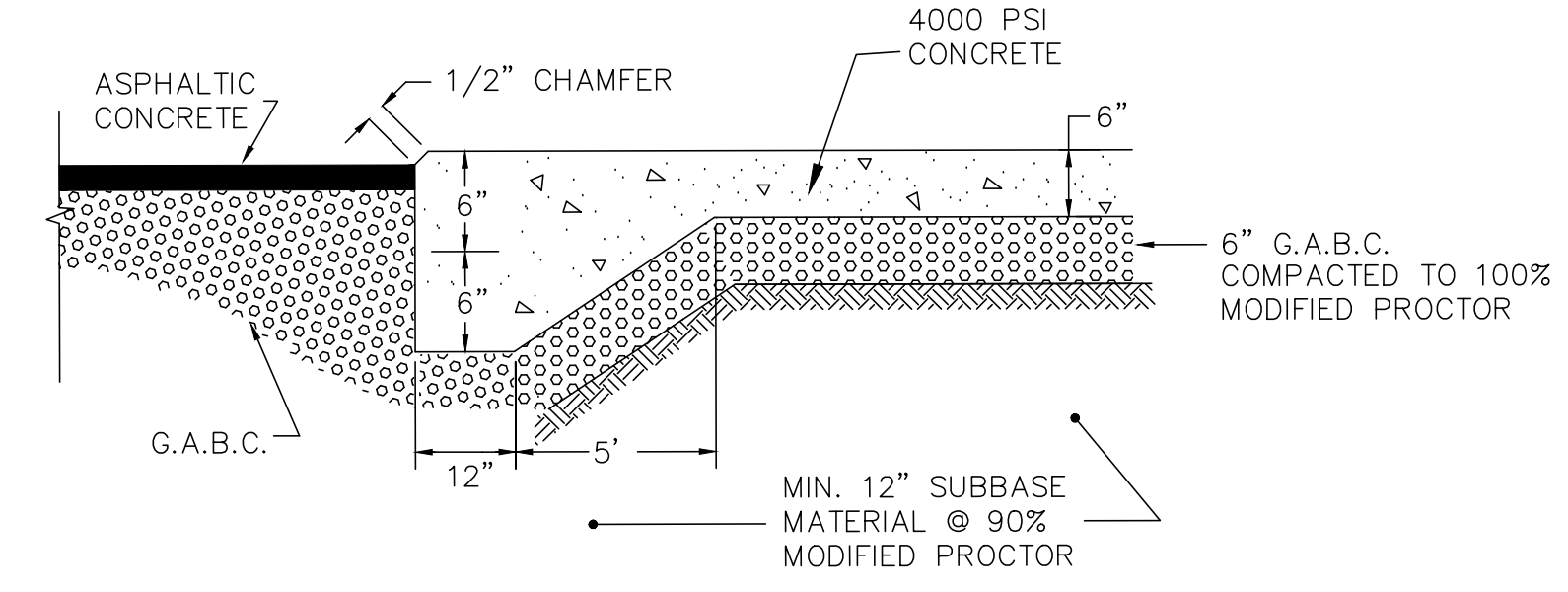
11
C503



HANDICAP RAMP

NOT TO SCALE

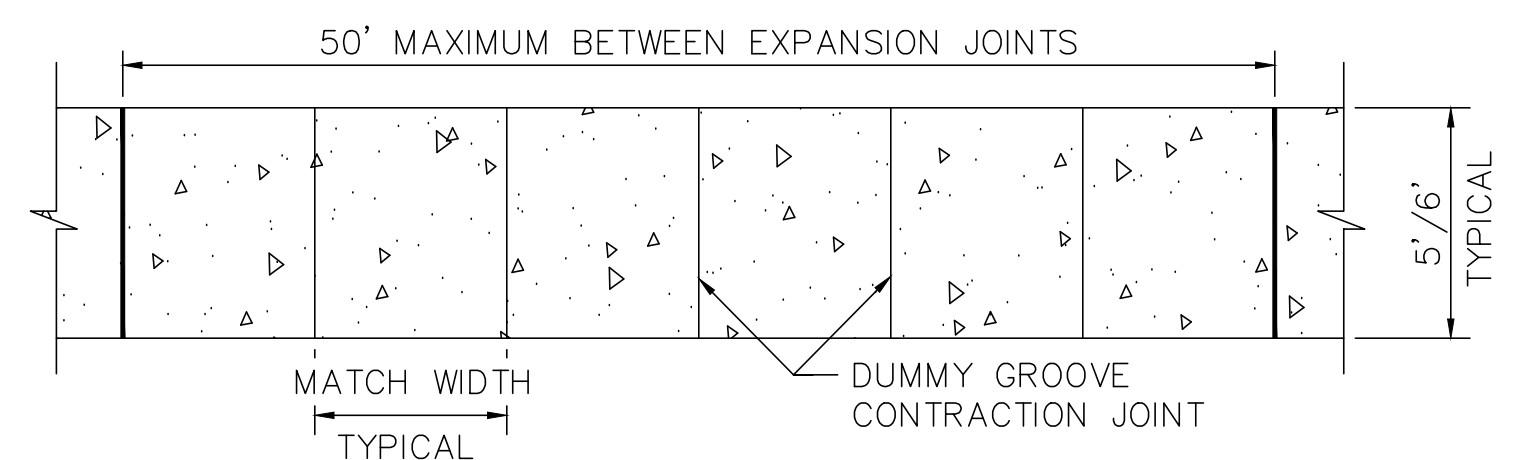
7
C503



THICKENED EDGE CONCRETE SLAB(AT ASPHALT PAVEMENT JOINING)

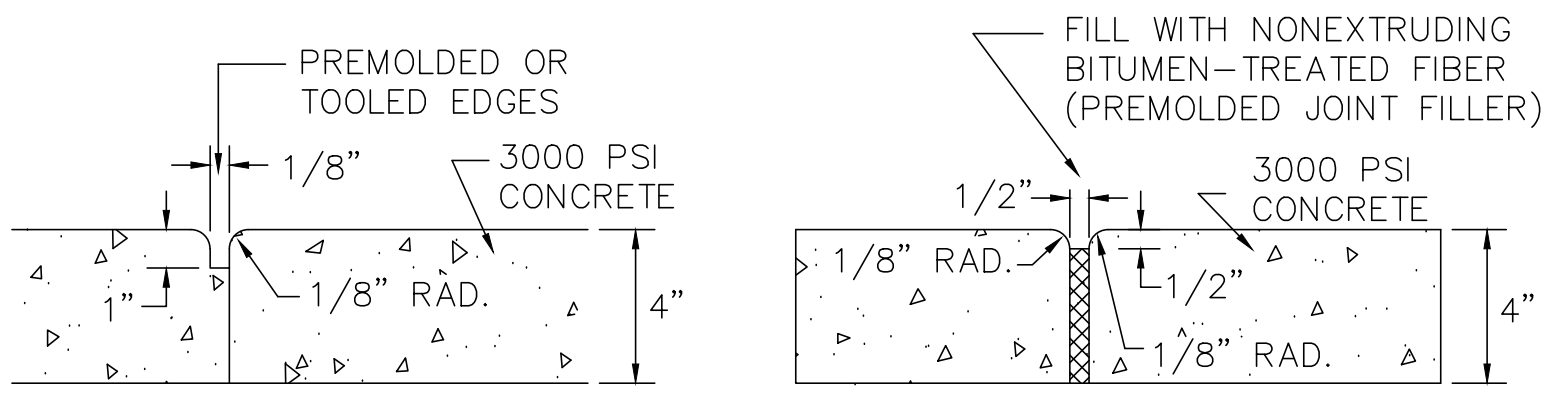
NOT TO SCALE

2
C503



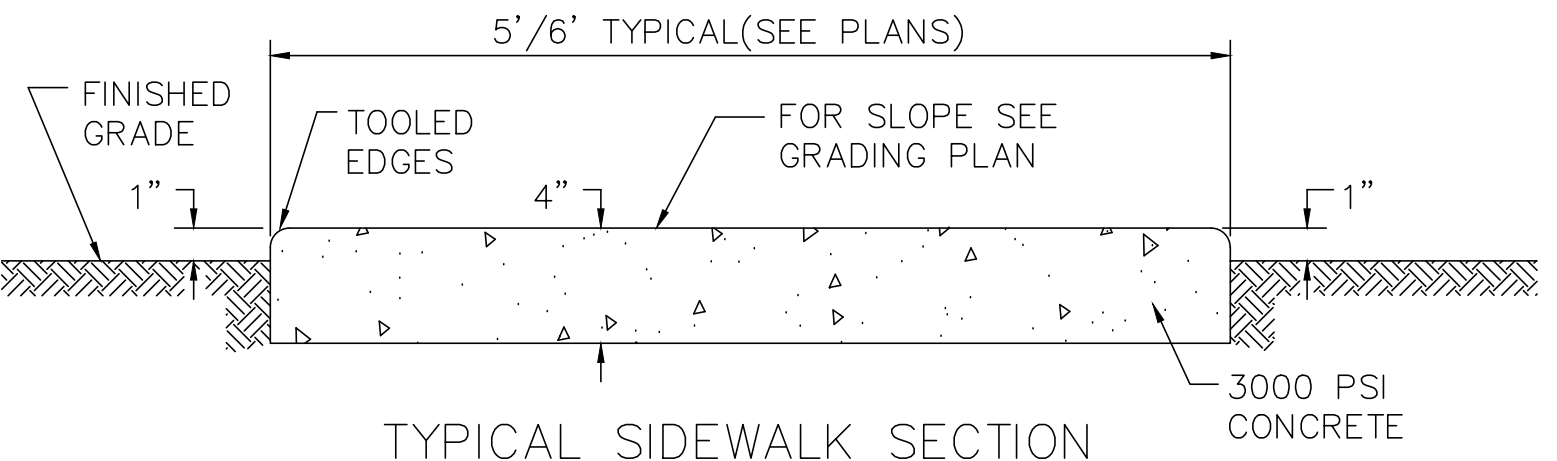
SIDEWALK PLAN

NOTE: ALSO PROVIDE EXPANSION JOINTS WHERE SIDEWALK ABUTS CURB & GUTTER AND/OR OTHER SIDEWALKS.



DUMMY GROOVE CONTRACTION JOINT

EXPANSION JOINT



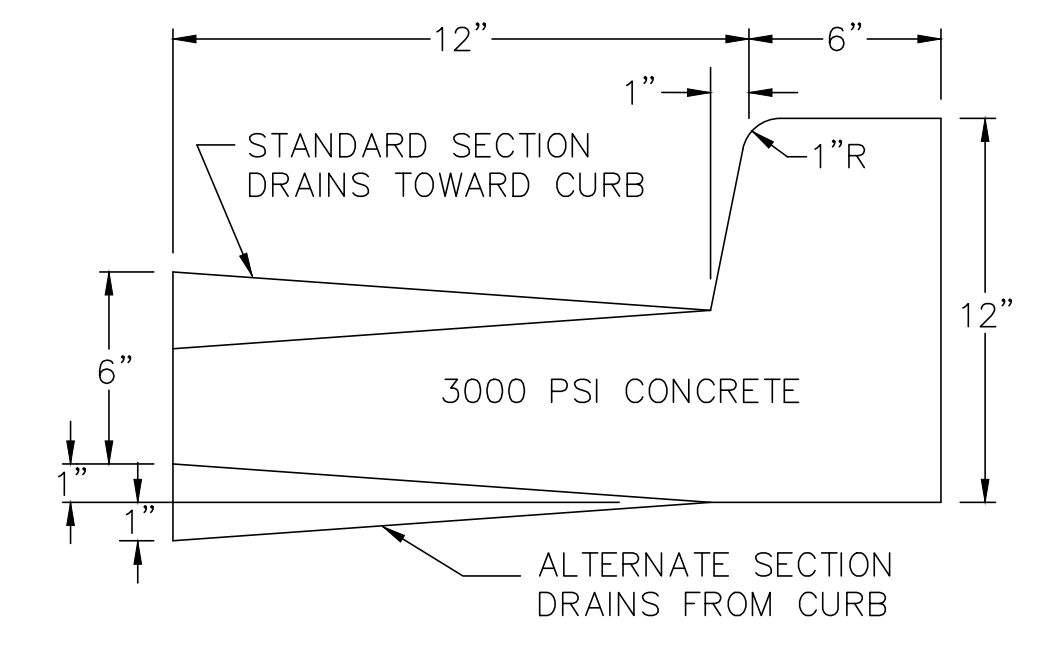
TYPICAL SIDEWALK SECTION

SIDEWALK DETAIL

NOT TO SCALE

12
C503

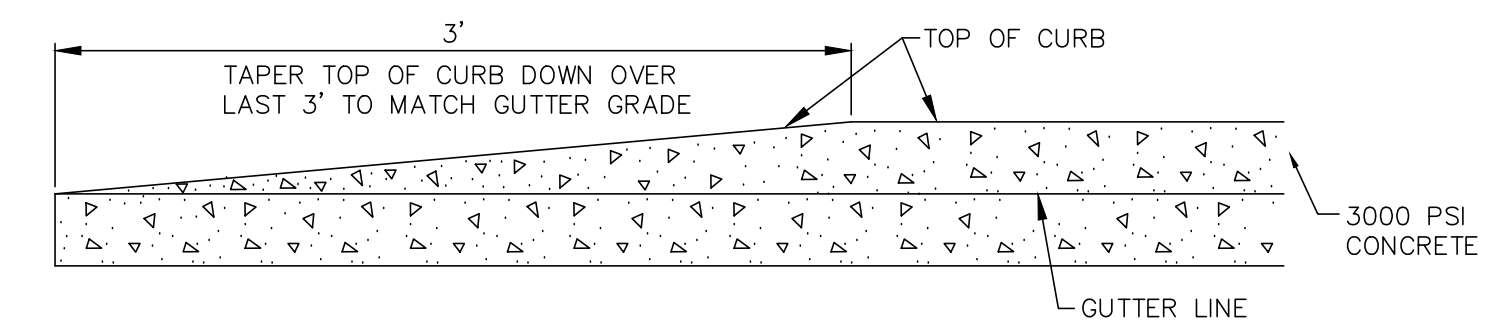
NOTE: SIDEWALK CONTRACTION JOINTS @ 6'-0" O.C., EXPANSION JOINTS @ 24'-0" O.C., UNLESS SHOWN OTHERWISE ON PLANS



CONCRETE CURB DETAIL

NOT TO SCALE

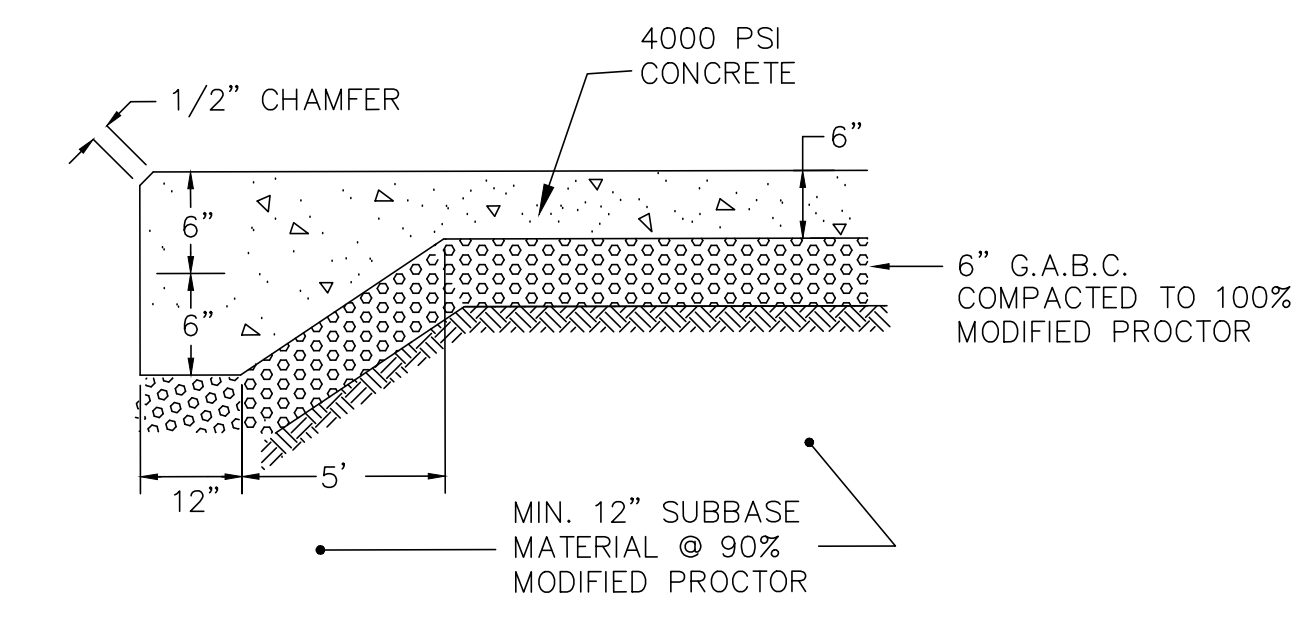
8
C503



CONCRETE CURB TAPER DETAIL

NOT TO SCALE

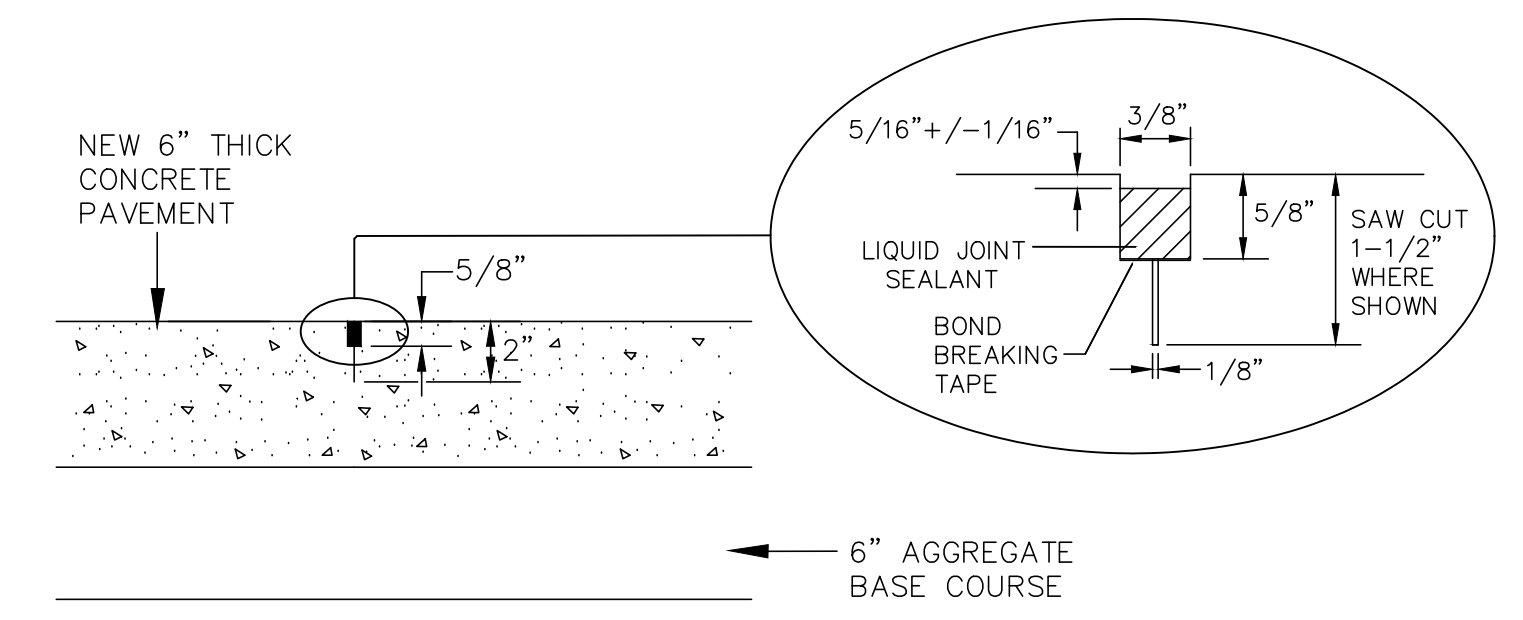
9
C503



THICKENED EDGE CONCRETE SLAB

NOT TO SCALE

4
C503

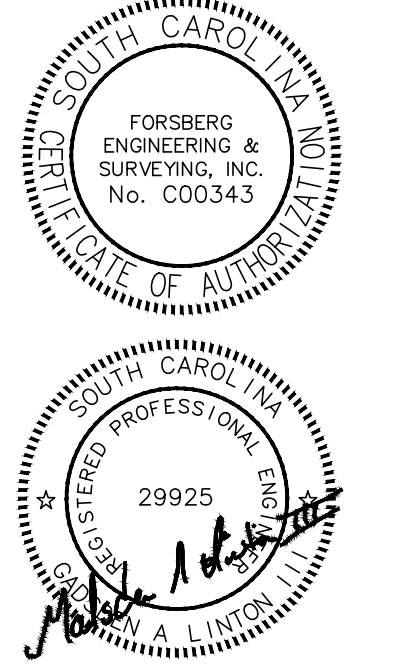


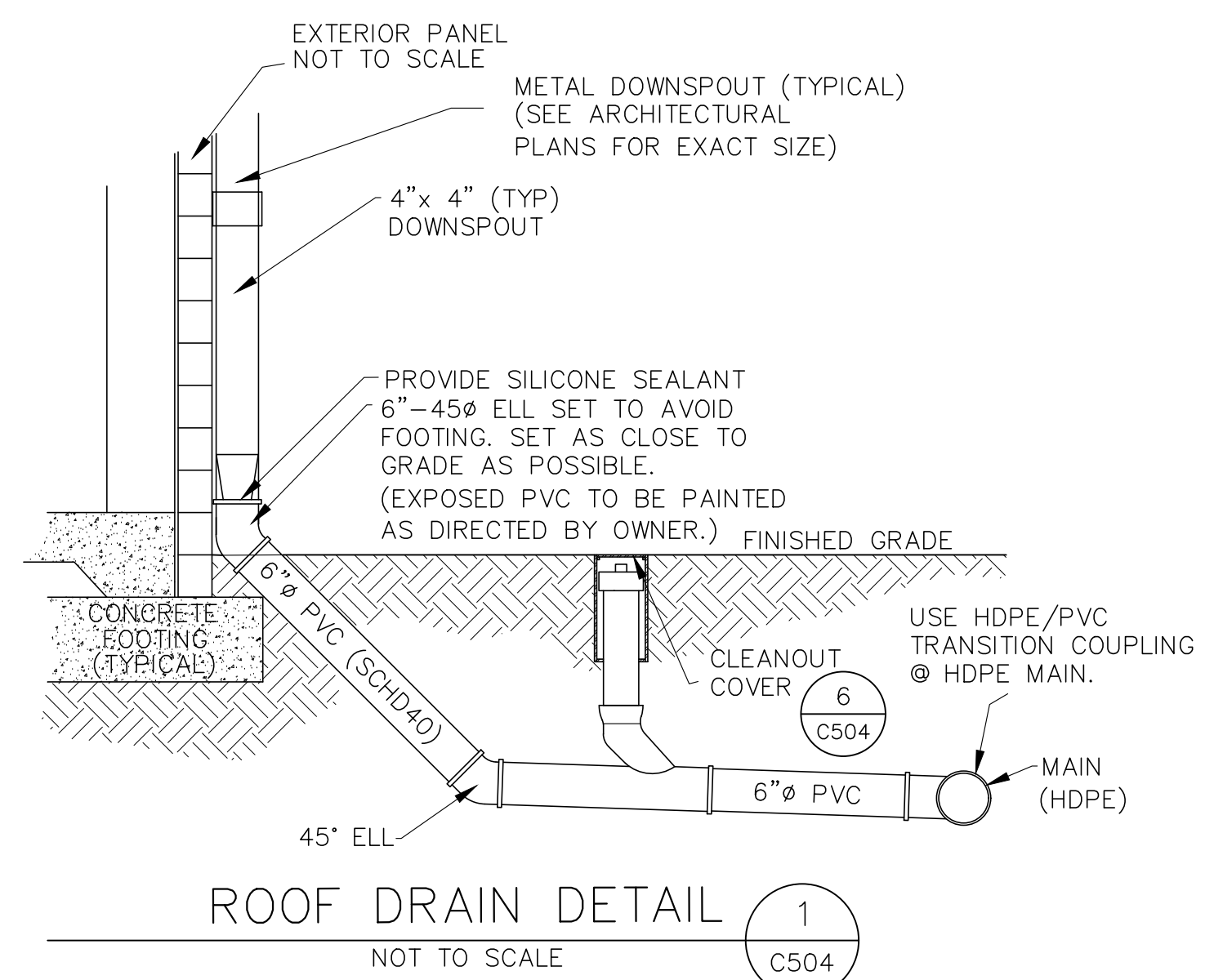
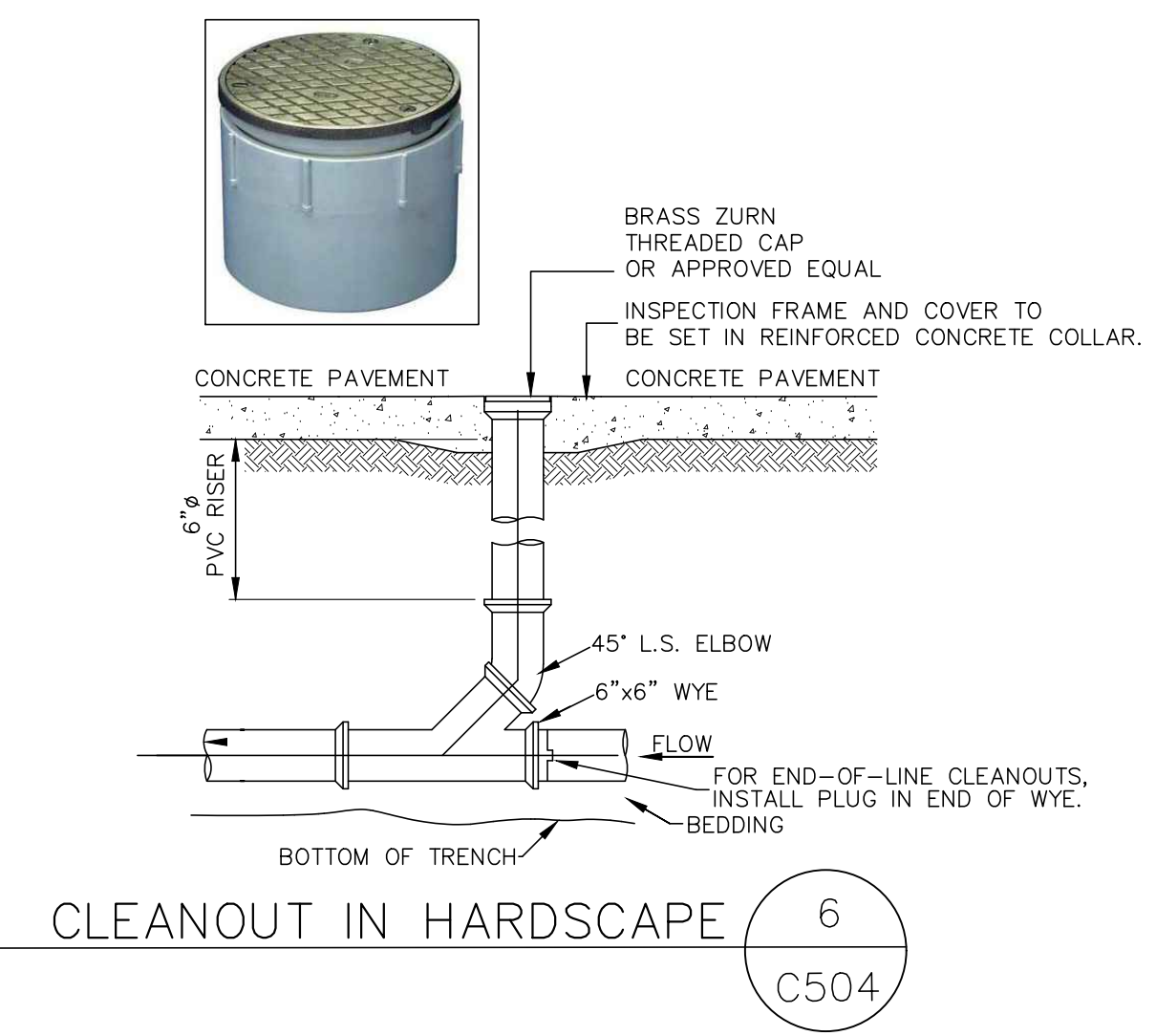
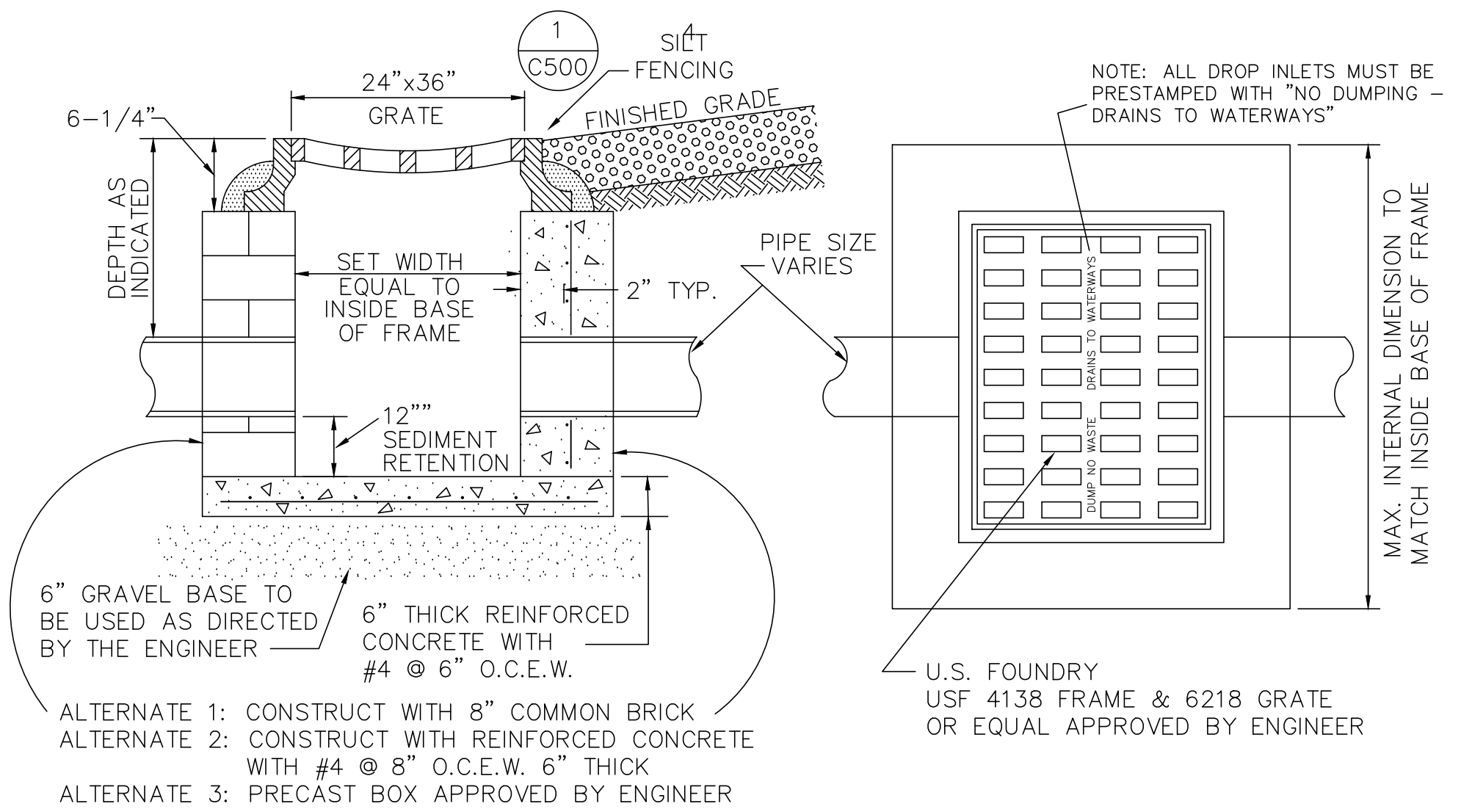
TYPICAL CONCRETE CONTRACTION JOINT [CJ]

NOT TO SCALE

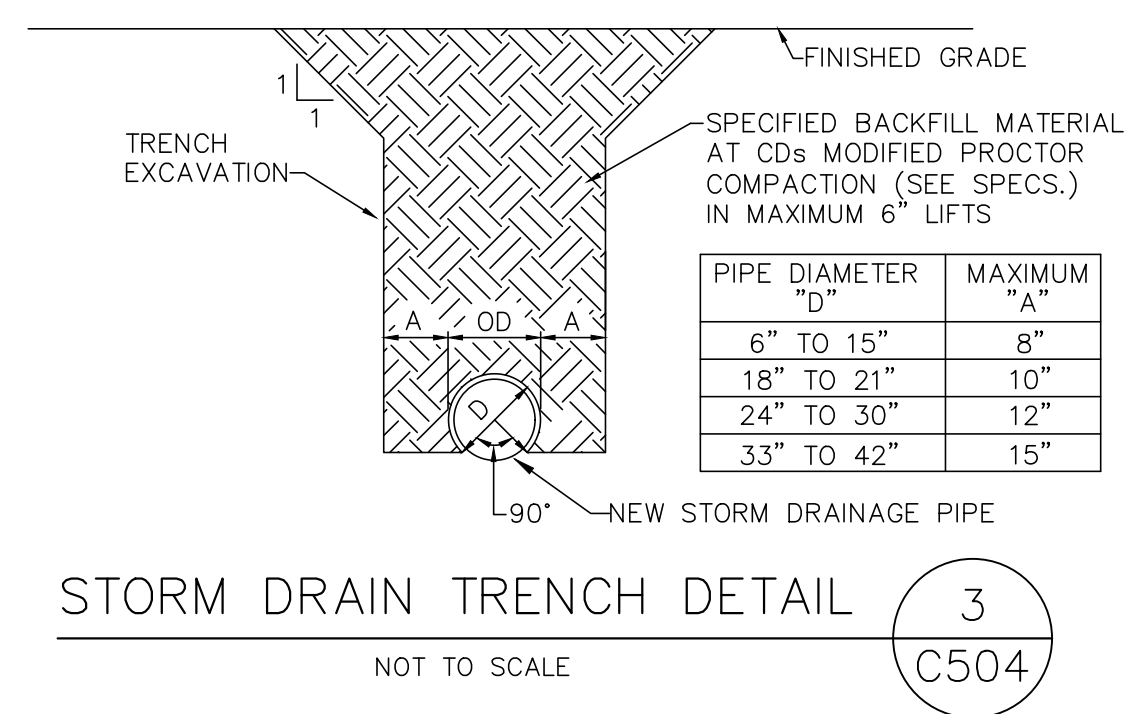
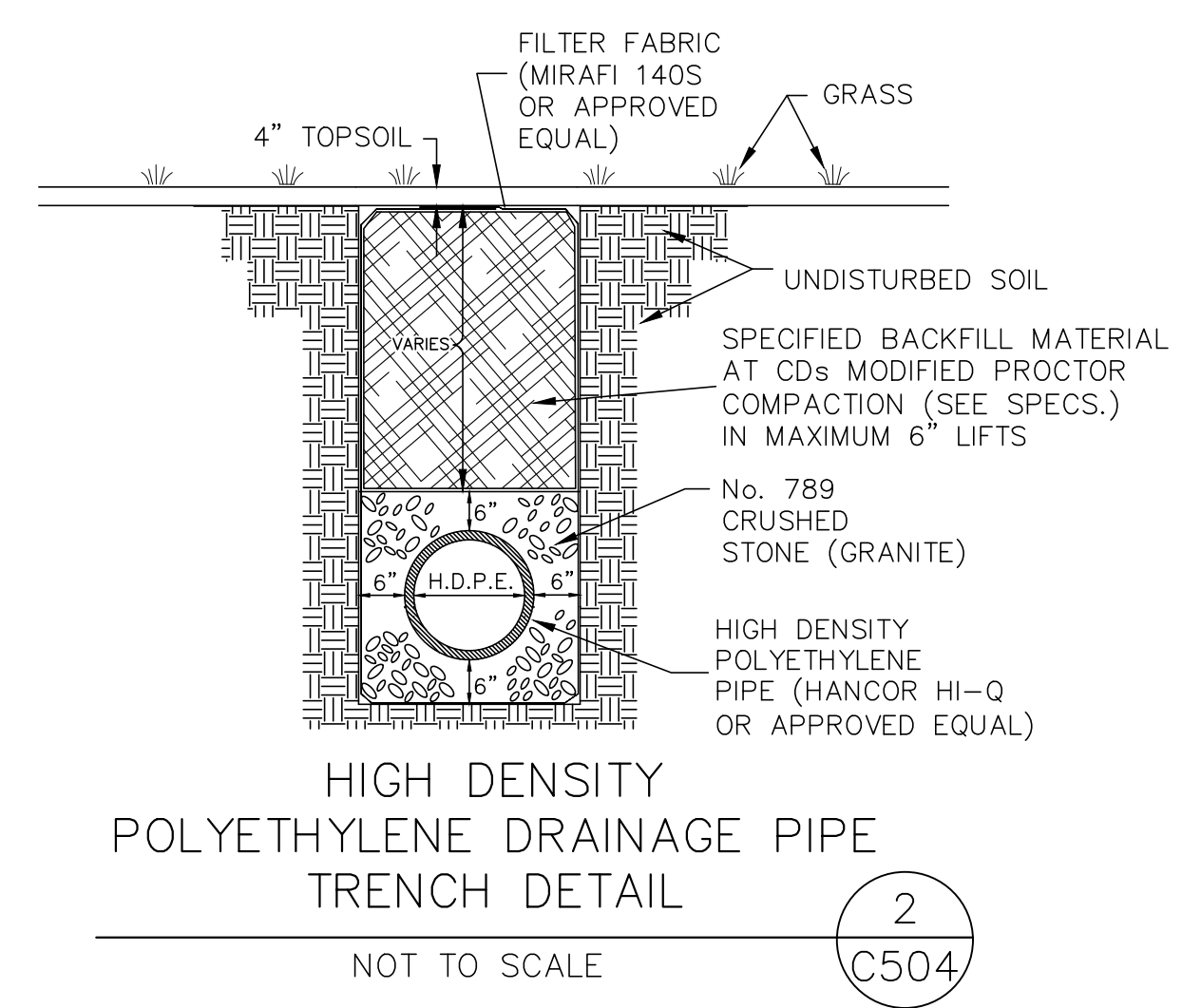
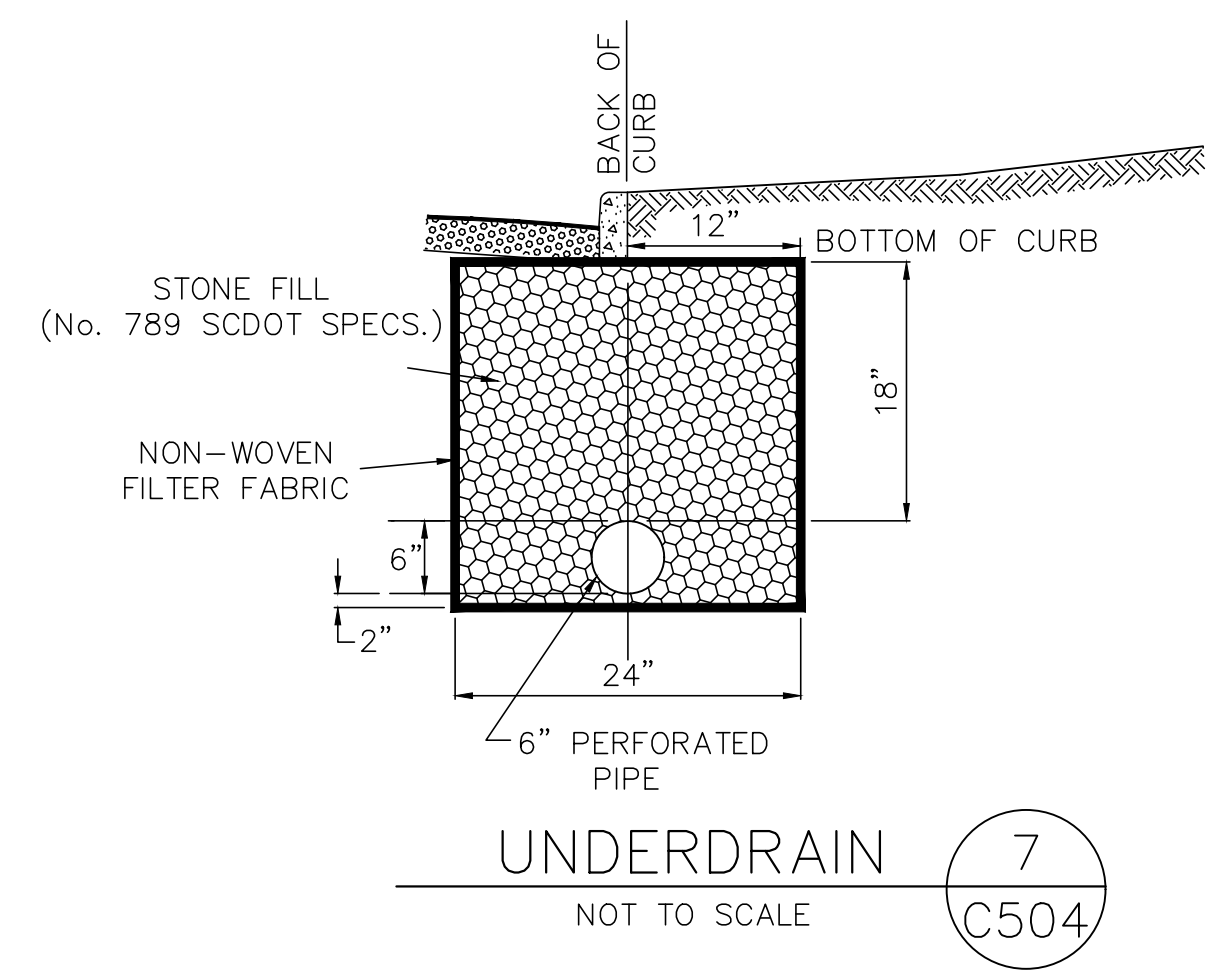
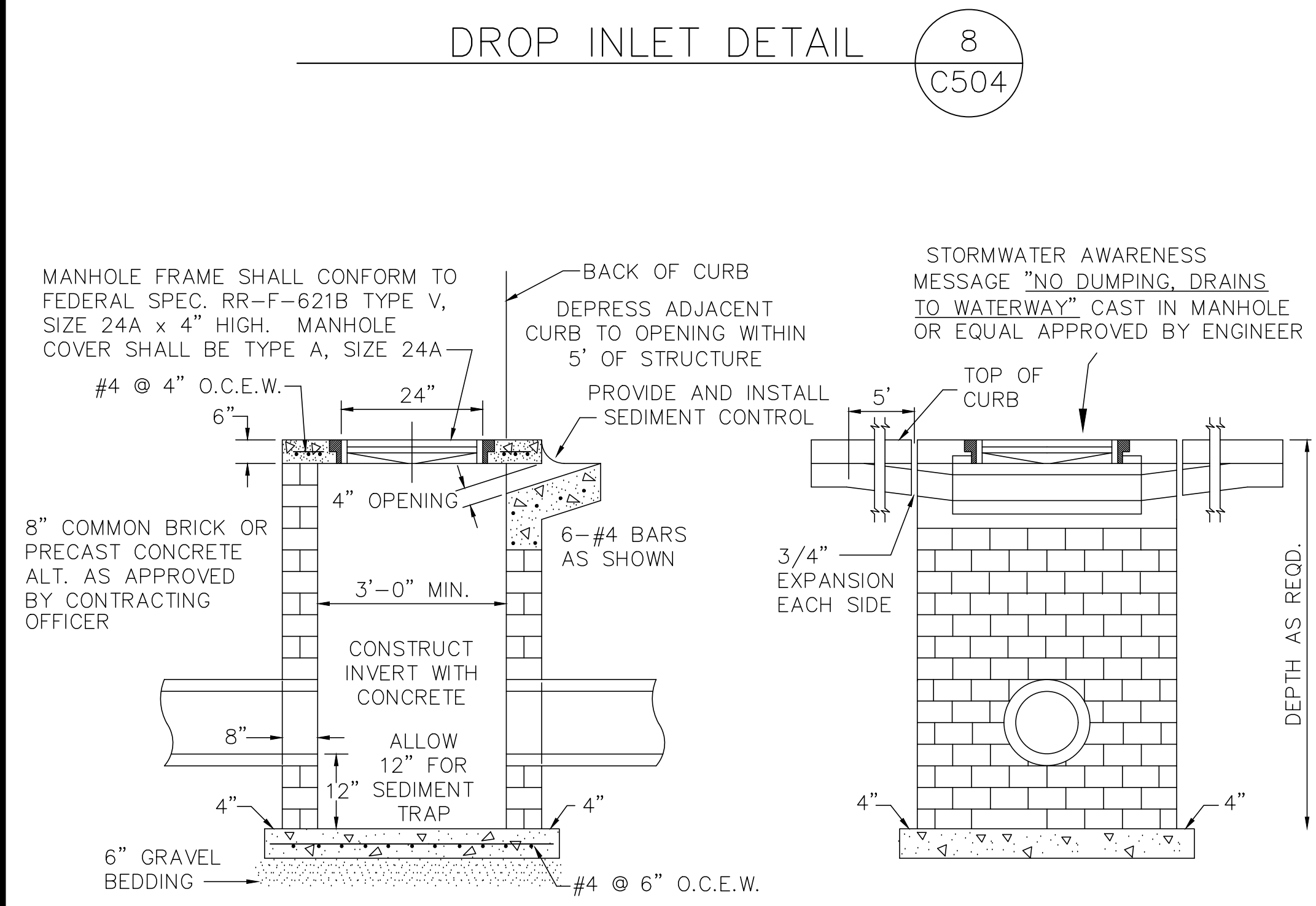
5
C503

REV.	DATE	DESCRIPTION

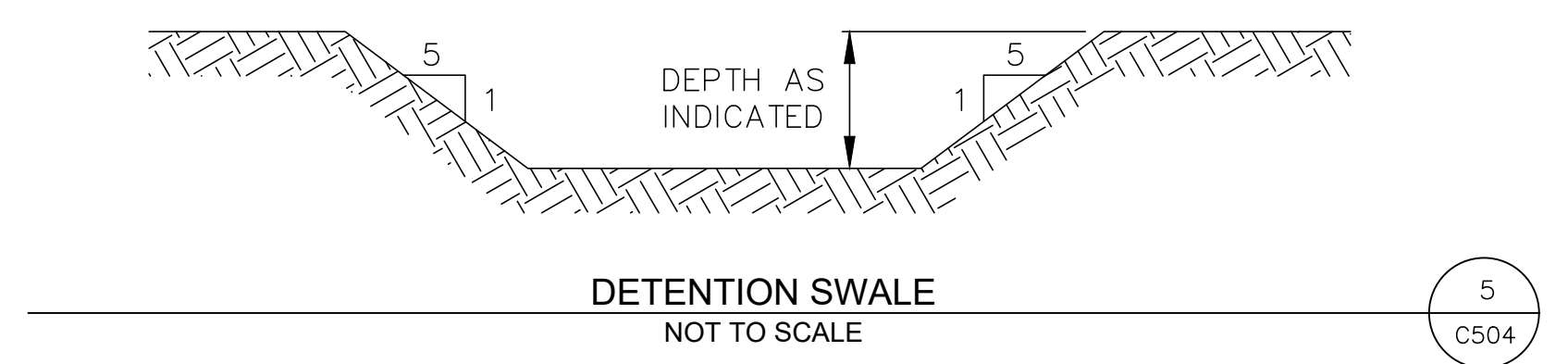
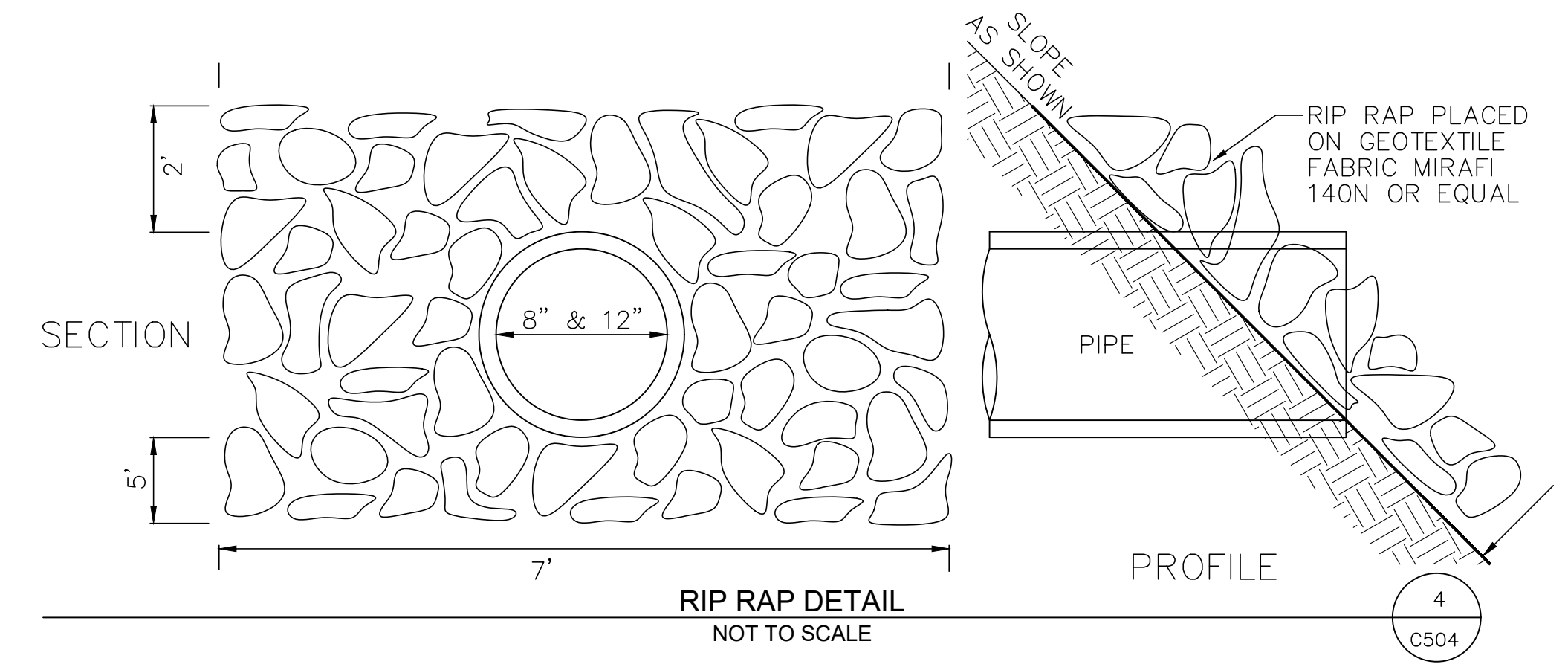




ALL MANHOLE LIDS AND CATCH BASINS SHALL CONTAIN A LABEL IDENTIFYING THE SYSTEM AS STORMWATER AND MARKED WITH AN STORMWATER MESSAGE THAT STATES: "NO DUMPING-DRAINS TO WATERWAYS"



- The key to a functional sediment basin is weekly inspections, routine maintenance, and regular sediment removal.
- Attention to sediment accumulations within the basin is extremely important. Accumulated sediment deposition should be continually checked and removed when necessary.
- Remove accumulated sediment when it reaches 50% of the design sediment storage volume or 1/2 the height of the riser structure, whichever is reached first.
- Removed sediment from the basin shall be placed in stockpile storage areas or spread thinly across the disturbed area. Stabilize the removed sediment after it is relocated.
- Inspections of sediment basins should be conducted once every calendar week and, as recommended, within 24-hours of each rainfall event that produces 1/2-inch or more of precipitation.
- All temporary sediment basins, which are not to be converted to a detention basin post-construction, should be removed within 30 days after final site stabilization is achieved.
- Disturbed areas resulting from the removal of the sediment basin should be permanently stabilized and additional BMPs, such as silt fence, should be utilized to accept stormwater runoff from this disturbed area until final stabilization is reached.
- Sediment basins should not be placed in Waters of the State or USGS blue-line streams (unless approved by Federal TLities).
- Sediment basin's side slopes shall be seeded and, when necessary, stabilized with vegetative or synthetic matting to prevent the formation of rills and gullies.

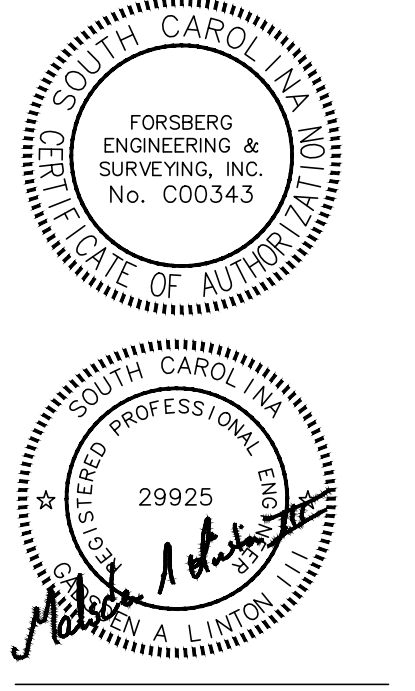


DRY DETENTION SWALE NOTES
 NOT TO SCALE

BMP MAINTENANCE REQUIREMENTS:
 THE OWNER IS RESPONSIBLE TO PERMANENT LONG-TERM MAINTENANCE AS AGREED TO IN THE COVENANTS AGREEMENTS. SEE CONSTRUCTION DETAILS FOR BMP MAINTENANCE REQUIREMENTS.

PERMANENT MAINTENANCE:
SWALES: GRASS TO BE MOWED EVERY TWO WEEKS OR WHEN NEEDED DURING SUMMER SEASON. NOTE EROSION OF POND BANKS OR BOTTOMS EVERY 6 MONTHS. MOW SIDE SLOPES, REMOVE DEBRIS/LITTER, AND PROVIDE NUTRIENT MANAGEMENT WHEN NEEDED. MONITOR SEDIMENT ACCUMULATIONS AND REMOVE SEDIMENT WHEN SWALE VOLUME HAS BEEN REDUCED BY 25% (25 TO 50 YEAR MAINTENANCE).

REV.	DATE	DESCRIPTION

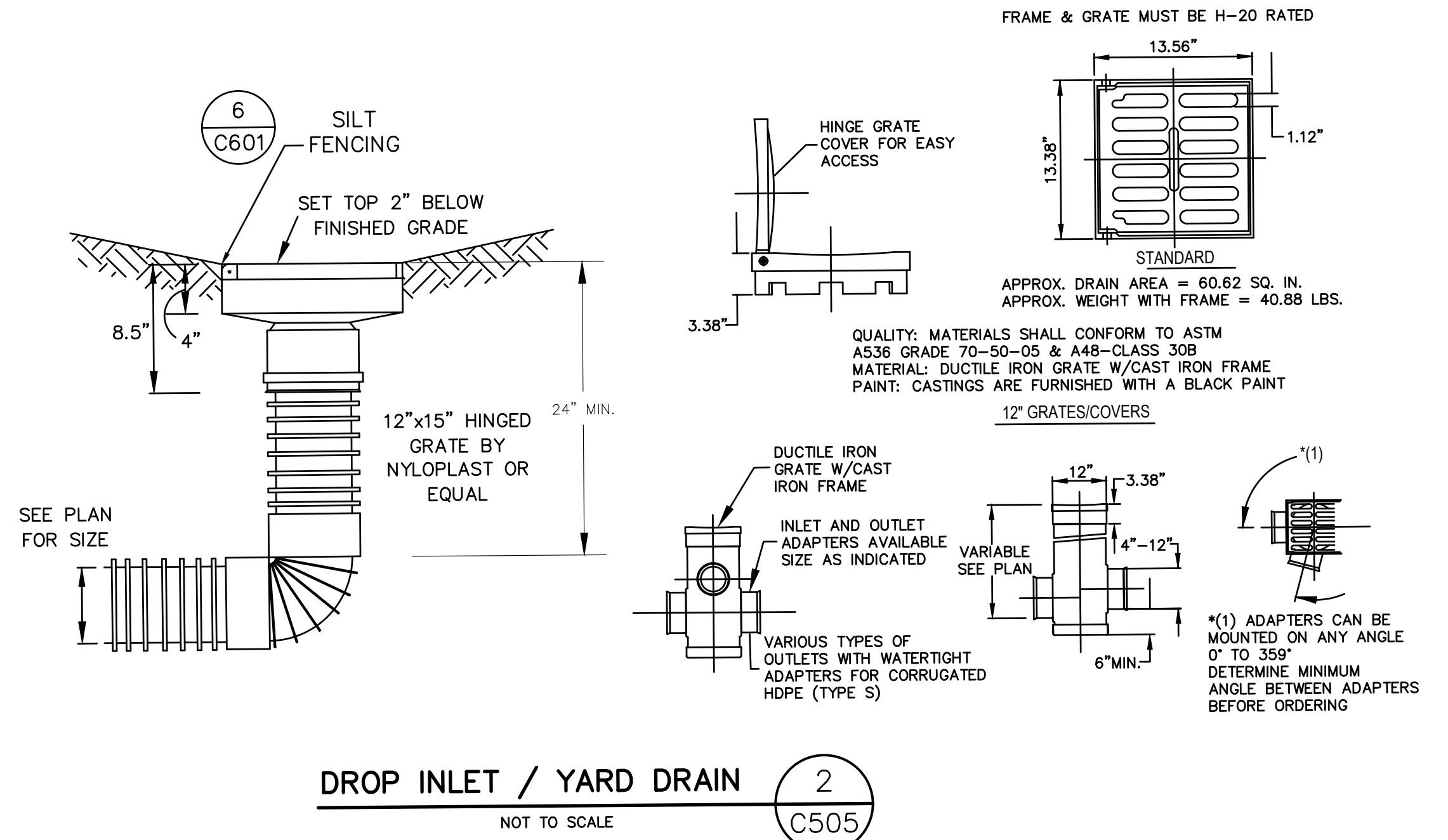
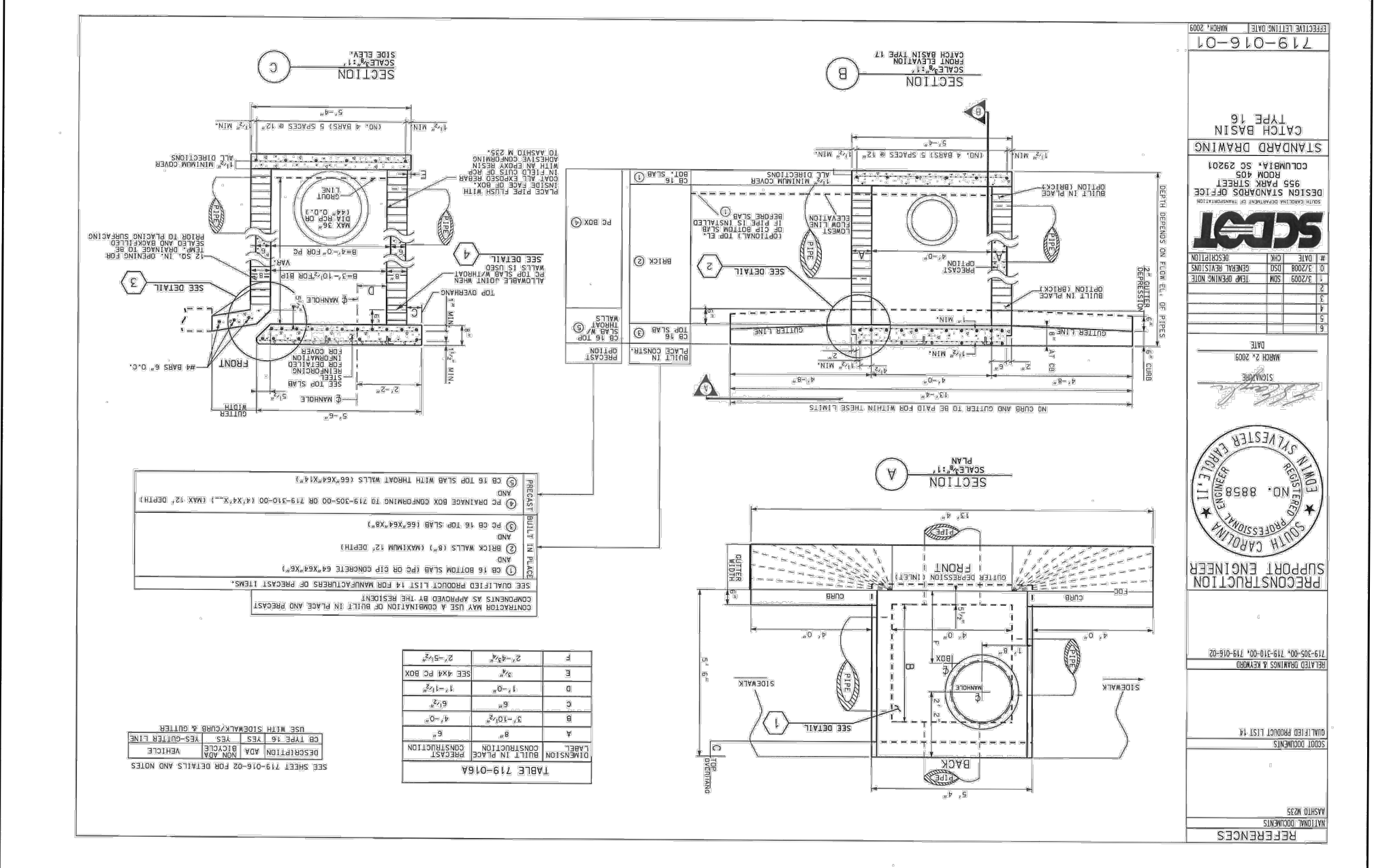
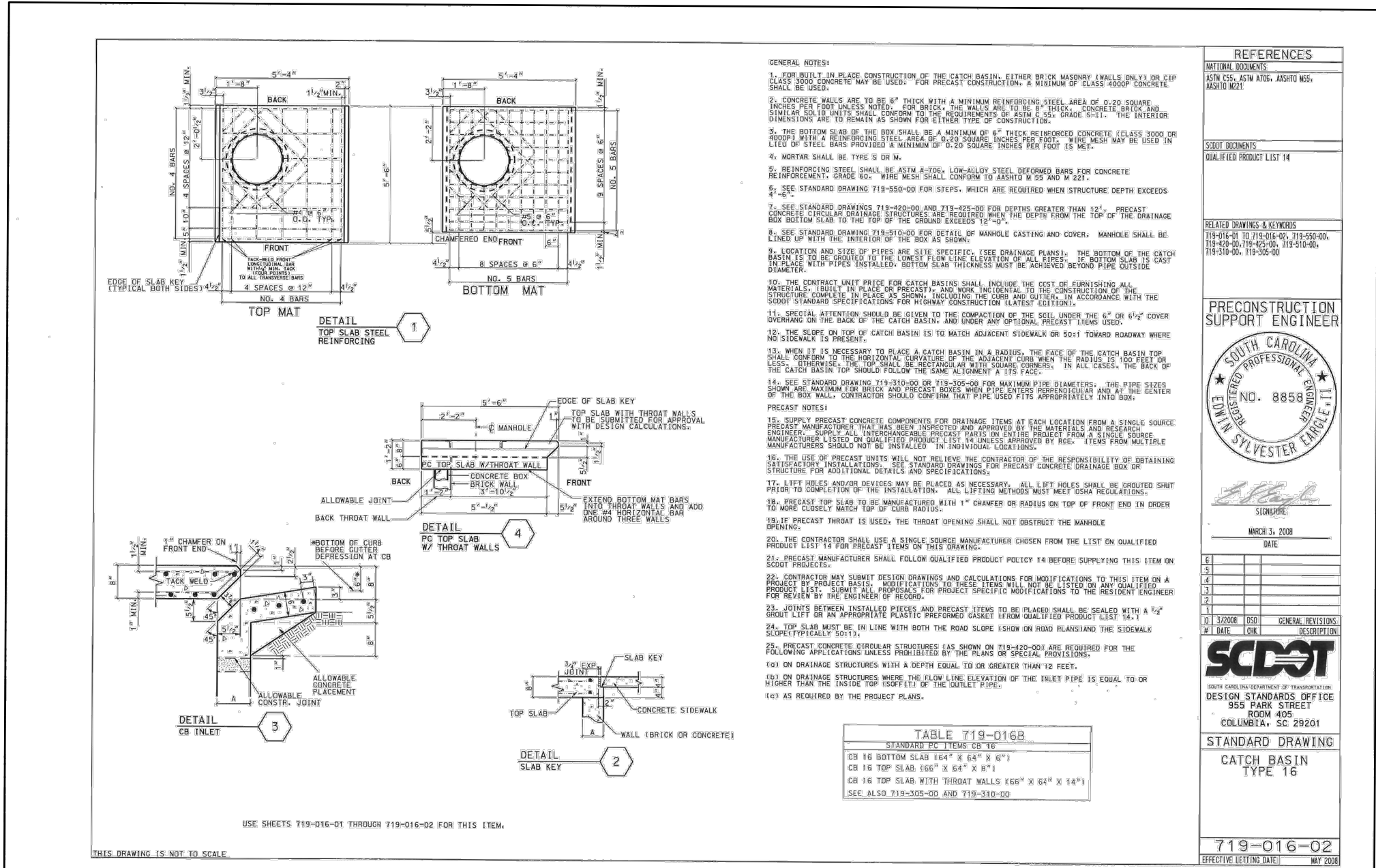
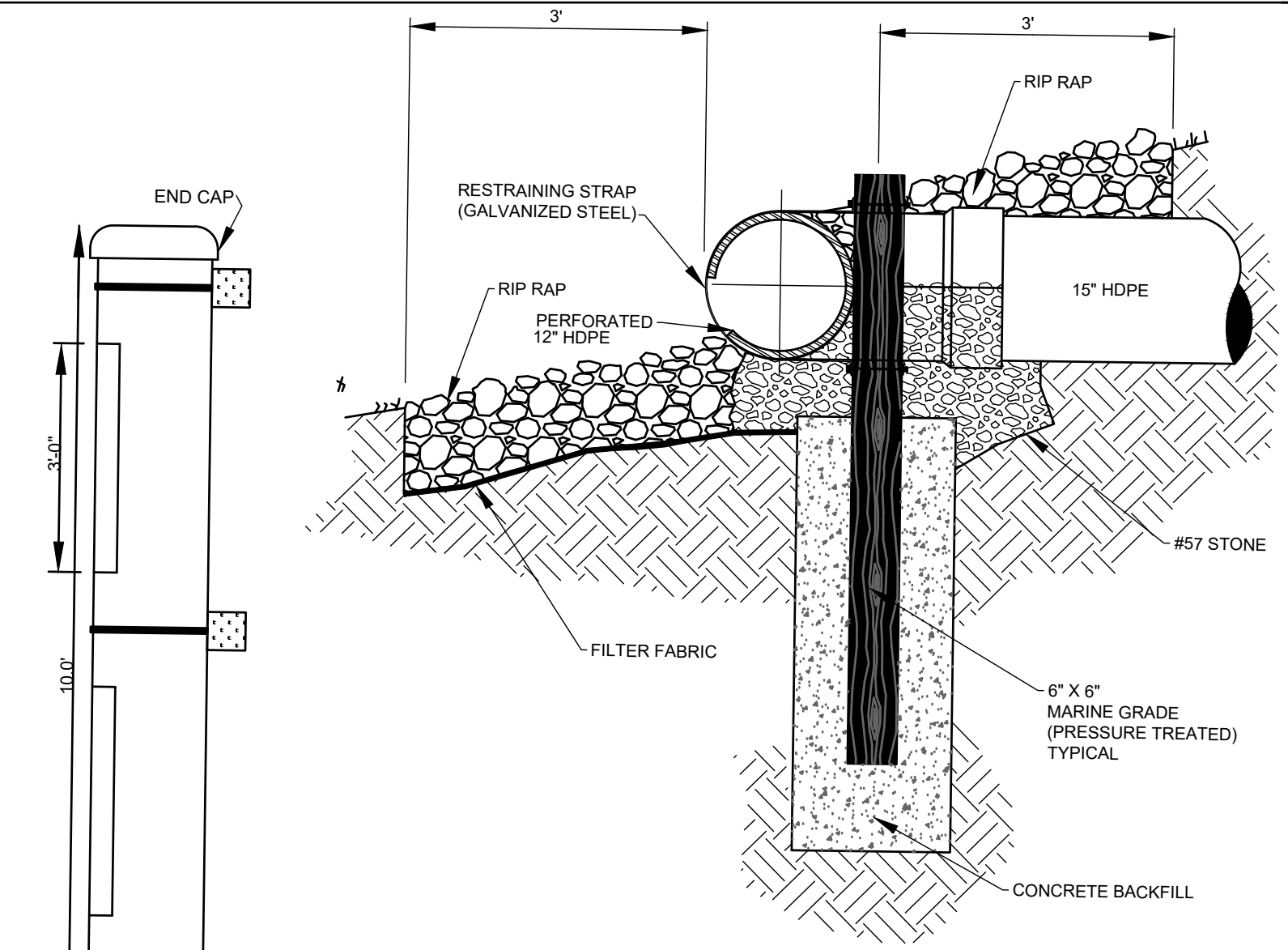
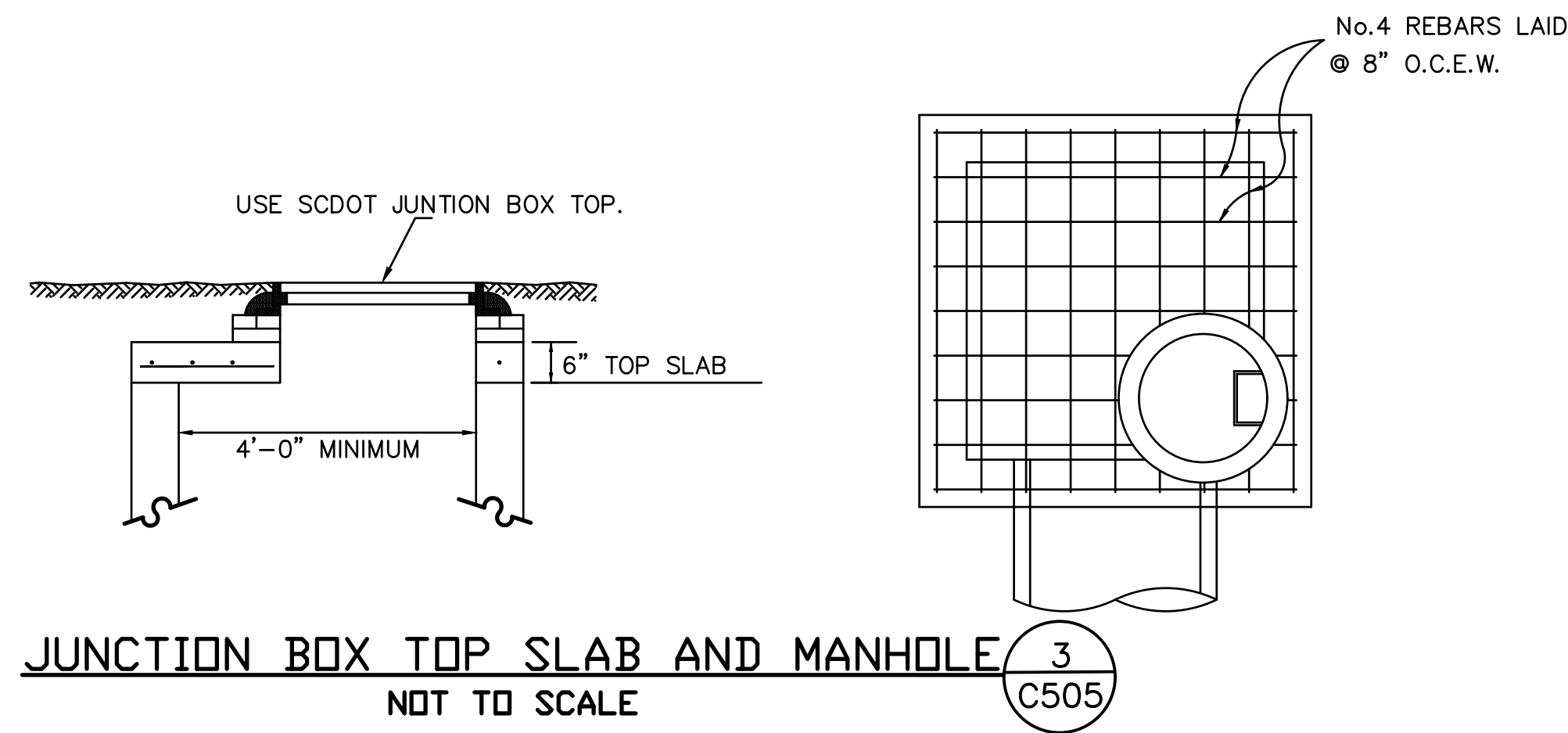
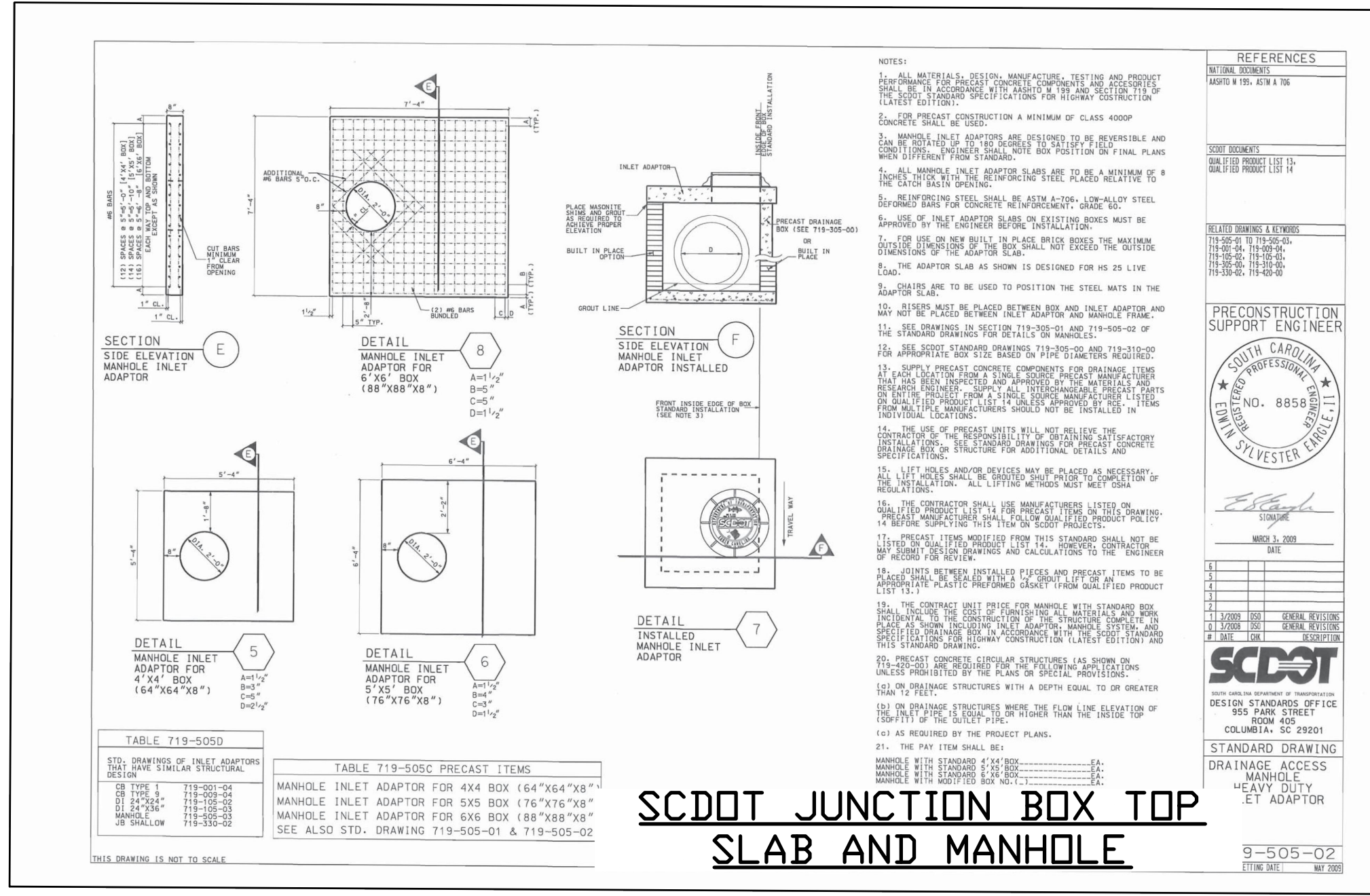


TAXPAYER SERVICE CENTER
 COLLETON COUNTY
 118 BENSON STREET
 WALTERBORO, SC 29488

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 JOB NUMBER: 1904
 PROJECT MGR.: SM
 DRAWN BY: TL
 CHECKED BY: GL
 APPROVED BY: TL
 DATE ISSUED FOR: 11/23/2020
 CDS

CONSTRUCTION DETAILS

C504



REV.	DATE	DESCRIPTION

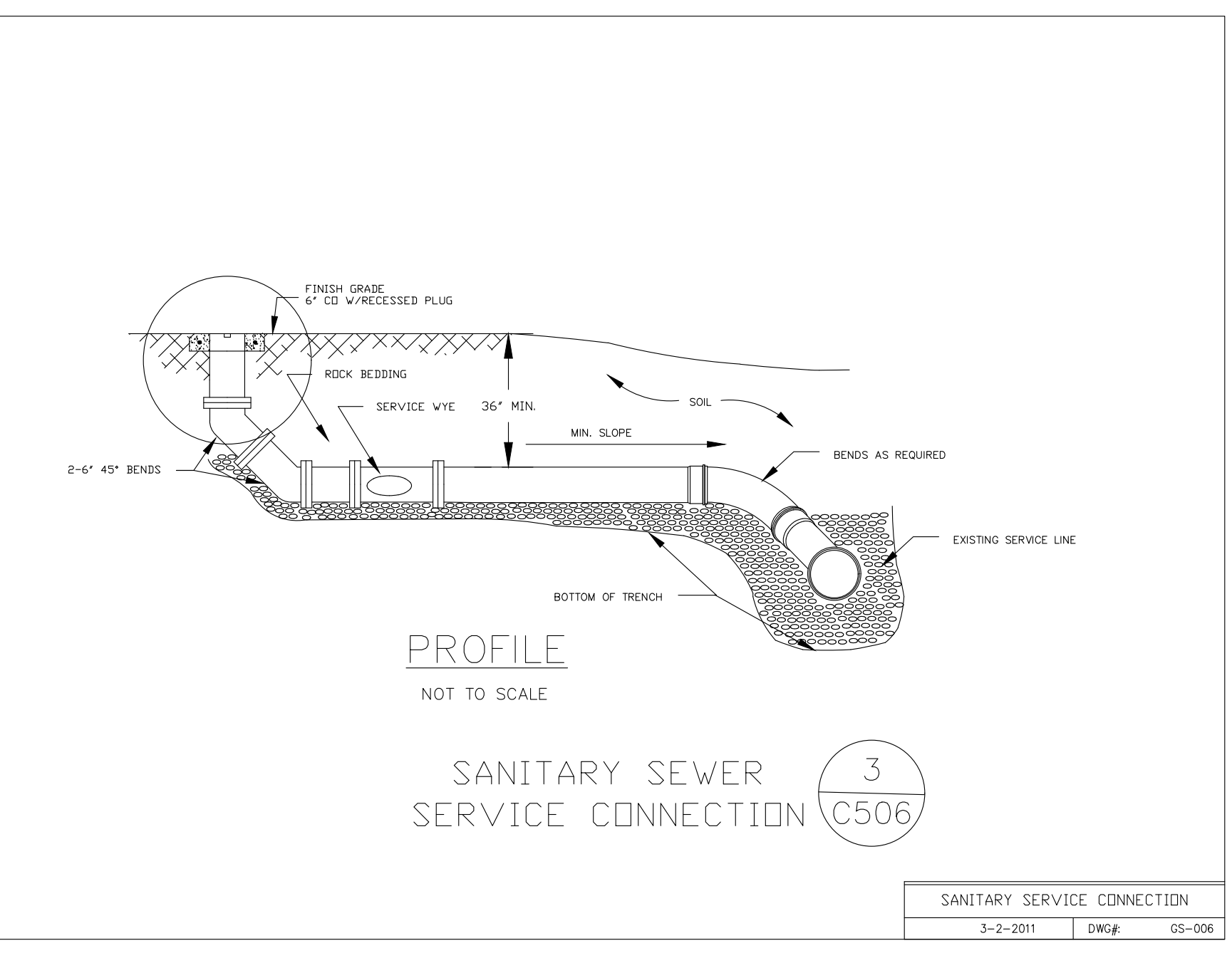
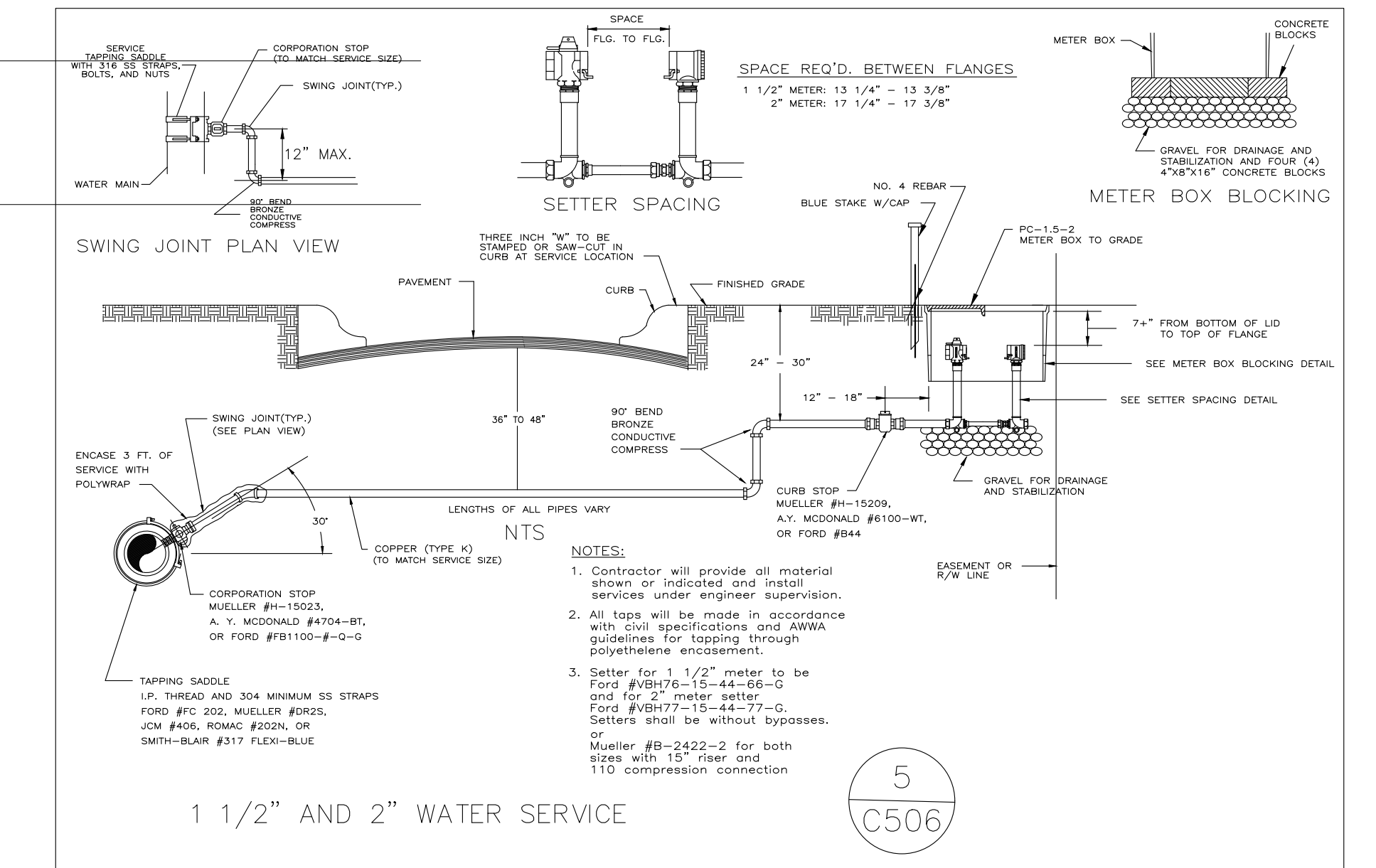
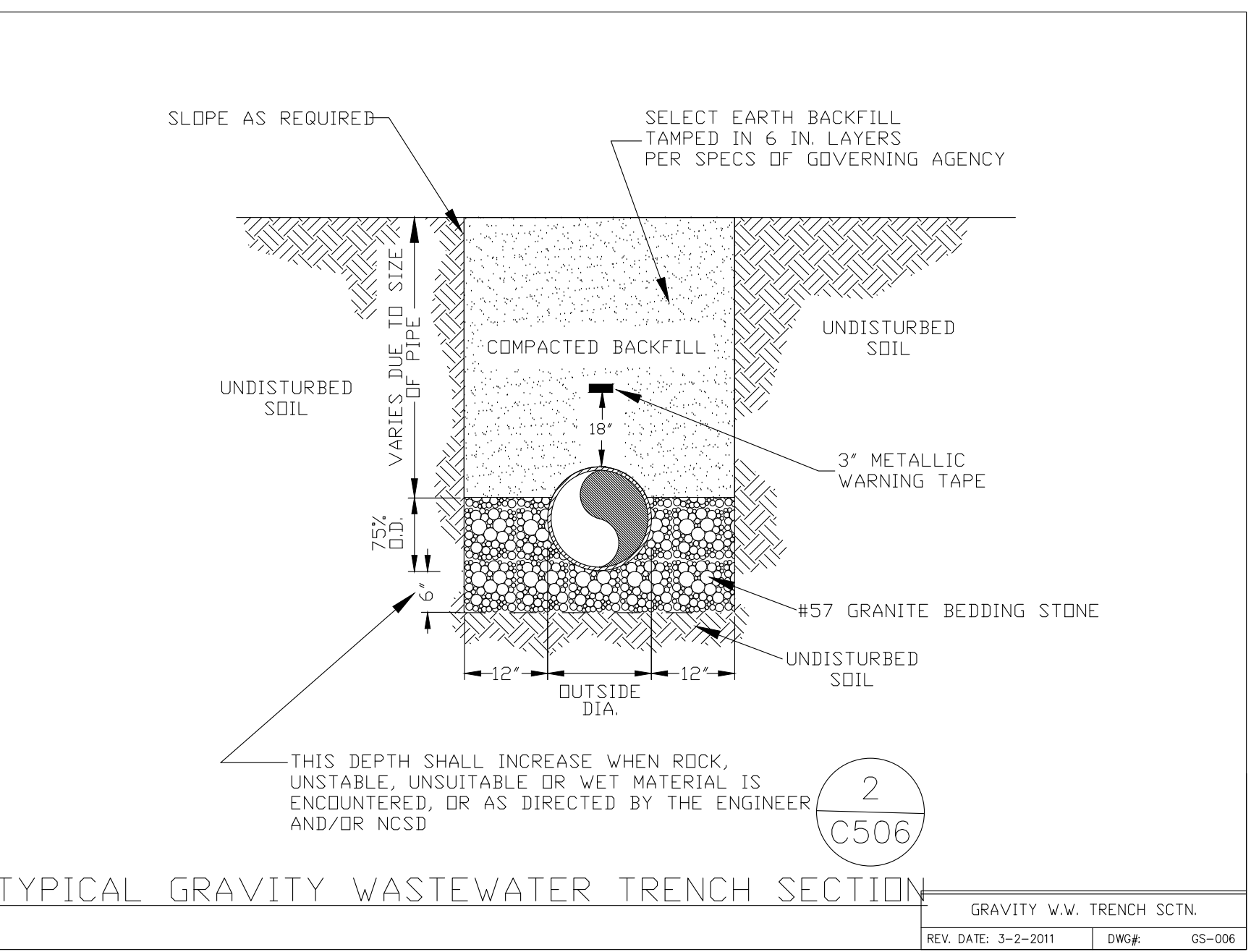
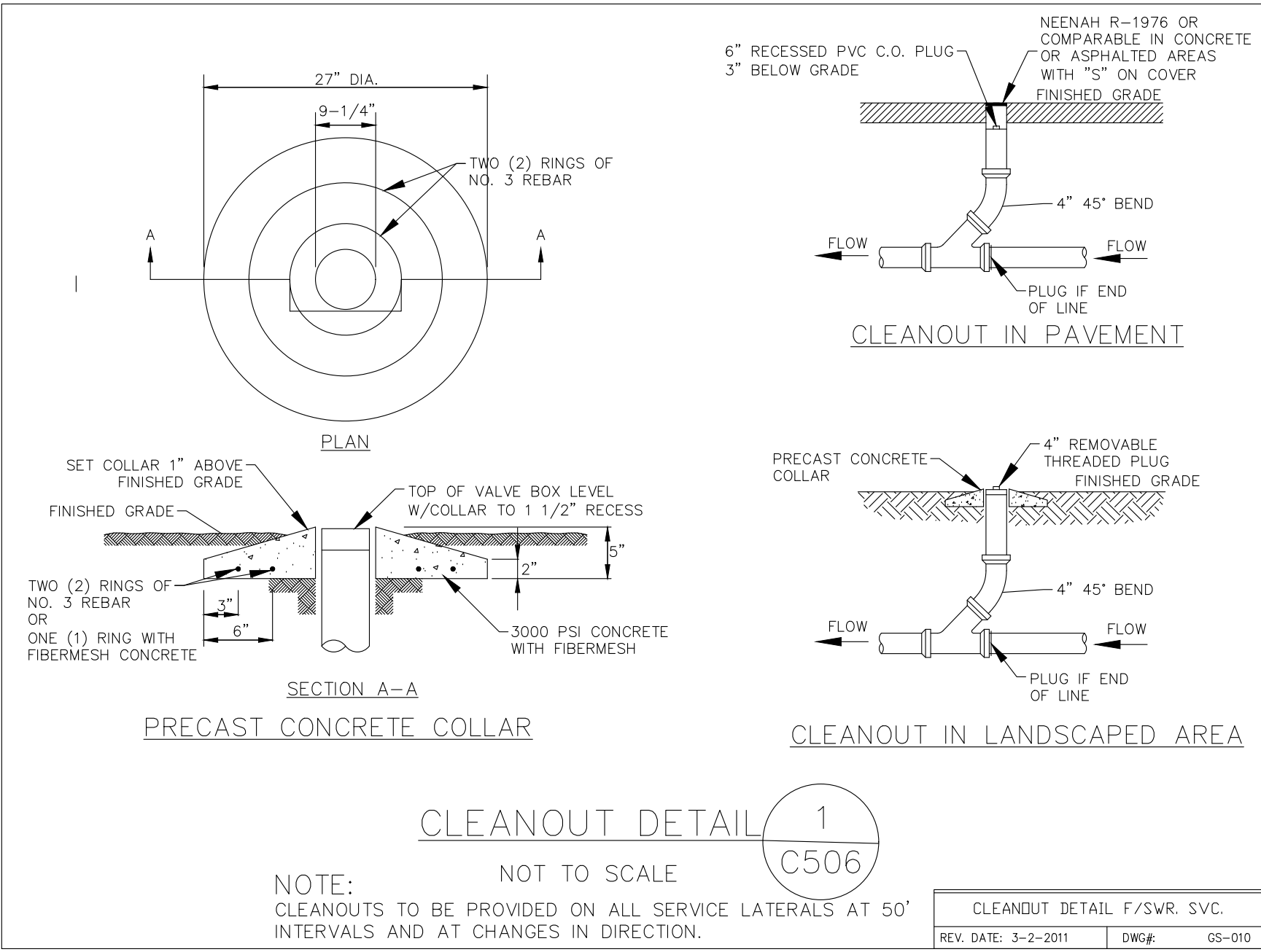
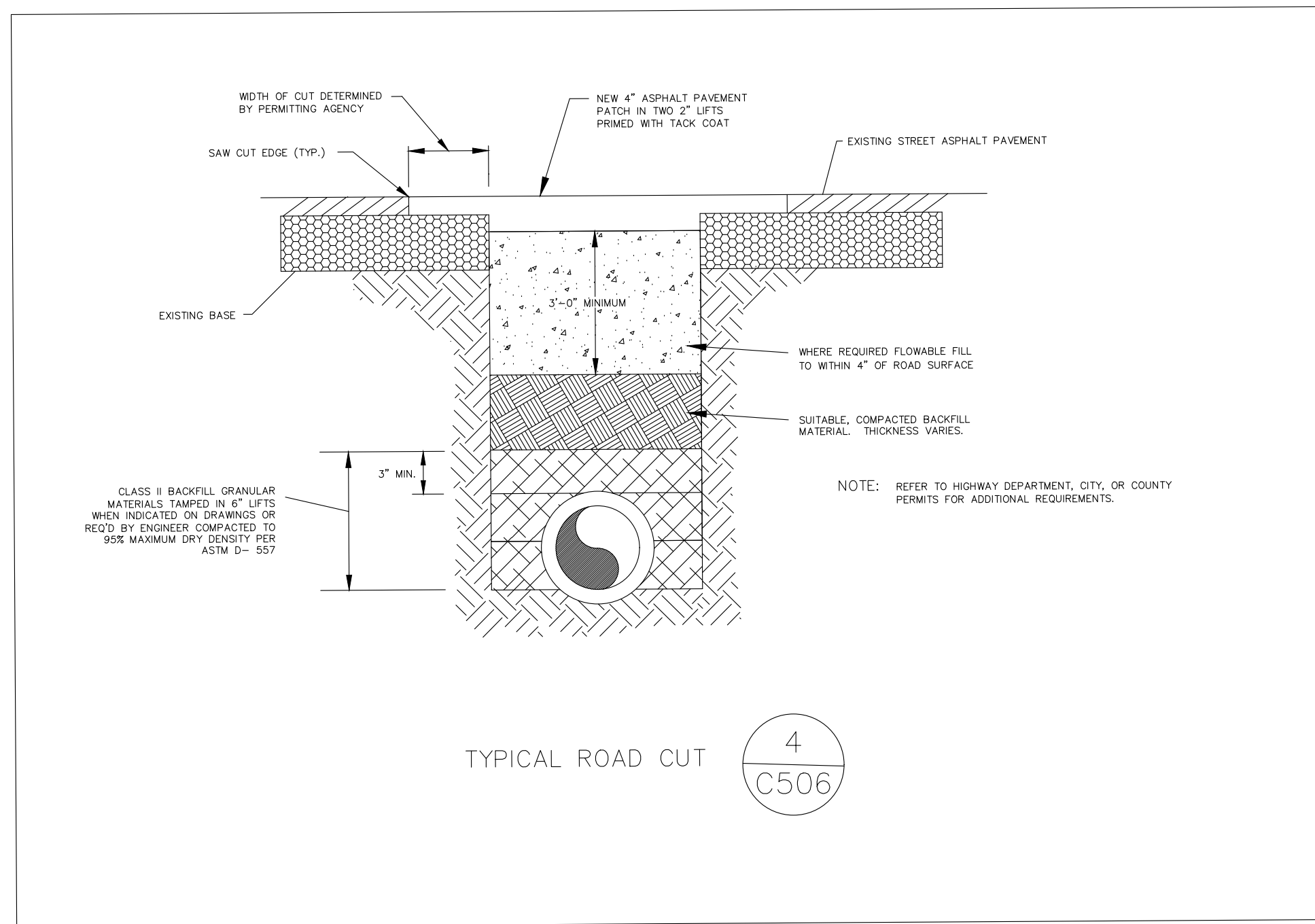
SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
FORSEBERG ENGINEERING & SURVEYING, INC.
No. C00343

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
29925

TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

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JOB NUMBER:
PROJECT MGR.:
DRAWN BY: TL
CHECKED BY: GL
APPROVED BY: TL
DATE ISSUED FOR: CD5
11/23/2020

CONSTRUCTION DETAILS
C505



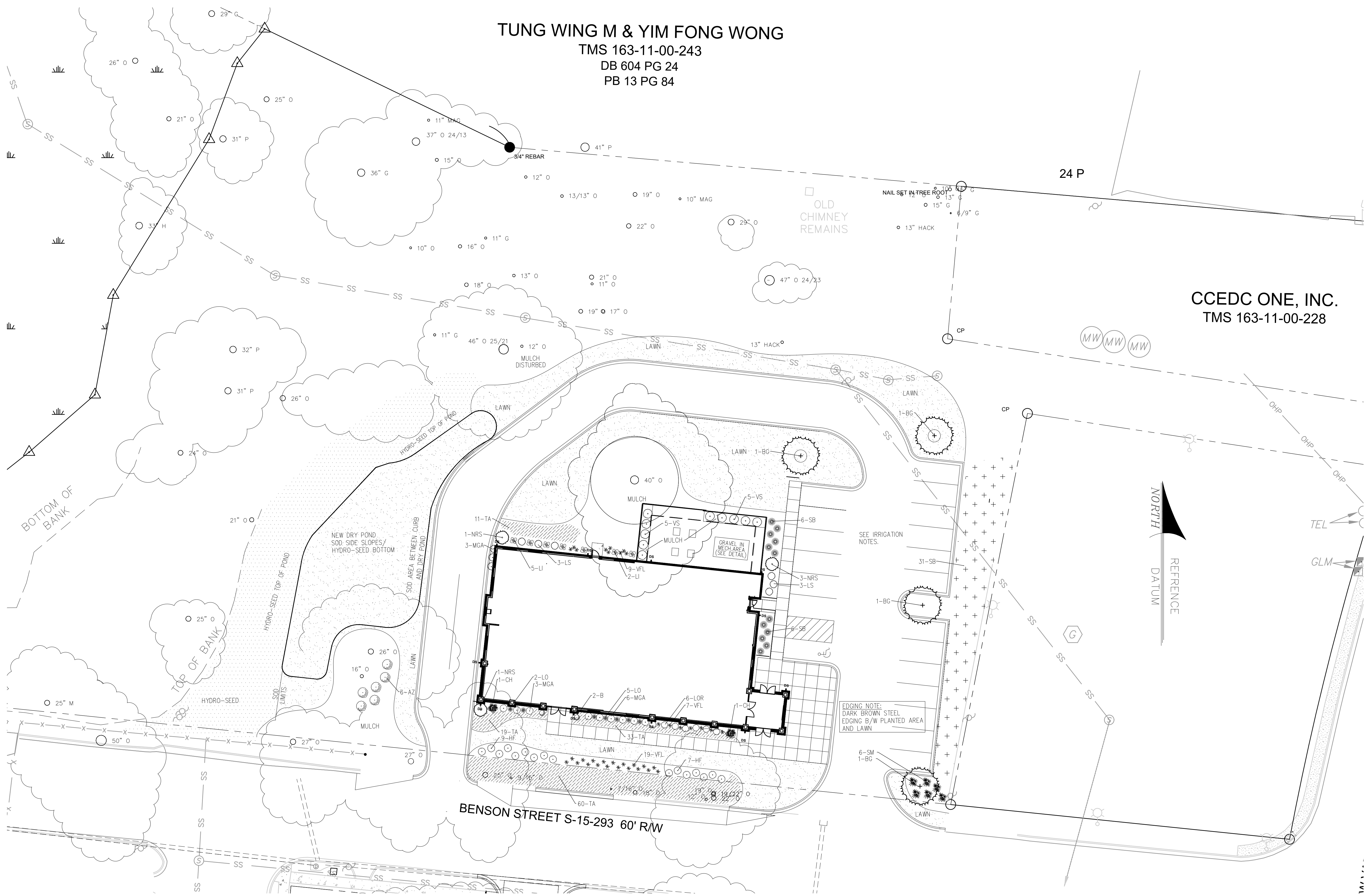
REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
COLLETON COUNTY
 118 BENSON STREET
 WALTERBORO, SC 29488

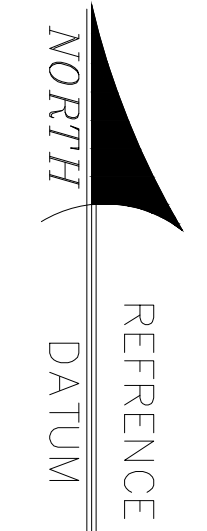
COPYRIGHT © 2021 GLICK/BOEHM & ASSOCIATES, INC.
 JOB NUMBER: 1904
 PROJECT MGR.: SM
 DRAWN BY: TL
 CHECKED BY: GL
 APPROVED BY: TL
 DATE ISSUED FOR: 11/23/2020

CONSTRUCTION DETAILS
C506



TUNG WING M & YIM FONG WONG
 TMS 163-11-00-243
 DB 604 PG 24
 PB 13 PG 84

CCEDC ONE, INC.
 TMS 163-11-00-228



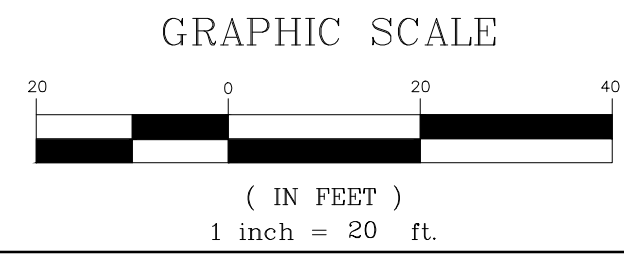
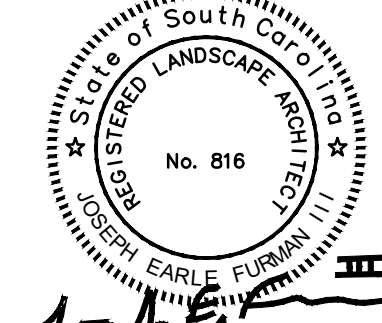
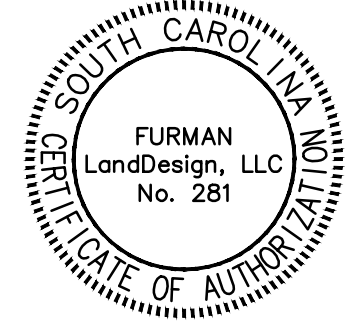
EDGING NOTE:
 DARK BROWN STEEL
 EDGING B/W PLANTED AREA
 AND LAWN

GBA
 GLICK BOEHM ARCHITECTURE
 ARCHITECTURE PLANNING INTERIOR DESIGN
 493 King Street, Suite 100 Charleston, South Carolina 29403
 P: 843.727.1768 www.glickboehm.com

REV#	DATE	DESCRIPTION

TAXPAYER SERVICE CENTER
 COLLETON COUNTY
 118 BENSON STREET
 WALTERBORO, SC 29488

FURMAN
 LandDesign, LLC
 Landscape Architecture
 Jody Furman 843-343-1320
 www.furmanlanddesign.com



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 JOB NUMBER: 1904
 PROJECT MGR.: SM
 DRAWN BY: Author
 CHECKED BY: Checker
 APPROVED BY: Approver
 DATE ISSUED FOR: CD SET
 11/23/2020

LANDSCAPE PLANTING PLAN

L101

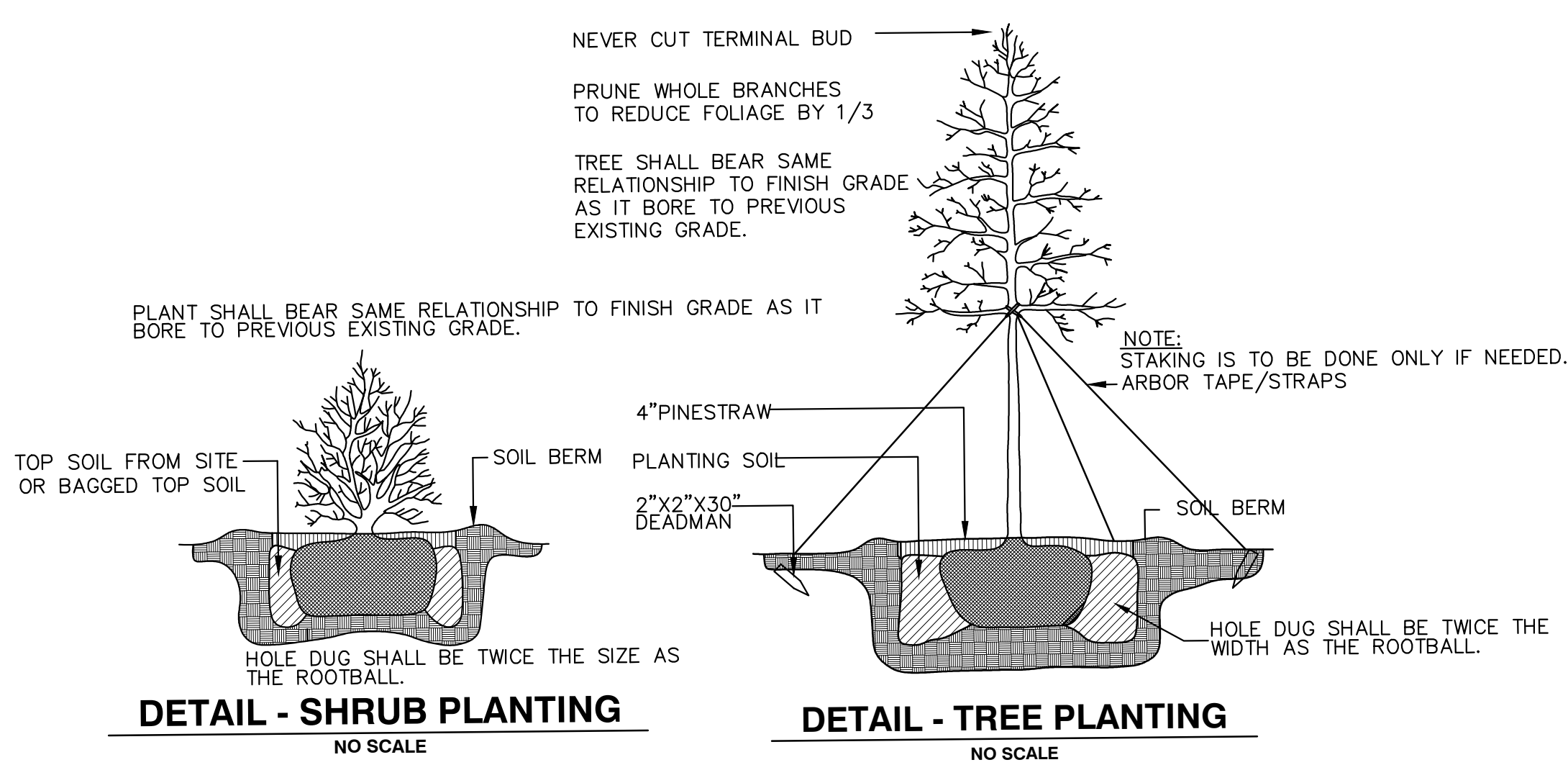
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TAXPAYER SERVICE CENTER
 COLLETON COUNTY
 118 BENSON STREET
 WALTERBORO, SC 29488

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 GLICK/BOEHM & ASSOCIATES, INC.
 JOB NUMBER: 1904
 PROJECT MGR.: SM
 DRAWN BY: Author
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PLANT SCHEDULE/ DETAILS

L102



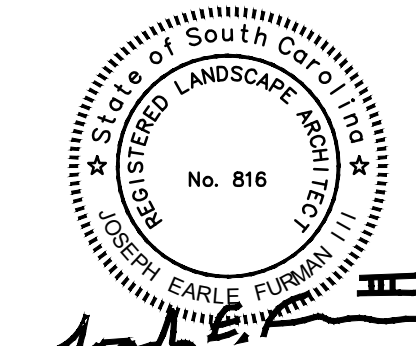
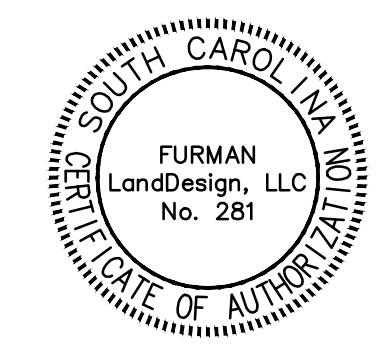
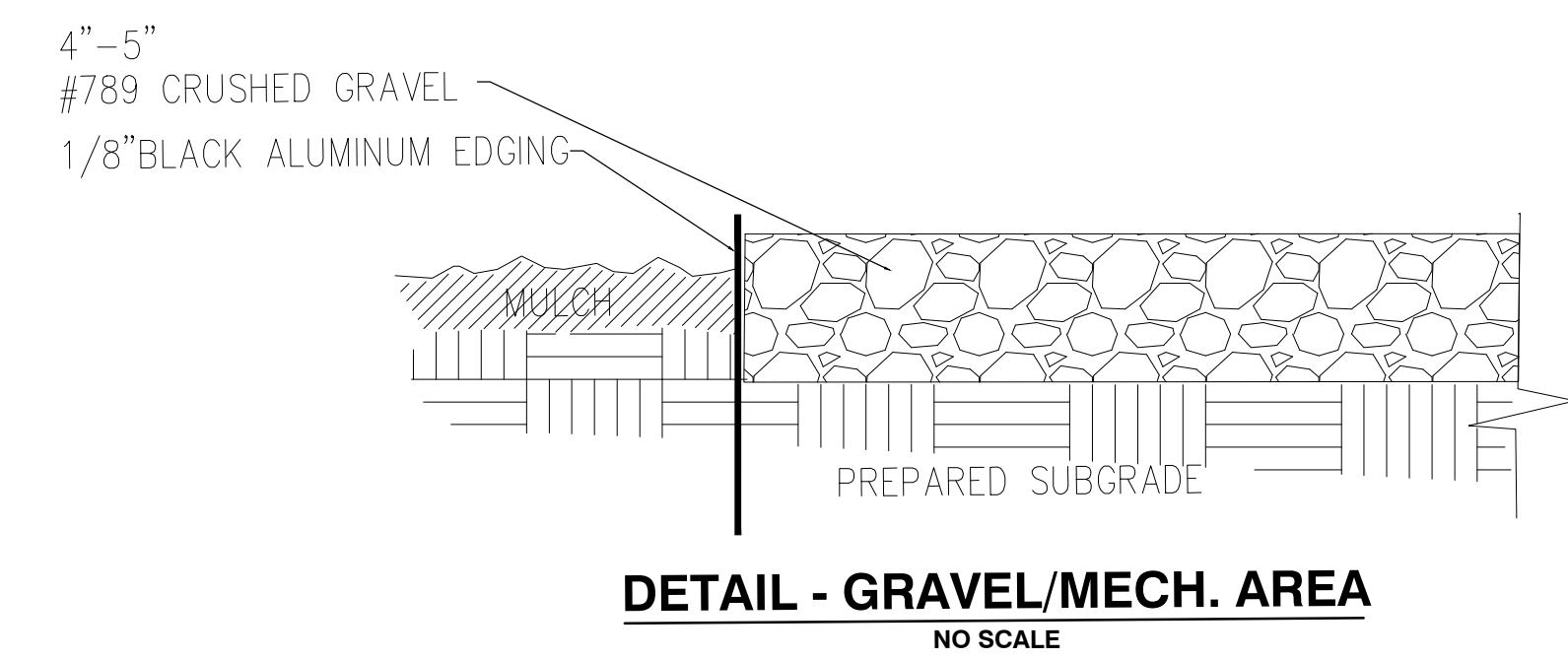
IRRIGATION NOTES

1. THE CONTRACTOR IS ADVISED TO VISIT THE SITE AND VERIFY FIELD CONDITIONS.
2. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE BUILDING CODES.
3. THE CONTRACTOR SHALL OBTAIN ALL LICENSES AND PERMITS REQUIRED FOR THE PERFORMANCE OF HIS WORK.
4. ALL PLANTED AREAS SHALL BE IRRIGATED BY AN PERMANENT LANDSCAPE IRRIGATION SYSTEM. SYSTEM SHALL BE DESIGNED BY AN APPROVED IRRIGATION CONTRACTOR, NOT THE INSTALLER.
5. EXISTING IRRIGATION AS-BUILTS SHALL BE PROVIDED UPON REQUEST FROM OWNER. LANDSCAPE CONTRACTOR SHALL COORDINATE PIPING AND CONNECTION TO A NEW OR EX. APPROVED WATER METER.
6. PIPE SLEEVES SHALL BE INSTALLED BY IRRIGATION CONTRACTOR AS NECESSARY. COORDINATE WITH GENERAL CONTRACTOR.
7. IRRIGATION TIME CLOCK AND POWER SUPPLY LOCATION SHALL BE COORDINATED WITH OWNER.
8. EXISTING ECOLOGY AND AESTHETICS WILL OFTEN CAUSE ADJUSTMENT OF THESE PLANS TO FIT SITE. STAKE OUT BY CONTRACTOR AND FIELD ADJUSTMENT BY LANDSCAPE ARCHITECT ARE ABSOLUTELY NECESSARY.
9. IRRIGATION SYSTEM/ PLANT MATERIAL SHALL BE GUARANTEED BY CONTRACTOR FOR A MINIMUM PERIOD OF 730 DAYS FROM DATE OF COMPLETION AND ACCEPTANCE BY OWNER.
10. THE LOCATION OF ALL ABOVE GROUND AND BELOW GROUND UTILITIES IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR. DAMAGE TO UTILITIES AND PERSONAL INJURY AS A RESULT OF THE FAILURE TO DETERMINE AND/OR RESPECT UTILITY LOCATIONS IS THE SOLE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR. UTILITY LOCATIONS ARE NOT SHOWN ON THESE PLANS.
11. IRRIGATION WATER SUPPLY LINE TO TERMINATE INSIDE MECHANICAL AREA IN THE CORNER CLOSEST TO THE REAR BACK DOOR.
12. ADD 120 VOLT GROUND FAULT POWER SUPPLY TO IRRIGATION TERMINATION LOCATION(SEE ABOVE) TO SUPPLY IRRIGATION CLOCK.
13. ALL LANDSCAPING AND IRRIGATION ARE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.

NOTE: CONTRACTOR TO VERIFY COUNTS FROM ACTUAL PLAN.

CODE	TREES	COMMON NAME	HEIGHT/SIZE
BG	NYSSA SYLVATICA	BLACK GUM	2.5" CAL
QV	QEURCUS VIRGINIANA	LIVE OAK	2.5" CAL.
SHRUBS			
HF	CRYPTOMIUM FALCATUM	HOLLY FERN	3 GAL
SB	SPARTINA GRASS	SPARTINA GRASS	3 GAL
DR	ROSA 'WHITE DRIFT'	WHITE DRIFT ROSE	3 GAL
LOR	LORAPETALUM 'PURPLE DAYDREAM'	PURPLE DAYDREAM LORAPETALUM	3 GAL.
MGA	ABELIA 'MARDI GRAS'	MARDI GRAS ABELIA	3 GAL.
B	BUXUS GLOBE	GLOBE BOXWOOD	7 GAL.
TA	TRACELOSPERMUM ASIATICUM	ASIAN JASMINE	6" POTS
VS	VIBURNUM SUSPENSUM	SUSPENSUM VIB.	3 GAL.
LI	LIGULARIA	TRACTOR SEAT PLANT	3 GAL.
VFL	VARIEGATED FLAX LILY	VAR. FLAX LILY	1 GAL.
LO	LOMANDRA	BREEZE GRASS	3 GAL
CH	CHAEMEROPS HUMILIS	MED. FAN PALM	15 GAL
NRS	NELLIE R. STEVENS HOLLY	CONICAL HOLLY	6'-7' HT
AZ	AZALEA 'RED FORMOSA'	RED FORMOSA	15 GAL
AZ2	AZALEA 'PURPLE FORMOSA'	PURPLE FORMOSA	6'-7' HT
LS	LIGUSTRUM SUNSHINE	SUNSHINE LIGUSTRUM	7 GAL.
SM	SABAL MINOR	DWF. PALMETTO	3 GAL.

SOIL TOPSOIL: ADD 2" TO ALL PLANTED AREAS/TILL INTO EXISTING
 MULCH 3" SHREDDED HARDWOOD MULCH DARK BROWN
 LAWN
 EMPIRE CENTIPEDE SOD/HYDRO-SEED



Jody Furman

GENERAL NOTES:

- STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL 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 ALL 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 ACCORDING TO THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL ENGINEER (ECS SOUTHEAST, LLP) (REPORT DATED OCTOBER 25, 2019, ECS PROJ. No. 343774).
- SITE PREPARATION, EXCAVATION, FILL, BACKFILL, ETC. SHALL BE IN STRICT ACCORDANCE WITH THE PROJECT GEOTECHNICAL REPORT.

CONCRETE:

- TYPICAL 28 DAY CONCRETE COMPRESSIVE STRENGTH (F_c).
LOCATION Fc (PSI)
FOOTINGS/SLABS 3000
NOTE: CONCRETE SHALL BE NORMAL WEIGHT UNLESS NOTED OTHERWISE.
- REINFORCING STEEL: ASTM A-615, 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 LOOSENEED 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 #4 AGGREGATE. ALL PRECAUTIONS SHOULD BE TAKEN TO AVOID SEGREGATION OF CONCRETE DURING PLACEMENT.
- EPOXY PRODUCTS FOR REBAR ANCHORING SHALL BE "HILTI HIT HY 200" OR ENGINEER APPROVED EQUAL.

TIMBER:

- STRUCTURAL TIMBERS SHALL BE NO. 2 SOUTHERN PINE UNLESS INDICATED OTHERWISE ON DRAWINGS.
- STRUCTURAL LAMINATED VENEER LUMBER (LVL) SHALL HAVE THE FOLLOWING PROPERTY VALUES:
F_b = 2800 PSI, F_v = 285 PSI, F_c = 500 PSI, E = 1,900,000 PSI.
- WALL STUDS SHALL BE SPF (SPRUCE-PINE-FIR) OR DOUGLAS FIR (DF) "STUD" GRADE OR BETTER.
- BLOCKING FOR WALL SHEATHING IS REQUIRED AT ALL PANEL EDGES: BLOCKING BETWEEN PANEL EDGES MAY BE INSTALLED WITH NARROW OR WIDE FACE VERTICAL.
- TIMBER DESIGNATED AS "TD" SHALL BE PRESSURE TREATED IN ACCORDANCE WITH AWWA STANDARD C2. ALL TIMBER USED IN DECKS, PORCHES AND OTHER EXPOSED AREAS SHALL BE PRESSURE TREATED.
- MULTI-MEMBER LVLS SHALL BE SCREWED TOGETHER. SEE TYPICAL DETAIL HEADER DETAIL. UNLESS ADDITIONAL CONNECTIONS ARE NOTED WALL SHEATHING IS SUFFICIENT TO CONNECT STUDS TO HEADERS. (CONTRACTOR OPTION: PROVIDE 18 GA. OR FLAT SIMPSON H2.5 BETWEEN FULL HEIGHT STUD AND HEADER.) ANY REQUIRED ADDITIONAL CONNECTIONS WILL BE INDICATED ON THE DRAWINGS ON A CASE SPECIFIC BASIS.

STRUCTURAL STEEL:

- STRUCTURAL STEEL MATERIALS SHALL CONFORM TO THE FOLLOWING ASTM SPECIFICATIONS:
BEAMS: ASTM A992, F_y = 50 KSI
ANGLES, PLATES, MISC. STEEL: ASTM A36, F_y = 36 KSI
TUBES: ASTM A500, GRADE B, F_y = 42 KSI
ANCHOR BOLTS: ASTM A-307
- STEEL DETAILS AND CONNECTIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE AISC SPECIFICATIONS (LATEST EDITION), INCLUDING ALL SUPPLEMENTS AND REVISIONS.
- CONNECTIONS NOT SPECIFICALLY DETAILED ON THE DRAWINGS MAY BE BOLTED OR WELDED.
- WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY (AWS)

DESIGN CRITERIA

CODE: IBC 2018
DEAD LOADS: MATERIAL WEIGHT
ROOF LIVE LOAD: 20 PSF
FLOOR LIVE LOAD: 50PSF (OFFICES)
100PSF (LOBBY)
80 PSF (CORRIDORS)

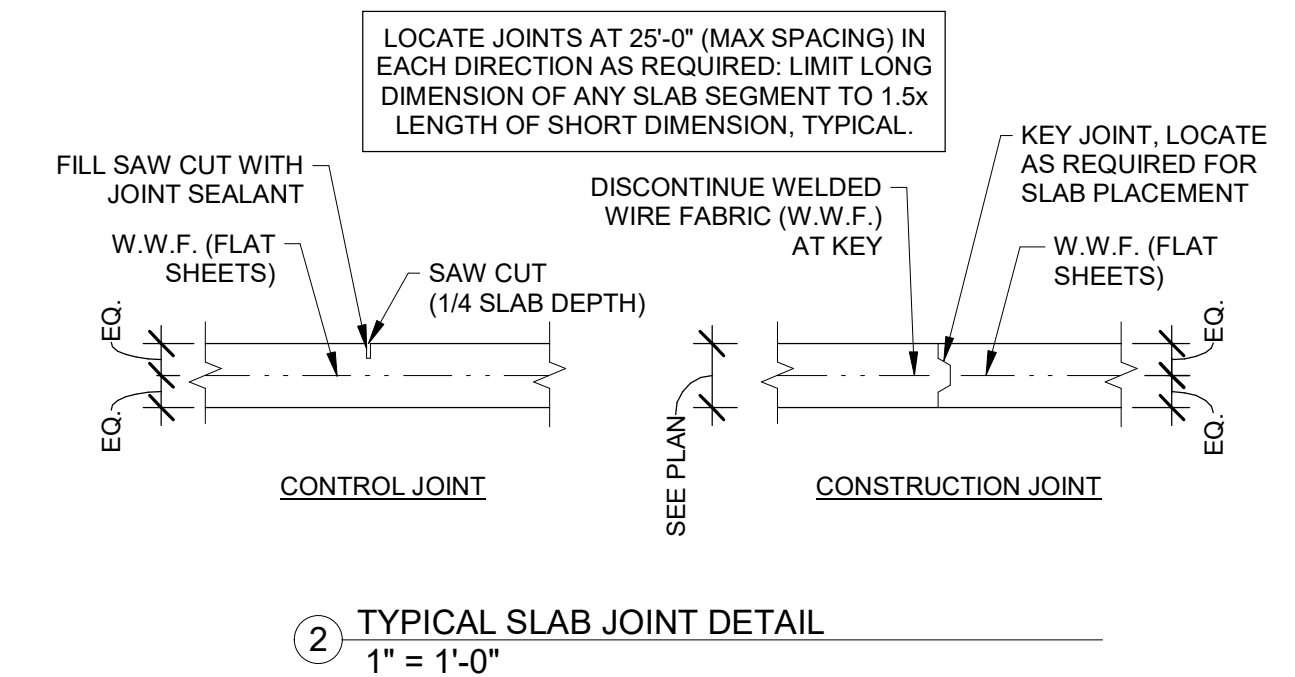
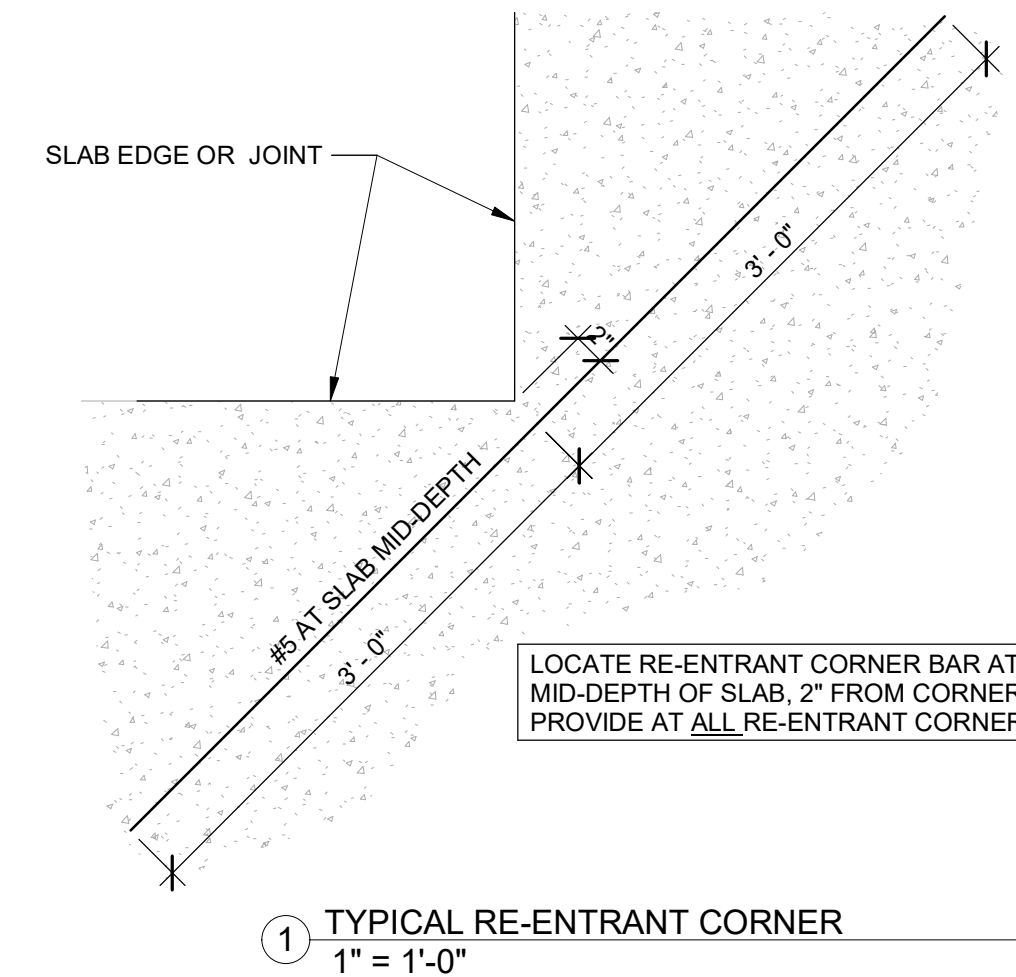
BLGD RISK CATEGORY: II
DESIGN WIND SPEED: 135 MPH
SOIL BEARING PRESSURE: 3000 PSF

SEISMIC DATA

S_{DS} = 0.584g
S_{D1} = 0.294g
SEISMIC IMPORTANCE FACTOR: 1.00
SEISMIC DESIGN CATEGORY: D
LATERAL FORCE RESISTING SYSTEM: LIGHT FRAMED (WOOD) WALLS WITH SHEATHING
R = 6.50
Q = 2.50
C_d = 4.00

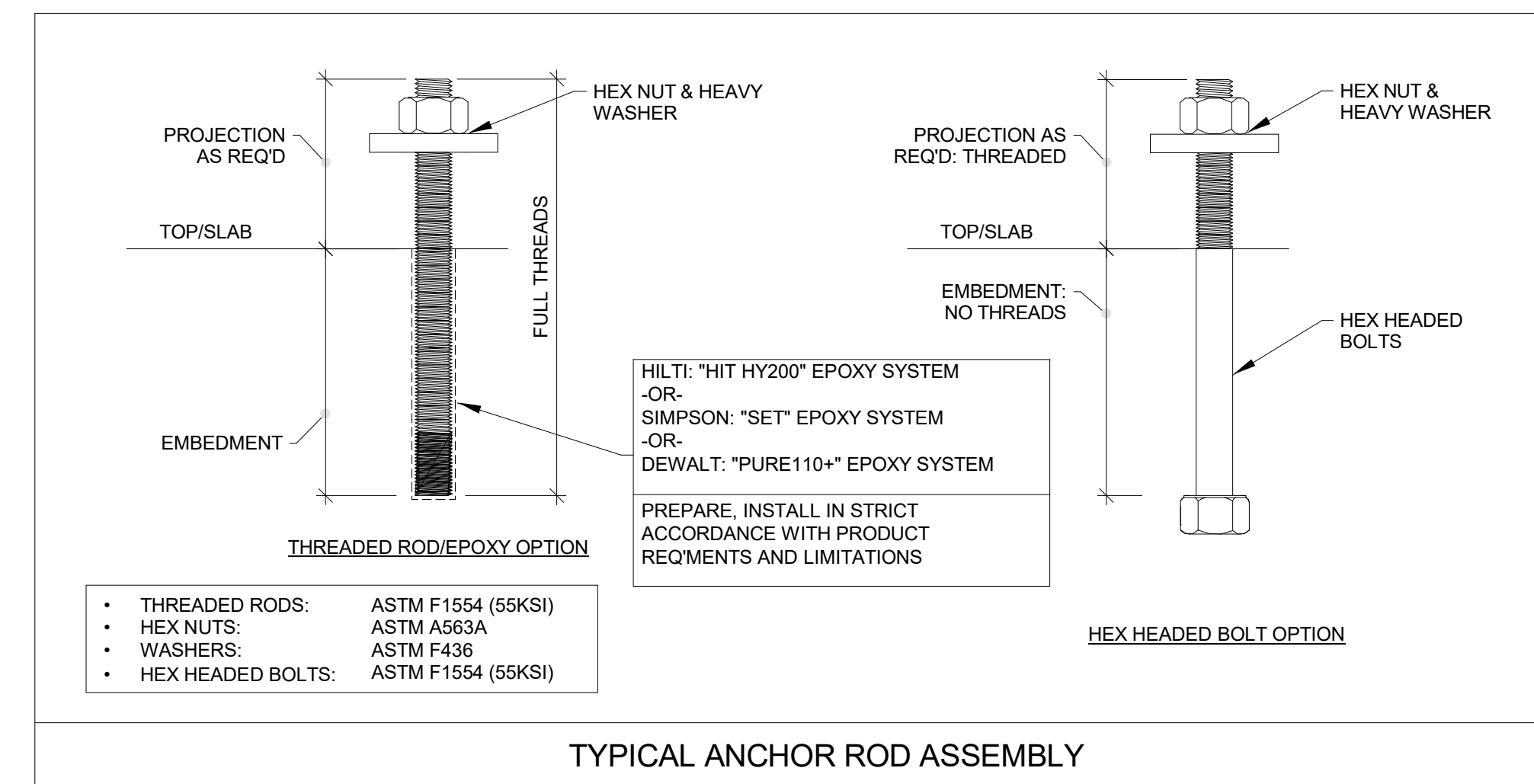
Special Inspections: Cast-In-Place Concrete

Item	Agency # (Qualif.)	Scope
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.
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 laps 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.)
Sampling and Testing of Concrete	ACI-CFTT ACI-STT	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 Building Official



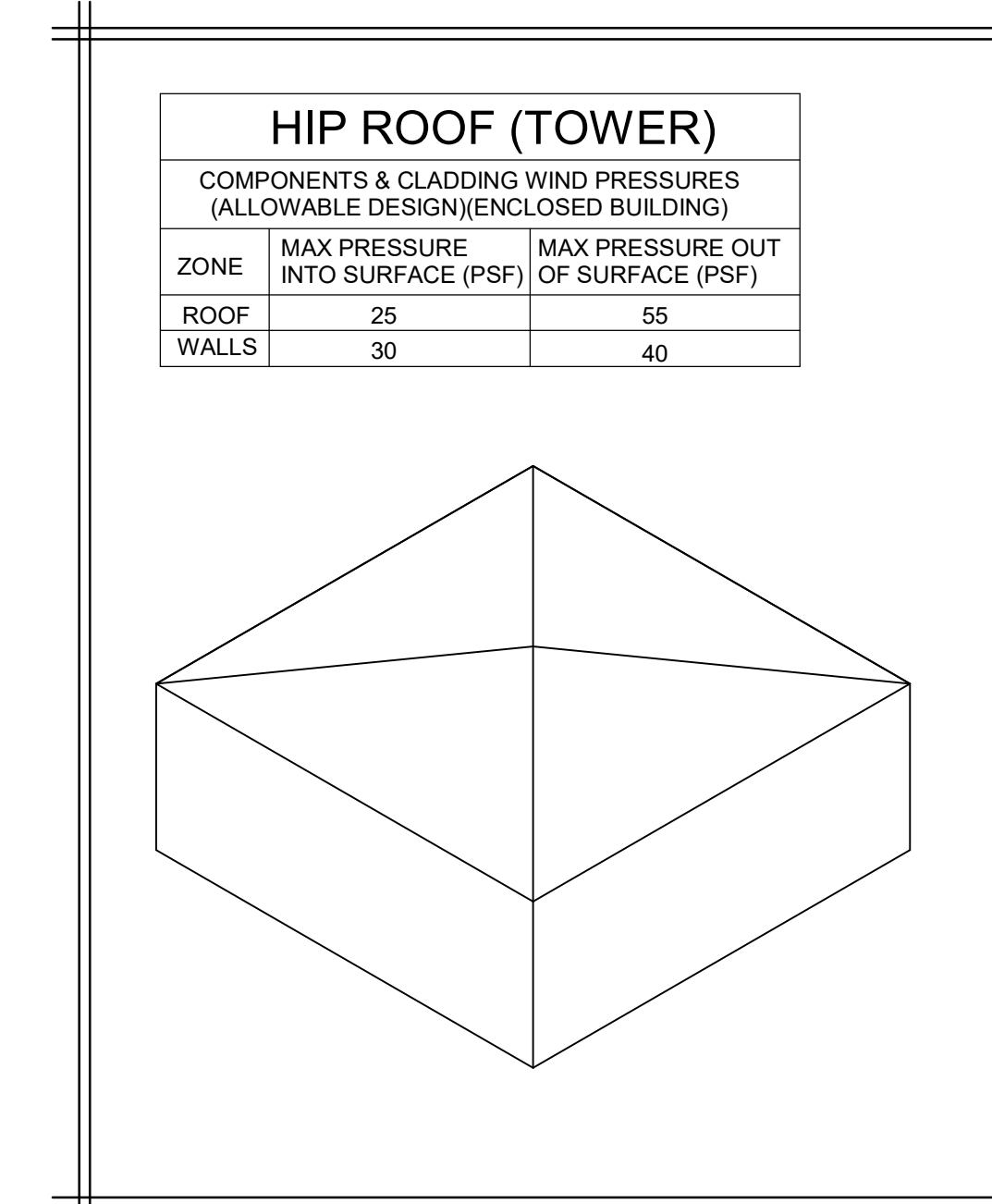
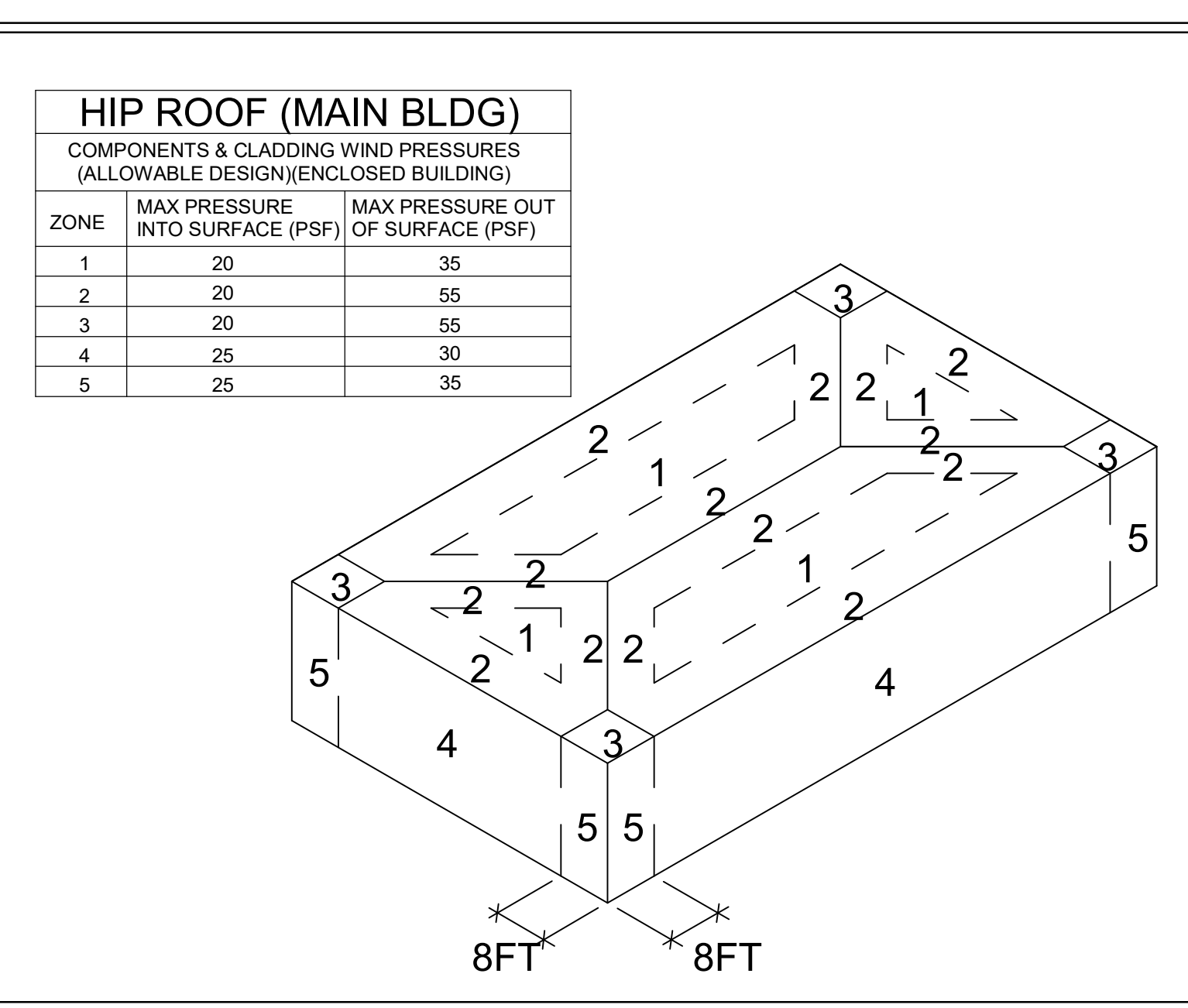
Special Inspections: Soils and Foundations

Item	Agency # (Qualif.)	Scope
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) Continuously inspect removal of unsuitable material and preparation of sub-grade prior to placement of controlled fill.
Controlled Structural Fill	PE/GE	Perform sieve tests (ASTM D422 & D1140) and modified Proctor tests (ASTM D1557) of each source of fill material. Periodically inspect placement, lift thickness and compaction of controlled fill. Verify conformance with recommendations of Geotechnical Report.

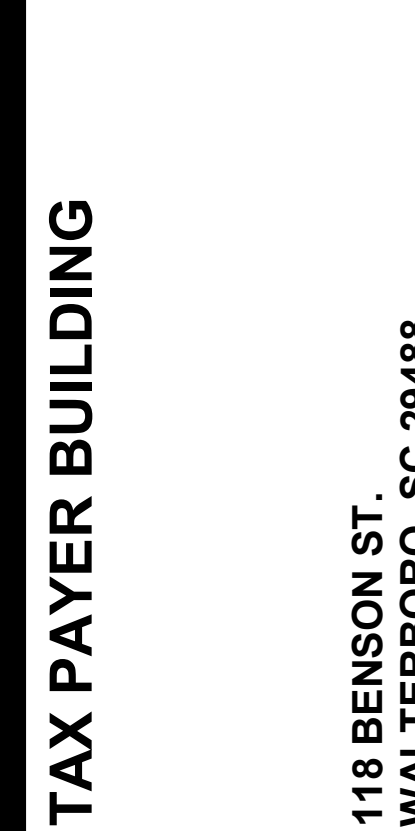


Special Inspections: Wood Construction

Item	Agency # (Qualif.)	Scope
Material Grading	PE/EIT	Periodically inspect Material Grades. (100% inspection rate; a minimum of once weekly during applicable portion of the work.
Connections	PE/EIT	Periodically inspect Mechanical Connections (nails, screws, bolts, strapping, etc.). (100% inspection rate; a minimum of once weekly during applicable portion of the work.
Framing and Details	PE/EIT	Periodically inspect Framing Layout, Geometry, and Details. (100% inspection rate; a minimum of once weekly during applicable portion of the work.
Sheathing and Shearwalls	PE/EIT	Periodically inspect size, configuration, blocking and fastening of sheathing and shearwalls. Verify panel grade and thickness. (100% inspection rate; a minimum of once weekly during applicable portion of the work.
Permanent Truss Bracing	PE/EIT	Periodically inspect bracing configuration, sizes, and connections. (100% inspection rate; a minimum of once weekly during applicable portion of the work.

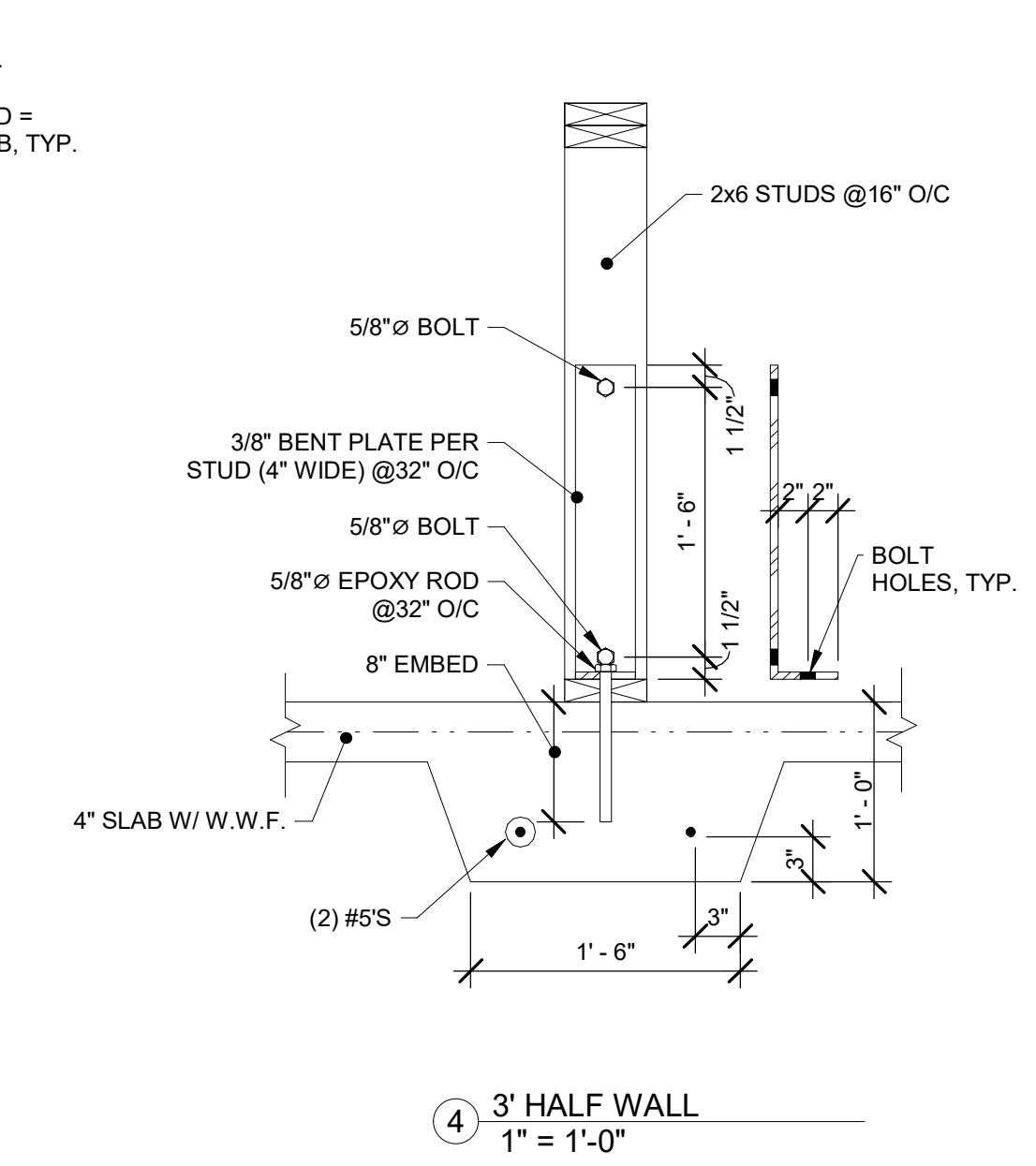
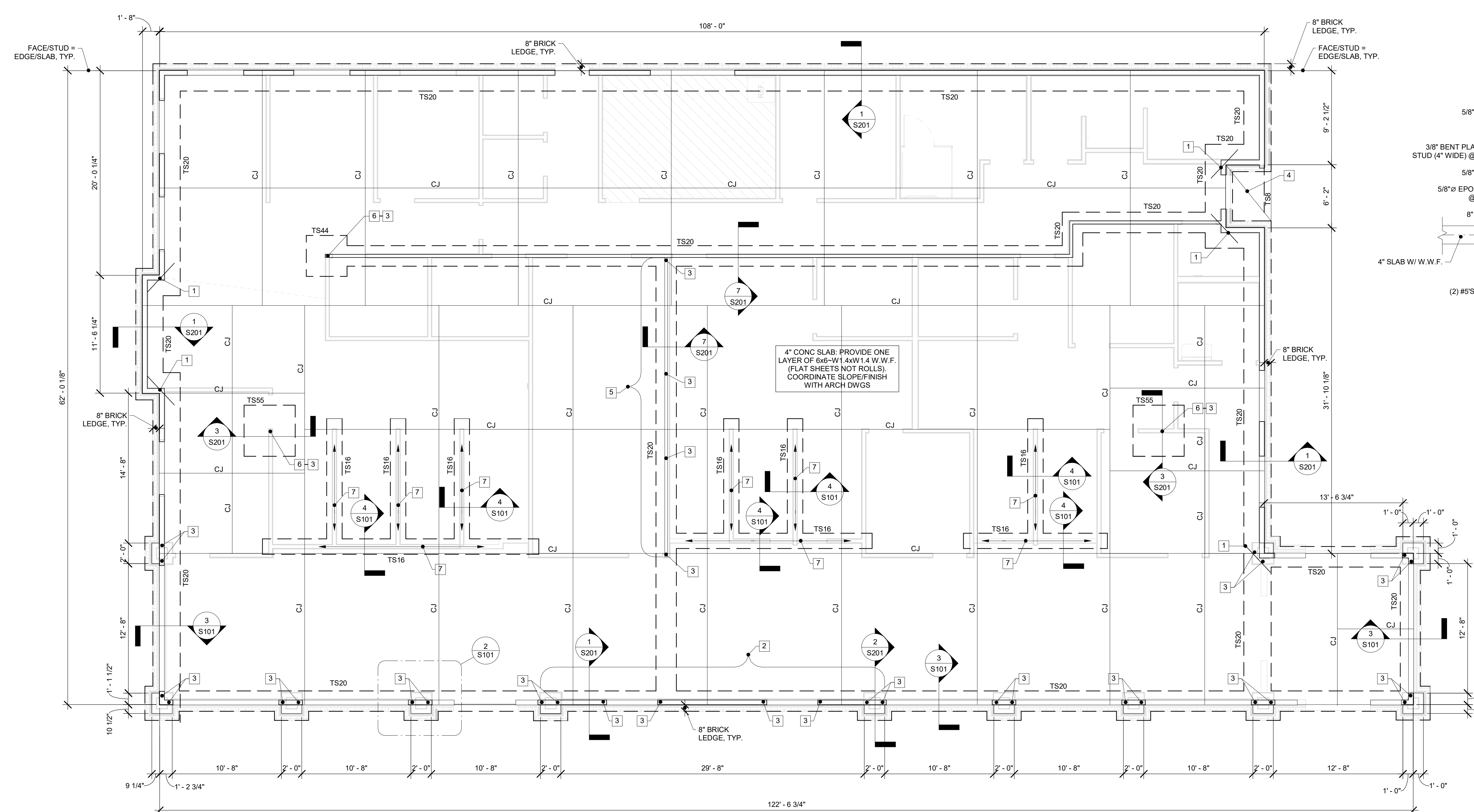


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TAX PAYER BUILDING
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WALTERBORO, SC 29488

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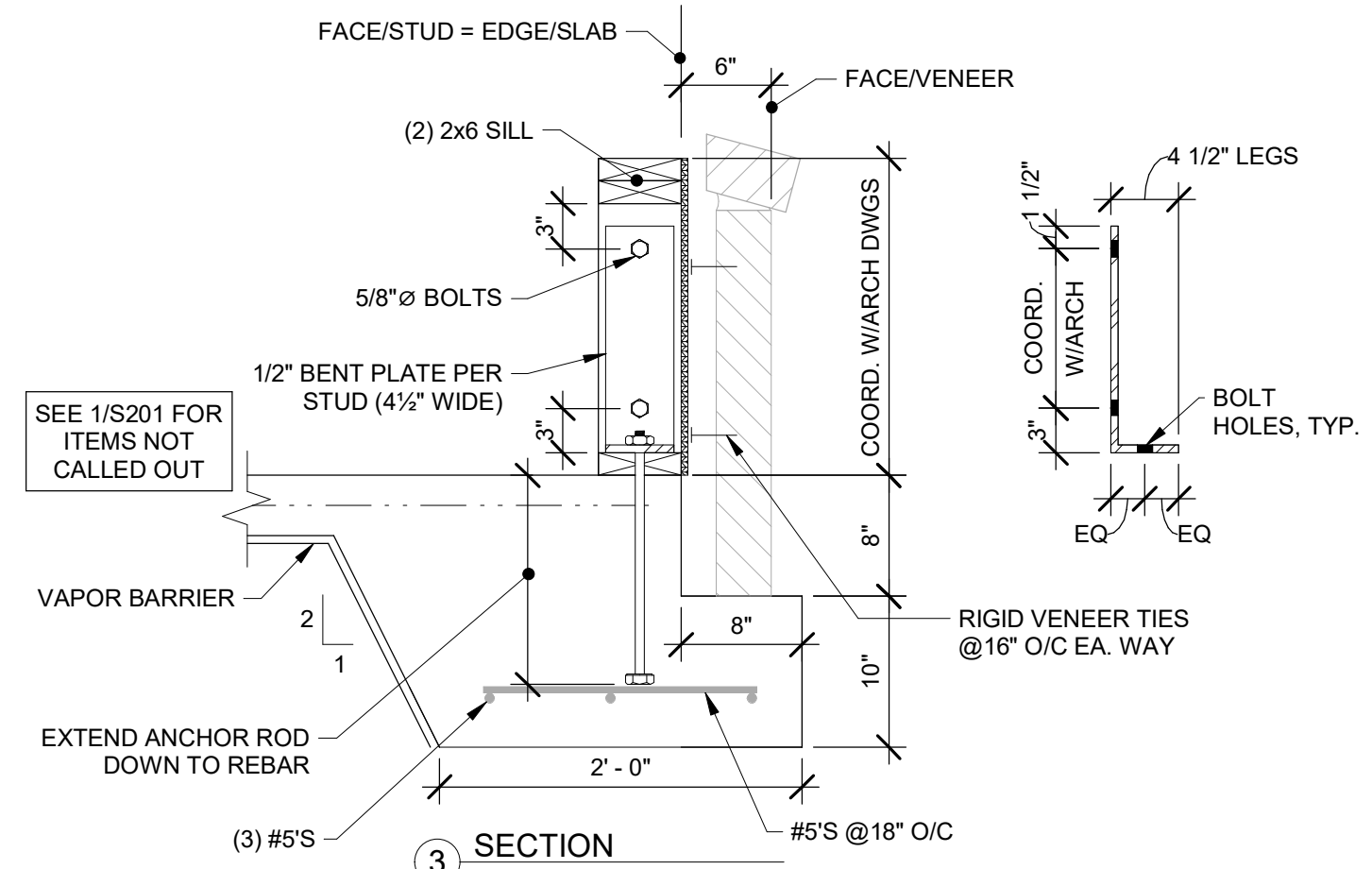
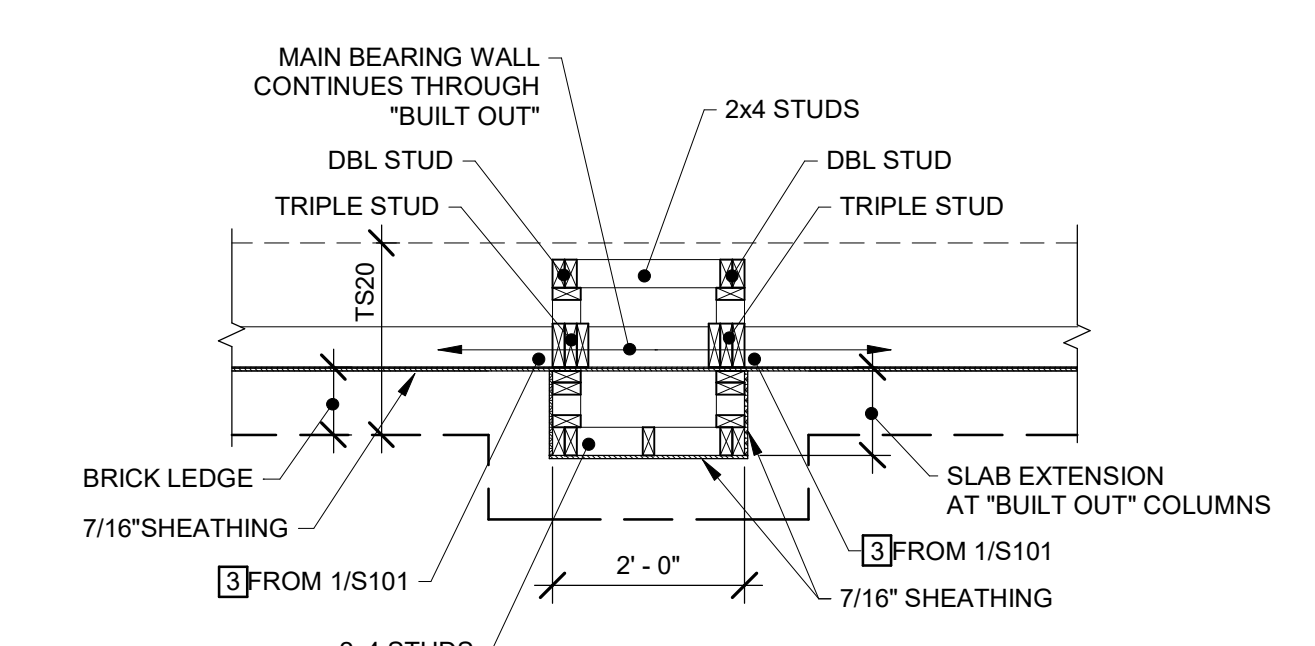


- DRAWING NOTES: 1/S101**
- RE-ENTRANT CORNER BAR IN SLAB: SEE DETAIL ON S100
 - WALL INDICATED IS A SHEARWALL: SHEATH BOTH SIDES WITH 7/16" OSB OR PLYWOOD (APA RATED SHEATHING). ATTACH WITH 10D NAILS @8" O/C (PANEL INTERIORS) & @4" O/C (PANEL PERIMETERS); BLOCKNAIL ALL PANEL EDGES.
 - SIMPSON HDB3 AT TRIPLE STUD IN WALL. PROVIDE THROUGH BOLTS INTO STUDS PER MANUF'R REQMENTS
 - 4" CONC. SLAB WITH W.W.F.; COORD. SLOPE, ELEV., FINISH W/ARCH DWGS; PROVIDE 1/2" EXP'N JT. MAT'L AT PERIMETER
 - WALL INDICATED IS A SHEARWALL: SHEATH ONE SIDE WITH 7/16" OSB OR PLYWOOD (APA RATED SHEATHING). ATTACH WITH 10D NAILS @8" O/C (PANEL INTERIORS) & @4" O/C (PANEL PERIMETERS); BLOCKNAIL ALL PANEL EDGES.
 - LOCATE FOOTING CENTERED BELOW MULT. STUD IN WALL FOR ROOF FRAMING SUPPORT
 - HALF WALL (4'-5" MAX HEIGHT); SEE DETAIL 4/S101

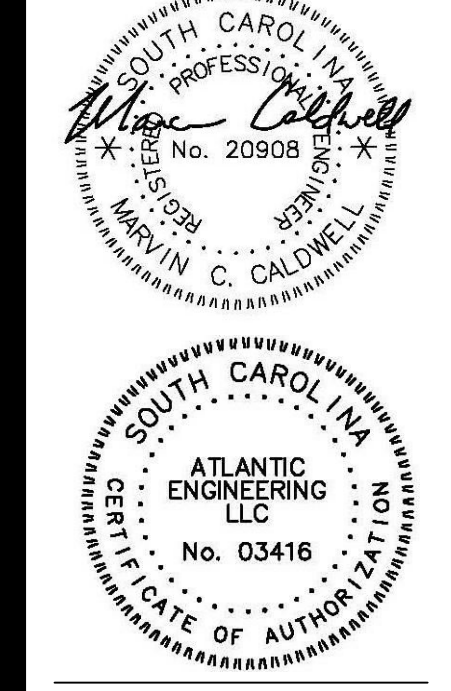
1 FOUNDATION PLAN
3/16" = 1'-0"

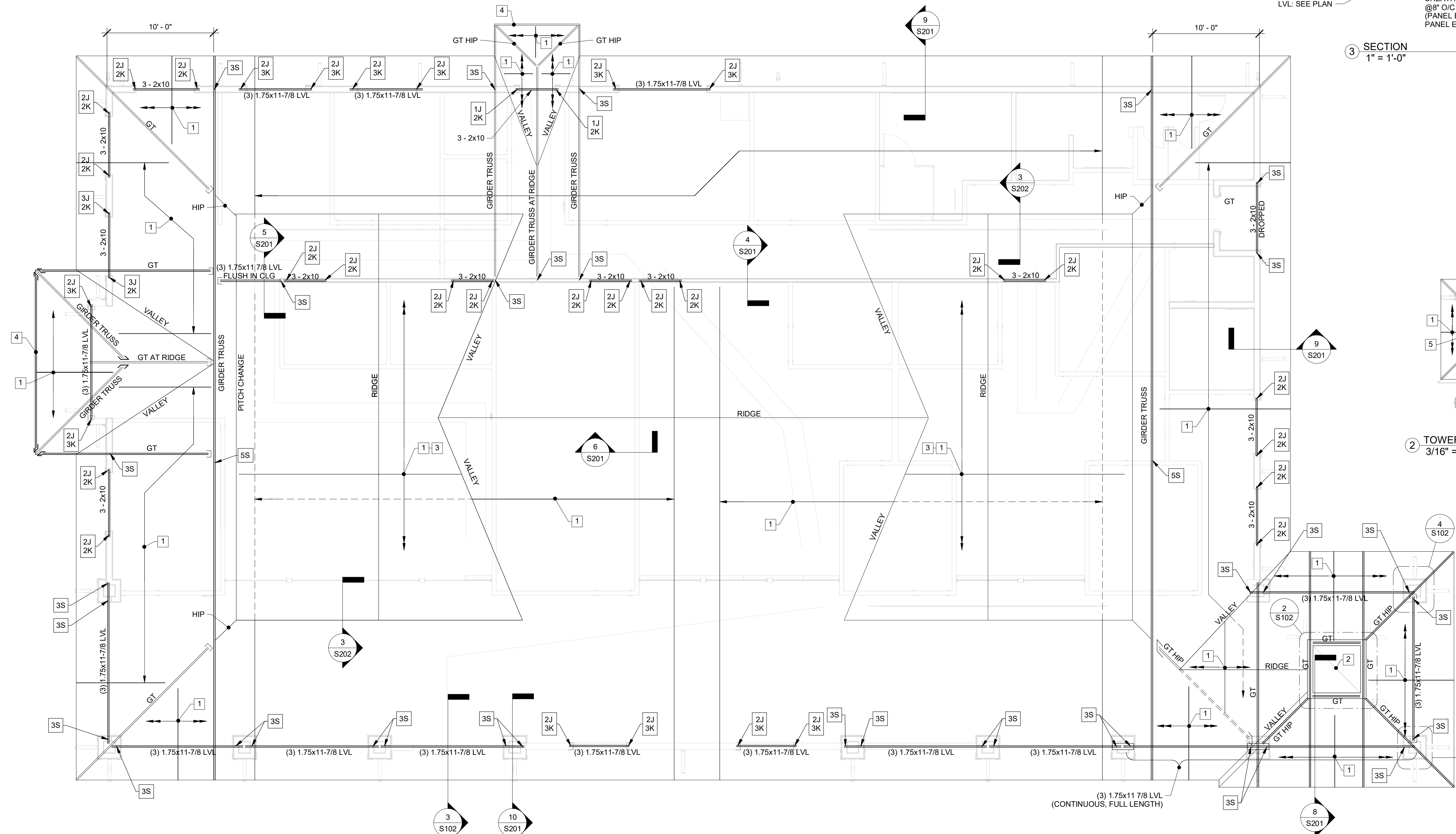
FOOTING SCHEDULE	
MARK	DESCRIPTION
TS16	1'-6" WIDE (12" DEEP) THICKENED SLAB W/(2) #5'S
TS20	2'-0" WIDE (1'-6" DEEP) THICKENED SLAB W/(3) #5'S & #5'S PERP. @18" O/C AT EXT. WALLS
TS44	4'-0" SQUARE (1'-6" DEEP) THICKENED SLAB W/(5) #5'S EA. WAY
TS55	5'-0" SQUARE (1'-6" DEEP) THICKENED SLAB W/(6) #5'S EA. WAY
TS8	8" SQUARE THICKENED SLAB EDGE

CJ - SAW CUT CONTROL JOINT



REV.	DATE	DESCRIPTION



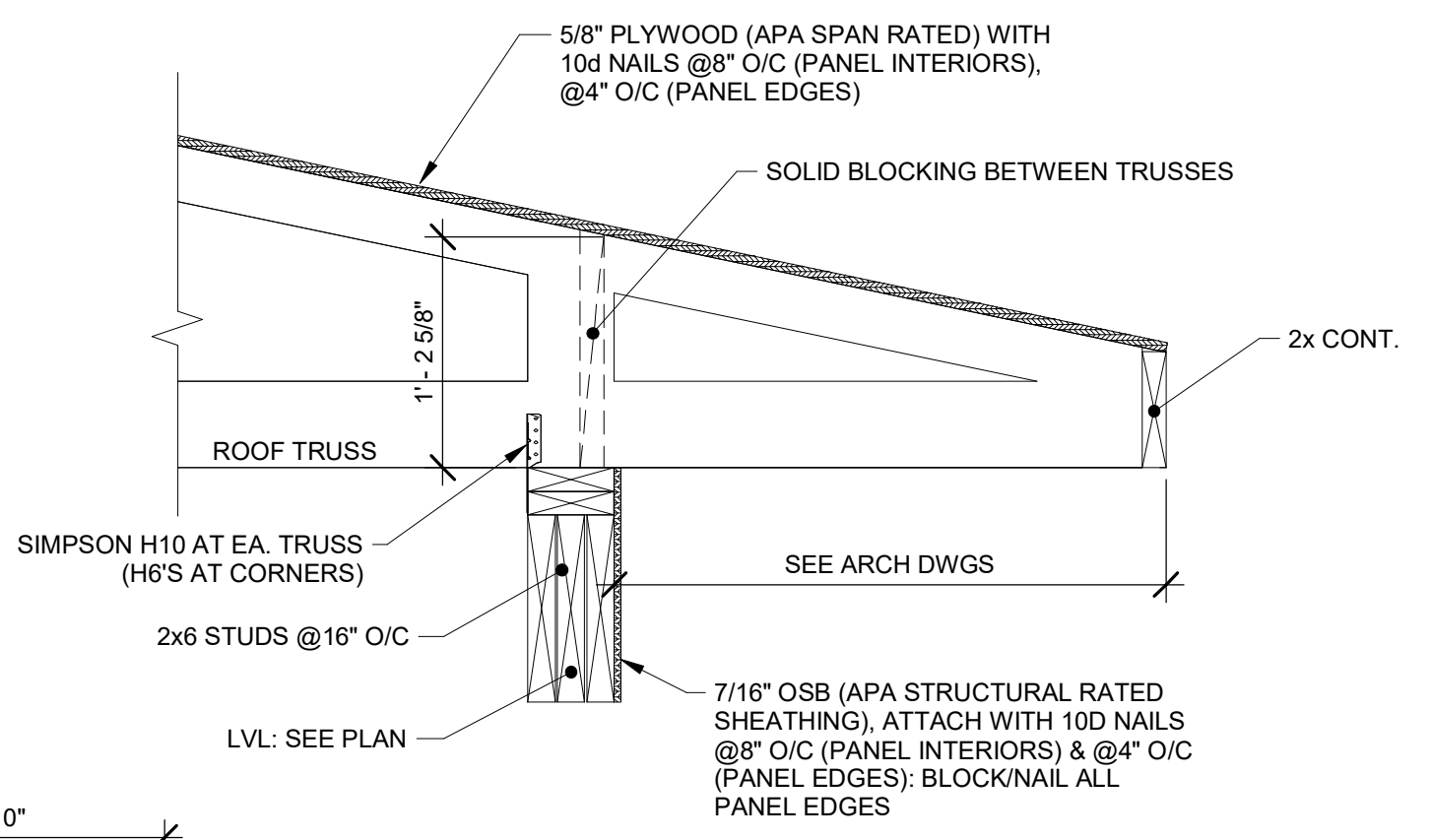


1 ROOF FRAMING PLAN
3/16" = 1'-0"

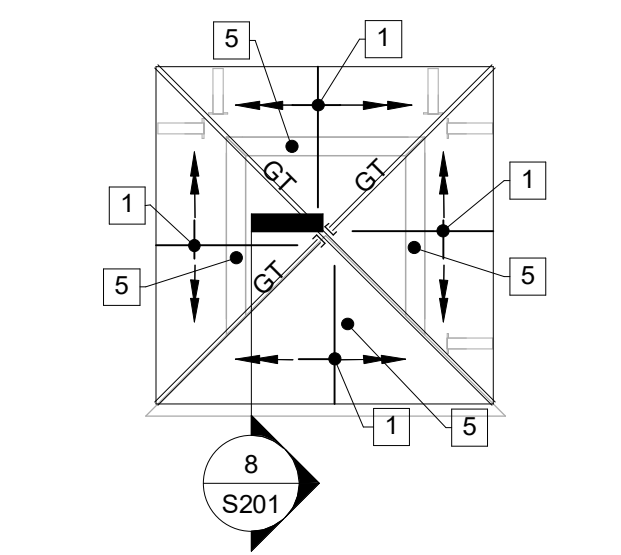
ROOF TRUSS NOTES:
 PROVIDE HANGERS, CONNECTIONS, UPLIFT RESTRAINTS, BRIDGING, ETC AS REQUIRED FOR A COMPLETE TRUSS SYSTEM
 PROVIDE GABLE END WALL BRACING, ROTATIONAL BRACING, BRIDGING, ETC. AS PART OF A COMPLETE ROOF TRUSS SYSTEM

- DRAWING NOTES: S102 X**
1. ROOF TRUSSES @2'-0" O/C
 2. OPEN TO ROOF ABOVE
 3. OVERFRAMING
 4. TRUSS OR BEAM PER TRUSS ENGINEER
 5. 3-2x6 HEADER IN TOWER WALL

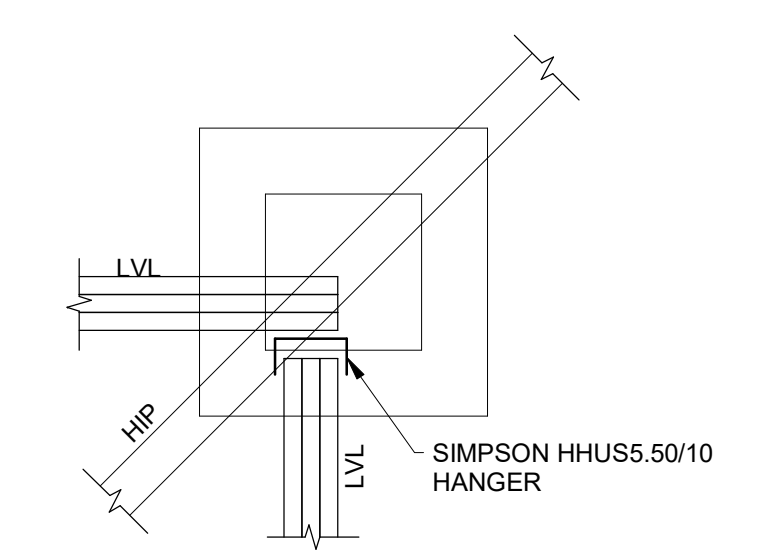
- LEGEND THIS PLAN S102**
- XXS - NUMBER OF STUDS IN WALL AT BEARING LOCATIONS
 - XXJ - NUMBER OF JACK STUDS AT HEADER
 - XXX - NUMBER OF KING STUDS AT HEADER



3 SECTION
1" = 1'-0"

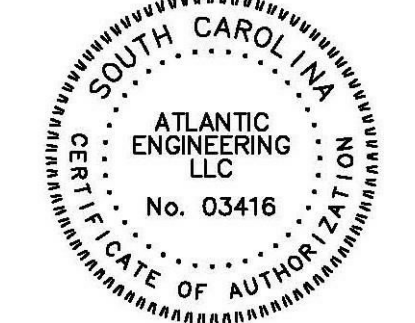
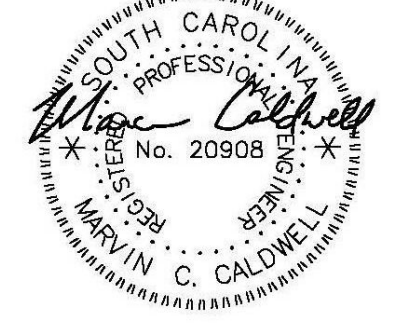


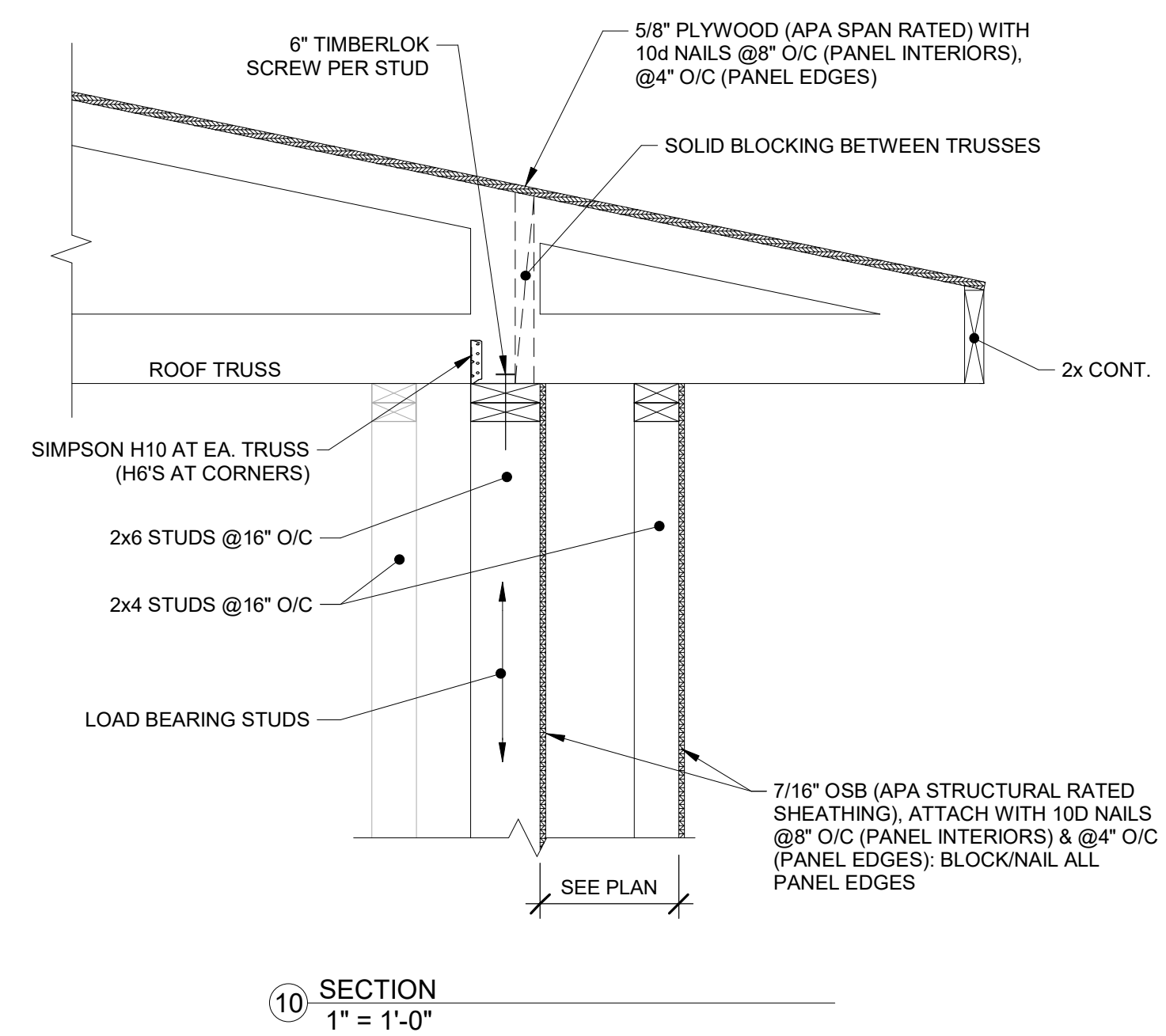
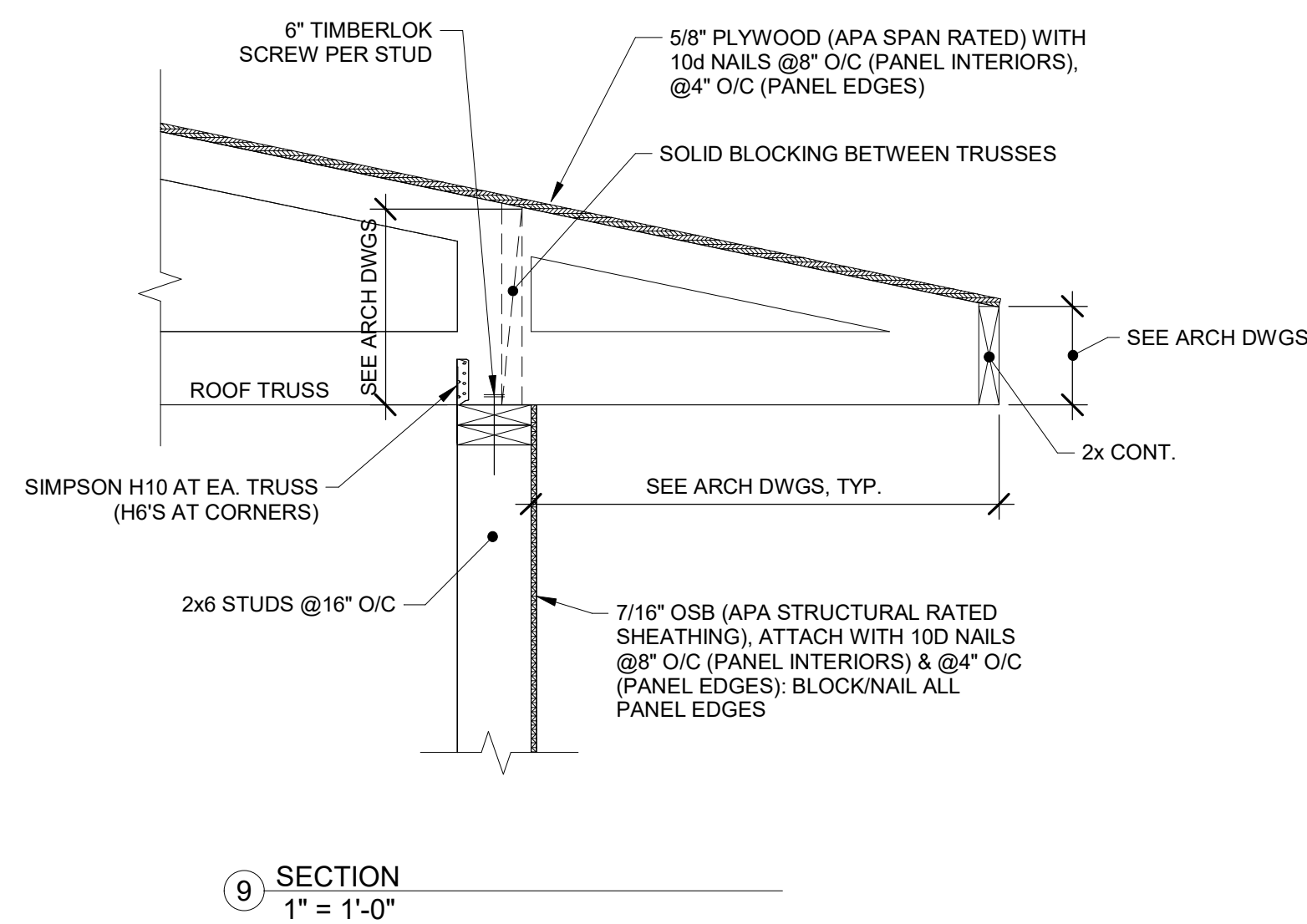
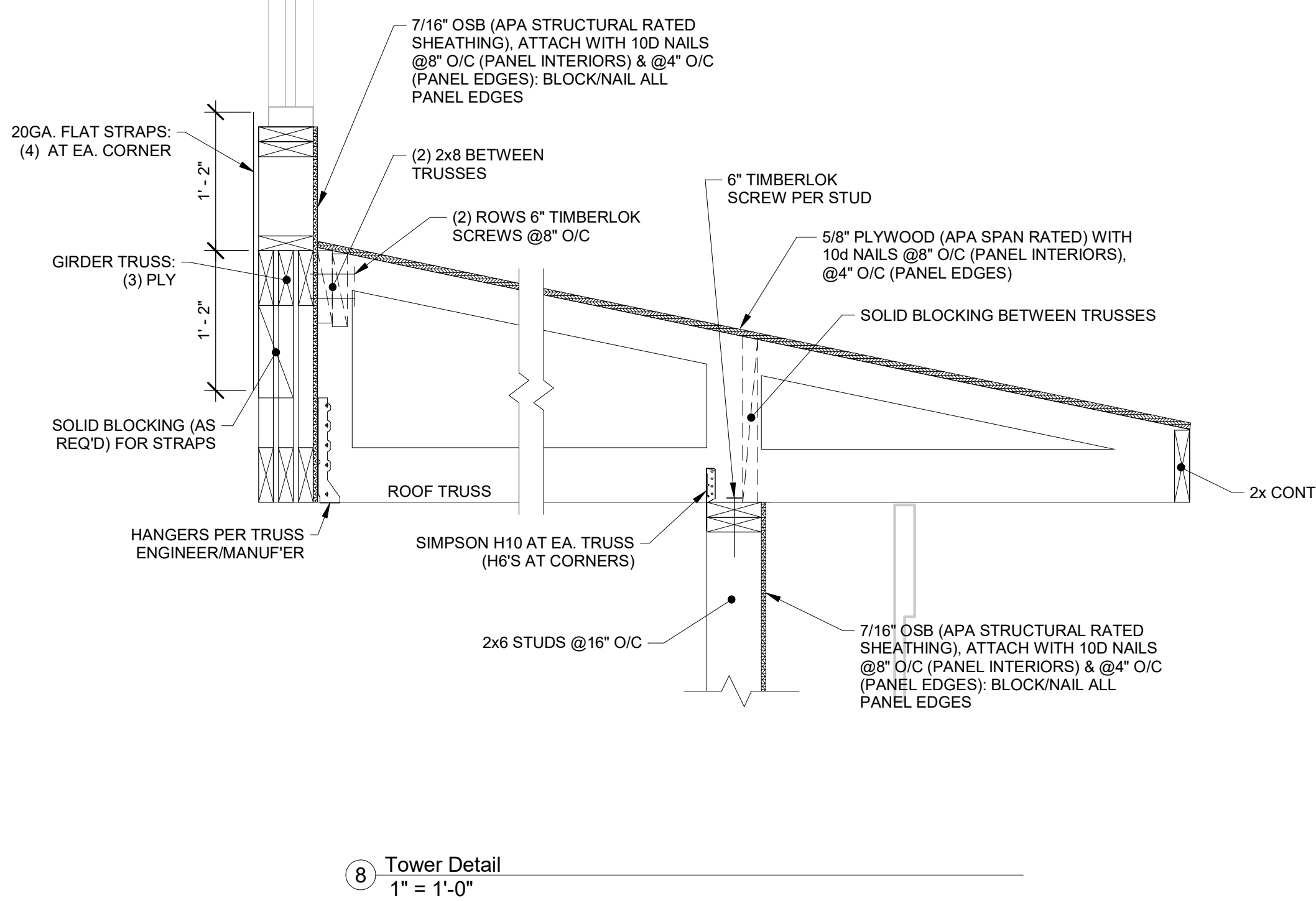
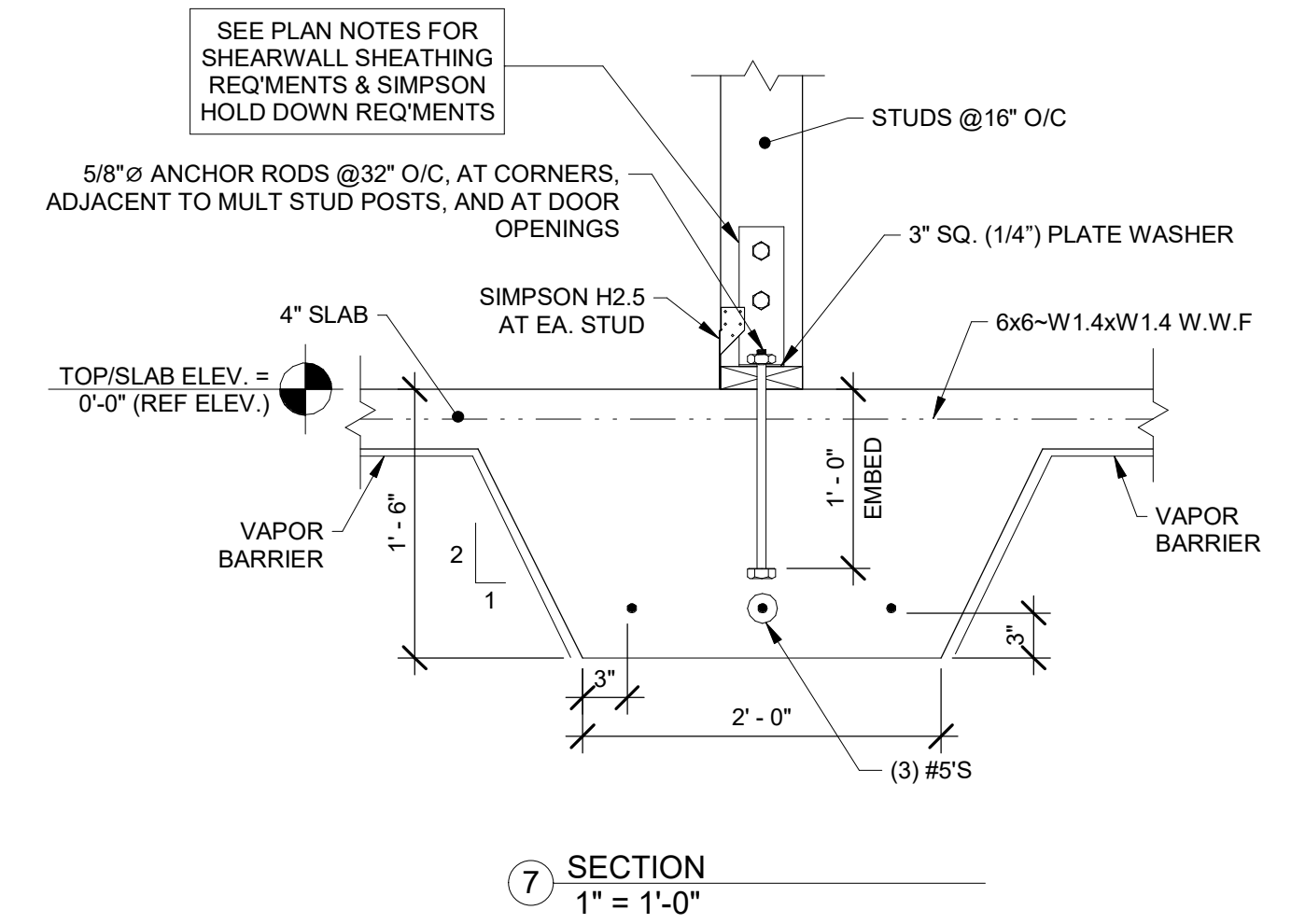
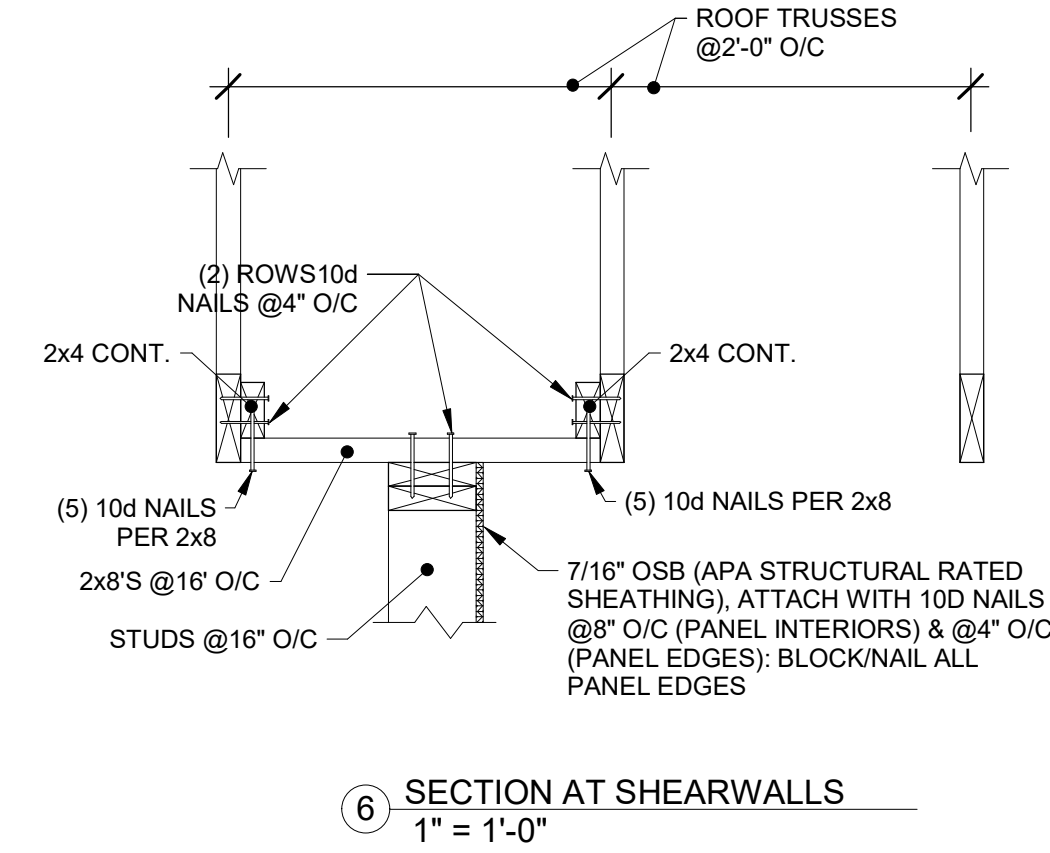
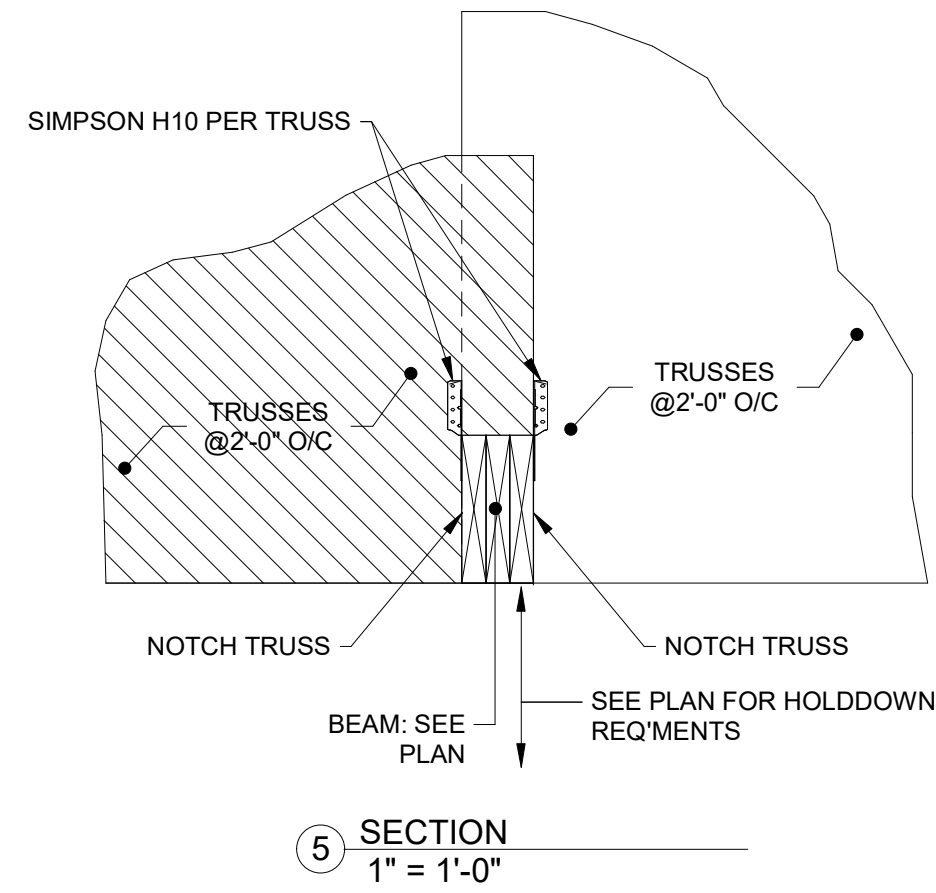
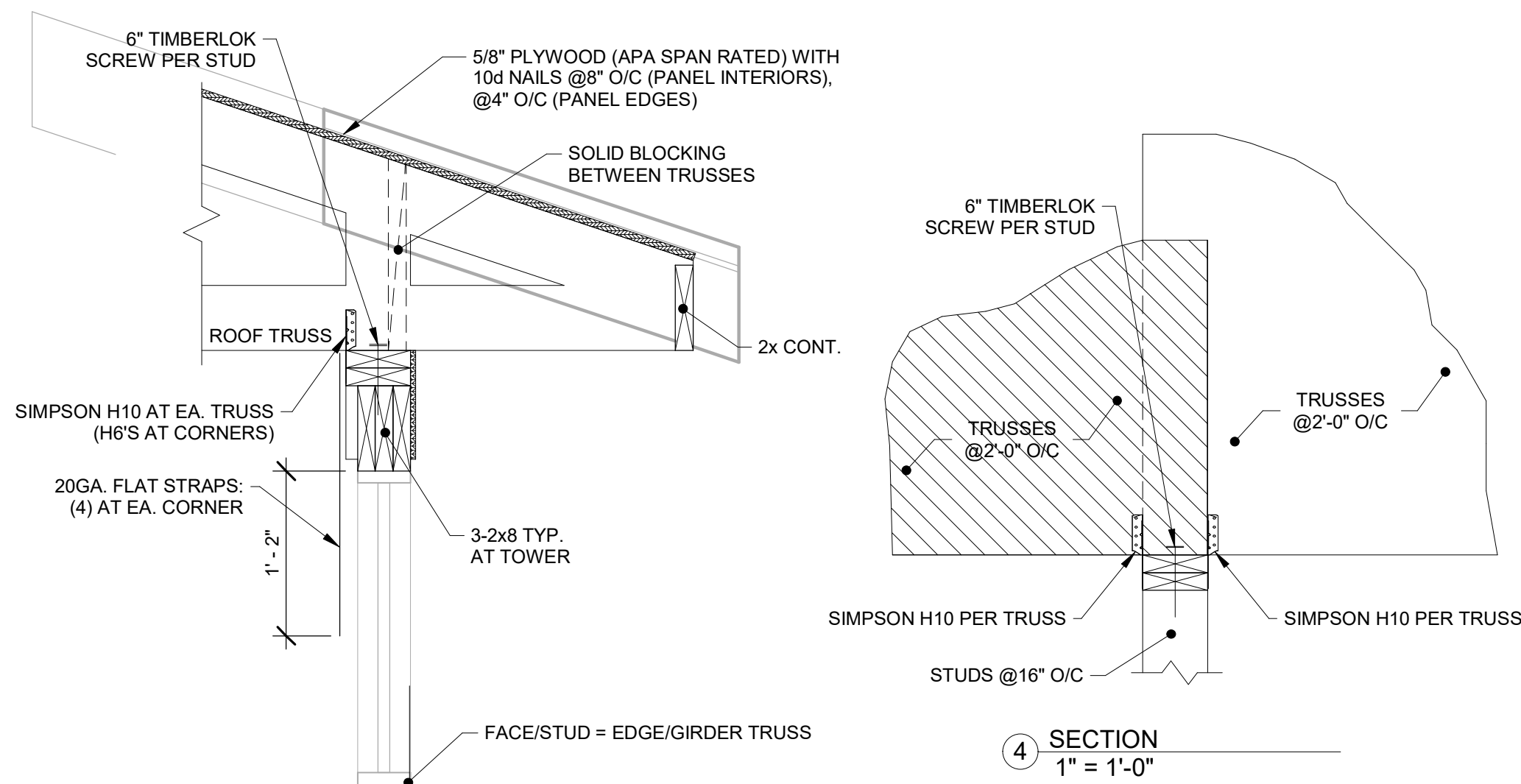
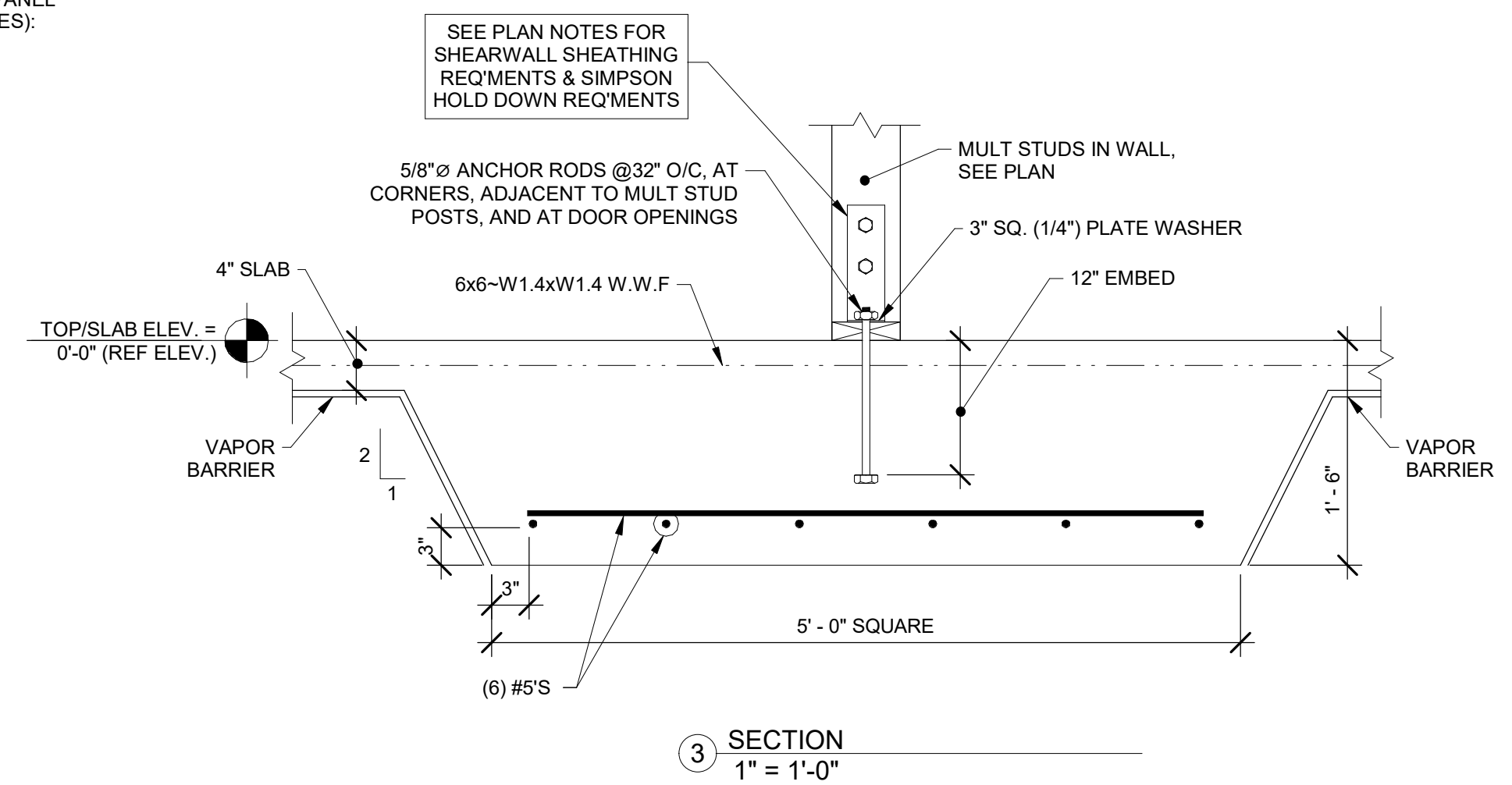
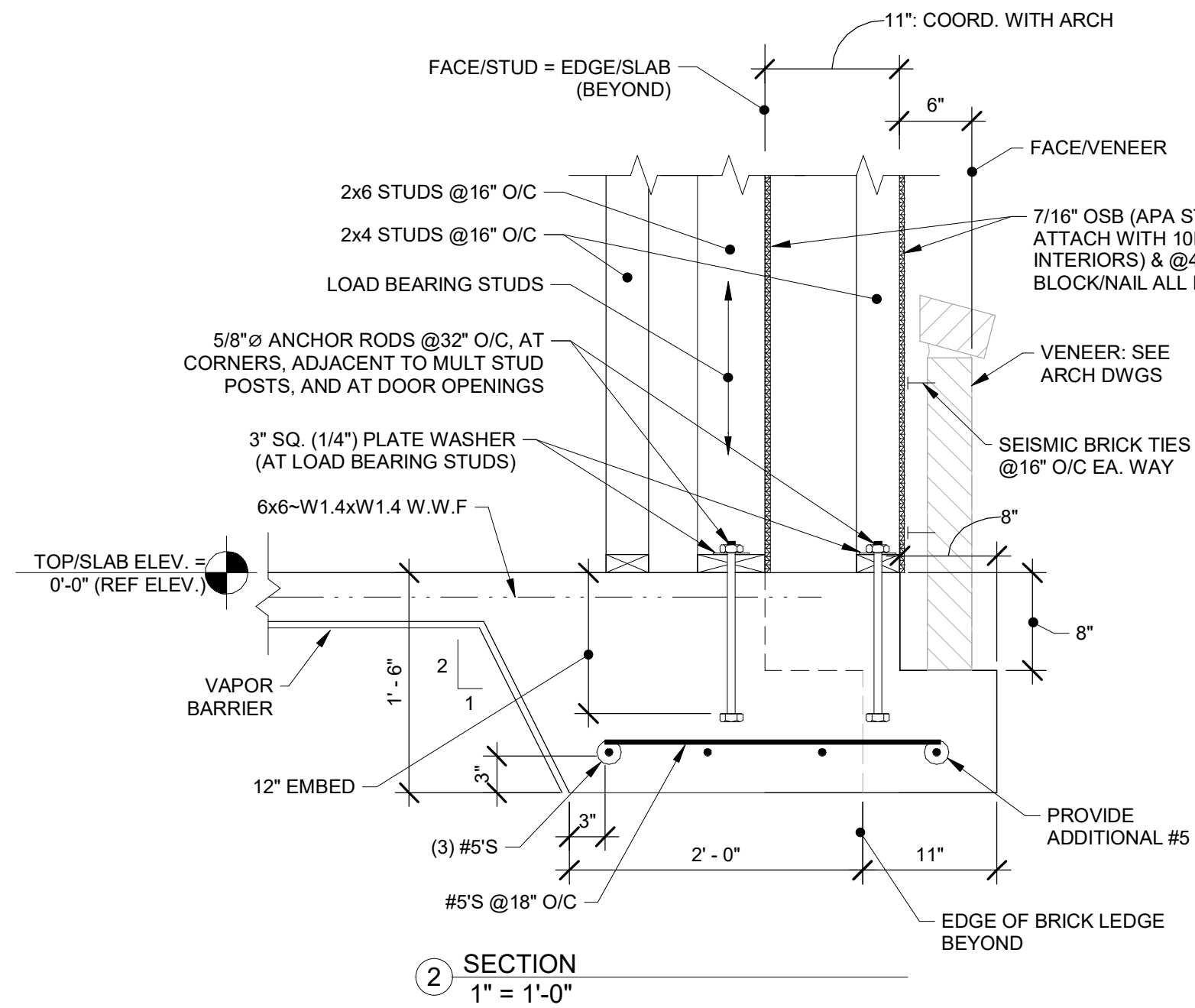
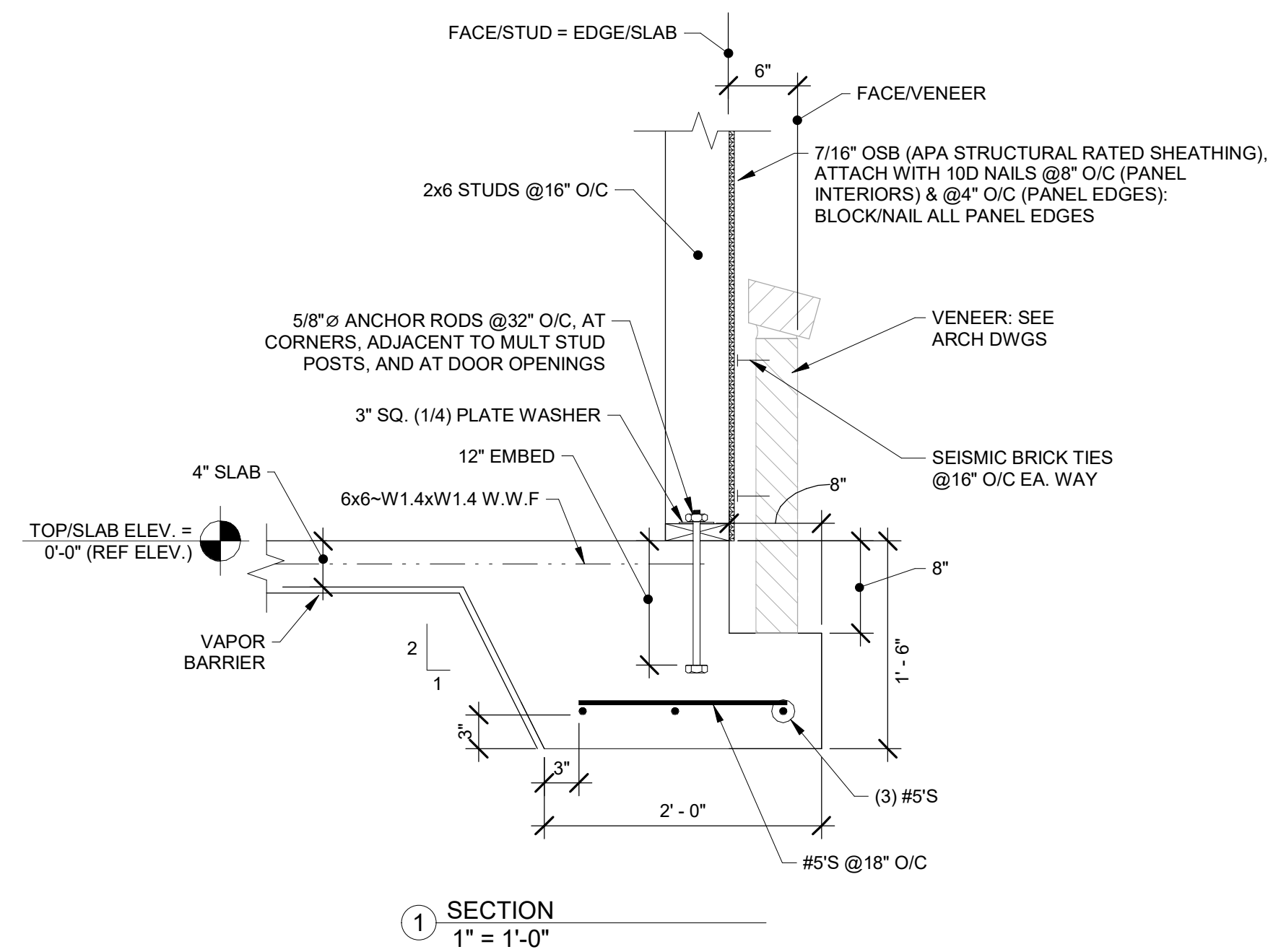
2 TOWER FRAMING PLAN
3/16" = 1'-0"



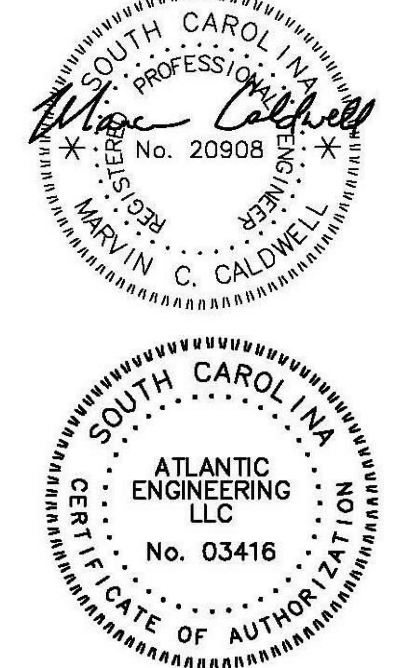
4 LVL INTERSECTION
3/4" = 1'-0"

REV.	DATE	DESCRIPTION



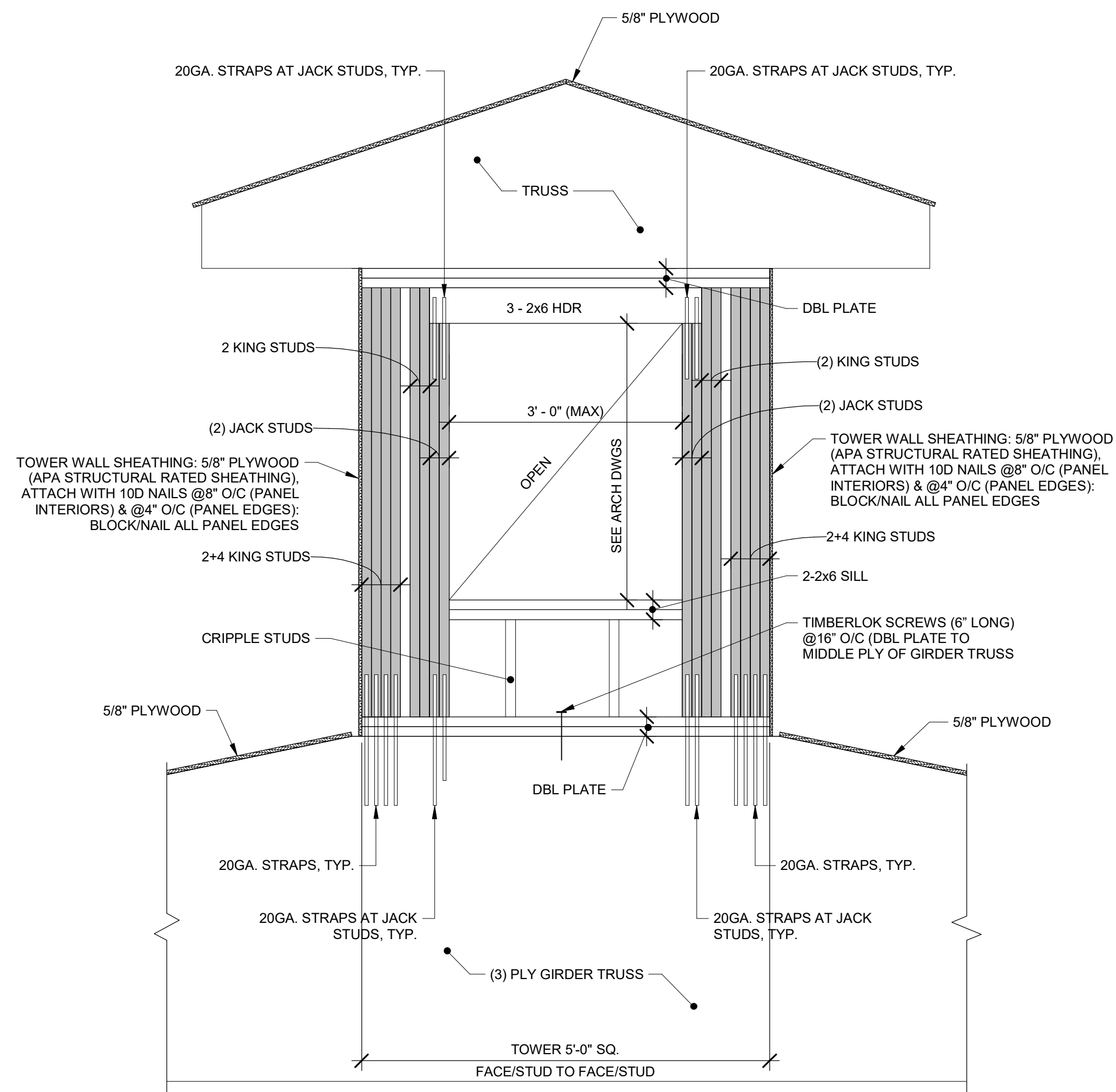


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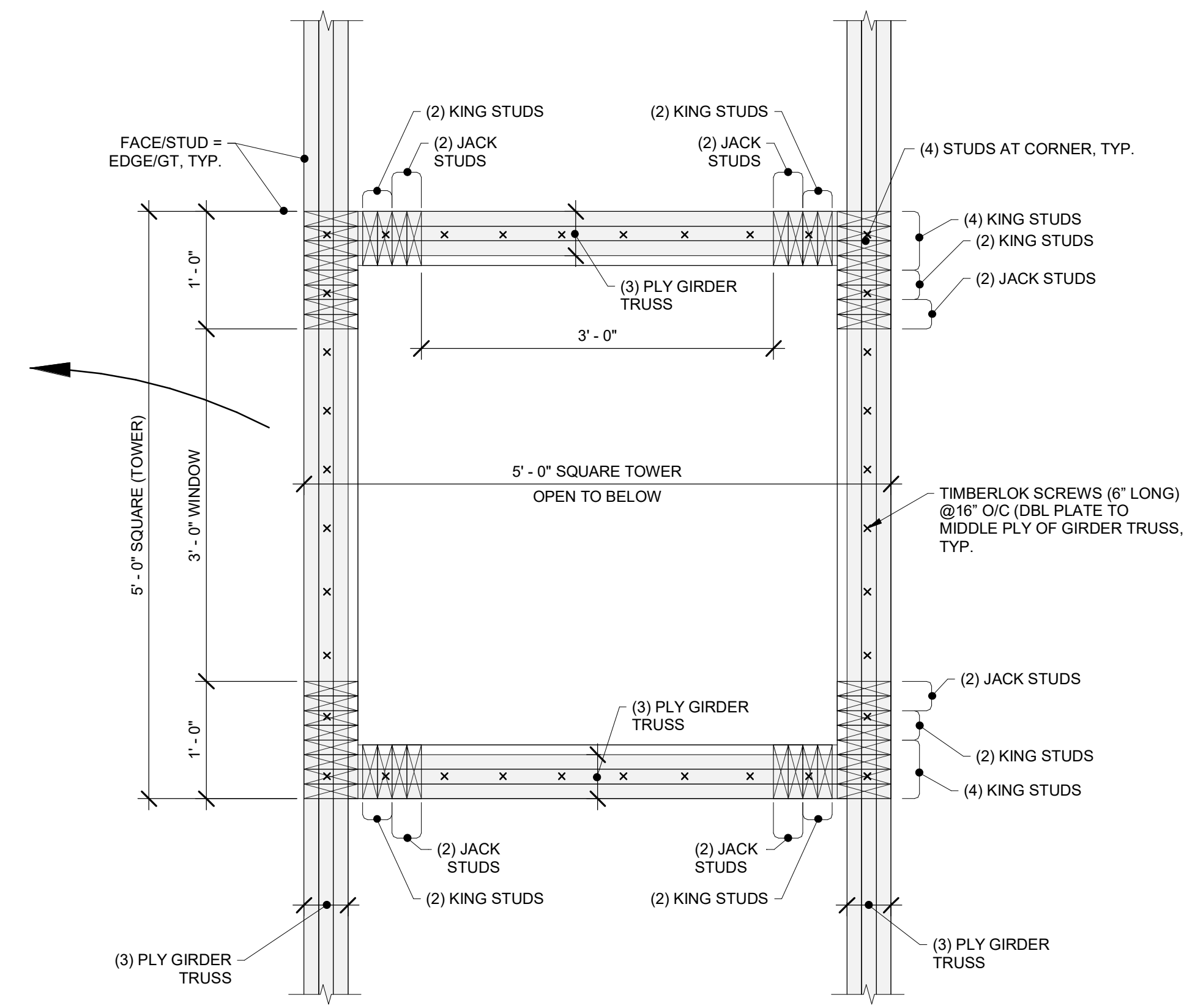


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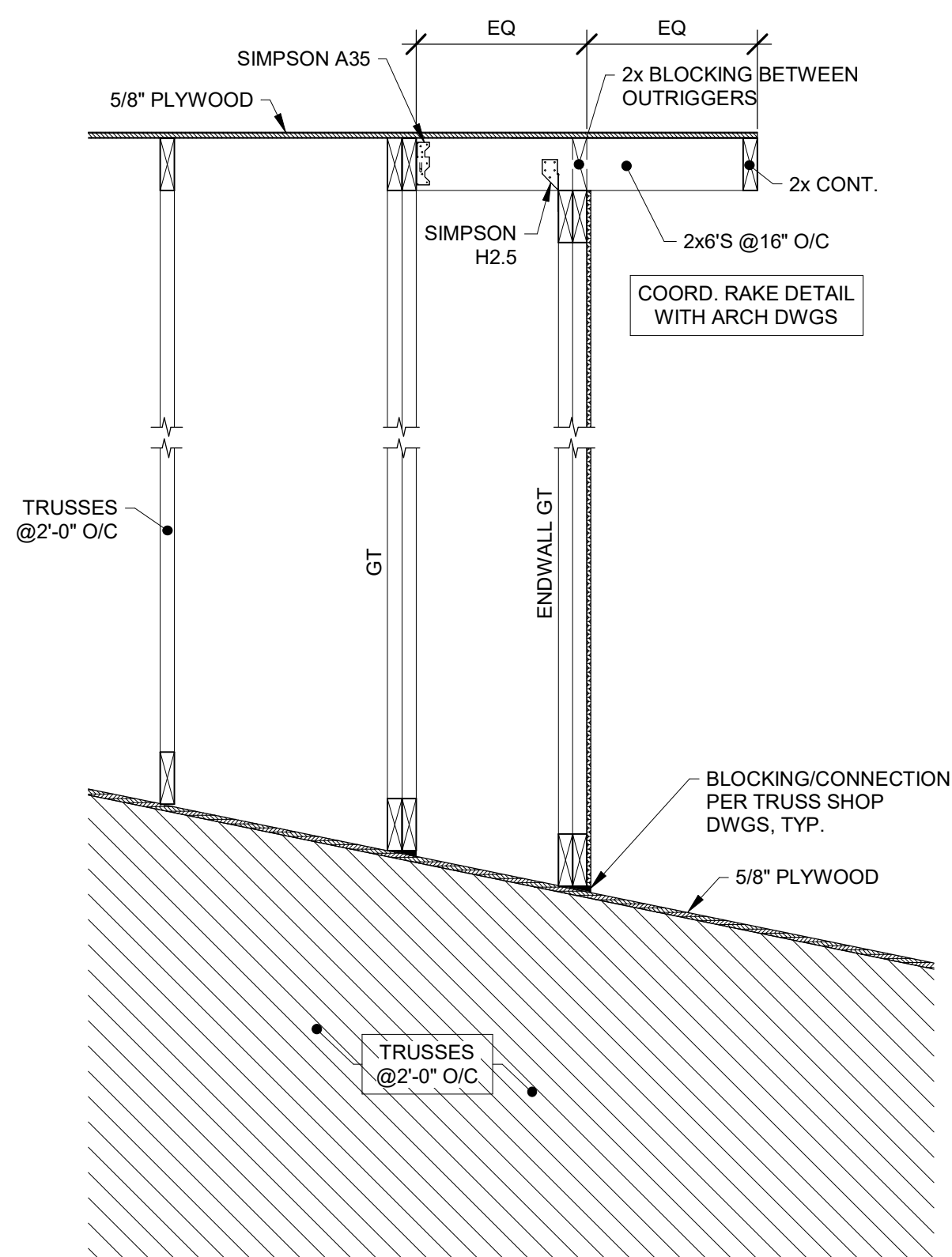
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① TOWER FRAMING ELEVATION
3/4" = 1'-0"

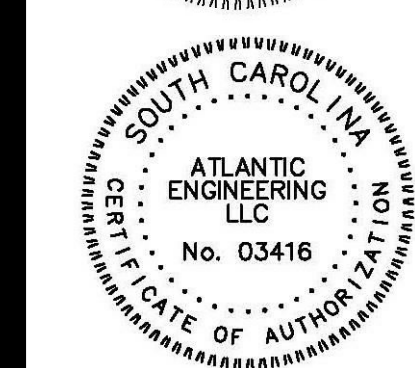
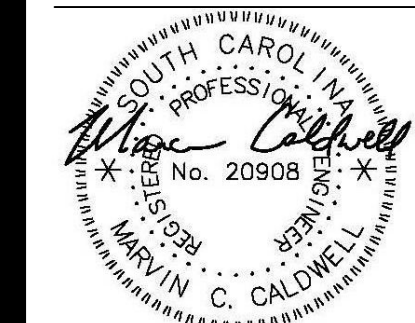


② TOWER FRAMING PLAN VIEW
1" = 1'-0"



③ TYP. GABLE END WALL DETAIL
3/4" = 1'-0"

REV	DATE	DESCRIPTION



TAX PAYER BUILDING
118 BENSON ST.
WALTERBORO, SC 29488

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11/23/2020

TOWER FRAMING/ DETAIL

S202

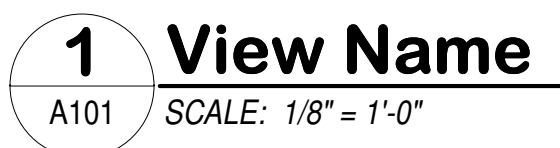
TYPICAL SYMBOLS USED ON ALL ARCHITECTURAL SHEETS

View Name

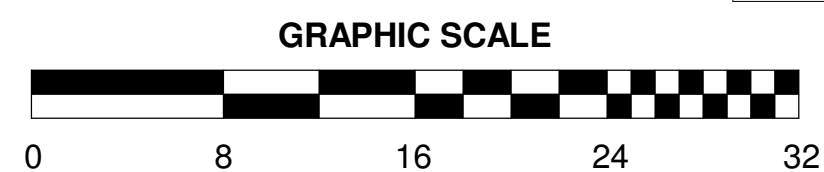
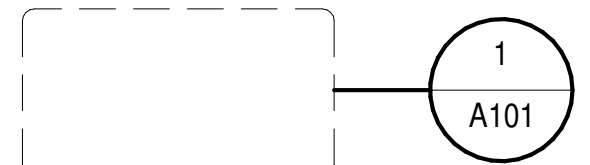
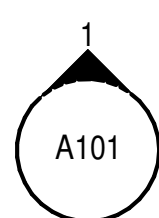
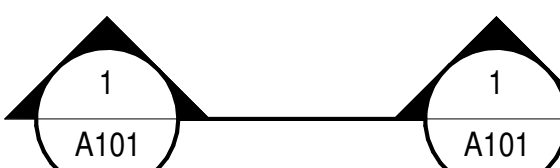
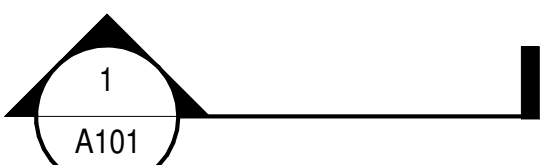
SCALE: 1/8" = 1'-0"



SCALE: 1/8" = 1'-0"



SCALE: 1/8" = 1'-0"



GRAPHIC SCALE OF A SHEET OR DETAIL

DETAIL TITLE WITHOUT DETAIL NUMBER: USED ONLY FOR TYPICAL DETAILS THAT DO NOT HAVE TO BE REFERENCED OR FOR "FLOOR" TYPE PLANS.

1-PART DETAIL TITLE WITH DETAIL NUMBER: USED TO IDENTIFY DETAILS THAT DO NOT HAVE TO BE REFERENCED BACK TO DETAIL CUT.

2-PART DETAIL TITLE WITH DETAIL NUMBER & REFERENCED SHEET NO.: USED TO IDENTIFY DETAILS THAT NEED TO BE REFERENCED BACK TO DETAIL CUT.

2-PART WALL SECTION CALLOUT KEY WITH DETAIL NUMBER & SHEET REFERENCE WHERE DETAIL IS DRAWN.

2-PART BUILDING SECTION CALLOUT KEY WITH DETAIL NUMBER & SHEET REFERENCE WHERE DETAIL IS DRAWN.

ELEVATION CALLOUT KEY WITH DETAIL NUMBER & SHEET REFERENCE WHERE DETAIL IS DRAWN.

2-PART ELEVATION CALLOUT KEY WITH DETAIL NUMBER & SHEET REFERENCE WHERE DETAIL IS DRAWN.

LEGEND & SYMBOLS

	STUD WALL: SEE WALL TYPES ON A500
	WALL TYPES: SEE SHEET A500 FOR TYPES
	ROOM NAME & NUMBER: SEE SHEET A140 FOR FINISHES
	DOOR MARK: SEE SHEET A600 FOR SCHEDULE, TYPES AND FRAME ELEVATIONS
	WINDOW MARK: SEE SHEET A610 FOR SCHEDULE AND FRAME ELEVATIONS
	1 HOUR FIRE RATED WALL: SEE WALL TYPES
	VERTICAL DATUM MARKER
	NEW CONSTRUCTION KEYNOTE TAG
	CEILING HEIGHT
	ROOF SLOPE
	ROOF SLOPE - RISE / RUN
	EQUIPMENT TAG
	CENTERLINE
	REVISION MARK - ADDENDA
	REVISION MARK - ASI / RFI / PR / CCD
	PLAN NORTH ARROW
	TRUE NORTH ARROW

ABBREVIATIONS

A	ACT	ACOUSTICAL CEILING TILE
	AFF	ABOVE FINISH FLOOR
	ALT	ALTERNATE
	ALUM	ALUMINUM
B	B/	BOTTOM OF
	BD	BOARD
	BLDG	BUILDING
	BLKG	BLOCKING
	BM	BEAM
	BRG	BEARING
C	CA	CAST ACRYLIC
	CI	CONTINUOUS INSULATION
	CIP	CAST-IN-PLACE
	CJ	CONTROL JOINT
	CL	CENTERLINE
	CLG	CEILING
	CLO	CLOSET
	CLR	CLEAR
	CMU	CONCRETE MASONRY UNIT
	COL	COLUMN
	CONC	CONCRETE
	CONT	CONTINUOUS
	CPT	CARPET
	CT	CERAMIC TILE
D	DET	DETAIL
	DIAM	DIAMETER
	DIM	DIMENSION
	DN	DOWN
	DWG	DRAWING
E	EA	EACH
	EJ	EXPANSION JOINT
	EL OR ELEV	ELEVATION
	EQ	EQUAL
	EQUIP	EQUIPMENT
	ET	EPOXY TERRAZO
	EW	EACH WAY
	EXIST	EXISTING
	EXP	EXPOSED (TO STRUCTURE)
	EXT	EXTERIOR
F	FACT	FACTORY FINISH
	FD	FLOOR DRAIN
	FDN	FOUNDATION
	FEC	FIRE EXTINGUISHER CABINET

ABBREVIATIONS

	FIN	FINISH (ED)
	FIP	FOAM-IN-PLACE
FL OR FLR	FLOOR	FLOOR
	FOB	FACE OF BRICK
	FOF	FACE OF FINISH
	FOS	FACE OF STUD
	FT	FOOT / FEET
G	G	GROUT
	GA	GAGE / GAUGE
	GALV	GALVANIZED
	GCB	GLAZED COVE BASE
	GFCI	GOVERNMENT FURNISHED CONTRACTOR INSTALLED
	GFRC	GLASS FIBER REINFORCED CONCRETE
	GL	GLASS / GLAZING
	GWB	GYPSUM WALL BOARD
	GYP	GYPSUM
H	HC	HOLLOW CORE
	HM	HOLLOW METAL
I	ID	INSIDE DIAMETER
	INSUL	INSULATION
J	JT	JOINT
L	LAV	LAVATORY
	LP	LOW POINT
M	MAX	MAXIMUM
	MECH	MECHANICAL
	MFR	MANUFACTURER
	MIN	MINIMUM
	MISC	MISCELLANEOUS
	MO	MASONRY OPENING
	MT	METAL THRESHOLD
	MTL	METAL
N	N	NORTH
	NIC	NOT IN CONTRACT
	NO OR #	NUMBER
	NTS	NOT TO SCALE
O	OC	ON CENTER
	OD	OUTSIDE DIAMETER
	OPG	OPENING
	OPP	OPPOSITE
	OS	OVERFLOW SCUPPER

ABBREVIATIONS

P	PL	PLASTIC LAMINATE
	PNT	PAINT
R	R	RISER
	RAD	RADIUS
	RCP	REFLECTED CEILING PLAN
	RD	ROOF DRAIN
	REINF	REINFORCED
	REQ'D	REQUIRED
	REV	REVERSED
	RO	ROUGH OPENING
S	SC	SEALED CONCRETE
	SCW	SOLID CORE DOOR
	SF	STOREFRONT
	SHT	SHEET
	SIM	SIMILAR
	SPEC	SPECIFICATION
	SQ	SQUARE
	SS	STAINLESS STEEL
	ST	STAIN
	STL	STEEL
	SUSP	SUSPENDED
	SV	SHEET VINYL FLOORING
T	T	TREAD
	T/	TOP OF
	TBB	TILE BACKERBOARD
	TEMP	TEMPORARY
	THK	THICK
	TP	TOILET PARTITION
	TYP	TYPICAL
U	U.N.O.	UNLESS NOTED OTHERWISE
V	VB	VINYL BASE
	VCT	VINYL COMPOSITION TILE
	VERT	VERTICAL
	VJ	VERTICAL JOINT
	VPAB	VAPOR PERMEABLE AIR BARRIER
	VWC	VINYL WALL COVERING
W	W/	WITH
	W/O	WITHOUT
	WD	WOOD
	WT	WALL TILE

KEYNOTE LEGEND - MASTER

KEY VALUE	KEYNOTE TEXT
1.01	ALIGN
1.03	LINE OF ROOF ABOVE
1.04	NO CEILING, OPEN TO STRUCTURE ABOVE
1.30	HALF-HIGH WALL, REFER TO ELEVATIONS AND DETAILS, REFER TO STRUCTURAL DRAWINGS FOR SUPPORT AND BRACING
1.31	KNOX BOX #3200 WITH RECESSED MOUNTING KIT, TO BE INSTALLED AT 6'-0" O.C. ABOVE SIDEWALK. REFER TO DETAIL ON A500.
3.01	CONCRETE FLOOR SLAB
3.02	CONCRETE FOUNDATION, RE: STRUCT.
4.07	BRICK ROWLOCK SILL
4.30	BRICK VENEER WATERTABLE
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPLASH WHERE SHOWN
6.04	SOLID WOOD CASEWORK, PAINTED
6.05	WOOD TRUSS
6.30	WOOD CABINET BOXES WITH WOOD DOORS/ DRAWER FACES, PAINTED
6.31	SOLID SURFACE
6.32	SOLID WOOD BASEBOARD, STAINED, REFER TO DETAIL ON A140
6.33	SOLID WOOD 5/4 WINDOW SILL, PAINTED
6.34	SOLID WOOD 1x4 WINDOW APRON, PAINTED
6.35	TWO-STEP SOLID WOOD CORNICE TRIM, PAINTED, REFER TO DETAIL ON A120
6.36	SOLID WOOD 1x6, PAINTED
6.38	SOLID WOOD SHIPLAP SIDING WITH 6" EXPOSURE, STAINED
6.39	WOOD CABINET WITH ADJUSTABLE SHELF, PAINTED
6.40	WOOD CABINET SHELL WITH OPEN BAY, PAINTED
6.41	SOLID WOOD FIXED CAP, PAINTED

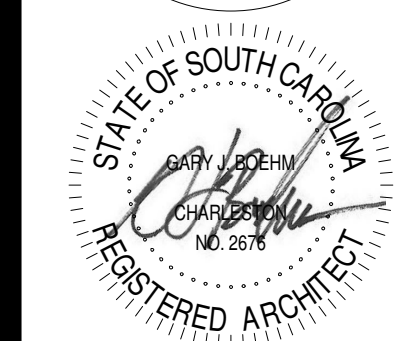
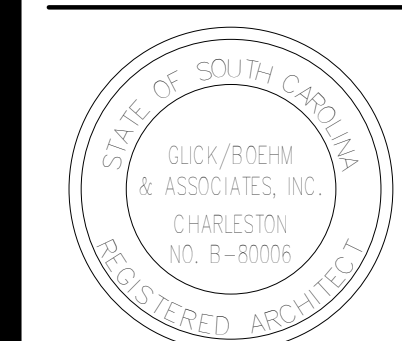
KEYNOTE LEGEND - MASTER

6.42	WOOD FILLER STRIP, PAINT TO MATCH CABINETS
6.43	SOLID WOOD APPLIANCE SIDE-PANEL, 3/4" THICK, PAINTED
6.44	4" ROUND WHITE POLYPROPYLENE PLASTIC SOFFIT LOUVER WITH INSECT SCREEN, SPACED EVERY 6'-0" O.C. MINIMUM
7.04	FIBER CEMENT PANEL, PAINTED
7.05	FIBER CEMENT TRIM, PAINTED
7.06	STANDING SEAM METAL ROOF
7.10	SEAMLESS SHEET METAL GUTTER
7.11	SHEET METAL DOWNSPOUT, WITH STRAP ANCHORS 4'-0" O.C. VERTICAL
7.30	FIBER CEMENT BOARD AND BATTEN, PAINTED
7.31	FIBER CEMENT LAP SIDING, PAINTED
7.32	FIBER CEMENT TWO-PIECE FRIEZE BOARD, PAINTED
7.33	
7.34	FIBER CEMENT CORNER TRIM, PAINTED
7.35	FIBER CEMENT SOFFIT, PAINTED
7.37	FIBER CEMENT 1x12, PAINTED
7.38	FIBER CEMENT 5/4x10, PAINTED
7.39	FIBER CEMENT 1x3 BATTEN STRIP, PAINTED, EQUALLY SPACED EVERY 12'-0" O.C. MAXIMUM
7.40	POLYURETHANE WALL BRACKET #1 (AT WALLS AND TOWER COLUMNS) ON VERTICAL 5/4x6 FIBER CEMENT MOUNTING PLATE, ALL TO BE PAINTED, FYPON #BKT25X27 OR EQUAL
7.41	POLYURETHANE WALL BRACKET #2 (AT BUILDING COLUMNS AND UPPER TOWER ROOF) ON VERTICAL 5/4x6 FIBER CEMENT MOUNTING PLATE, ALL TO BE PAINTED, FYPON #BKT16X18 OR EQUAL
8.05	ALUMINUM STOREFRONT

KEYNOTE LEGEND - MASTER

8.19	ARCHITECTURAL WALL LOUVER, RE: MECHANICAL
8.31	PLEXIGLASS FACIAL SCREEN WITH PASS-THROUGH IN PAINTED SOLID WOOD FRAME
9.03	ACOUSTIC CEILING TILE
9.30	GYPSUM WALL BOARD FINISH AS RECESSED PANEL, PAINTED TO MATCH TRIM
10.02	FIRE EXTINGUISHER CABINET
10.08	TOILET PARTITION, HINEY HIDERS OR EQUAL, COLOR: GREY
10.30	BANK DRIVE-THROUGH TRANSACTION STATION WITH INTERCOM, COVENANT SECURITY EQUIPMENT MODEL #CSE-QS-QST-619S OR EQUAL
10.31	THROUGH WALL NIGHT DEPOSITORY WITH INTERIOR RECEIVING CHEST, AMERICAN VAULT CORPORATION MODEL #85-2034 OR EQUAL
11.01	WALL MOUNTED TV, BY OWNER; GC TO PROVIDE BLOCKING WITHIN WALL AT THIS LOCATION, VERIFY SIZE AND LOCATION PRIOR TO INSTALLATION
11.02	REFRIGERATOR, BY OWNER
22.01	DRINKING FOUNTAIN, RE: PLUMBING
22.02	MOP SINK, RE: PLUMBING
22.03	WATER CLOSET, RE: PLUMBING
22.04	URINAL, RE: PLUMBING
22.05	LAVATORY, RE: PLUMBING
22.17	STAINLESS STEEL SINK, RE: PLUMB.
22.30	TOILET PARTITION, GREY
26.04	LIGHT FIXTURE, RE: ELEC.
32.30	BLACK ALUMINUM 4'-0" HIGH FENCE WITH VERTICAL PICKETS, SPACED EVERY 4" O.C., WITH SLIDING GATE, REFER TO DETAILS ON A710

REV.	DATE	DESCRIPTION



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WALTERBORO, SC 29488

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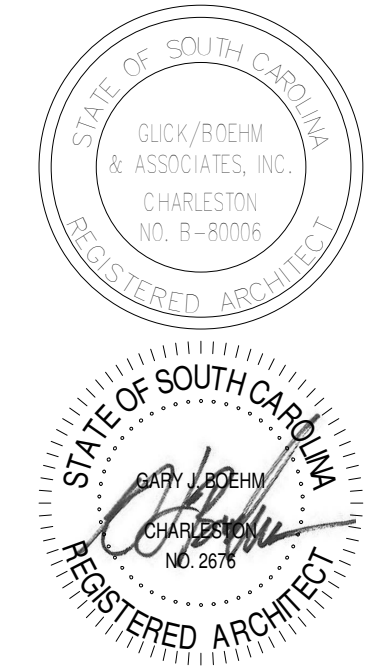
GENERAL ARCHITECTURAL INFORMATION

A000

GENERAL DIMENSION NOTES	
1	REFER TO GENERAL PROJECT NOTES ON G110.
2	DIMENSIONS INDICATED ARE FROM FACE OF STUD AND TO FACE OF MASONRY, U.O.N. REFER TO ENLARGED PLANS FOR ADDITIONAL DIMENSIONS NOT INDICATED ON OVERALL PLANS.
3	CONTRACTOR TO COORDINATE LOCATIONS OF ADDITIONAL PENETRATIONS THROUGH WALLS AND FLOORS NOT INDICATED ON ARCHITECTURAL DRAWINGS. RE: MECHANICAL, PLUMBING AND ELECTRICAL. REFER TO STRUCTURAL FOR LINTEL OR FRAMING REQUIREMENTS.
4	REFER TO WALL TYPE TAGS ON A100.
5	REFER TO SHEET A500 FOR PLUMBING FIXTURE CLEARANCE.
6	CLEAR (CLR) DIMENSIONS MUST BE FROM FINISH FACE TO FINISH FACE

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
1.01	ALIGN
32.30	BLACK ALUMINUM 4'-0" HIGH FENCE WITH VERTICAL PICKETS, SPACED EVERY 4" O.C., WITH SLIDING GATE, REFER TO DETAILS ON A710

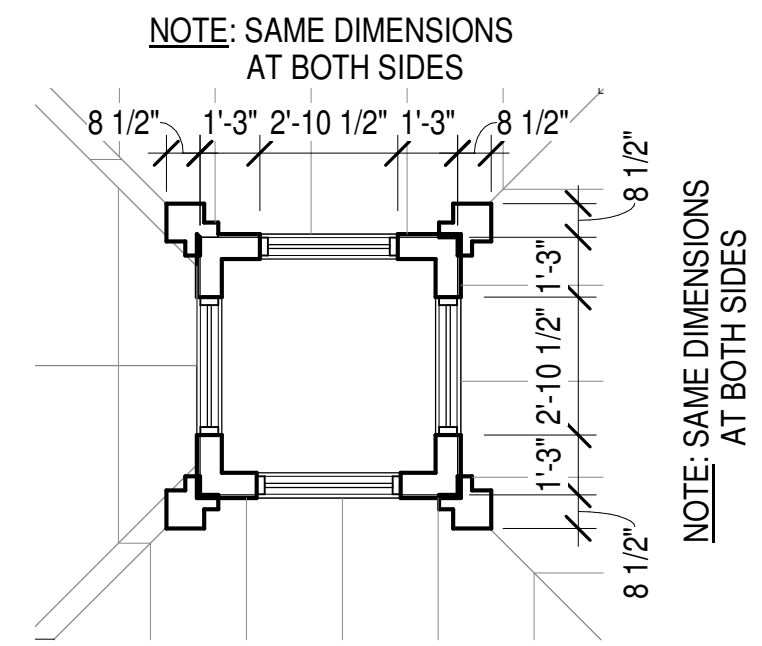
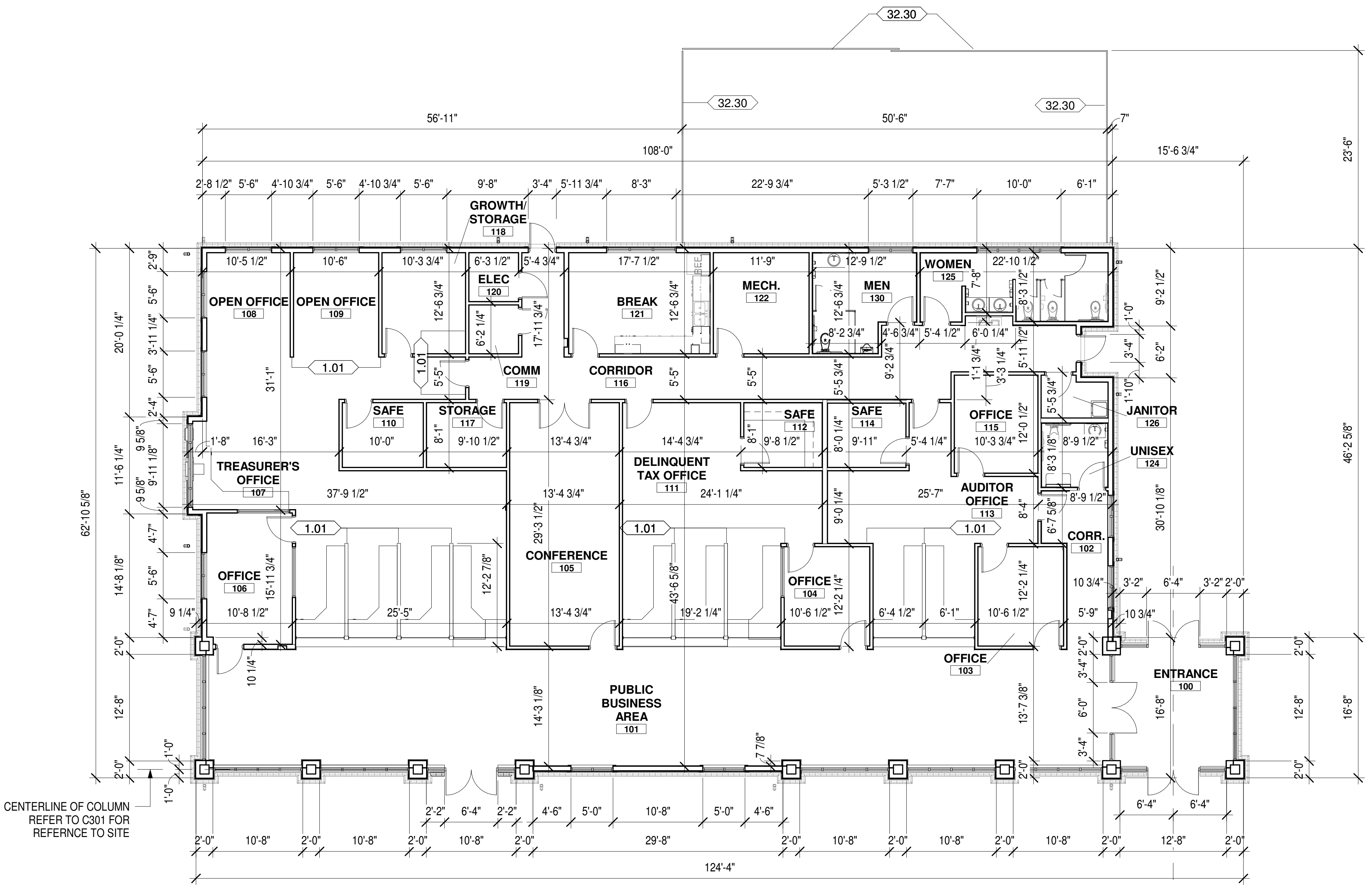
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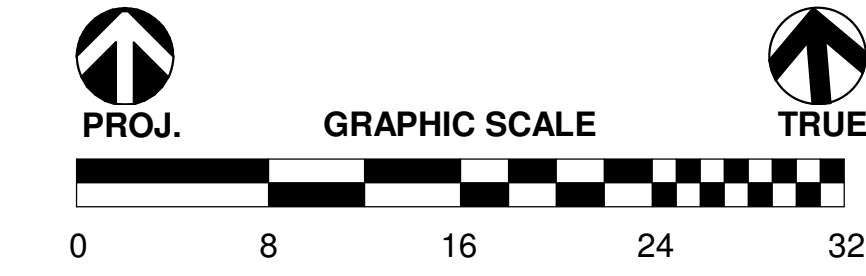
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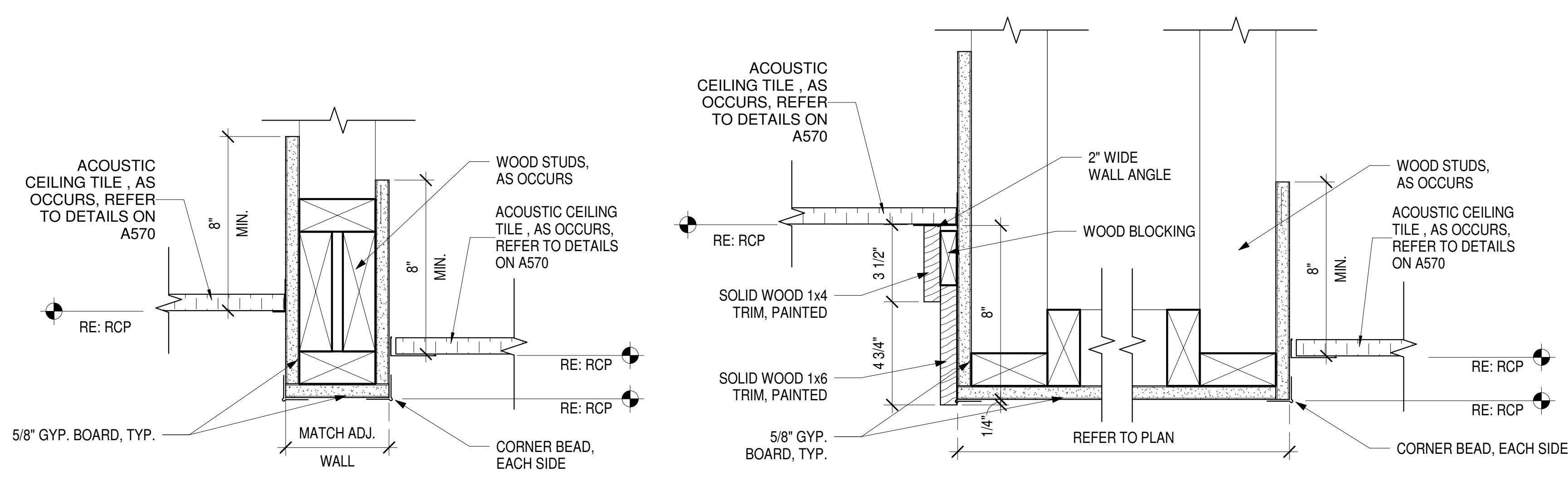
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DIMENSION FLOOR PLAN
A110



CENTERLINE OF TOWER REFER TO C301 FOR REFERENCE FOR BUILDING LOCATION





2 TYP. GYPSUM BOARD SOFFIT DETAIL
A120 SCALE: 3" = 1'-0"

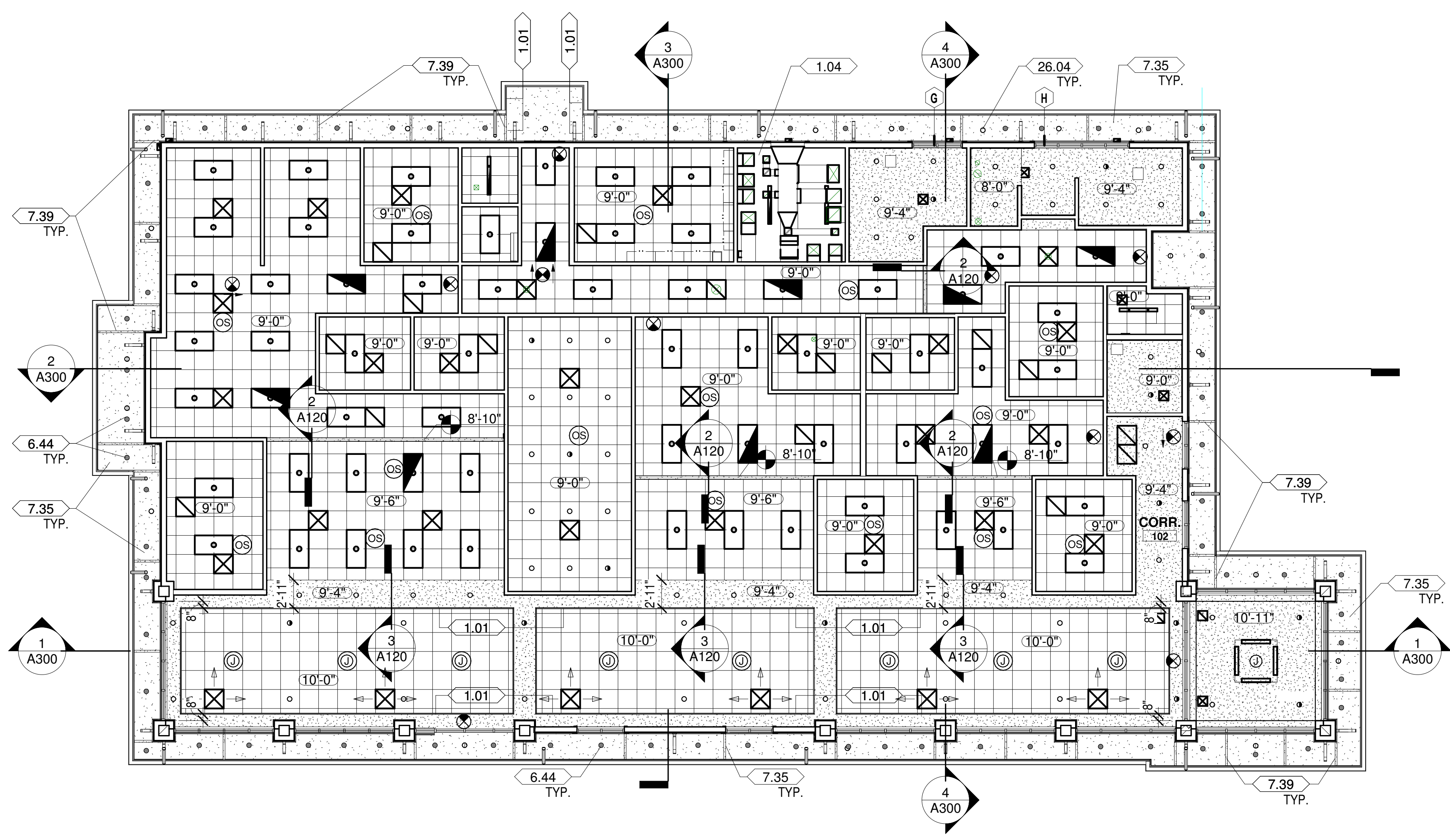
3 GYPSUM BOARD SOFFIT WITH TRIM DETAIL
A120 SCALE: 3" = 1'-0"

GENERAL CEILING PLAN NOTES

- 1 ALL CEILING HEIGHTS ARE 9' - 0" A.F.F., U.O.N.
- 2 ALL NOTED CEILING HEIGHTS ARE RELATIVE TO THE FINISH FLOOR BELOW.
- 3 ALL DIMENSIONS ARE TO FINISH FACE OF SOFFIT OR PARTITION AND TO CENTERLINE OF LIGHT FIXTURE, U.O.N.
- 4 CENTER CEILING GRID IN BOTH DIRECTIONS IN ROOM, U.O.N.
- 5 CENTER RECESSED DOWN LIGHTS IN CEILING SYSTEM, U.O.N.
- 6 REFER TO MECHANICAL DRAWINGS FOR DIFFUSER TYPES. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT PLACEMENT OF DEVICES. NOTIFY ARCHITECT OF ANY POTENTIAL CONFLICTS PRIOR TO PROCEEDING WITH WORK.
- 7 REFER TO ELECTRICAL DRAWINGS FOR LIGHT FIXTURE TYPES. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT PLACEMENT OF FIXTURES. NOTIFY ARCHITECT OF ANY POTENTIAL CONFLICTS PRIOR TO PROCEEDING WITH WORK.
- 8 UNDER CABINET LIGHTING (UCL) IS INDICATED ON INTERIOR ELEVATIONS.
- 9 SCUNCES ARE SHOWN ON ARCHITECTURAL FLOOR PLANS AND ELEVATIONS.
- 10 REFER TO SHEET A140 FOR FINISH SCHEDULE AND LEGEND FOR CEILING TYPES AND MATERIALS.
- 11 REFER TO SHEET A570 FOR TYPICAL CEILING AND SEISMIC DETAILS.

KEYNOTE LEGEND

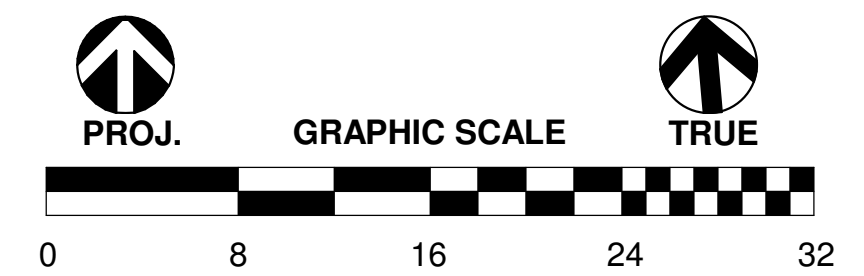
KEY VALUE	KEYNOTE TEXT
1.01	ALIGN
1.04	NO CEILING, OPEN TO STRUCTURE ABOVE
6.44	4" ROUND WHITE POLYPROPYLENE PLASTIC SOFFIT LOUVER WITH INSECT SCREEN, SPACED EVERY 6'-0" O.C. MINIMUM
7.35	FIBER CEMENT SOFFIT, PAINTED
7.39	FIBER CEMENT 1x3 BATTEN STRIP, PAINTED, EQUALLY SPACED EVERY 12'-0" O.C. MAXIMUM
26.04	LIGHT FIXTURE, RE: ELEC.



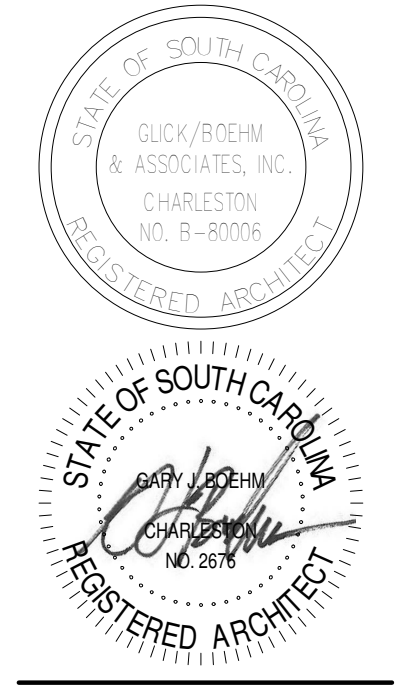
1 FIRST FLOOR CEILING PLAN
A120 SCALE: 1/8" = 1'-0"

LEGEND & SYMBOLS

- 2' X 2' ACT CEILING GRID SYSTEM; REFER TO FINISH SCHEDULE; A140
- GYPSUM BOARD CEILING SYSTEM; REFER TO FINISH SCHEDULE; A140
- FIBER CEMENT PANEL; REFER TO EXTERIOR MATERIAL/COLOR LEGEND FOR TYPES
- GYPSUM BOARD SOFFIT; REFER TO WALL SECTIONS AND DETAILS
- 2' x 4' LIGHT FIXTURE; REFER TO ELECTRICAL DRAWINGS
- LINEAR LIGHT FIXTURE; REFER TO ELECTRICAL DRAWINGS
- RECESSED CAN LIGHT FIXTURE; REFER TO ELECTRICAL DRAWINGS
- PENDANT LIGHT FIXTURE LOCATION; REFER TO ELECTRICAL DRAWINGS
- OCCUPANCY SENSOR; REFER TO ELECTRICAL DRAWINGS
- EXIT SIGN; REFER TO ELECTRICAL DRAWINGS
- SUPPLY DIFFUSER; REFER TO MECHANICAL DRAWINGS
- RETURN DIFFUSER; REFER TO MECHANICAL DRAWINGS
- ROUND SOFFIT VENT; REFER TO KEYNOTES ON THIS SHEET
- NEW CONSTRUCTION KEYNOTE TAG
- CEILING HEIGHT TAG
- VERTICAL DATUM MARKER



REV.	DATE	DESCRIPTION



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REFLECTED CEILING PLAN

ROOF PLAN NOTES

- 1 REFER TO GENERAL PROJECT NOTES ON G110
- 2 REFER TO A530 FOR ROOF DETAILS
- 3 REFER TO STRUCTURAL DRAWINGS FOR ROOF FRAMING
- 4 REFER TO WALL SECTIONS ON A310-A313 FOR ROOF FASCIA, SOFFIT AND GUTTER DETAILS
- 5 VENT THROUGH ROOFS AND OTHER ROOF PENETRATIONS ARE INDICATED FOR DETAIL COORDINATION. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ANY AND ALL ROOF PENETRATIONS. PENETRATIONS INCLUDE BUT ARE NOT LIMITED TO VENTS THROUGH ROOF, BOILER FLUES, EXHAUSTS AND OTHER MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS.
- 6 IN THE ABSENCE OF DETAIL FOR ANY CONDITION ON THE ROOF, THE MOST STRINGENT CONDITION OF THE CURRENT NRCA/SMACNA SHALL APPLY.

GENERAL ROOF NOTES

- 1 IN THE ABSENCE OF DETAIL FOR ANY CONDITION ON THE ROOF, THE MOST STRINGENT CONDITION OF THE CURRENT NRCA/SMACNA SHALL APPLY.
- 2 ALL CLARIFICATIONS OR ADDITIONAL INFORMATION NEEDED SHALL BE IN ACCORDANCE WITH THE CRITERIA AND DETAILS OF THE NRCA ROOFING AND WATERPROOFING MANUAL AND SMACNA ARCHITECTURAL SHEET METAL MANUAL. ANY DEVIATIONS FOR THE SPECIFIED OR INDICATED REQUIREMENTS SHALL BE SUBMITTED FOR APPROVAL BY THE ARCHITECT PRIOR TO INSTALLATION.
- 3 FOLLOW RECOMMENDATIONS AND GUIDELINES OF THE SMACNA MANUAL, LATEST EDITION, FOR DETAIL CLARIFICATIONS IN REFERENCE TO SHEET METAL WORK.
- 4 FOLLOW RECOMMENDATIONS AND GUIDELINES OF THE NRCA MANUAL, LATEST EDITION, FOR DETAIL CLARIFICATIONS IN REFERENCE TO MEMBRANE ROOF.
- 5 PROVIDE STAINLESS STEEL FLASHING MATERIAL AT LOCATION WHERE WATER SHEET DRAINS FROM HIGH TO LOW.
- 6 NO CURB SHALL COME WITHIN 8 INCHES OF VALLEY OR CRICKET LINE. ADJUST THE TAPERED INSULATION ACCORDING TO THE ACTUAL CURB PLACEMENTS.
- 7 PROVIDE CRICKETS AT ALL ROOFTOP EQUIPMENT LOCATIONS RUNNING PERPENDICULAR TO THE ROOF SLOPE THAT EXCEED 24 INCHES WIDE.
- 8 PREFABRICATE FLASHING CORNERS AND ENDS WITH MINIMUM 18 INCH RETURNS.
- 9 PROVIDE CONCEALED JOINT COVER PLATE IN FLASHING WITH 12 INCH WIDE SPLICE SHEET CENTERED ON SEAM. APPLY TWO ROWS OF BUTYL TAPE EACH SIDE OF JOINT AND PROVIDE SEALANT AT SEAM.
- 10 ALL SHEET METAL TERMINATIONS TO HAVE HEMMED EDGES. NO EXPOSED CUT EDGES.
- 11 ADD ADDITIONAL LAYER OF ROOFING MEMBRANE BELOW LOW SLOPE ROOF WHERE WATER SHEET DRAINS FROM HIGH TO LOW.

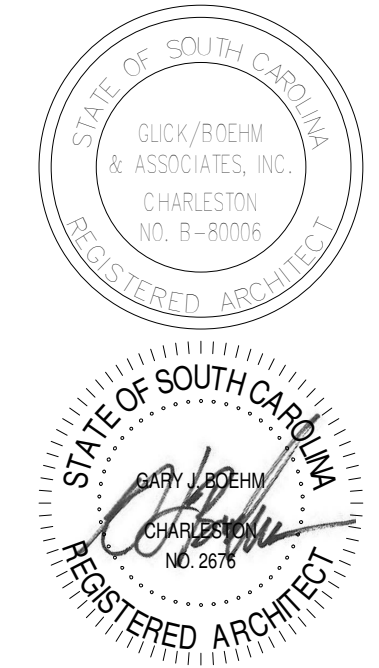
KEYNOTE LEGEND

KEY VALUE	KEYNOTE TEXT
7.06	STANDING SEAM METAL ROOF
7.10	SEAMLESS SHEET METAL GUTTER
7.11	SHEET METAL DOWNSPOUT, WITH STRAP ANCHORS 4'-0" O.C. VERTICAL

LEGEND & SYMBOLS

- STANDING SEAM METAL ROOF
- DS** DOWNSPOUT LOCATION
- $8/12$ SLOPE ARROW
- ? NEW CONSTRUCTION KEYNOTE TAG

REVISION	DATE	DESCRIPTION

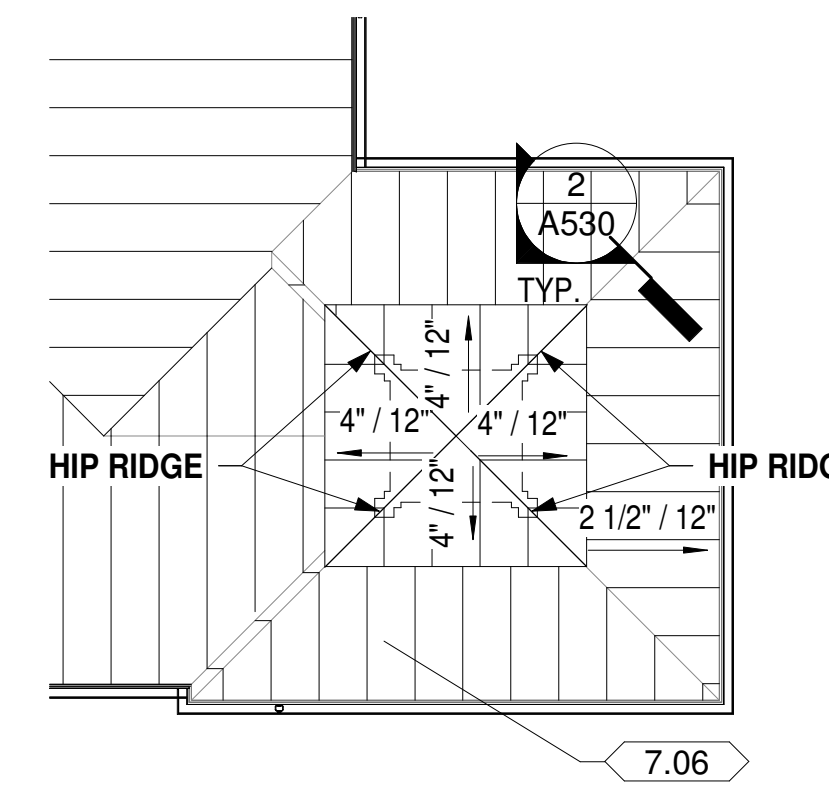
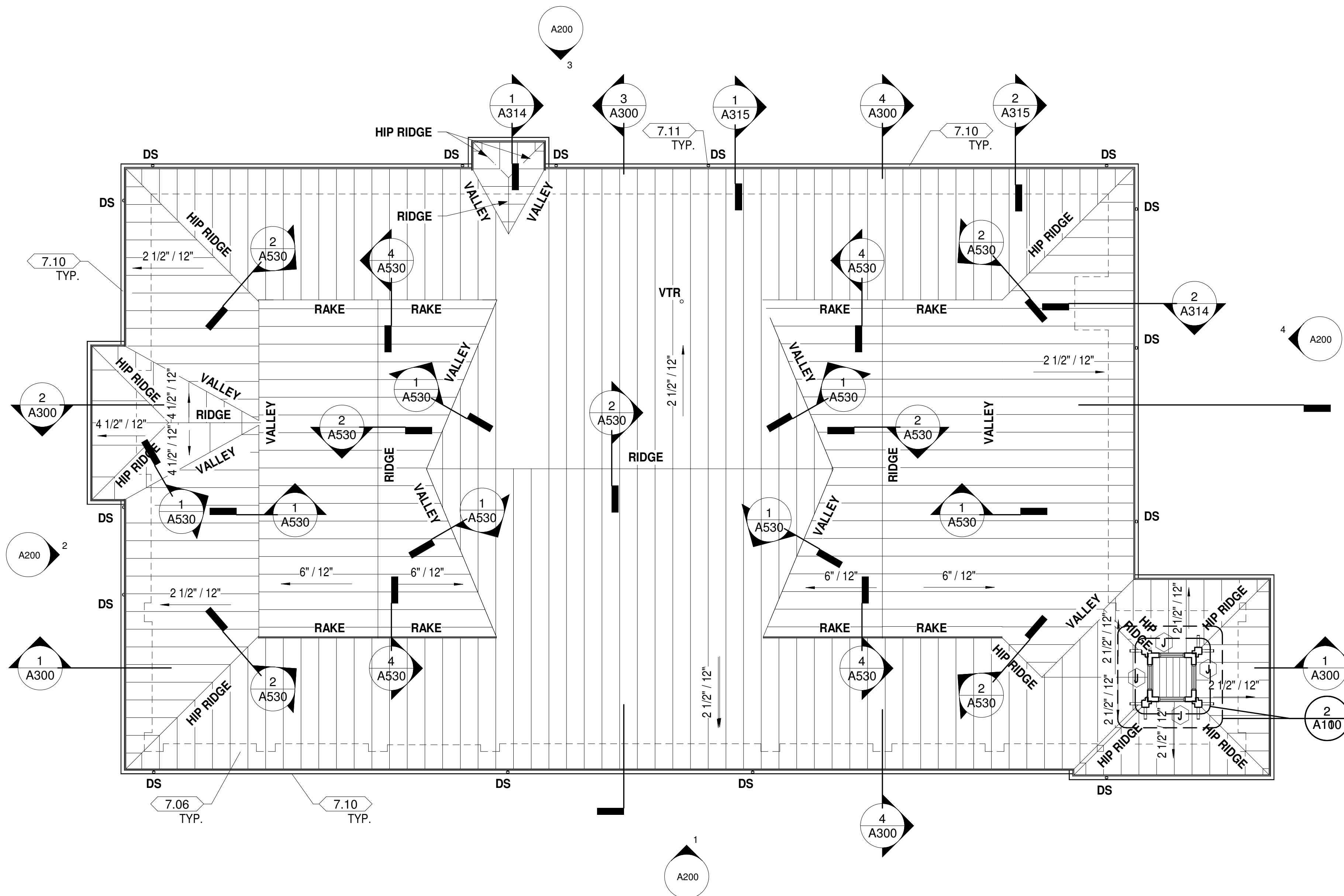


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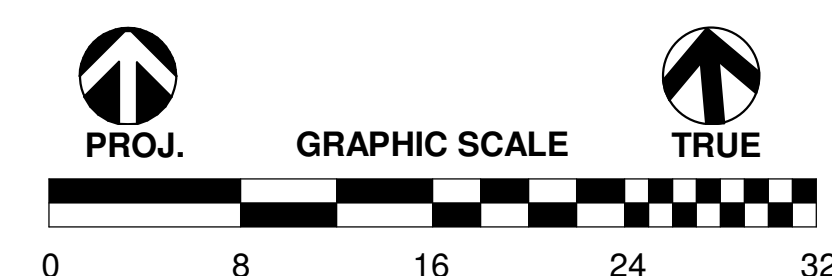
ROOF PLANS

A130



1 ROOF PLAN
 A130 SCALE: 1/8" = 1'-0"

2 UPPER TOWER ROOF PLAN
 A130 SCALE: 1/8" = 1'-0"



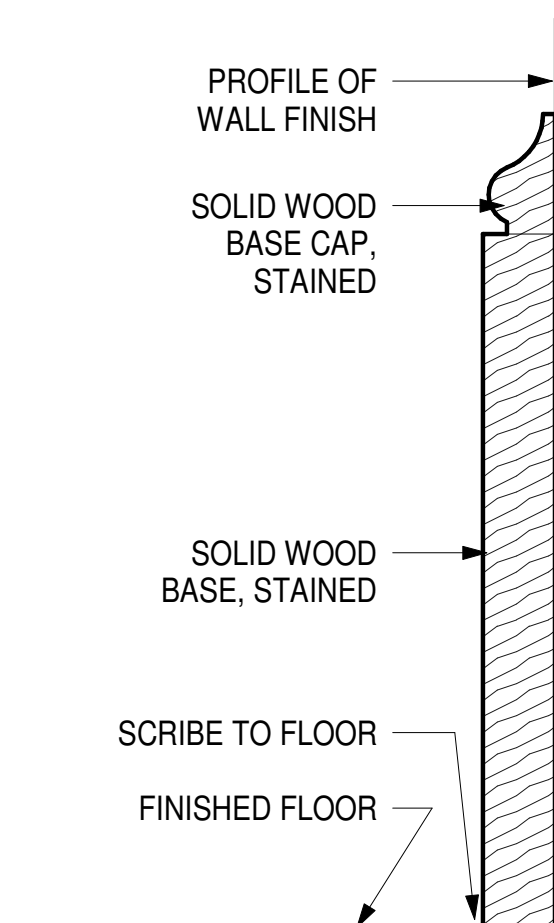
FINISH SCHEDULE									
NO.	ROOM NAME	FLOOR		WALLS				CEILING	NOTES
		FINISH	BASE	NORTH FINISH	EAST FINISH	SOUTH FINISH	WEST FINISH	FINISH	
100	ENTRANCE	LVT	WD	PNT	PNT	PNT	PNT	GYP	
101	PUBLIC BUSINESS AREA	LVT	WD	PNT	PNT	PNT	PNT	GYP/ACT	
102	CORR.	LVT	WD	PNT	PNT	PNT	PNT	GYP	
103	OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
104	OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
105	CONFERENCE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
106	OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
107	TREASURER'S OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
108	OPEN OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
109	OPEN OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
110	SAFE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
111	DELINQUENT TAX OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
112	SAFE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
113	AUDITOR OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
114	SAFE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
115	OFFICE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
116	CORRIDOR	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	NOTE: CORRIDOR TO BE 1 HOUR FIRE-RATED.
117	STORAGE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
118	GROWTH/STORAGE	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
119	COMM	SC	RB-1	PNT	PNT	PNT	PNT	N/A	
120	ELEC	SC	RB-1	PNT	PNT	PNT	PNT	N/A	
121	BREAK	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	
122	MECH.	SC	RB-1	PNT	PNT	PNT	PNT	N/A	
124	UNISEX	CT-2	-	CT-1	CT-1	CT-1	CT-1	GYP	
125	WOMEN	CT-2	-	CT-1	CT-1	CT-1	CT-1	GYP	
126	JANITOR	SC	RB-1	PNT	PNT	PNT	PNT	ACT	
130	MEN	CT-2	-	CT-1	CT-1	CT-1	CT-1	GYP	
131	STOR.	LVT	RB-1	PNT	PNT	PNT	PNT	ACT	

MATERIAL & FINISH LEGEND				(MANUFACTURER & COLOR-BASIS OF DESIGN)			
CERAMIC TILE (CT)				LUXURY VINYL TILE (LVT)			
CT-1	MANUFACTURER:	T.B.D.		LVT-1	MANUFACTURER:	T.B.D.	
	STYLE:	T.B.D.			STYLE:	T.B.D.	
	COLOR:	T.B.D.			COLOR:	T.B.D.	
	SIZE:	12" x 24"					
CT-2	MANUFACTURER:	T.B.D.		LVT-2	MANUFACTURER:	T.B.D.	
	STYLE:	T.B.D.			STYLE:	T.B.D.	
	COLOR:	T.B.D.			COLOR:	T.B.D.	
	SIZE:	12" x 24"					
PAINT (PNT)				RUBBER BASE (VB)			
PNT-1	MANUFACTURER:	BENJAMIN MOORE		RB-1	MANUFACTURER:	ROPPE	
	COLOR:	T.B.D.			STYLE:	T.B.D.	
					COLOR:	T.B.D.	
PNT-2	MANUFACTURER:	BENJAMIN MOORE		SOLID SURFACE (SS)			
	COLOR:	T.B.D.		SS-1	MANUFACTURER:	WILSONART	
PNT-3	MANUFACTURER:	BENJAMIN MOORE			STYLE:	T.B.D.	
	COLOR:	T.B.D.			COLOR:	T.B.D.	
PNT-4	MANUFACTURER:	BENJAMIN MOORE		SS-2	MANUFACTURER:	WILSONART	
	COLOR:	T.B.D.			STYLE:	T.B.D.	
PNT-5	MANUFACTURER:	BENJAMIN MOORE			COLOR:	T.B.D.	
	COLOR:	T.B.D.		SS-3	MANUFACTURER:	WILSONART	
PNT-6	MANUFACTURER:	BENJAMIN MOORE			STYLE:	T.B.D.	
	COLOR:	T.B.D.			COLOR:	T.B.D.	
PNT-7	MANUFACTURER:	BENJAMIN MOORE		ACOUSTICAL CEILING TILE (ACT)			
	COLOR:	T.B.D.		ACT-1	MANUFACTURER:	USG	
					STYLE:	4801	
					COLOR:	WHITE	
					GRID:	DONN DXL, WHITE	

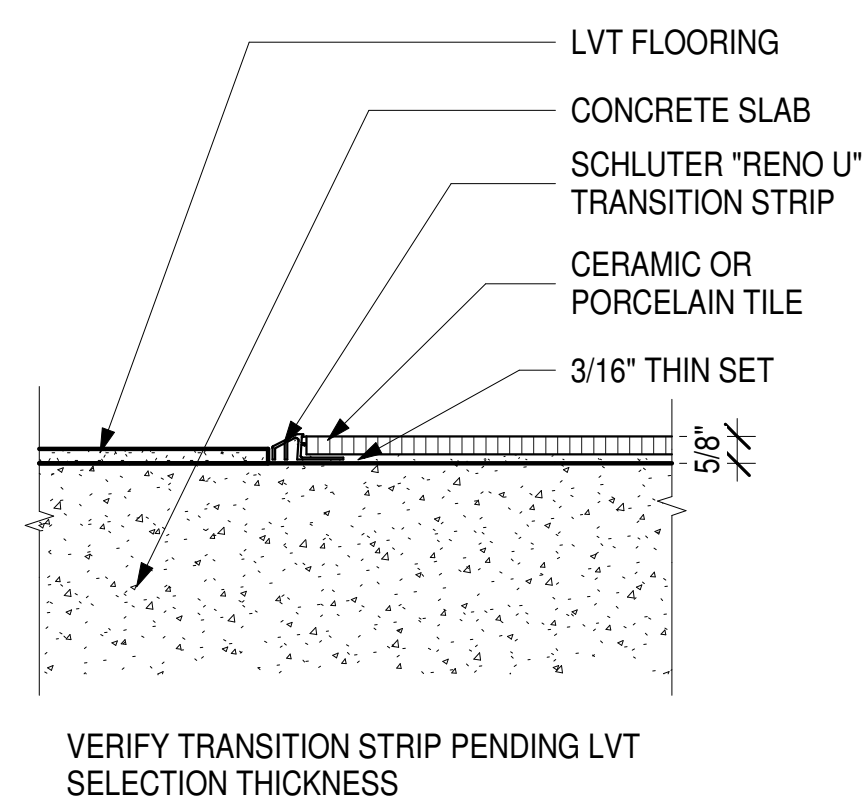
FINISH ABBREVIATION	
ACT	ACOUSTICAL CEILING TILE
ACW	ALUMINUM CLAD WOOD
ALUM	ALUMINUM
CONC.	CONCRETE
CP	CARPET
CT	CERAMIC TILE
FF	FACTORY FINISH
GYP BD	GYPSUM BOARD
MFR	MANUFACTURER FINISH
PNT	PAINT
SCW	SOLID CORE (WOOD DOOR)
ST	STAIN (FACTORY FINISH)
WC	WAINSCOT
WD	WOOD

FINISH PLAN NOTES	
1	REFER TO FLOORING MATERIAL TRANSITION DETAILS ON SHEET A140.
2	REFER TO MATERIAL LEGEND ON SHEET A140.
3	ALL WALLS TO BE LEVEL 4 FINISH.

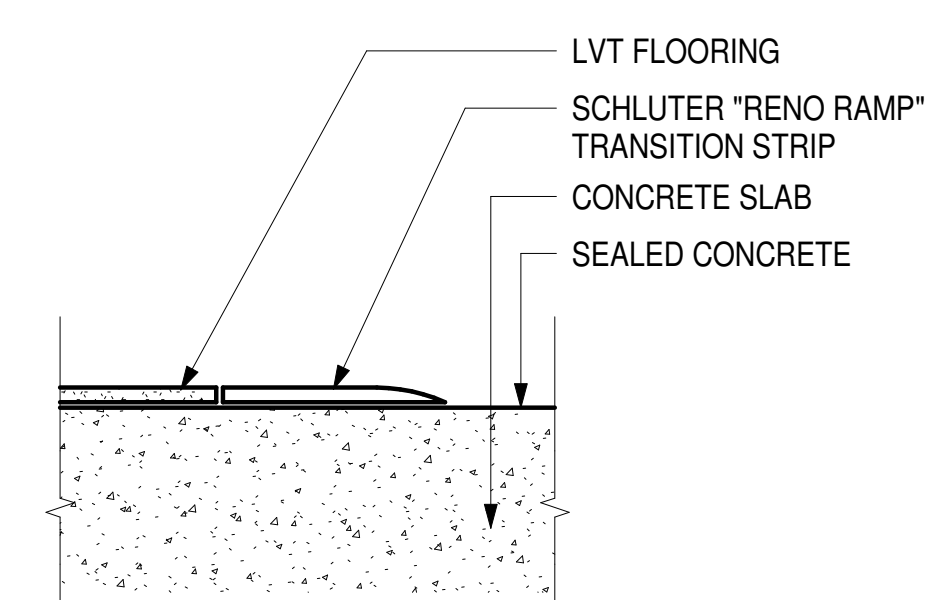
GENERAL FINISH NOTES	
GENERAL	
1	REFER TO SHEETS A420 FOR INTERIOR ELEVATIONS AND ADDITIONAL INFORMATION.
2	FINISH DIMENSIONS ARE FROM FACE OF FINISH SURFACE TO FACE OF FINISH SURFACE.
3	REFER TO REFLECTED CEILING PLANS FOR ADDITIONAL INFORMATION.
PAINT	
4	ALL PAINT COLORS ARE TO BE DETERMINED.
5	ALL GYP BOARD CEILINGS AND SOFFITS TO BE PAINTED PNT-5, U.O.N.
6	ALL HM DOOR AND INTERIOR WINDOW FRAMES TO BE ENAMEL PAINT.
7	ALL COUNTER SUPPORT KNEE BRACES SHALL BE PAINTED TO MATCH THE ADJACENT WALL SURFACE, U.O.N.
8	ALL ACCESS DOORS SHALL BE PAINTED TO MATCH THE SURFACE IN WHICH THEY OCCUR.
9	ALL EXPOSED PIPES, DUCTWORK AND GRILLS IN WALLS SHALL BE PAINTED TO MATCH COLOR OF ADJACENT WALL OR CEILING SURFACE, U.O.N.
FLOORING	
10	TRANSITION BETWEEN DIFFERENT FLOORING MATERIALS AT DOORWAYS TO OCCUR IN MIDDLE OF CLOSED DOOR THRESHOLD.
11	ALL EXPOSED CONCRETE TO BE SEALED, REFER TO SPECIFICATIONS FOR DETAILS.
12	FLOORING PATTERNS FOR LVT AND CERAMIC TILE ARE TO BE LAID OUT WITH ARCHITECT IN THE FIELD WHERE OCCURS. INSTALLER TO REQUEST CAD DRAWINGS FOR FURTHER INFORMATION AS REQUIRED.
13	FLOORING CONTRACTORS ARE RESPONSIBLE TO VERIFY THAT ALL ADJOINING FLOORING MATERIALS WILL BE FLUSH BUTTED TO AVOID RUBBER THRESHOLDS WHERE POSSIBLE. FLOOR PREP TO FAN OUT 36" TO AVOID VISIBLE MOUND.
TILE	
14	ALL TILED AREAS WILL HAVE EPOXY GROUT APPLIED ON FLOORS AND WALLS.



2 TYP. WOOD BASE DETAIL
 A140 SCALE: 6" = 1'-0"



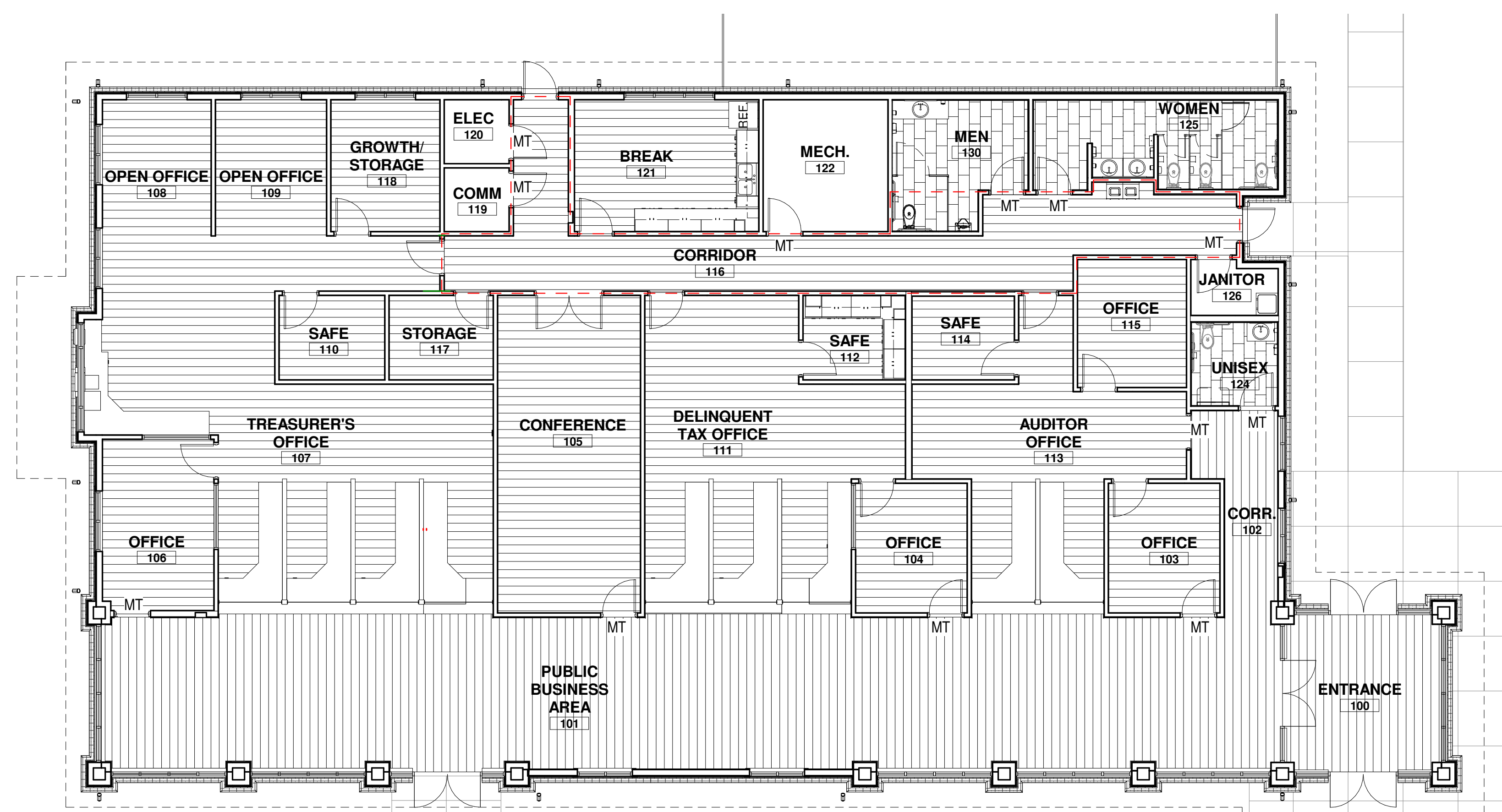
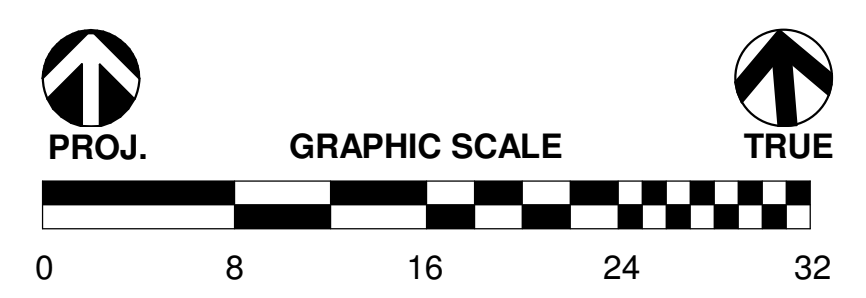
3 LVT TO CERAMIC TILE
 A140 SCALE: 3" = 1'-0"



4 LVT TO CONCRETE
 A140 SCALE: 3" = 1'-0"

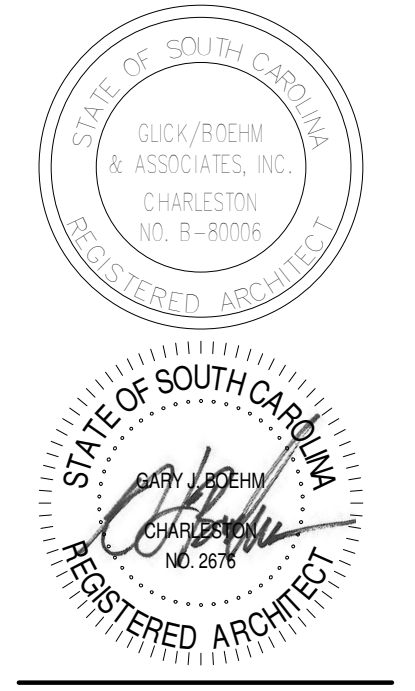
FLOOR PATTERN LEGEND	
SHEET A140 ONLY	
[Pattern]	CERAMIC TILE CT-1
[Pattern]	LUXURY VINYL TILE LVT-1
[Pattern]	LUXURY VINYL TILE LVT-2
[Pattern]	SEALED CONCRETE SC

MT = METAL THRESHOLD



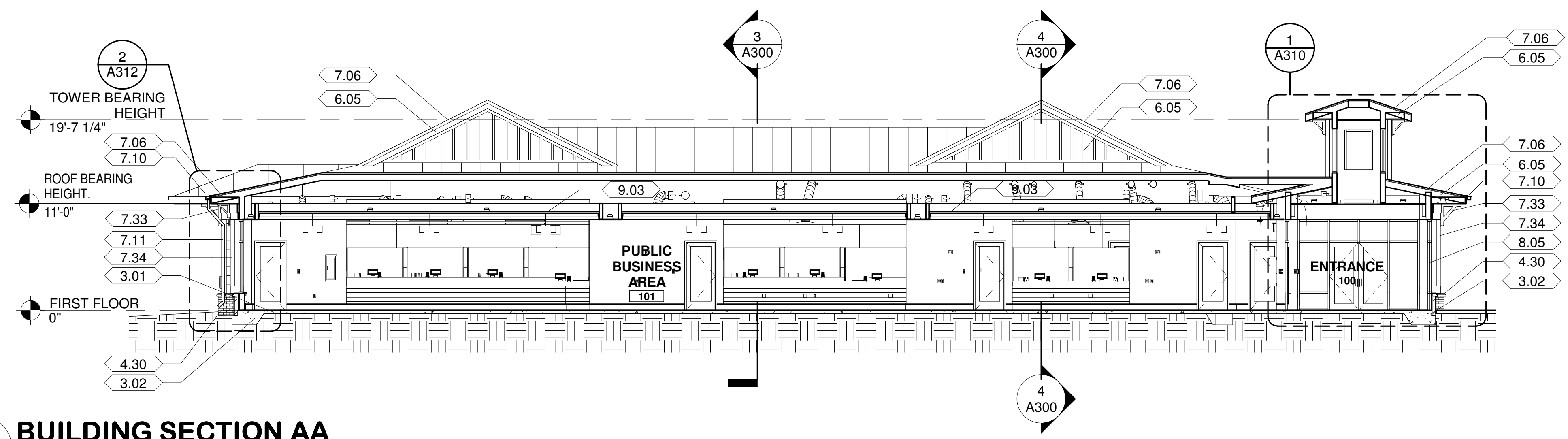
1 FINISH FLOOR PLAN
 A140 SCALE: 1/8" = 1'-0"

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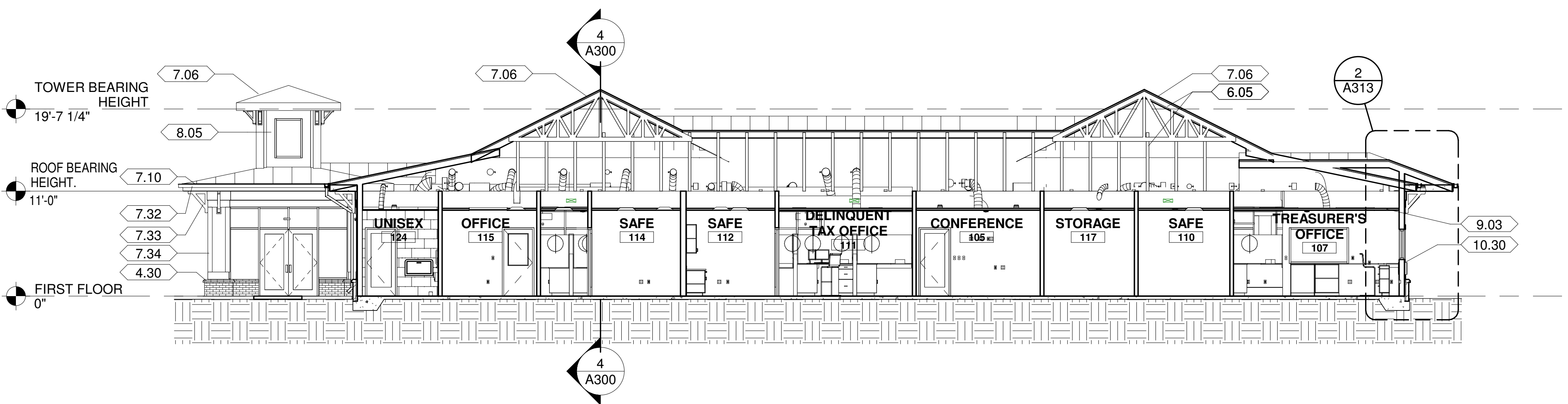
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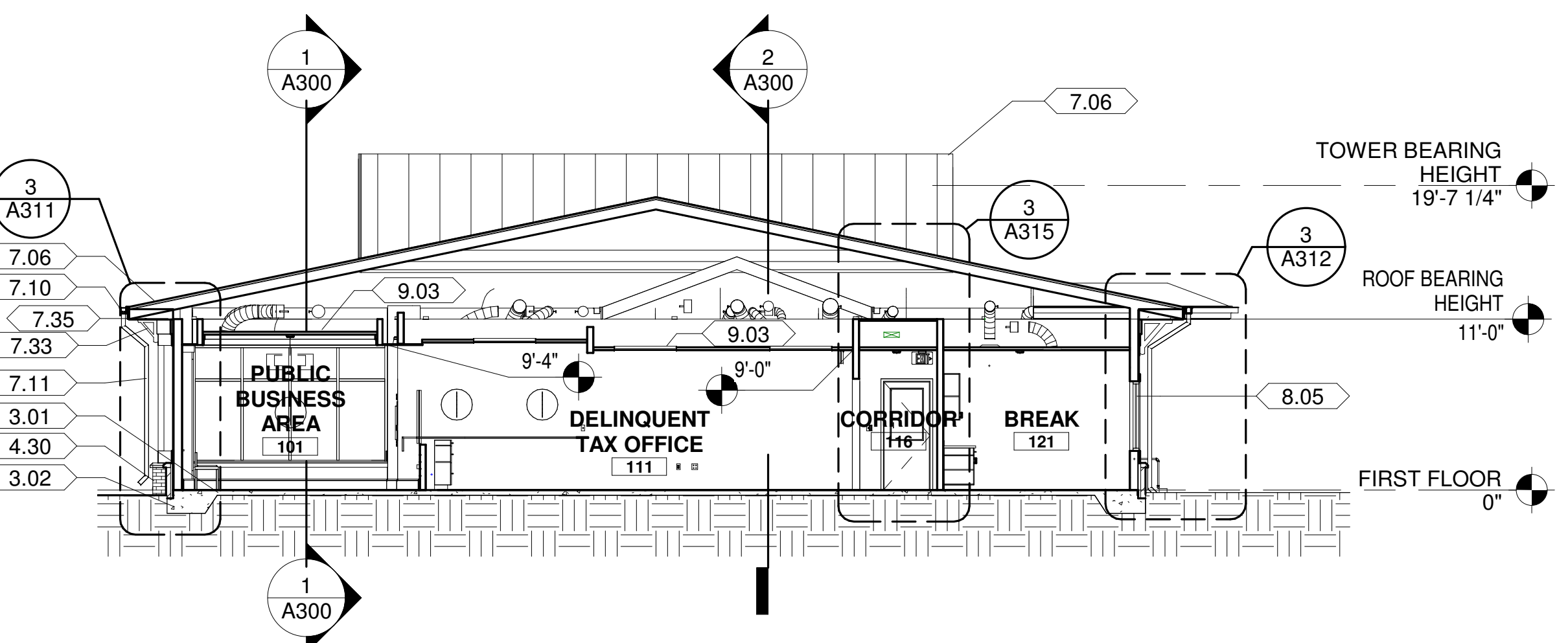
1 BUILDING SECTION AA
A300 SCALE: 1/8" = 1'-0"

SECTION NOTES	
1	REFER TO G110 FOR GENERAL PROJECT NOTES
2	REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE
3	TRUSS CONFIGURATION IS DIAGRAMMATIC. REFER TO STRUCTURAL.

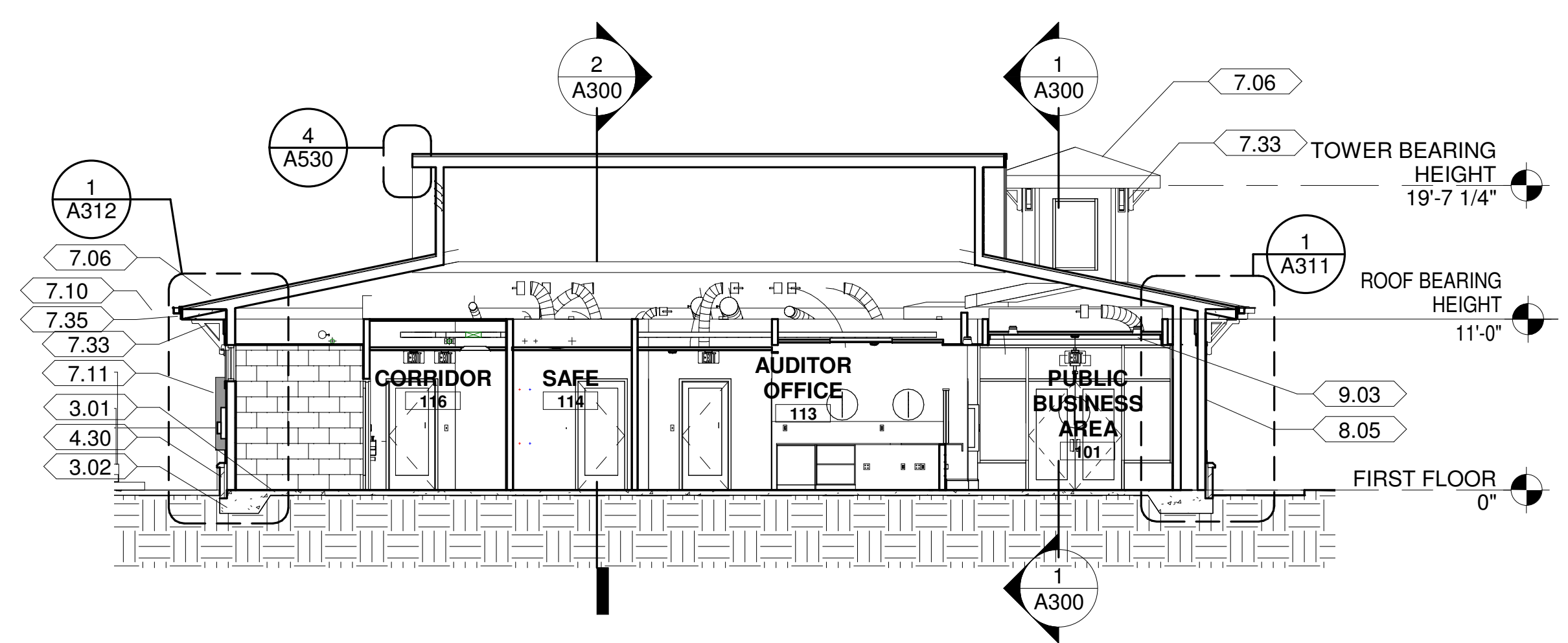
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
3.01	CONCRETE FLOOR SLAB
3.02	CONCRETE FOUNDATION, RE: STRUCT.
4.30	BRICK VENEER WATERTABLE
6.05	WOOD TRUSS
7.06	STANDING SEAM METAL ROOF
7.10	SEAMLESS SHEET METAL GUTTER
7.11	SHEET METAL DOWNSPOUT, WITH STRAP ANCHORS 4'-0" O.C. VERTICAL
7.32	FIBER CEMENT TWO-PIECE FRIEZE BOARD, PAINTED
7.33	FIBER CEMENT CORNER TRIM, PAINTED
7.34	FIBER CEMENT SOFFIT, PAINTED
8.05	ALUMINUM STOREFRONT
9.03	ACOUSTIC CEILING TILE
10.30	BANK DRIVE-THROUGH TRANSACTION STATION WITH INTERCOM, COVENANT SECURITY EQUIPMENT MODEL #CSE-QS-QST-619S OR EQUAL.



2 BUILDING SECTION BB
A300 SCALE: 1/8" = 1'-0"

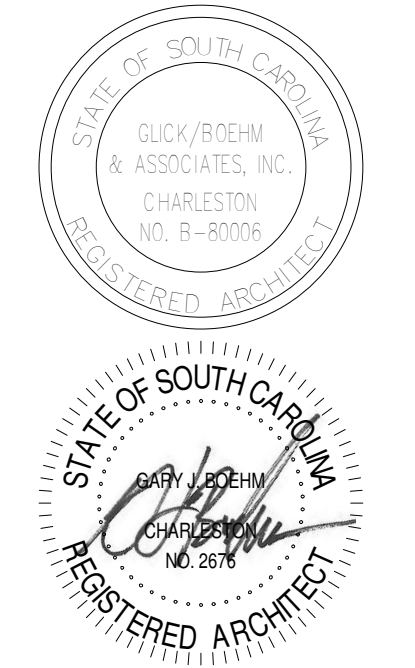


3 BUILDING SECTION CC
A300 SCALE: 1/8" = 1'-0"



4 BUILDING SECTION DD
A300 SCALE: 1/8" = 1'-0"

REV.	DATE	DESCRIPTION

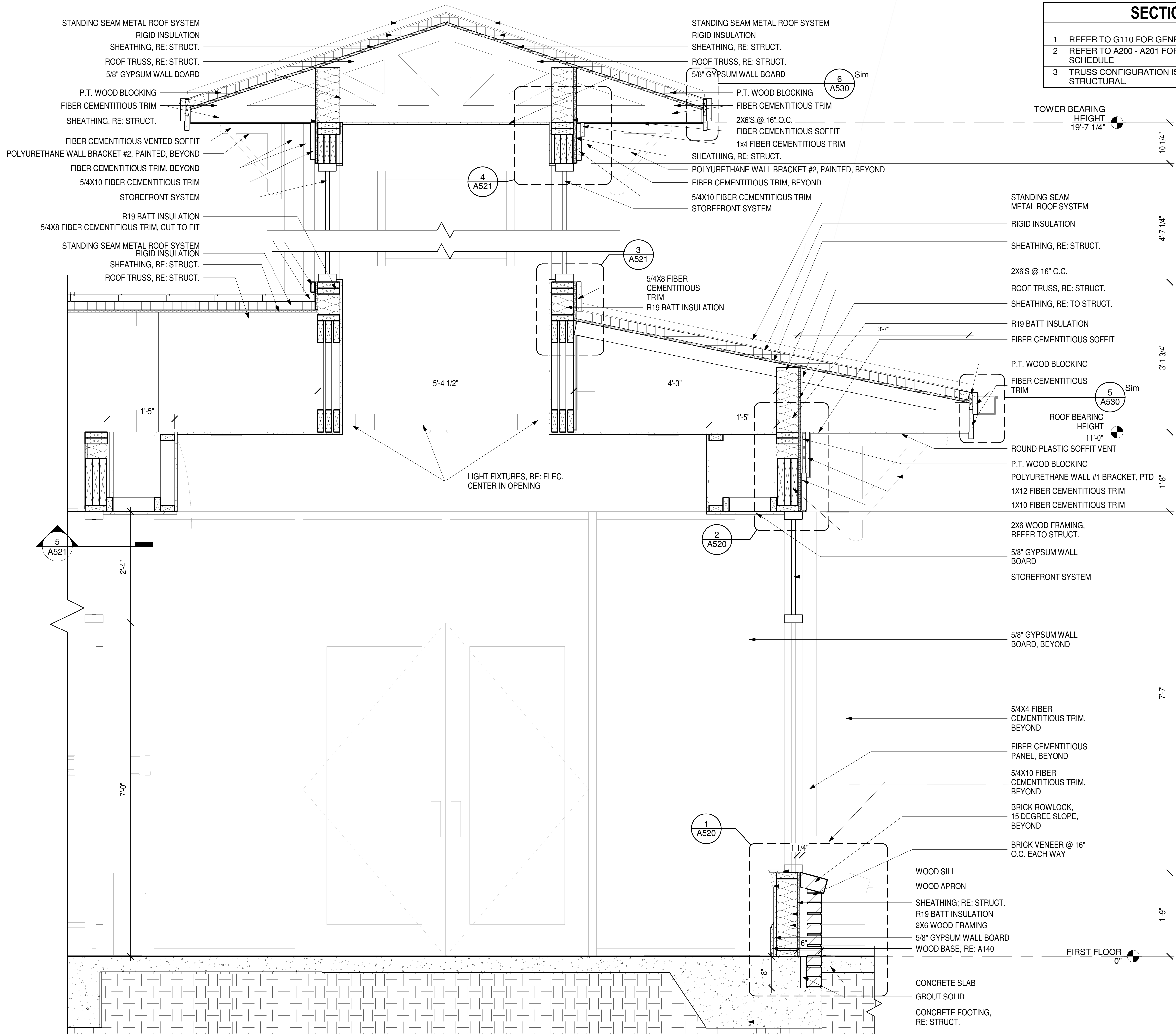


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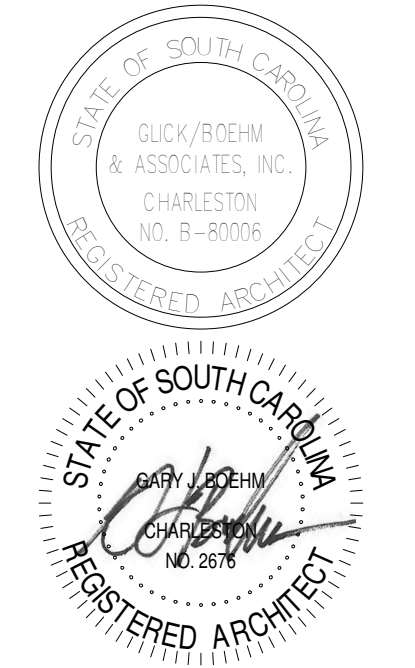
A300



SECTION NOTES	
1	REFER TO G110 FOR GENERAL PROJECT NOTES
2	REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE
3	TRUSS CONFIGURATION IS DIAGRAMMATIC. REFER TO STRUCTURAL.

1 WALL SECTION
A310 SCALE: 1" = 1'-0"

REV.	DATE	DESCRIPTION



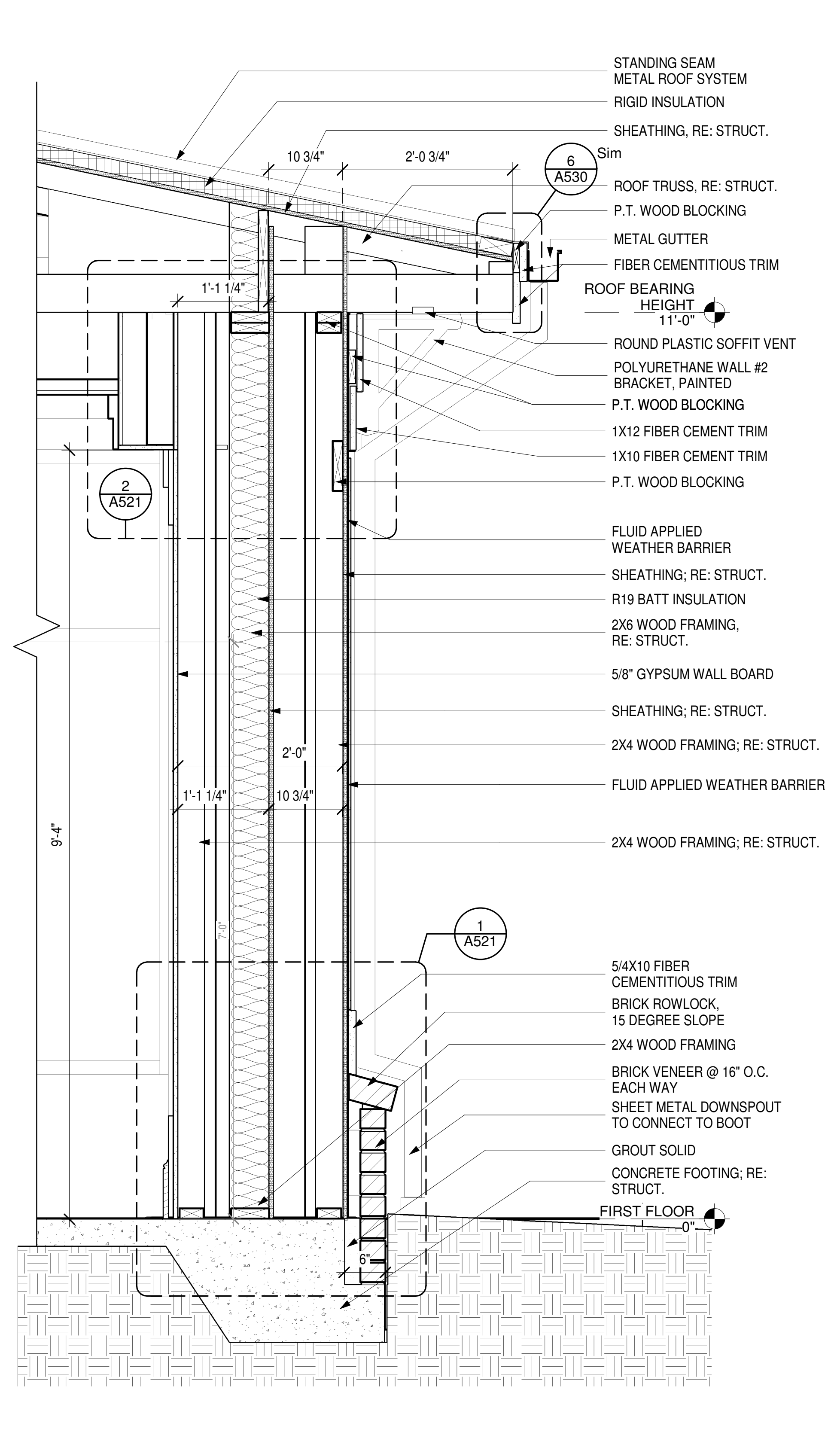
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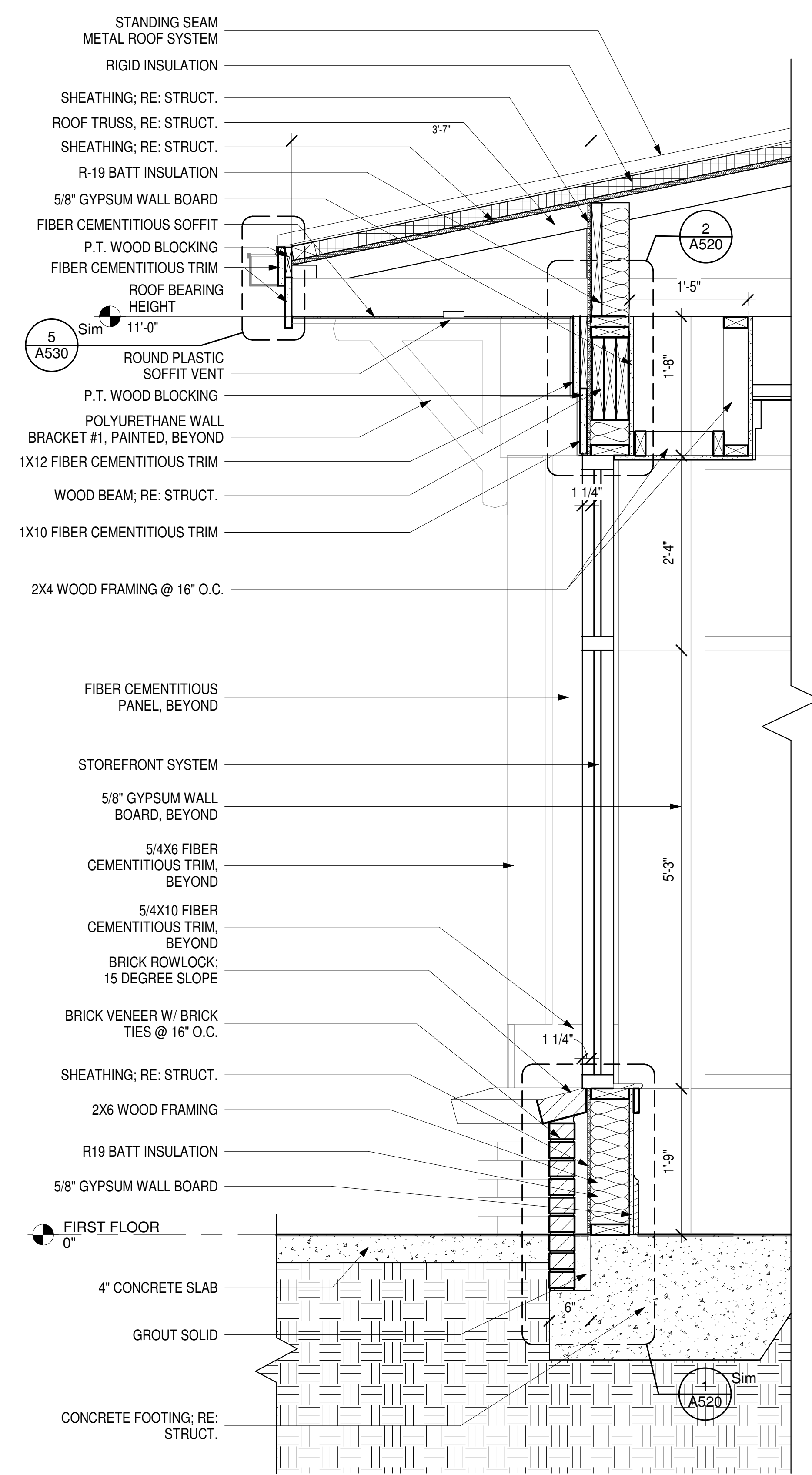
WALL SECTIONS

SECTION NOTES

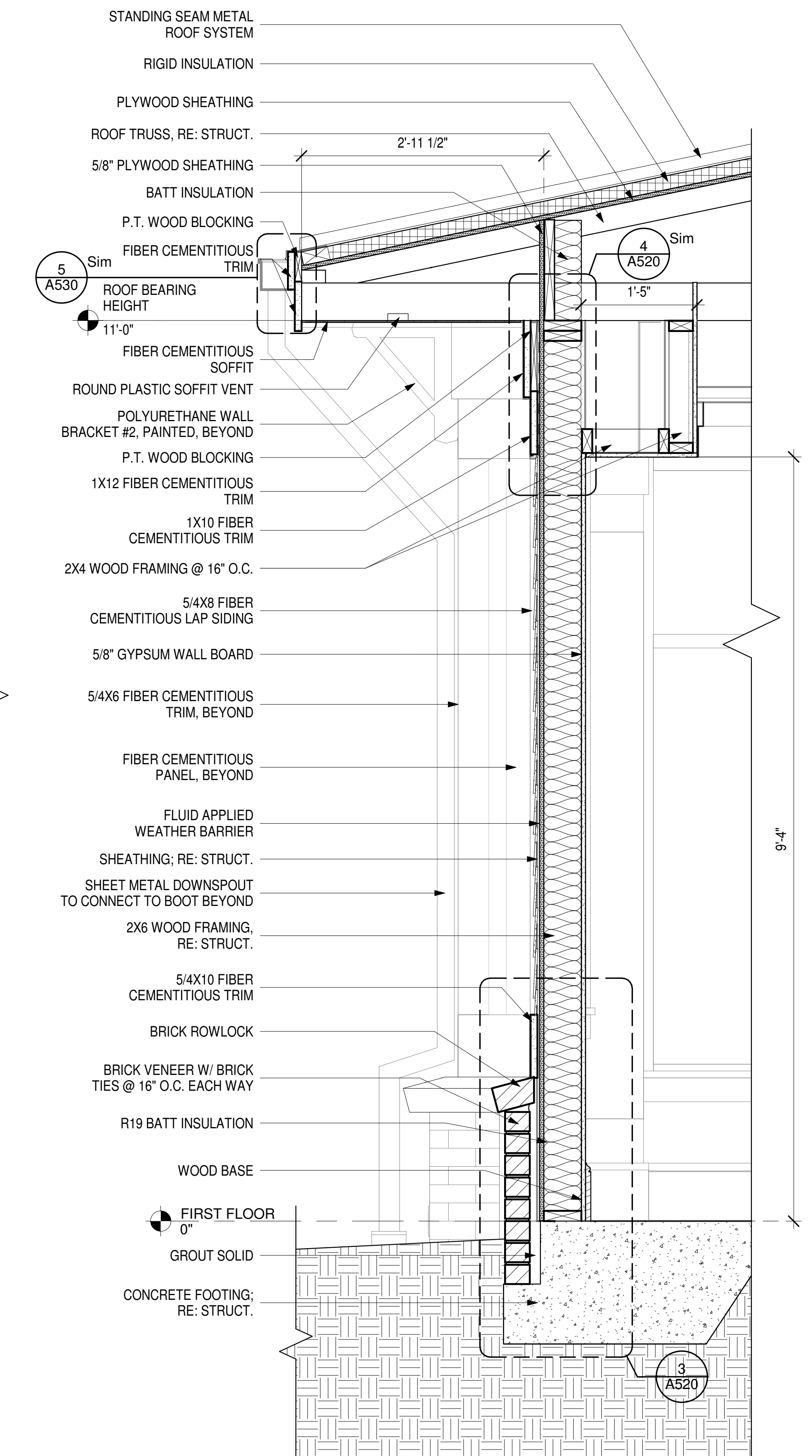
- 1 REFER TO G110 FOR GENERAL PROJECT NOTES
- 2 REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE
- 3 TRUSS CONFIGURATION IS DIAGRAMMATIC. REFER TO STRUCTURAL.



1 WALL SECTION
A311 SCALE: 1" = 1'-0"

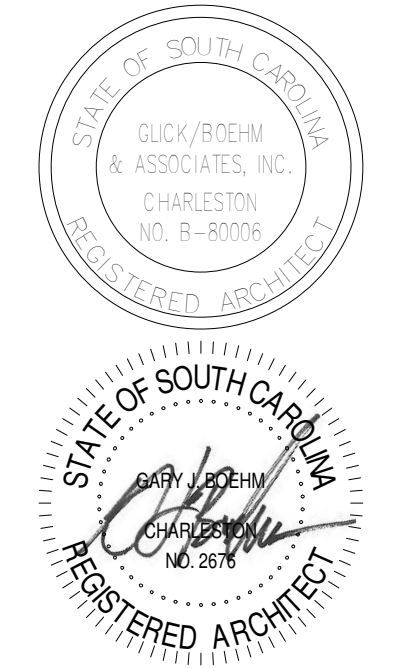


2 WALL SECTION
A311 SCALE: 1" = 1'-0"



3 WALL SECTION
A311 SCALE: 1" = 1'-0"

REV.	DATE	DESCRIPTION



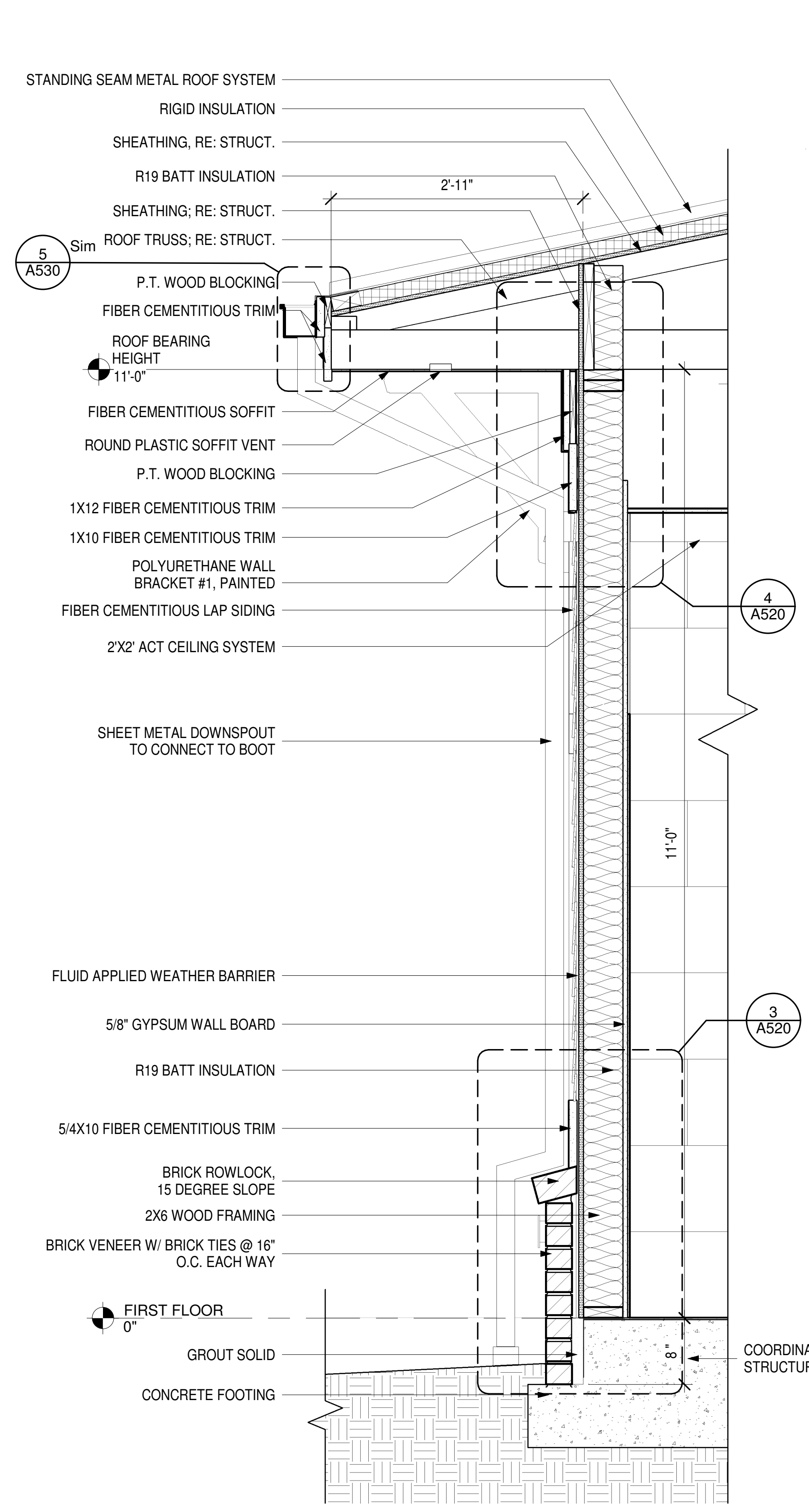
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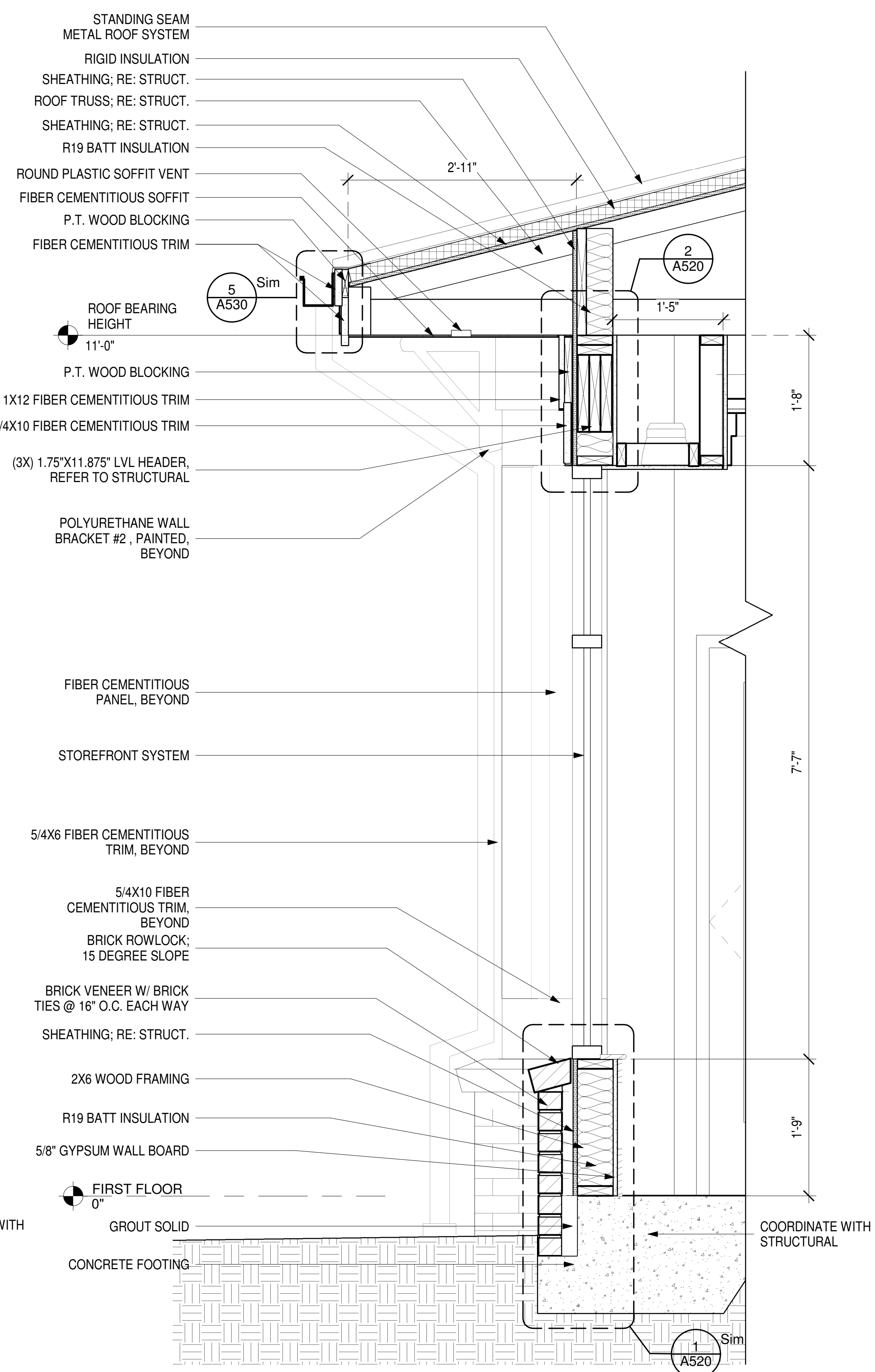
WALL SECTIONS

SECTION NOTES

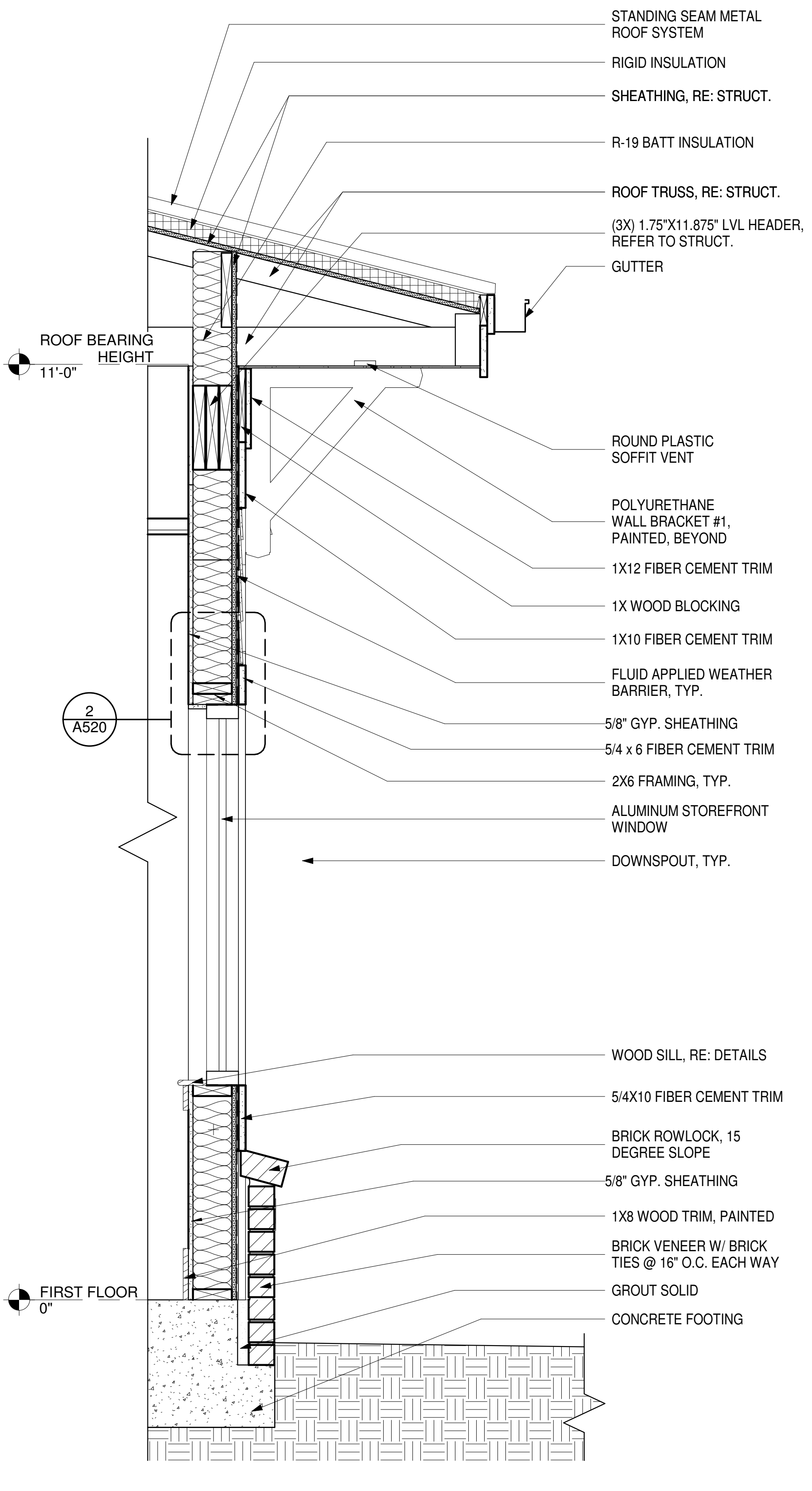
- 1 REFER TO G110 FOR GENERAL PROJECT NOTES
- 2 REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE
- 3 TRUSS CONFIGURATION IS DIAGRAMMATIC. REFER TO STRUCTURAL.



1 WALL SECTION
A312 SCALE: 1" = 1'-0"

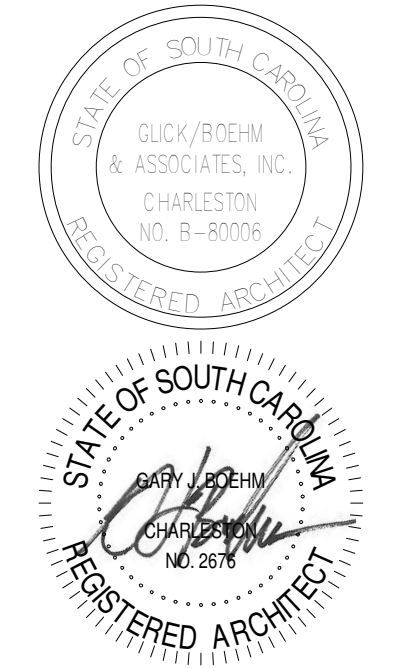


2 WALL SECTION
A312 SCALE: 1" = 1'-0"



3 WALL SECTION @ BREAK
A312 SCALE: 1" = 1'-0"

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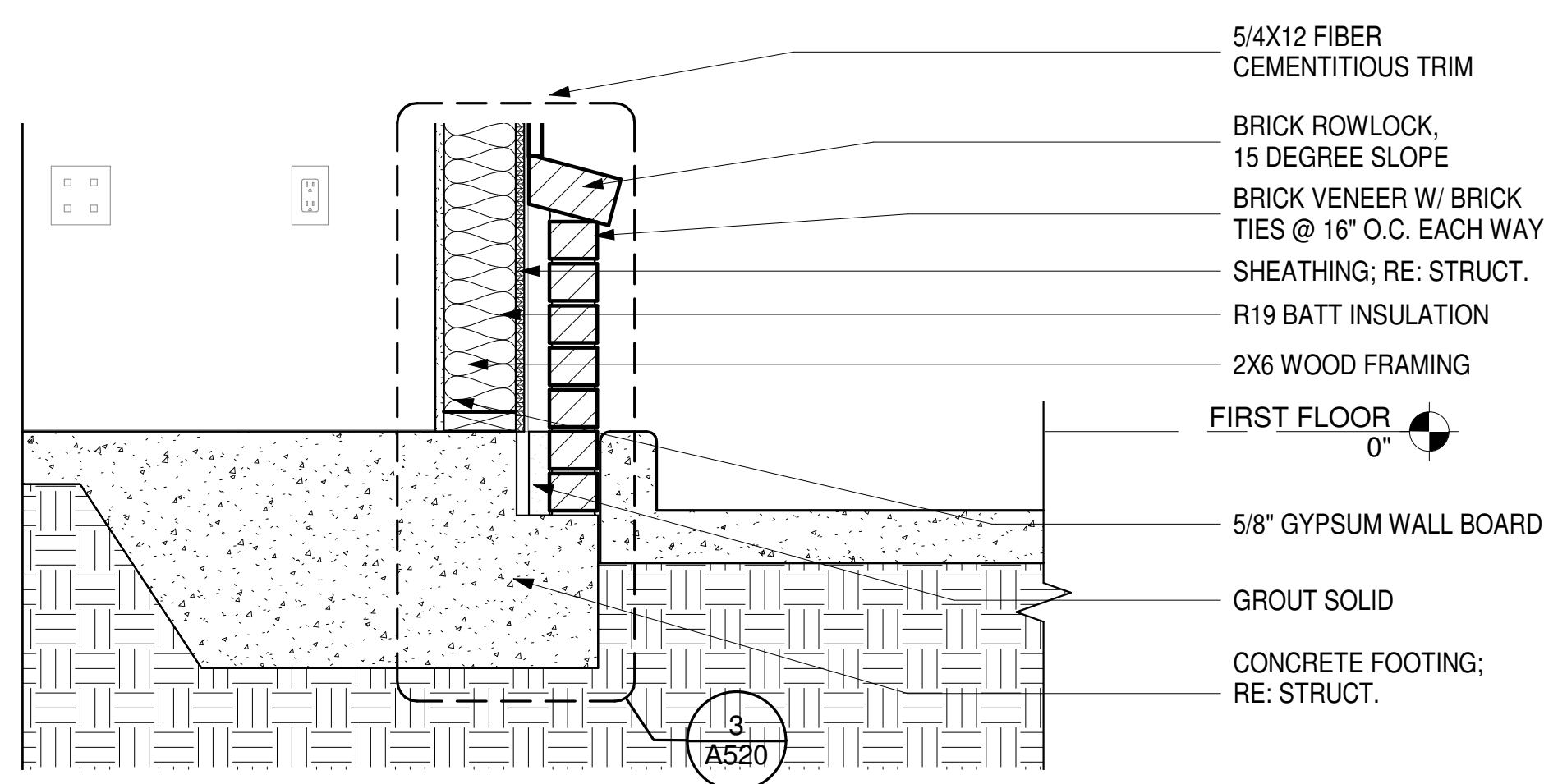
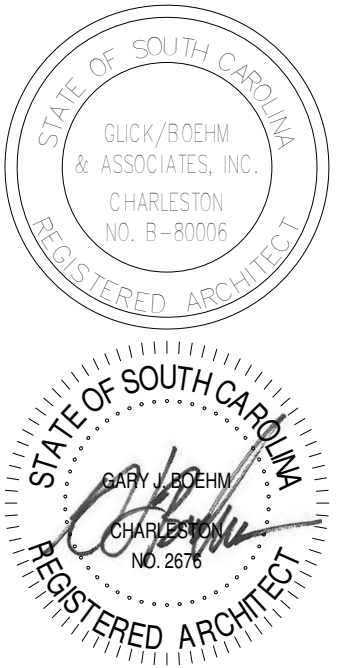
WALL SECTIONS

SECTION NOTES

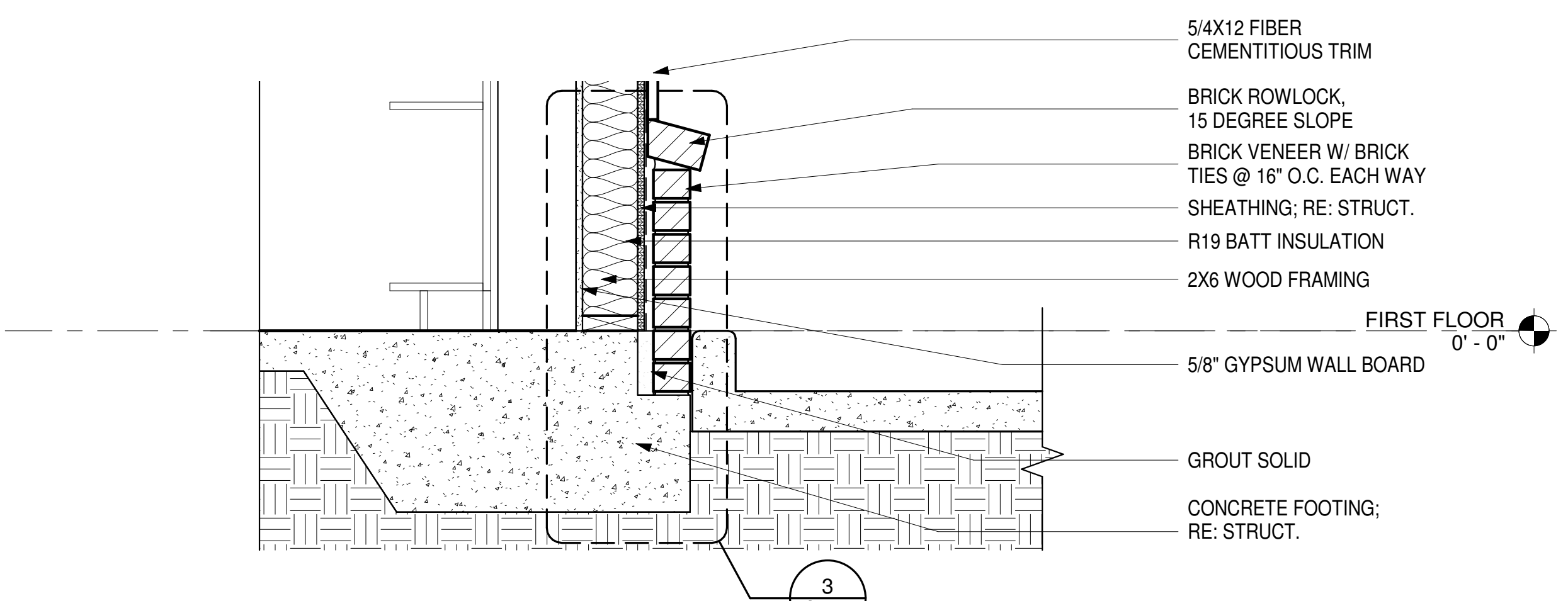
1	REFER TO G110 FOR GENERAL PROJECT NOTES
2	REFER TO A200 - A201 FOR EXTERIOR MATERIAL & COLOR SCHEDULE
3	TRUSS CONFIGURATION IS DIAGRAMMATIC. REFER TO STRUCTURAL.

DESCRIPTION

REV. DATE



1 WALL SECTION
 A313 SCALE: 1" = 1'-0"

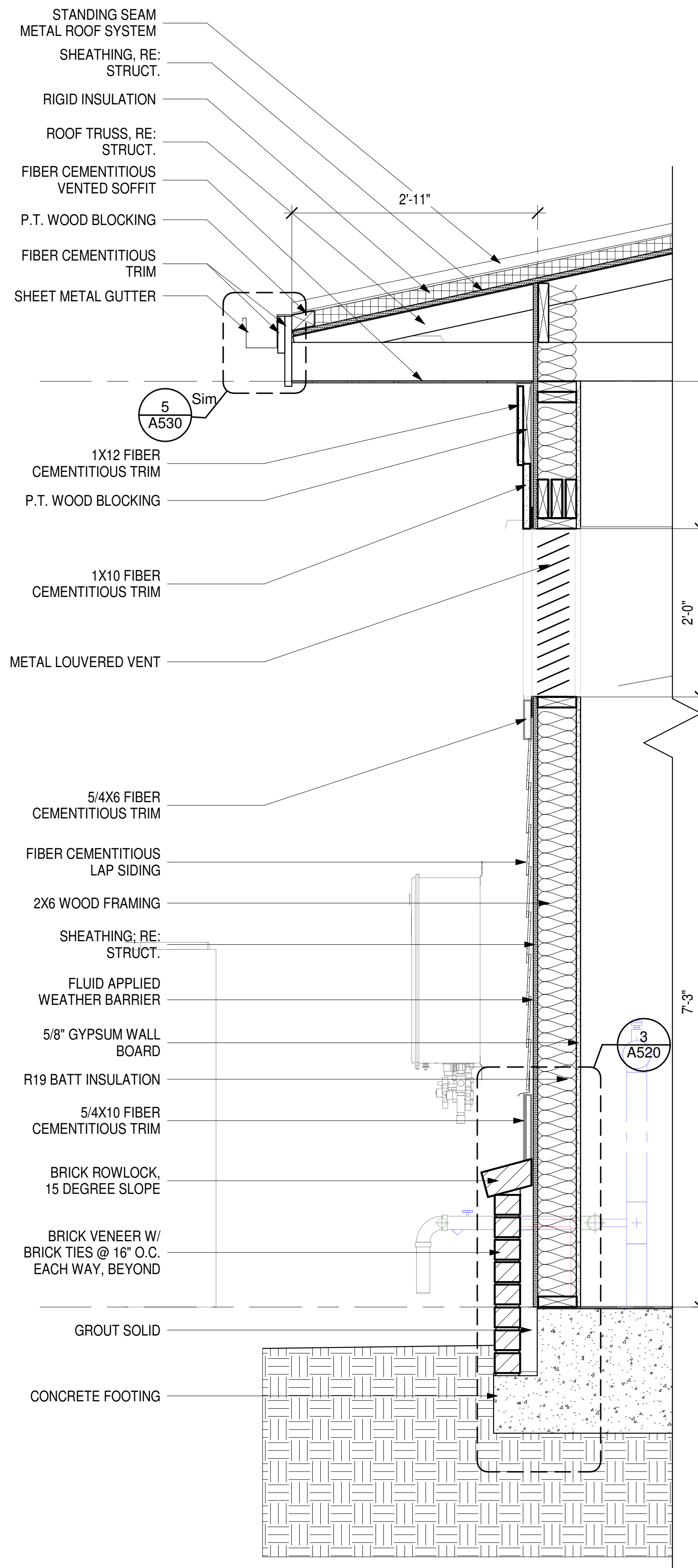


2 WALL SECTION
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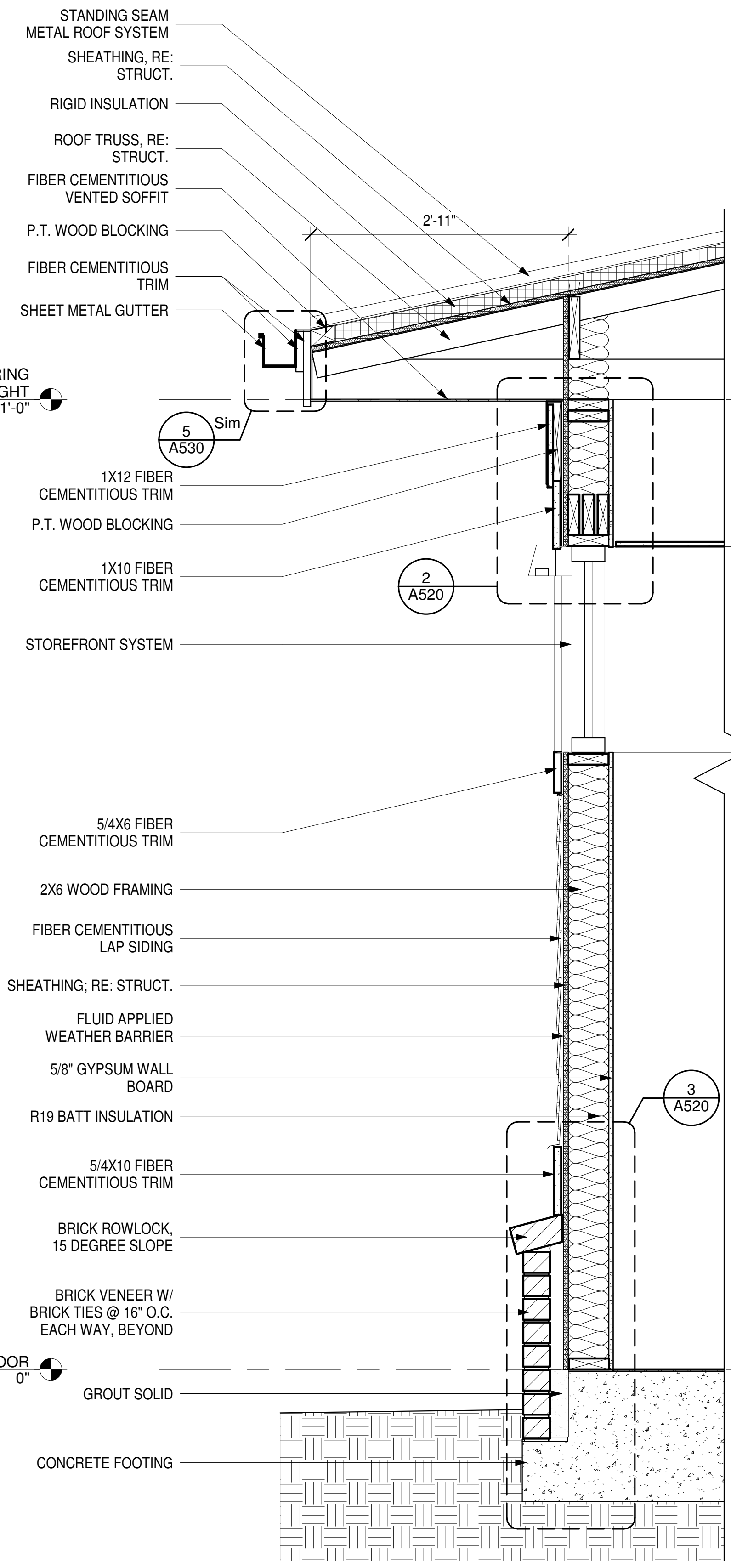
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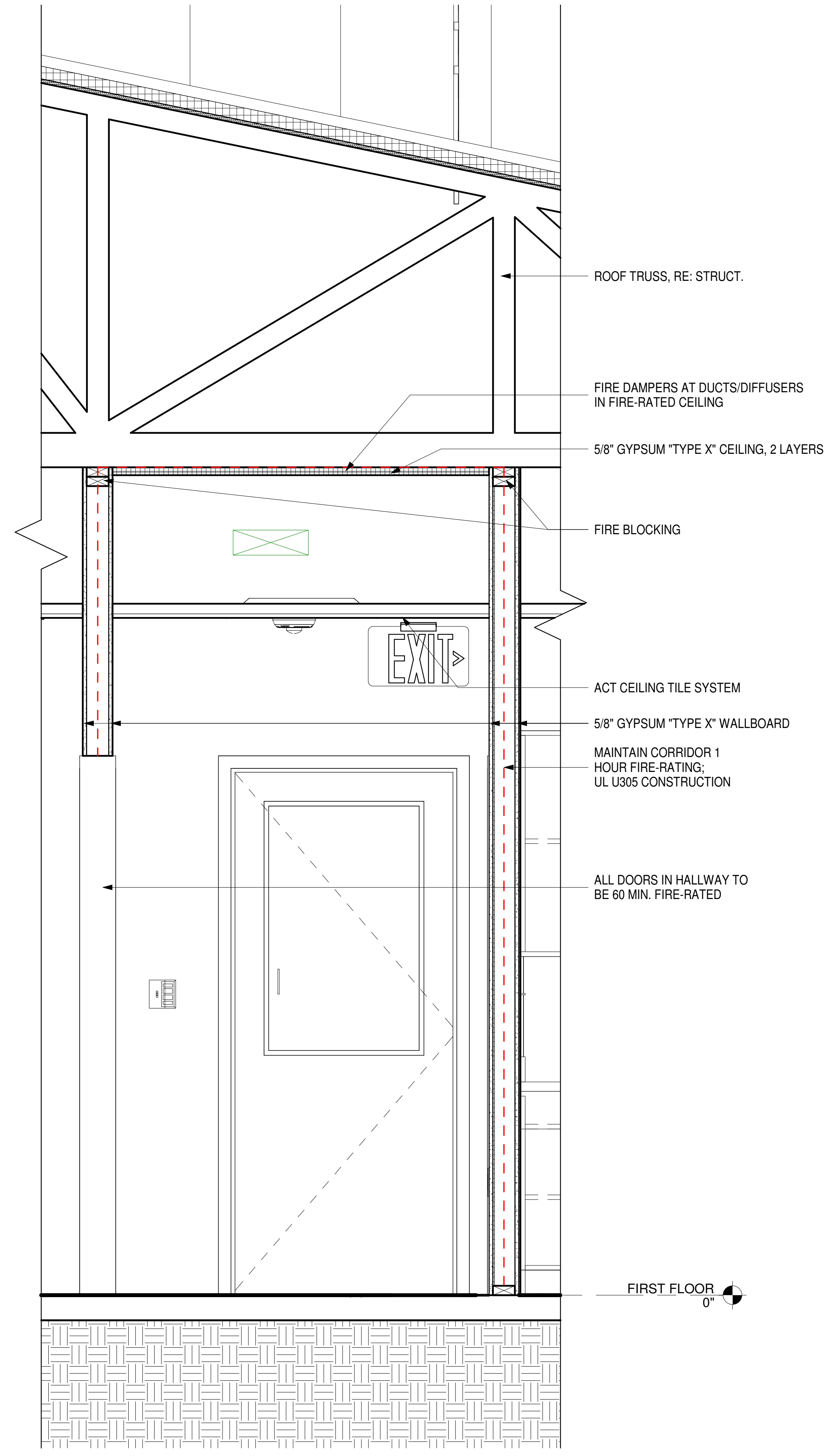
CDs WALL SECTIONS



1 WALL SECTION
 A315 SCALE: 1" = 1'-0"

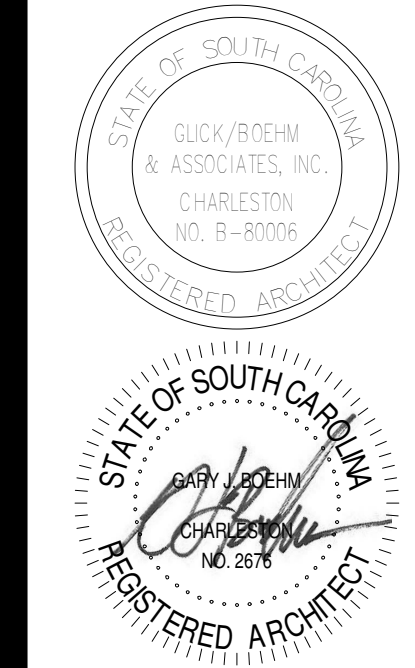


2 WALL SECTION
 A315 SCALE: 1" = 1'-0"



3 1 HR FIRE-RATED COORIDOR WALL SECTION
 A315 SCALE: 1" = 1'-0"

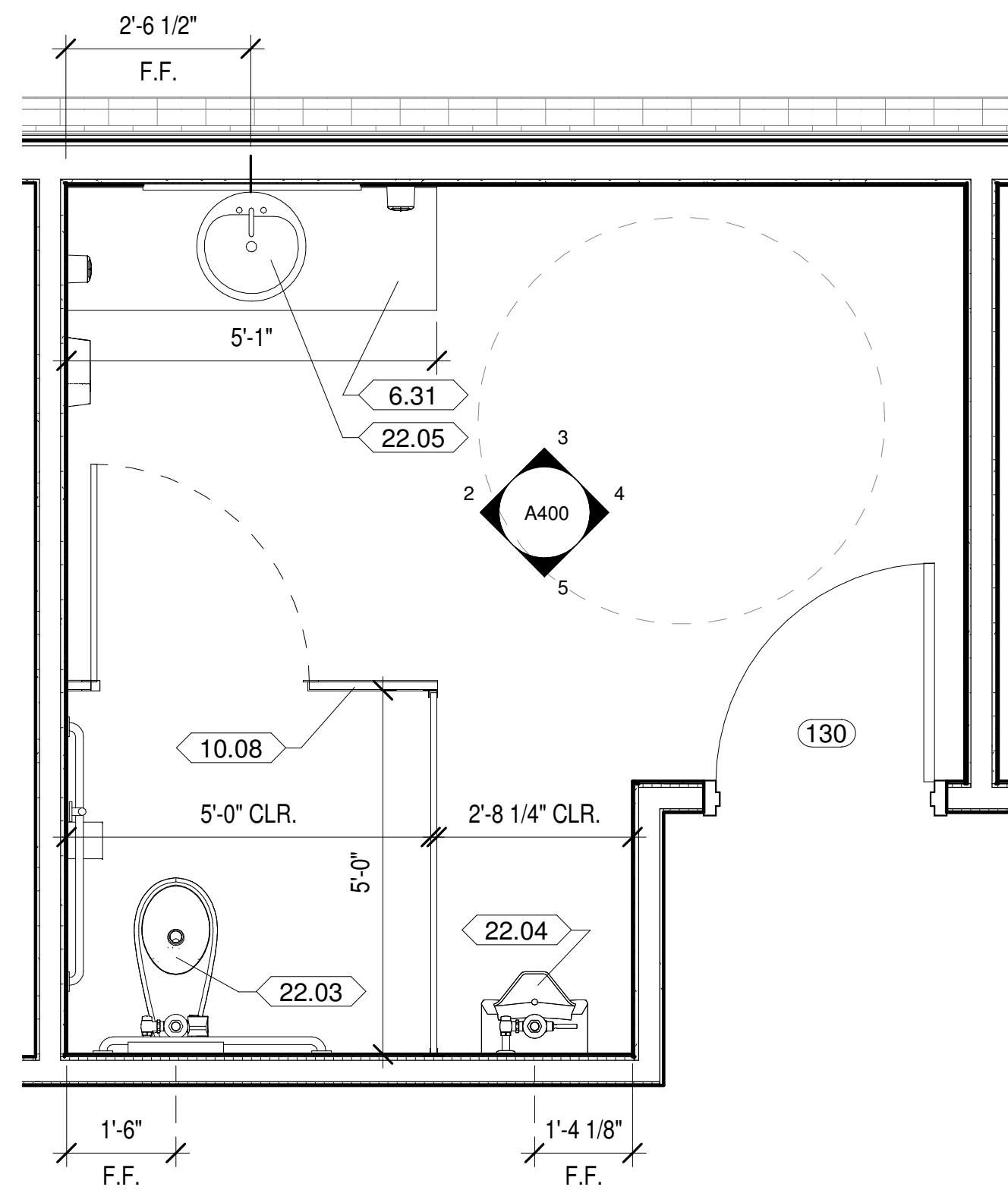
REV.	DATE	DESCRIPTION



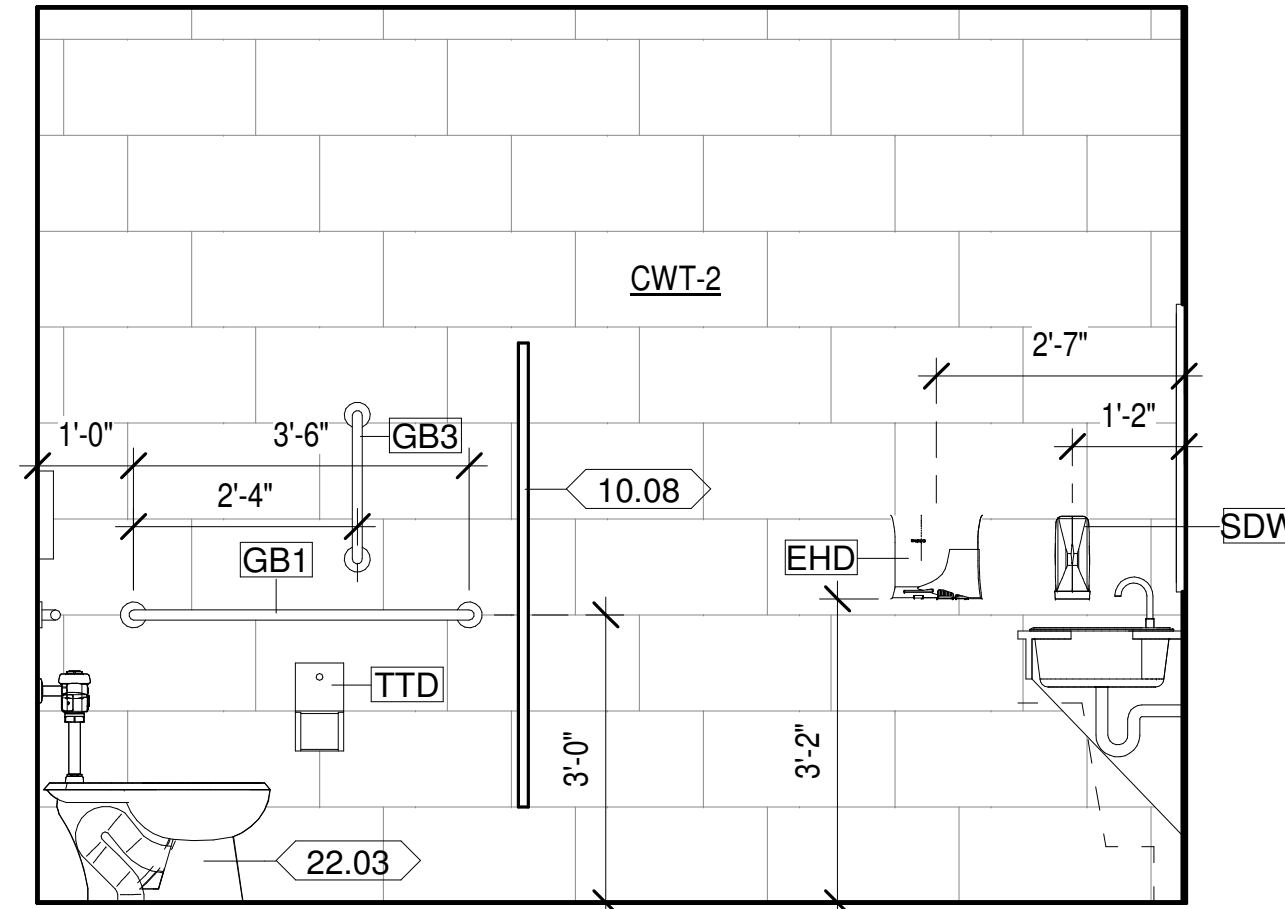
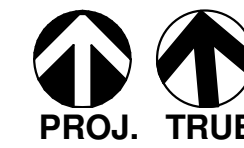
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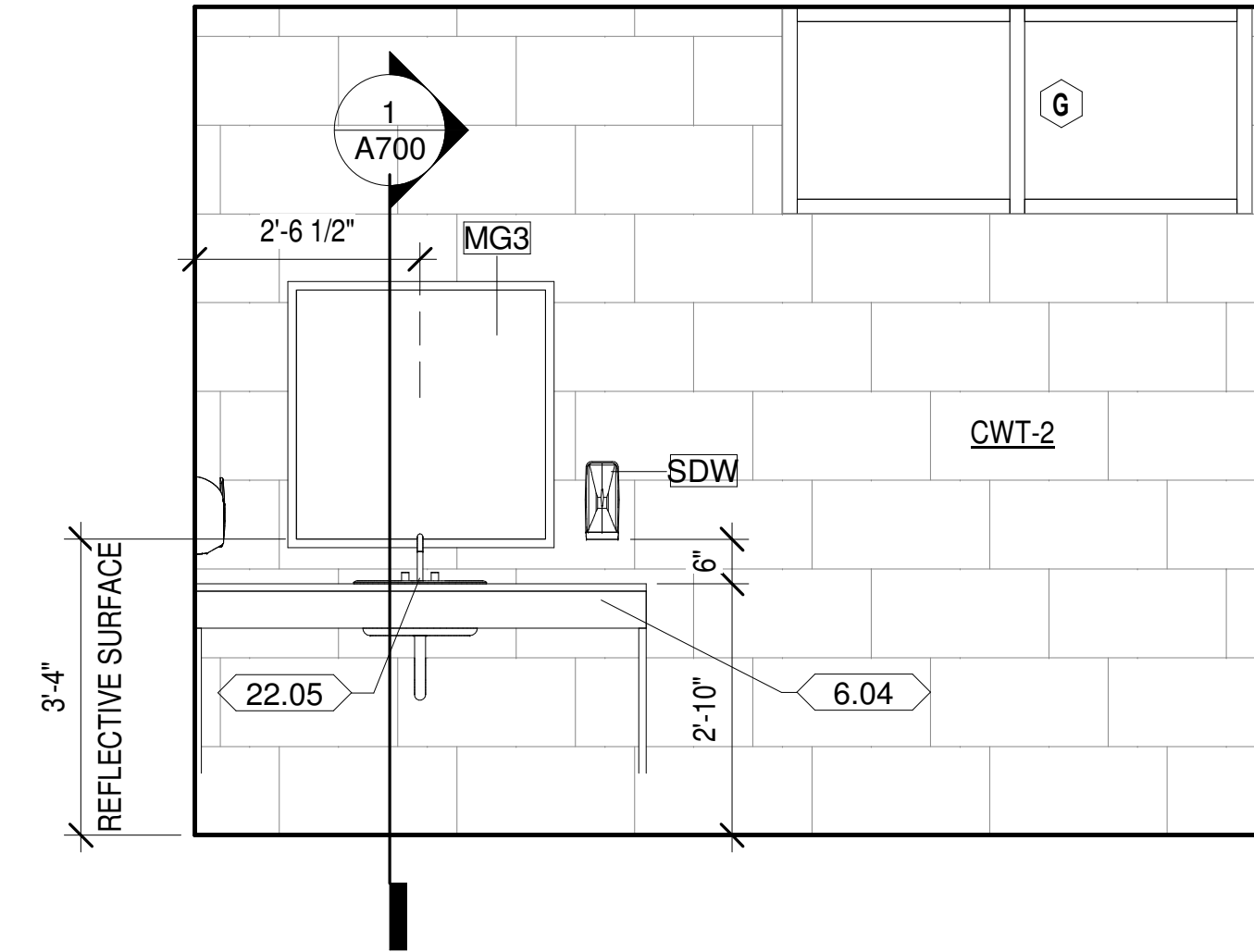
WALL SECTIONS



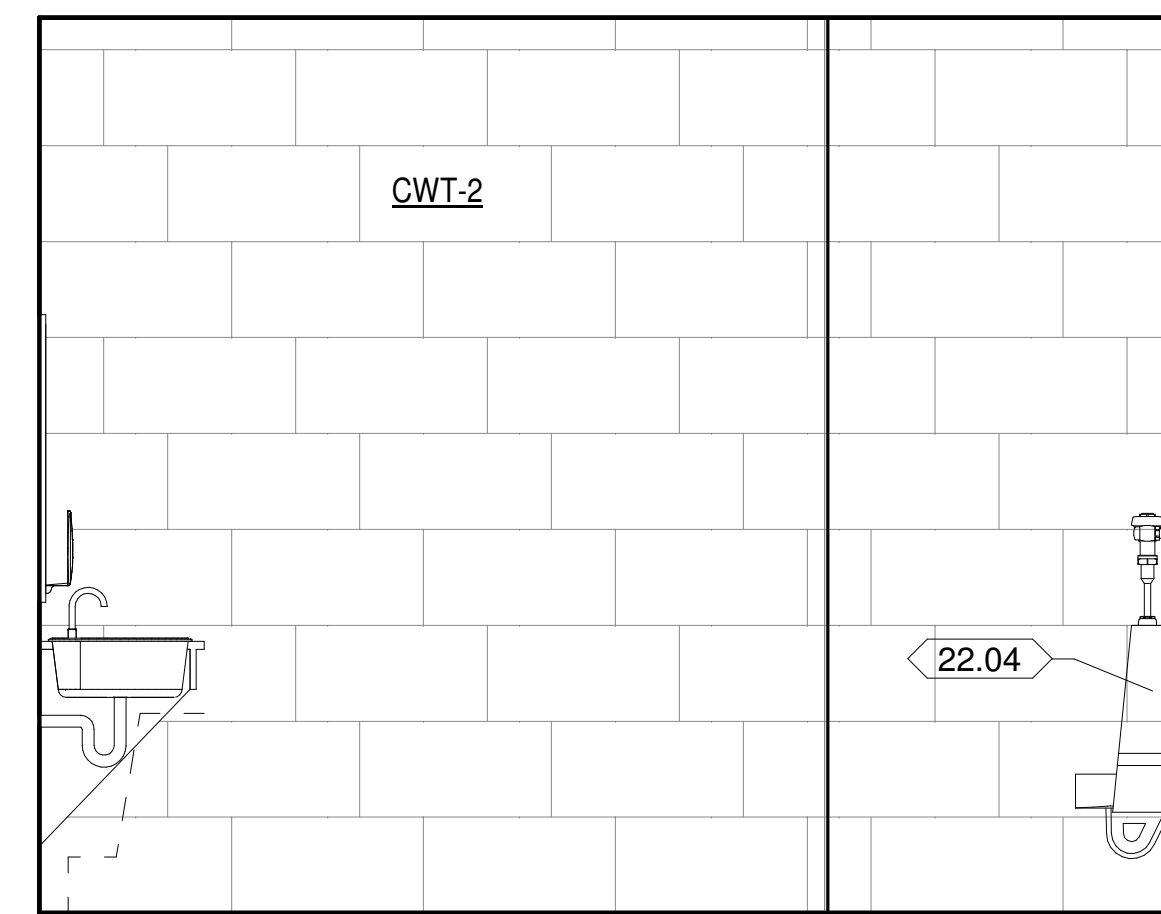
1 ENLARGED PLAN - MEN (130)
A400 SCALE: 1/2" = 1'-0"



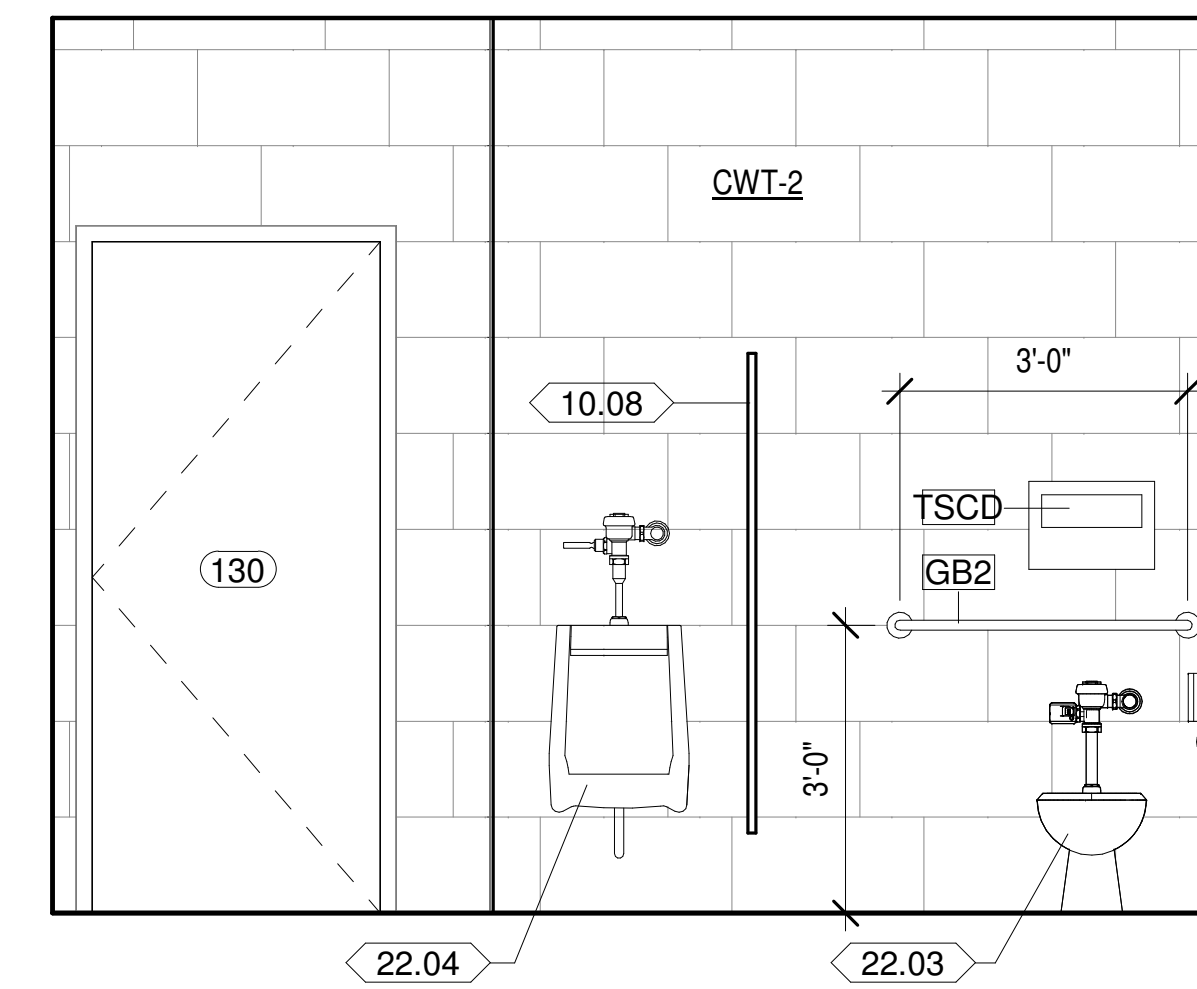
2 MEN (130) - WEST
A400 SCALE: 1/2" = 1'-0"



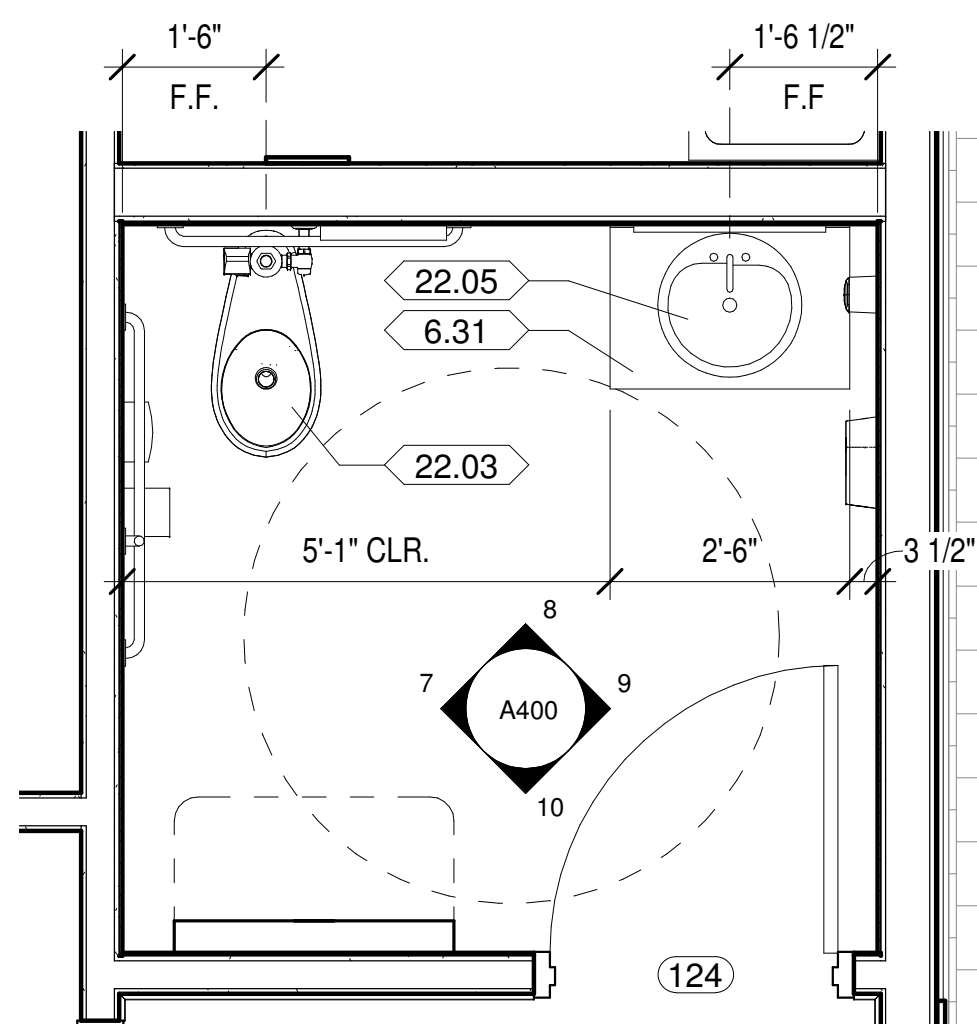
3 MEN (130) - NORTH
A400 SCALE: 1/2" = 1'-0"



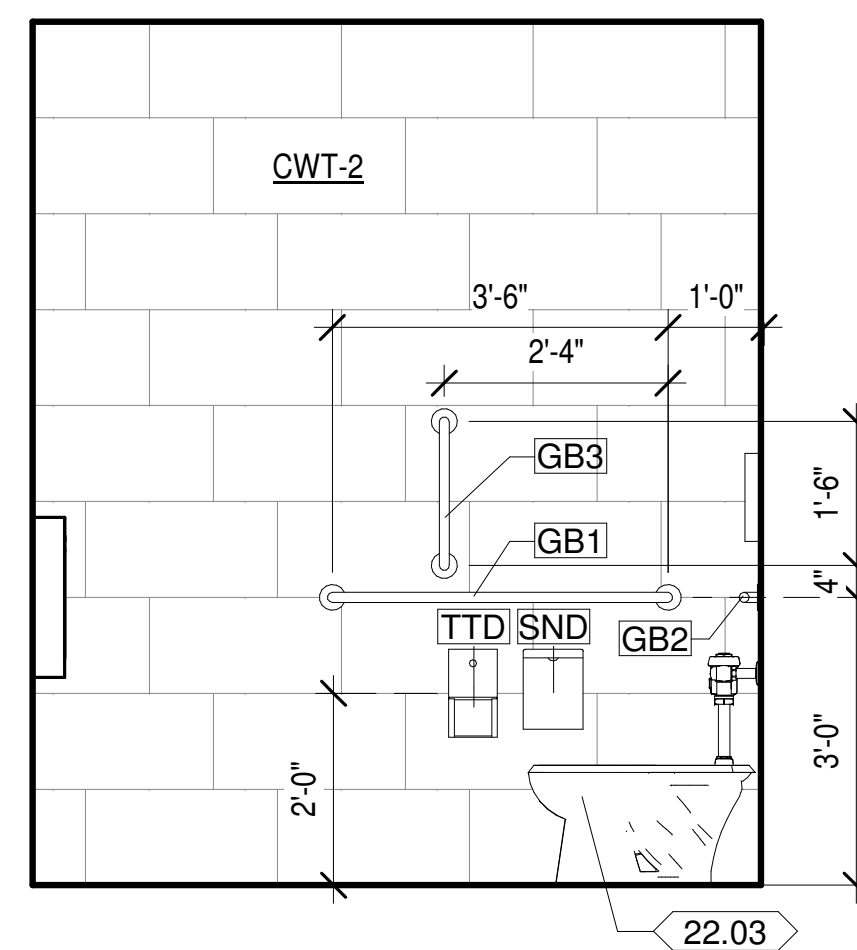
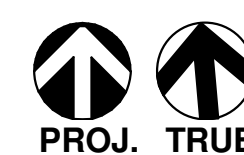
4 MEN (130) - EAST
A400 SCALE: 1/2" = 1'-0"



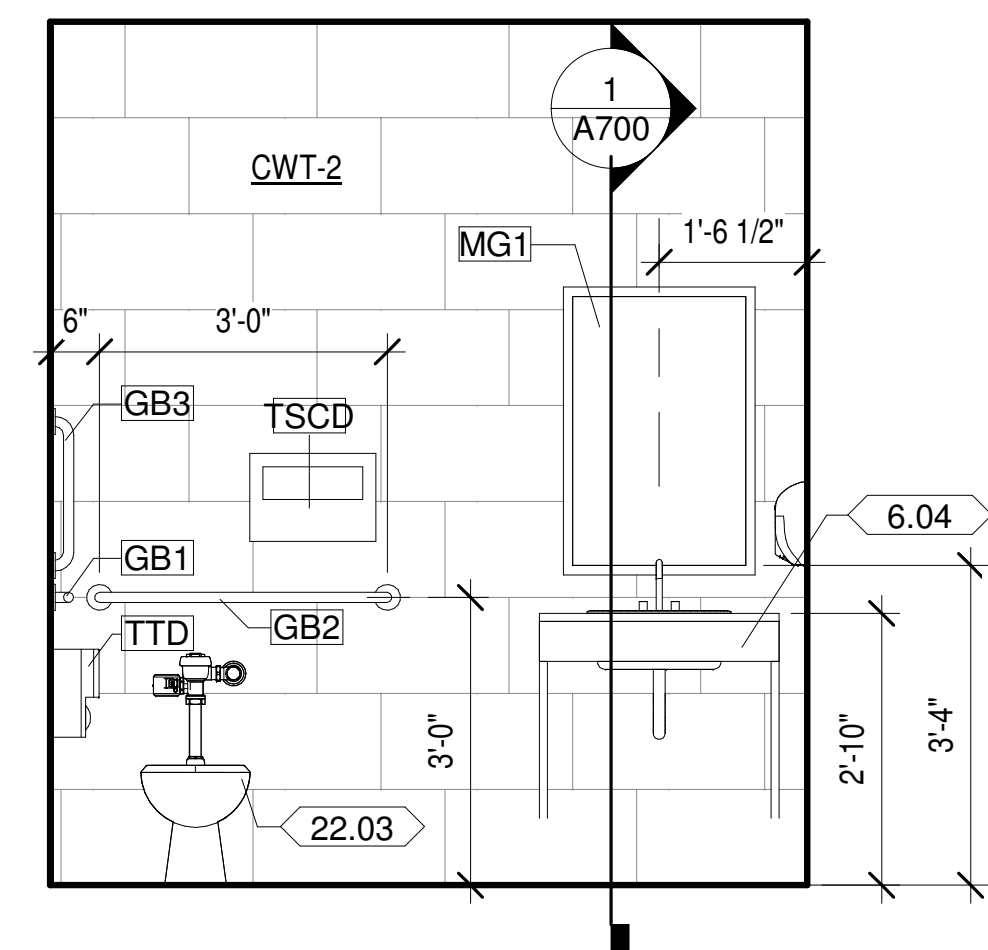
5 MEN (130) - SOUTH
A400 SCALE: 1/2" = 1'-0"



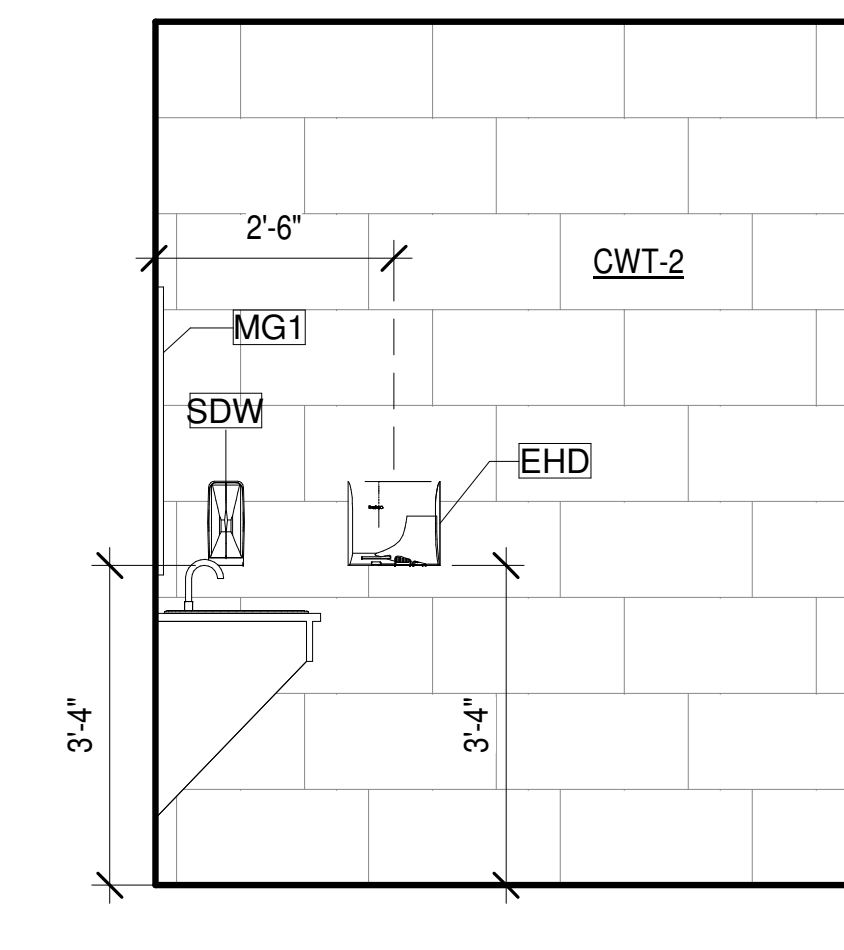
6 UNISEX (124) - ENLARGED PLAN
A400 SCALE: 1/2" = 1'-0"



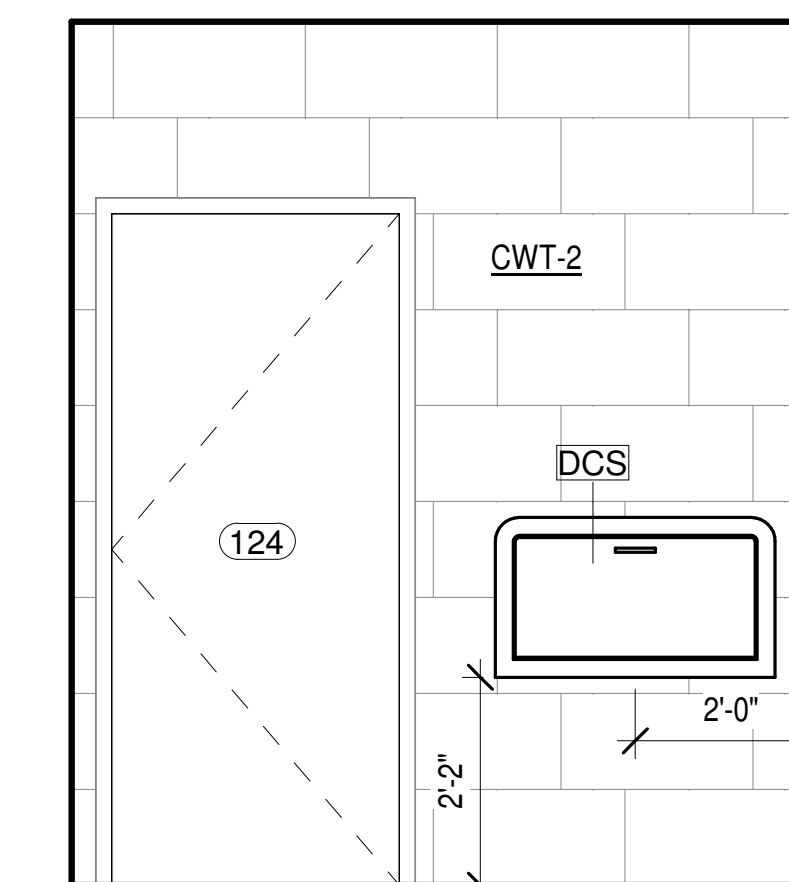
7 UNISEX (124) - WEST
A400 SCALE: 1/2" = 1'-0"



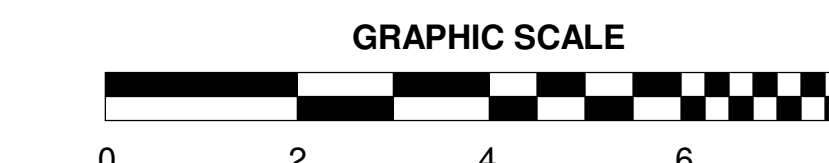
8 UNISEX (124) - NORTH
A400 SCALE: 1/2" = 1'-0"



9 UNISEX (124) - EAST
A400 SCALE: 1/2" = 1'-0"



10 UNISEX (124) - SOUTH
A400 SCALE: 1/2" = 1'-0"



ENLARGED PLAN NOTES

- 1 PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
- 2 MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
- 3 REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
- 4 REFER TO TOILET ACCESSORY SCHEDULE ON A501.

INTERIOR ELEVATION NOTES

- 1 REFER TO SHEET A500 FOR MOUNTING HEIGHTS OF FIXTURES, ACCESSORIES, AND SPECIALTY EQUIPMENT, U.O.N.
- 2 ALL DIMENSIONS ON INTERIOR SHEETS ARE FROM FACE OF FINISH TO FACE OF FINISH, U.O.N.
- 3 CONTRACTOR TO COORDINATE LOCATIONS OF ADDITIONAL PENETRATIONS THROUGH WALLS AND FLOORS NOT INDICATED ON ARCHITECTURAL DRAWINGS. RE: MECHANICAL, PLUMBING AND ELECTRICAL. REFER TO STRUCTURAL FOR LINTEL OR FRAMING REQUIREMENTS.

TOILET ACCESSORIES KEY

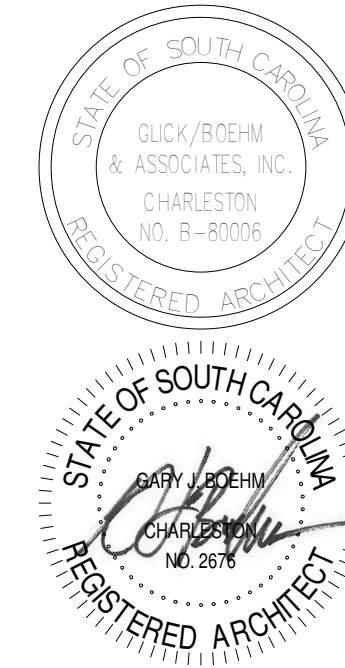
MARK	DESCRIPTION
REFER TO TOILET ACCESSORY SCHEDULE ON A500	
DCS	DIAPER CHANGING STATION
EHD	Adjustable Motor, Adjustable Sensor Operated Warm Air Dryer ELECTRIC HAND DRYER
GB1	42" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
GB2	36" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
GB3	18" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
MG1	WALL MOUNTED MIRROR
MG2	WALL MOUNTED MIRROR
MG3	WALL MOUNTED MIRROR
PTD	Surface Mounted Paper Towel Dispenser
SDW	Soap Dispenser Liquid Soap - Tank Type Vertical
SND	SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL
TSCD	Classic Series Surface Mounted Seat Cover Dispenser
TTD	SURFACE-MOUNTED MULTI-ROLL TOILET TISSUE DISPENSER

KEYNOTE LEGEND

KEY VALUE	KEYNOTE TEXT
6.04	SOLID WOOD CASEWORK, PAINTED
6.31	SOLID SURFACE
10.08	TOILET PARTITION, HINEY HIDERS OR EQUAL, COLOR: GREY
22.03	WATER CLOSET, RE: PLUMBING
22.04	URINAL, RE: PLUMBING
22.05	LAVATORY, RE: PLUMBING



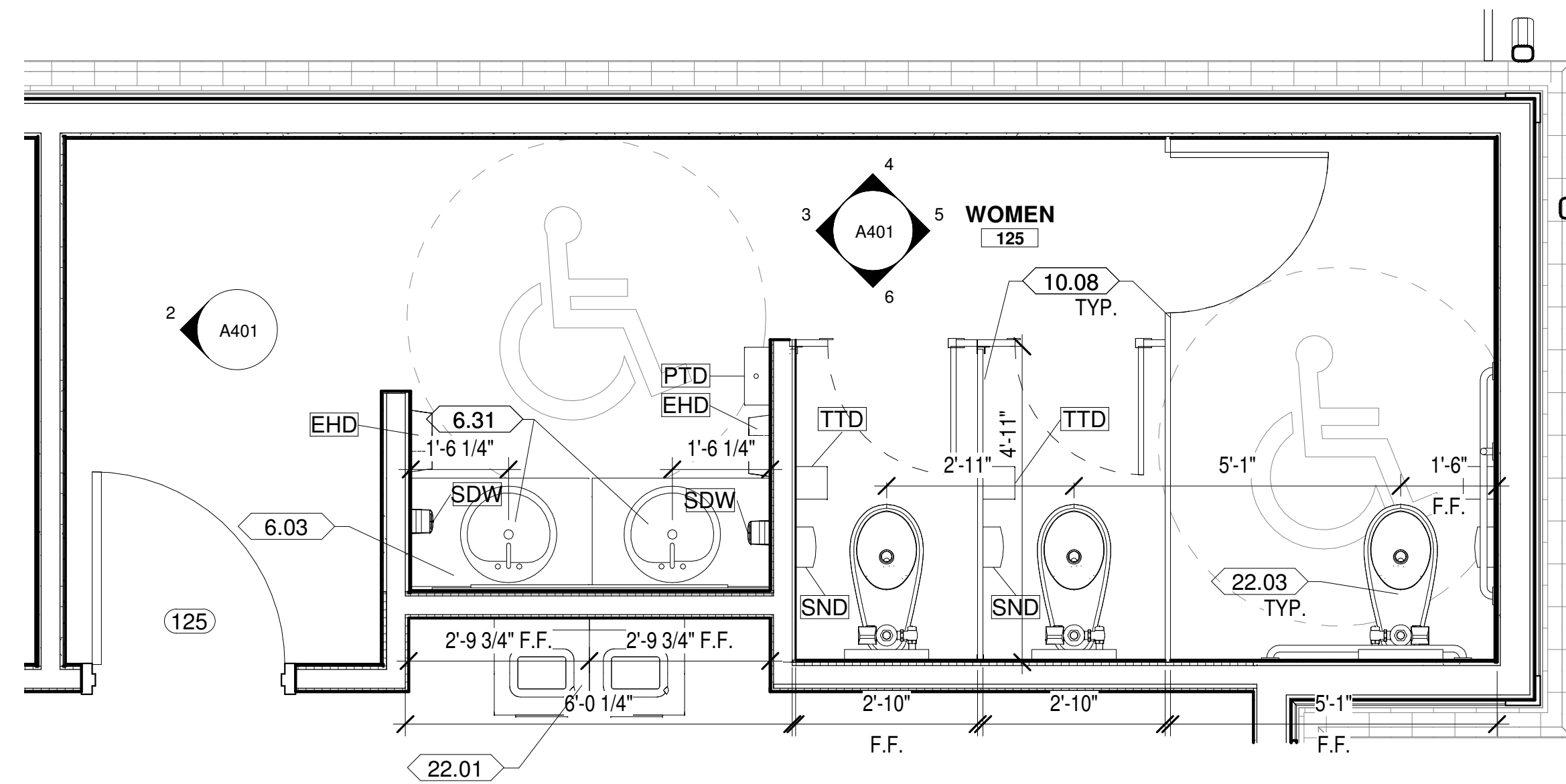
REV.	DATE	DESCRIPTION



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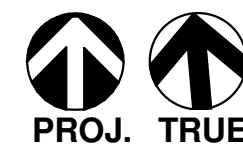
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ENLARGED PLANS - RESTROOMS
A400



1 ENLARGED PLAN - WOMEN (125)

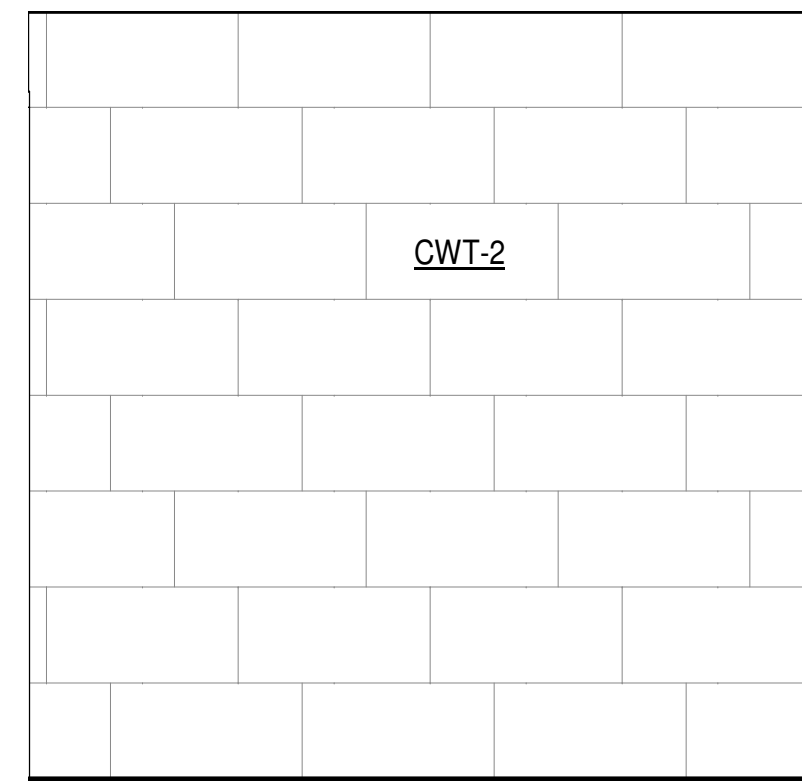
A401 SCALE: 1/2" = 1'-0"



TOILET ACCESSORIES KEY	
MARK	DESCRIPTION
REFER TO TOILET ACCESSORY SCHEDULE ON A500	
DCS	DIAPER CHANGING STATION
EHD	Adjustable Motor, Adjustable Sensor Operated Warm Air Dryer ELECTRIC HAND DRYER
GB1	42" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
GB2	36" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
GB3	18" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)
MG1	WALL MOUNTED MIRROR
MG2	WALL MOUNTED MIRROR
MG3	WALL MOUNTED MIRROR
PTD	Surface Mounted Paper Towel Dispenser
SDW	Soap Dispenser Liquid Soap - Tank Type Vertical
SND	SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL
TSCD	Classic Series Surface Mounted Seat Cover Dispenser
TTD	SURFACE-MOUNTED MULTI-ROLL TOILET TISSUE DISPENSER

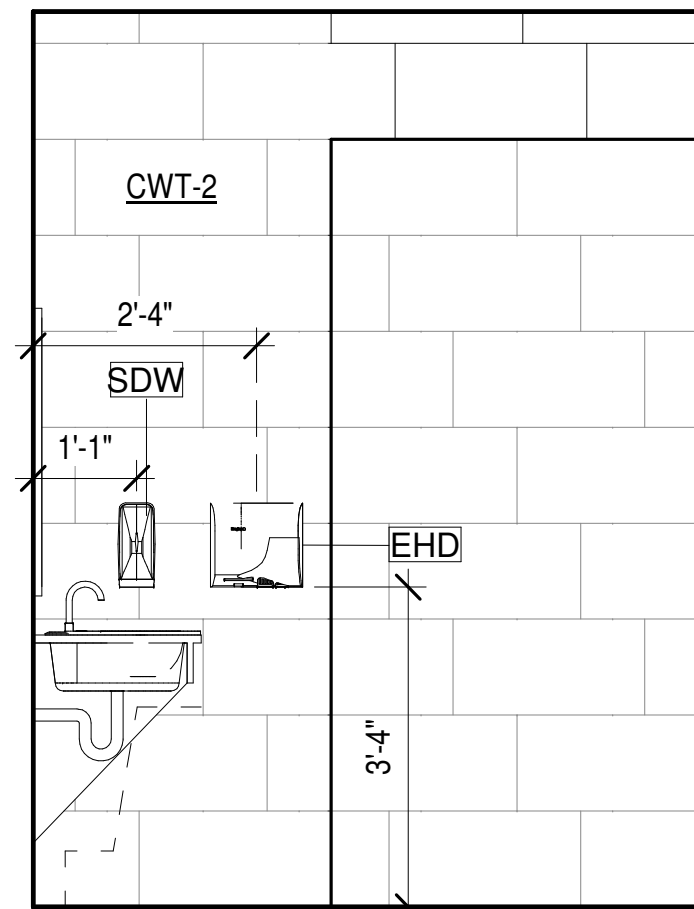
ENLARGED PLAN NOTES	
1	PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
2	MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
3	REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
4	REFER TO TOILET ACCESSORY SCHEDULE ON A501.

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPLASH WHERE SHOWN
6.04	SOLID WOOD CASEWORK, PAINTED
6.31	SOLID SURFACE
10.08	TOILET PARTITION, HONEY HIDERS OR EQUAL, COLOR: GREY
22.01	DRINKING FOUNTAIN, RE: PLUMBING
22.03	WATER CLOSET, RE: PLUMBING
22.30	TOILET PARTITION, GREY



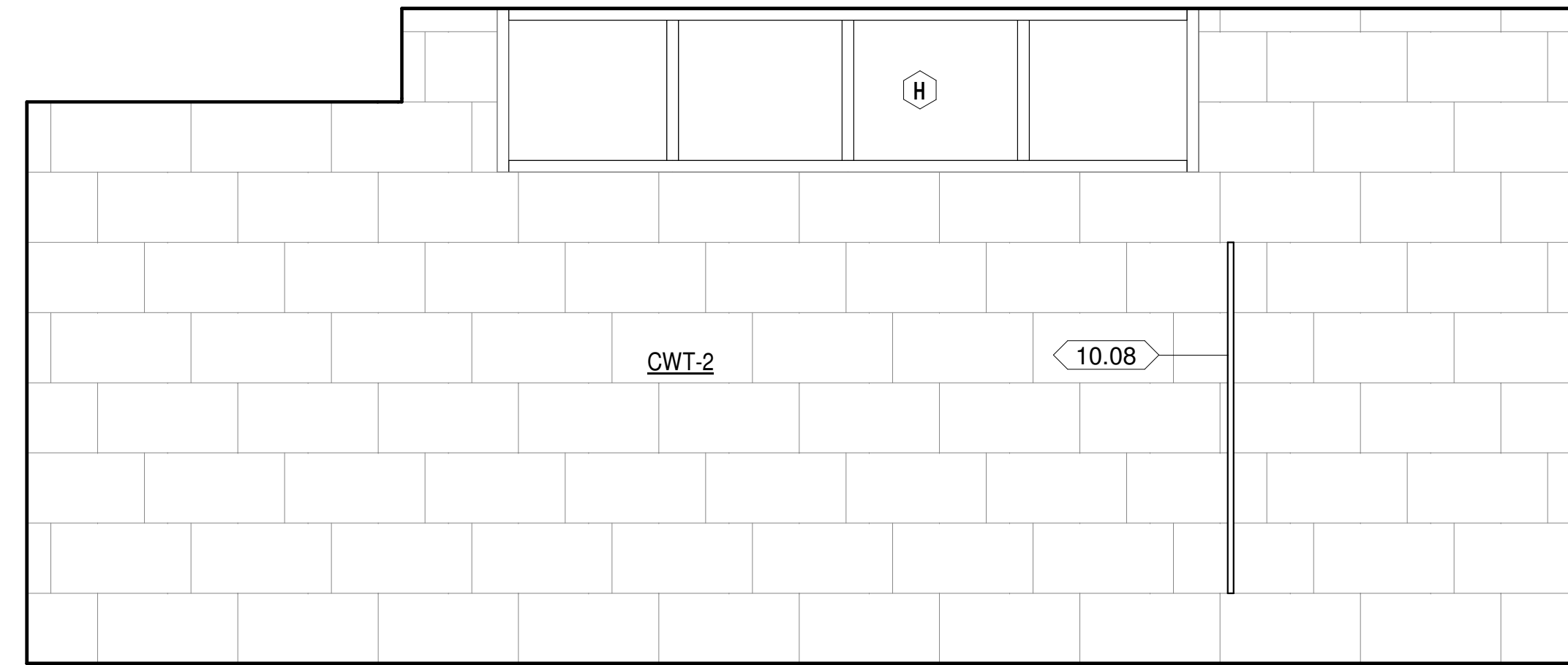
2 WOMEN (125) - WEST

A401 SCALE: 1/2" = 1'-0"



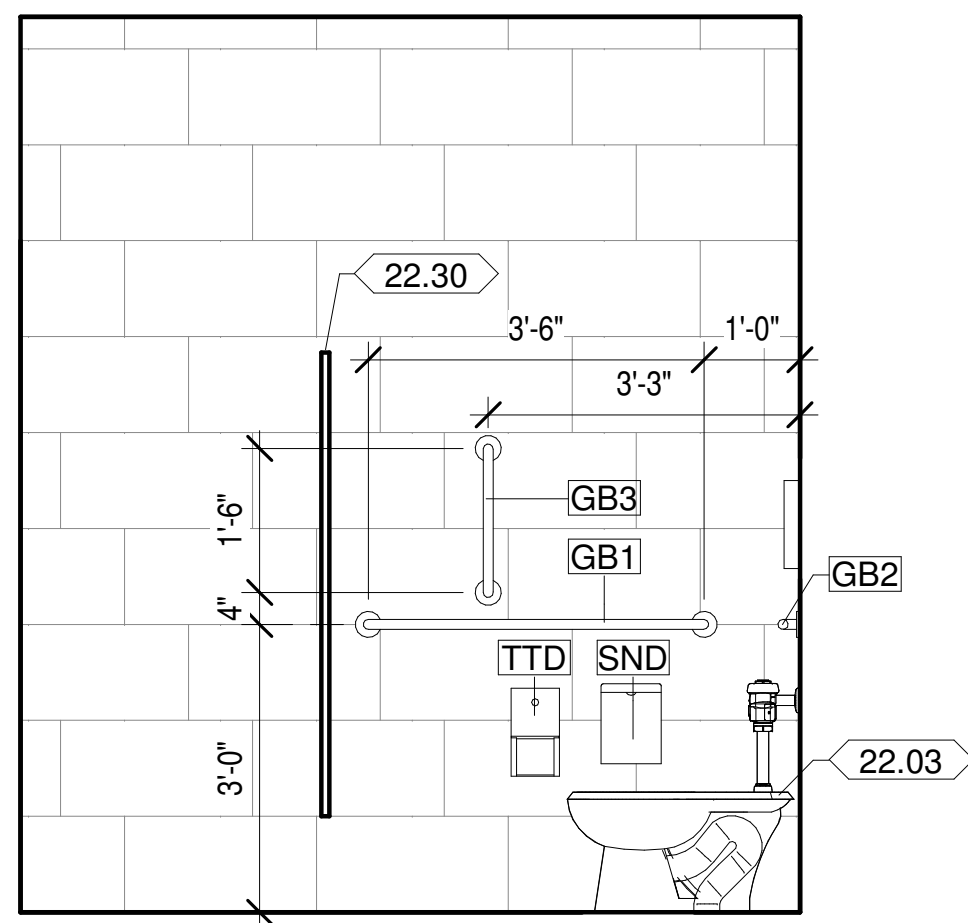
3 WOMEN (125) - WEST

A401 SCALE: 1/2" = 1'-0"



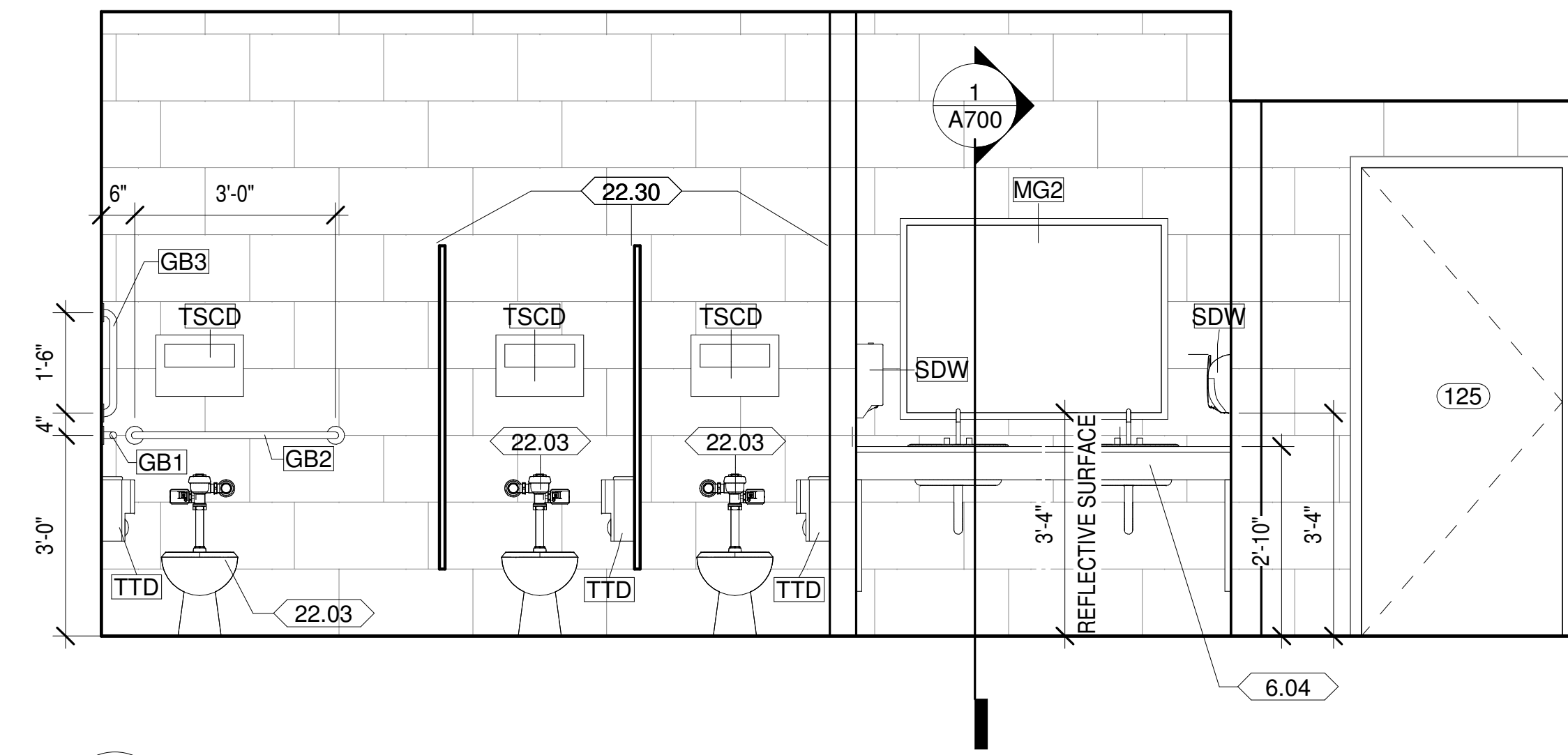
4 WOMEN (125) - NORTH

A401 SCALE: 1/2" = 1'-0"



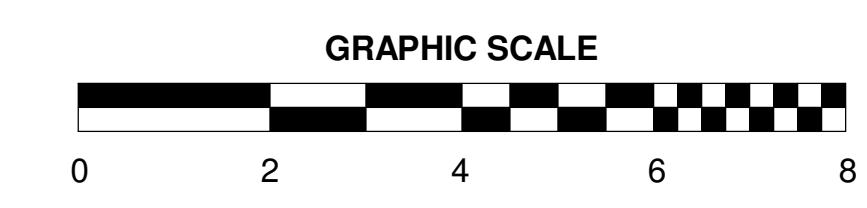
5 WOMEN (125) - EAST

A401 SCALE: 1/2" = 1'-0"

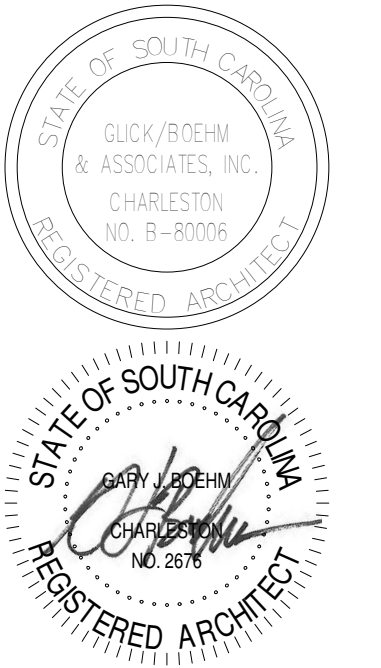


6 WOMEN (125) - SOUTH

A401 SCALE: 1/2" = 1'-0"



REV.	DATE	DESCRIPTION

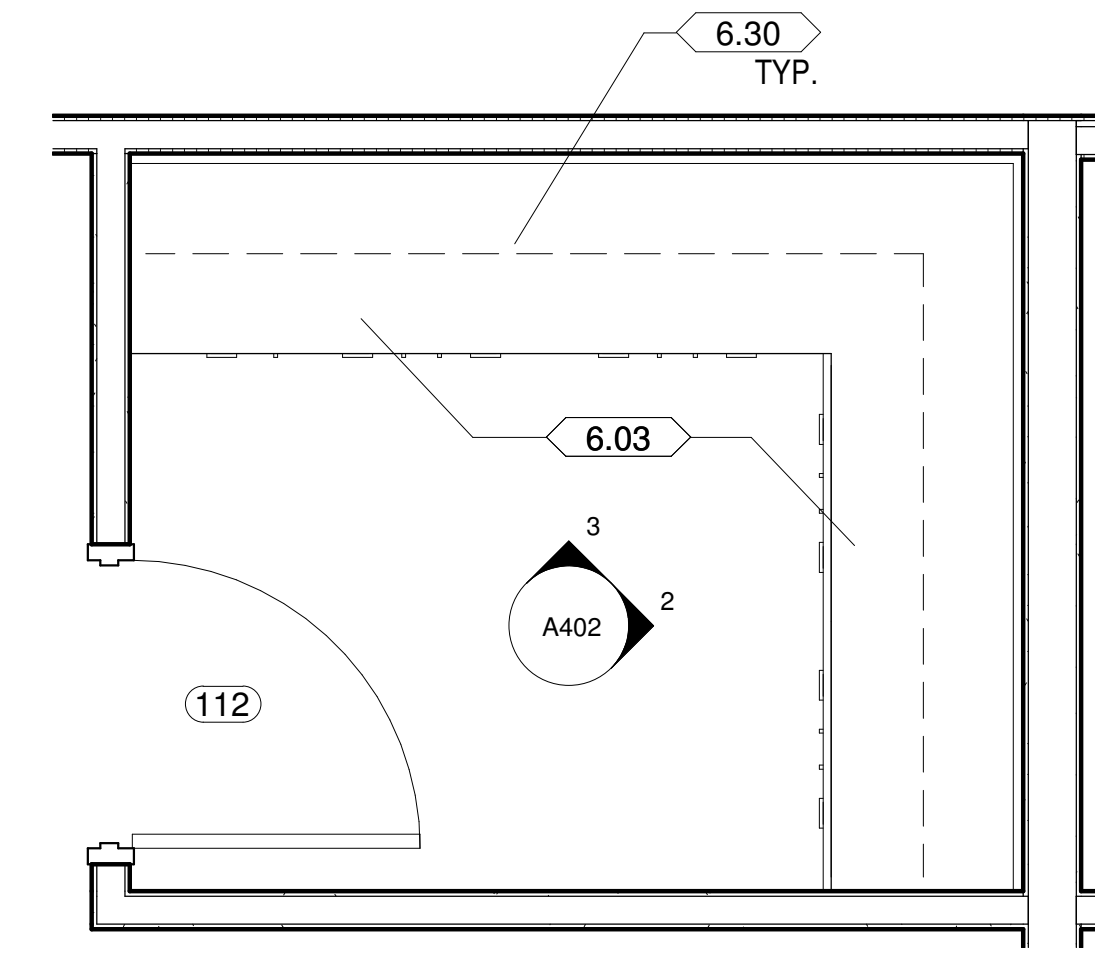


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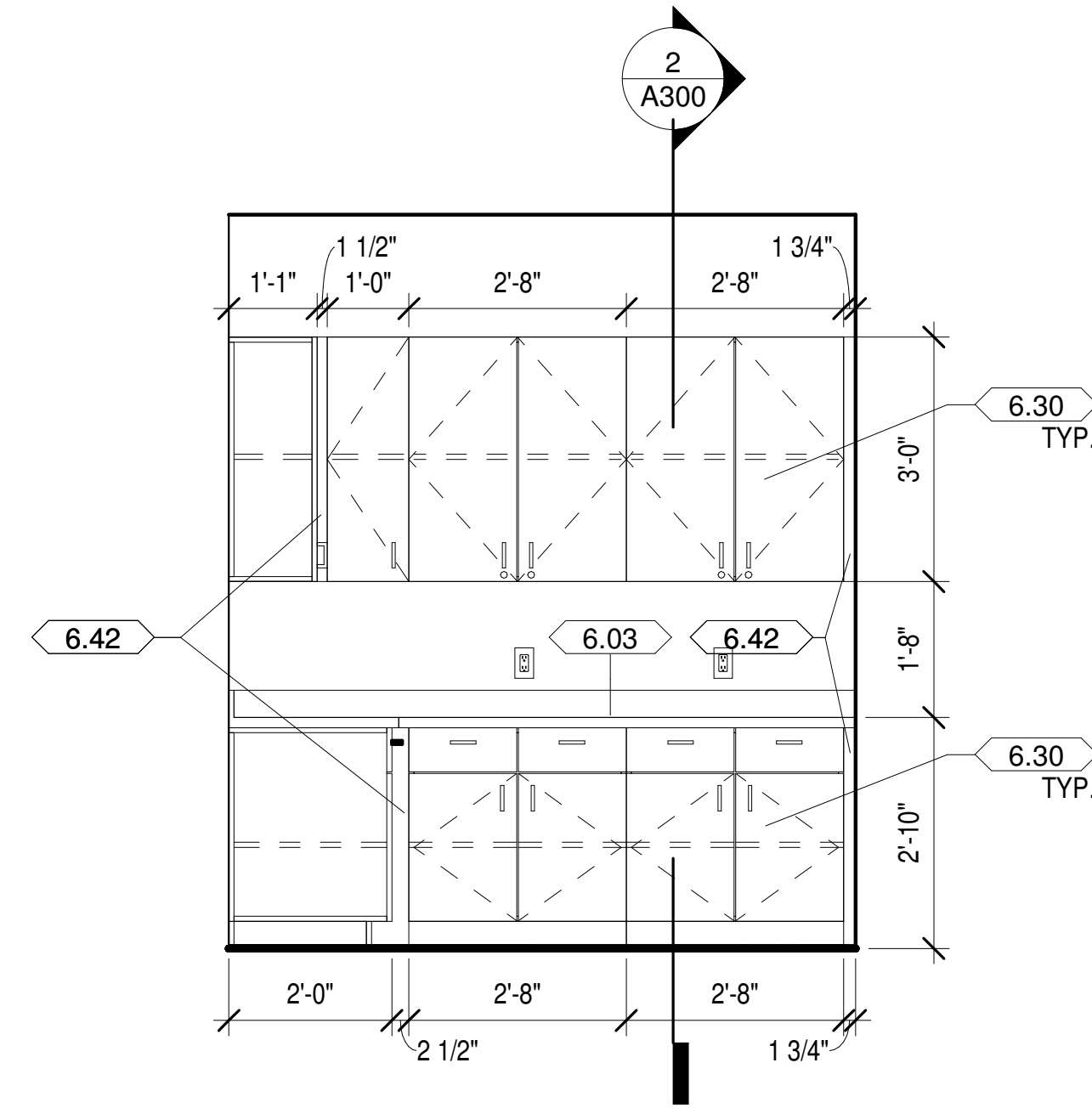
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ENLARGED PLANS - RESTROOMS

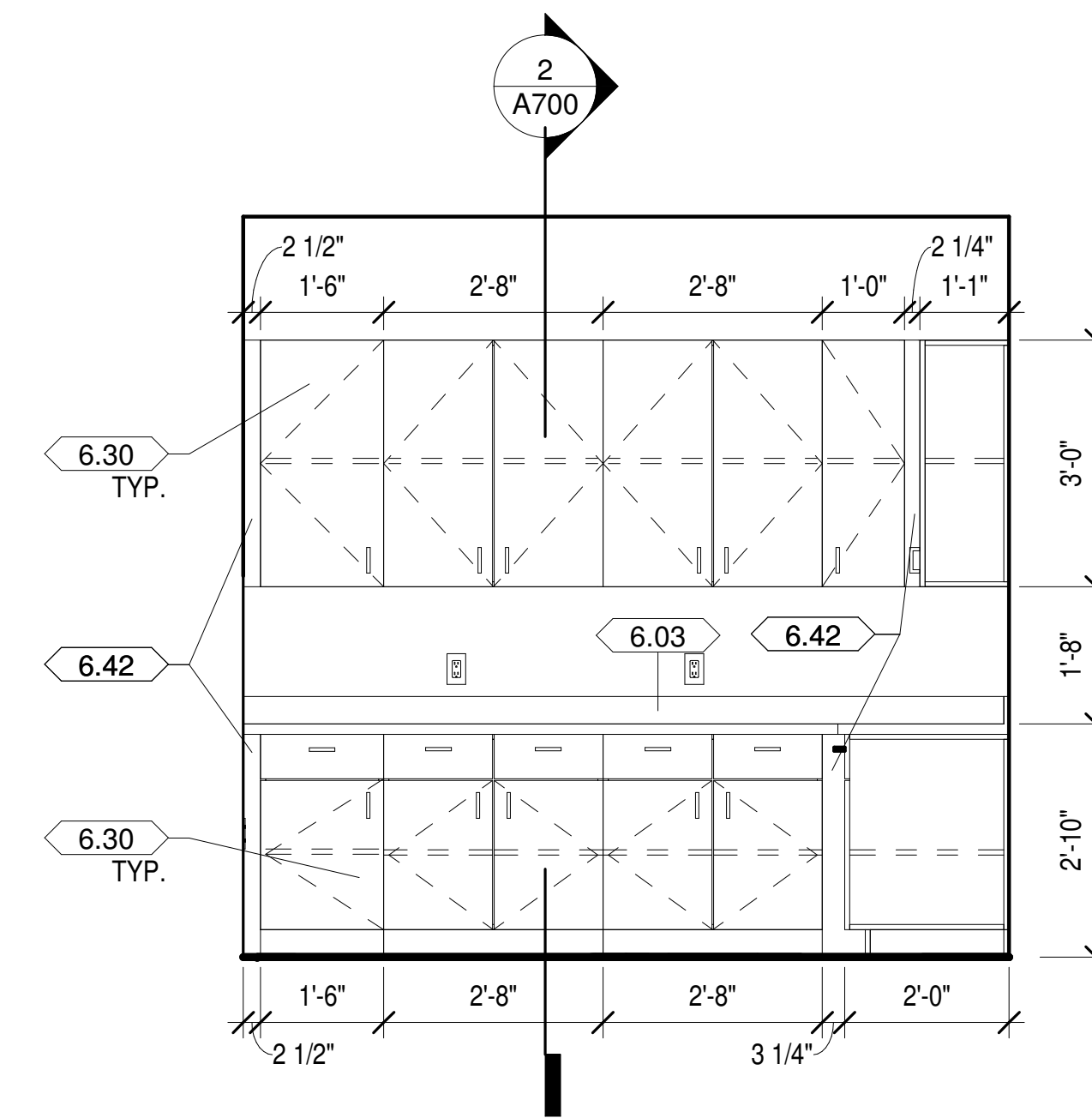
A401



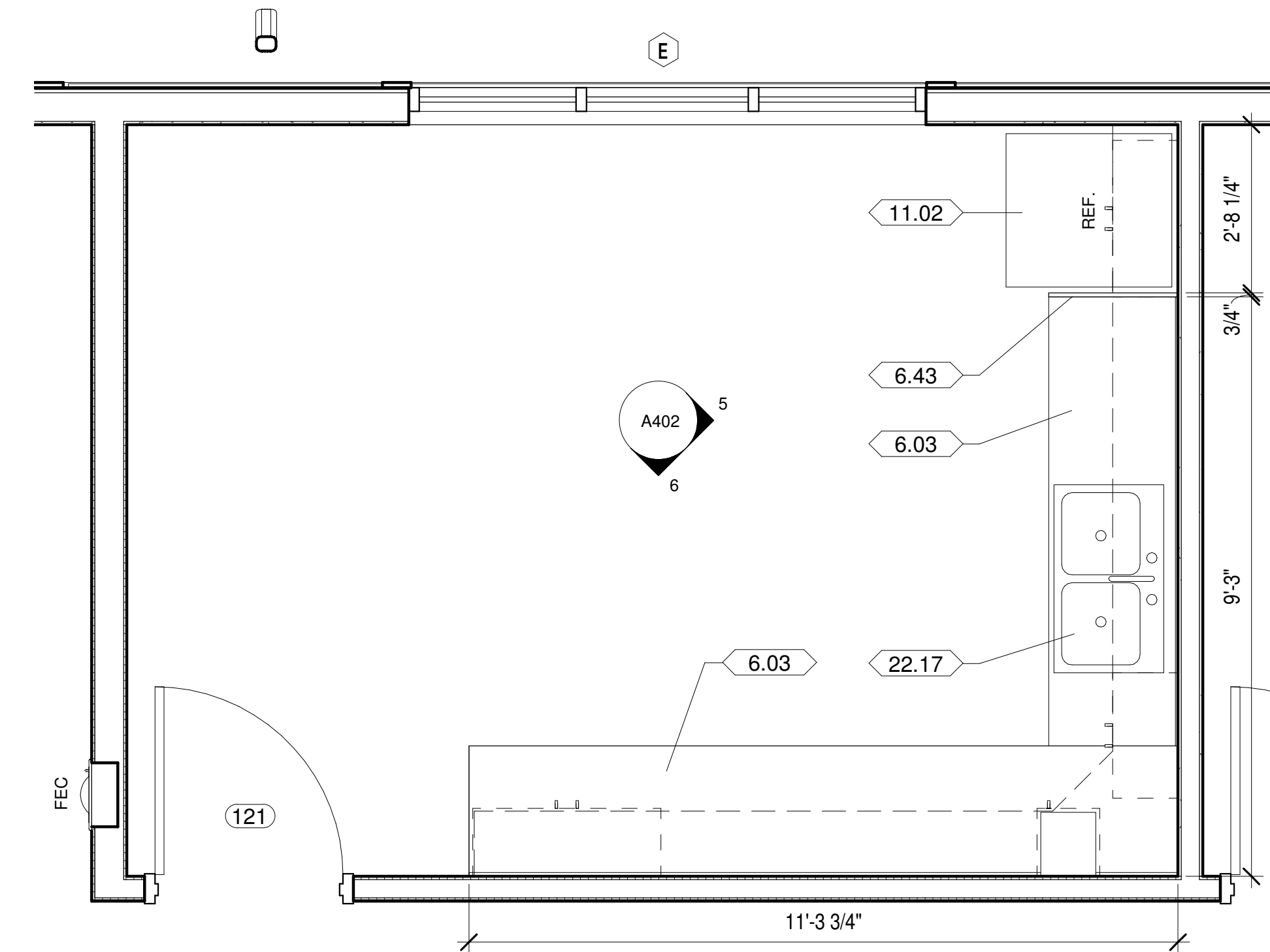
1 ENLARGED PLAN - SAFE (112)
A402 SCALE: 1/2" = 1'-0"



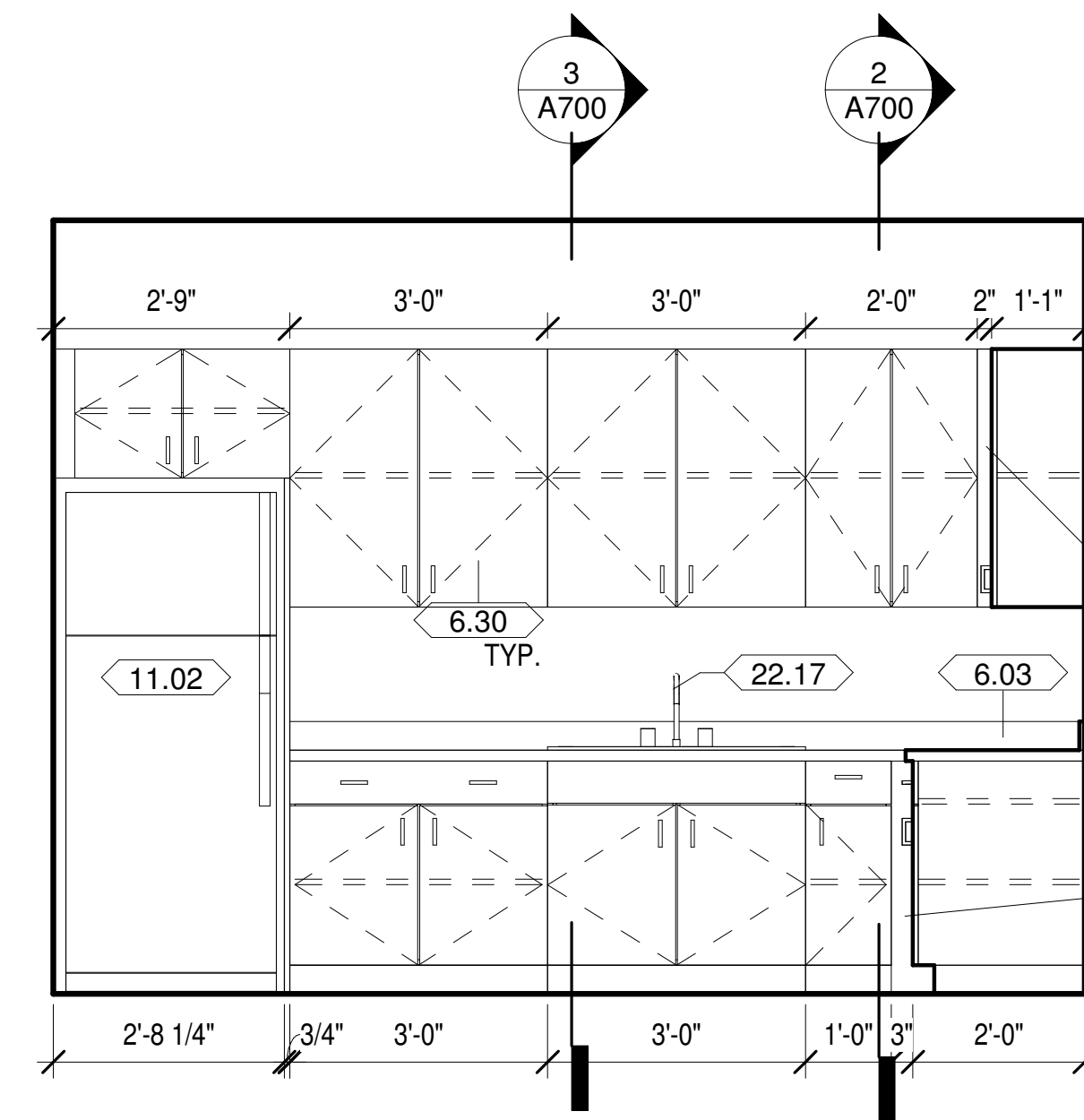
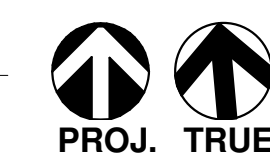
2 SAFE (113) - EAST
A402 SCALE: 1/2" = 1'-0"



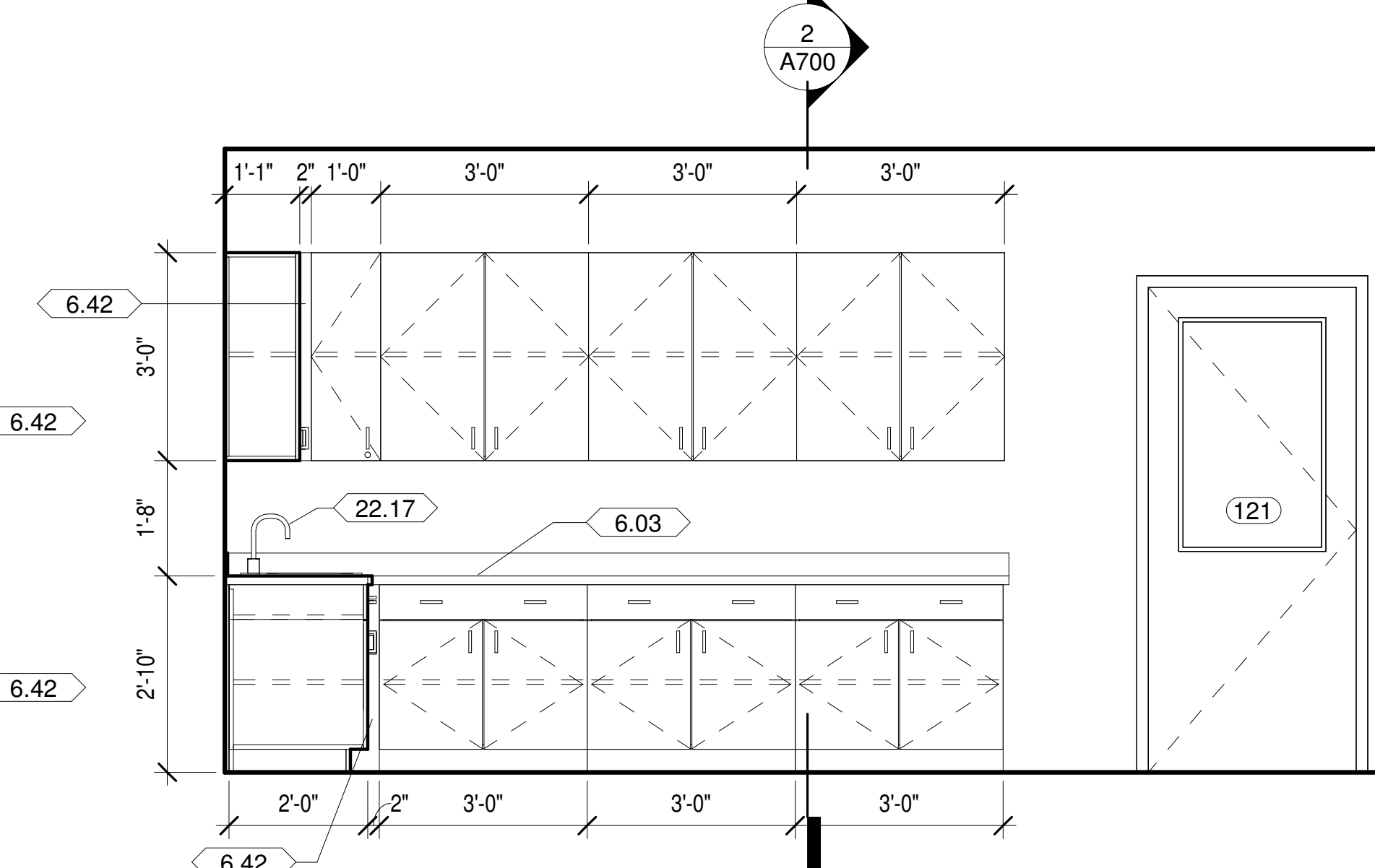
3 SAFE (113) - NORTH
A402 SCALE: 1/2" = 1'-0"



4 ENLARGED PLAN - BREAK ROOM (121)
A402 SCALE: 1/2" = 1'-0"



5 BREAK ROOM (121)- EAST
A402 SCALE: 1/2" = 1'-0"



6 BREAK ROOM (121) - SOUTH
A402 SCALE: 1/2" = 1'-0"

ENLARGED PLAN NOTES

- 1 PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
- 2 MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
- 3 REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
- 4 REFER TO TOILET ACCESSORY SCHEDULE ON A501.

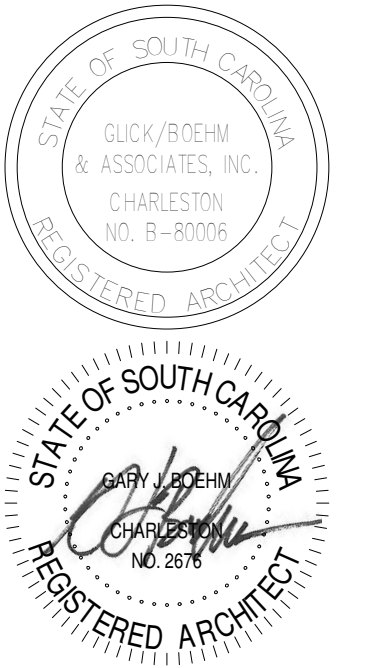
INTERIOR ELEVATION NOTES

- 1 REFER TO SHEET A500 FOR MOUNTING HEIGHTS OF FIXTURES, ACCESSORIES, AND SPECIALTY EQUIPMENT, U.O.N.
- 2 ALL DIMENSIONS ON INTERIOR SHEETS ARE FROM FACE OF FINISH TO FACE OF FINISH, U.O.N.
- 3 CONTRACTOR TO COORDINATE LOCATIONS OF ADDITIONAL PENETRATIONS THROUGH WALLS AND FLOORS NOT INDICATED ON ARCHITECTURAL DRAWINGS. RE: MECHANICAL, PLUMBING AND ELECTRICAL. REFER TO STRUCTURAL FOR LINTEL OR FRAMING REQUIREMENTS.

KEYNOTE LEGEND

KEY VALUE	KEYNOTE TEXT
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPASH WHERE SHOWN
6.30	WOOD CABINET BOXES WITH WOOD DOORS/ DRAWER FACES, PAINTED
6.42	WOOD FILLER STRIP, PAINT TO MATCH CABINETS
6.43	SOLID WOOD APPLIANCE SIDE-PANEL, 3/4" THICK, PAINTED
11.02	REFRIGERATOR, BY OWNER
22.17	STAINLESS STEEL SINK, RE: PLUMB.

REV.	DATE	DESCRIPTION

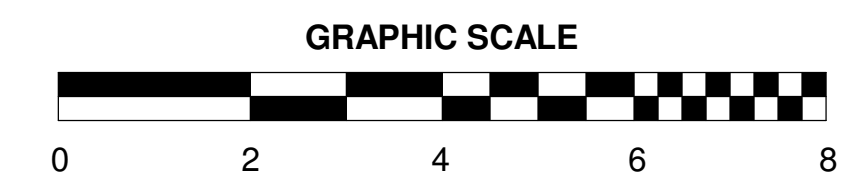


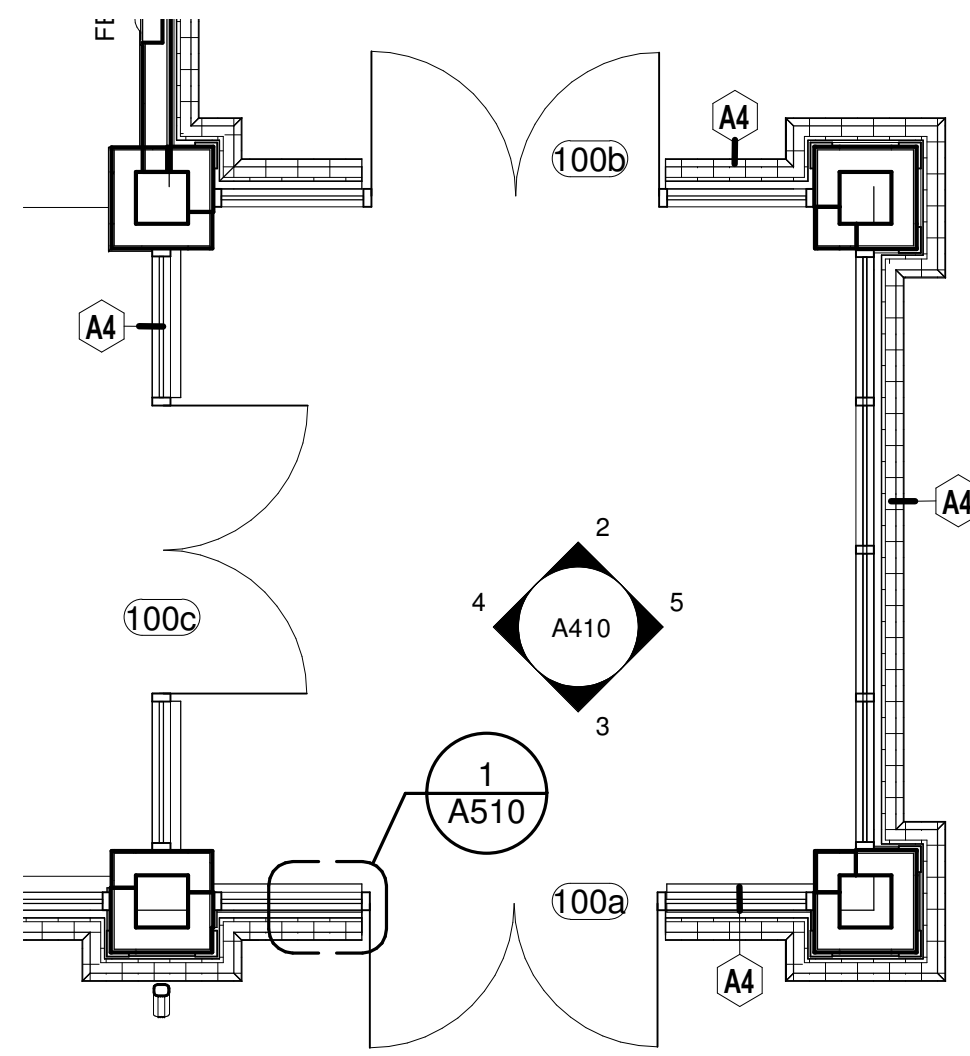
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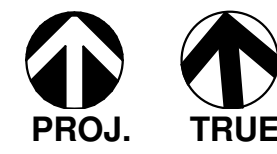
ENLARGED PLANS - SAFE & BREAK ROOM

A402





1 ENLARGED PLAN - TOWER
A410 SCALE: 1/4" = 1'-0"



ENLARGED PLAN NOTES

- 1 PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
- 2 MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
- 3 REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
- 4 REFER TO TOILET ACCESSORY SCHEDULE ON A501.

INTERIOR ELEVATION NOTES

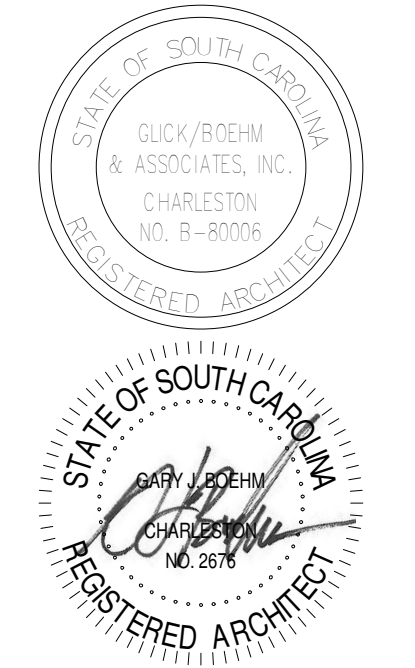
- 1 REFER TO SHEET A500 FOR MOUNTING HEIGHTS OF FIXTURES, ACCESSORIES, AND SPECIALTY EQUIPMENT, U.O.N.
- 2 ALL DIMENSIONS ON INTERIOR SHEETS ARE FROM FACE OF FINISH TO FACE OF FINISH, U.O.N.
- 3 CONTRACTOR TO COORDINATE LOCATIONS OF ADDITIONAL PENETRATIONS THROUGH WALLS AND FLOORS NOT INDICATED ON ARCHITECTURAL DRAWINGS. RE: MECHANICAL, PLUMBING AND ELECTRICAL. REFER TO STRUCTURAL FOR LINTEL OR FRAMING REQUIREMENTS.

KEYNOTE LEGEND

KEY VALUE	KEYNOTE TEXT
6.32	SOLID WOOD BASEBOARD, STAINED, REFER TO DETAIL ON A140
6.33	SOLID WOOD 5/4 WINDOW SILL, PAINTED
6.34	SOLID WOOD 1x4 WINDOW APRON, PAINTED
8.05	ALUMINUM STOREFRONT
26.04	LIGHT FIXTURE, RE: ELEC.



REV.	DATE	DESCRIPTION

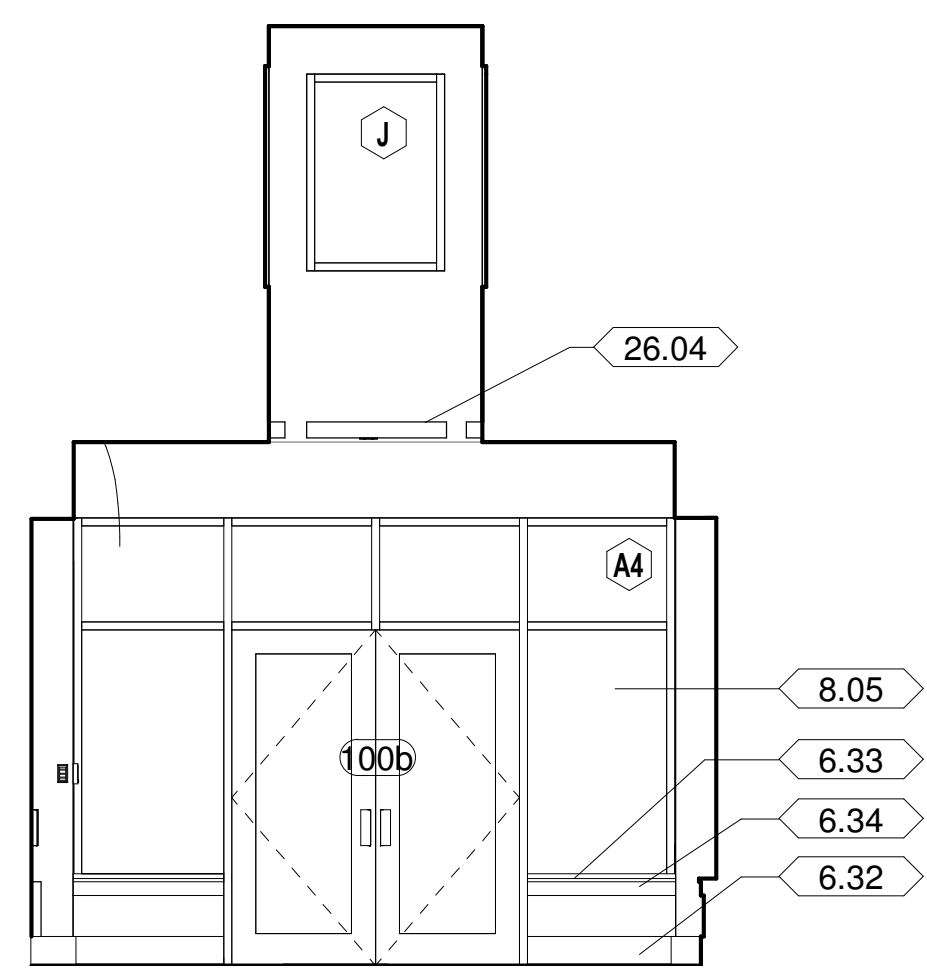


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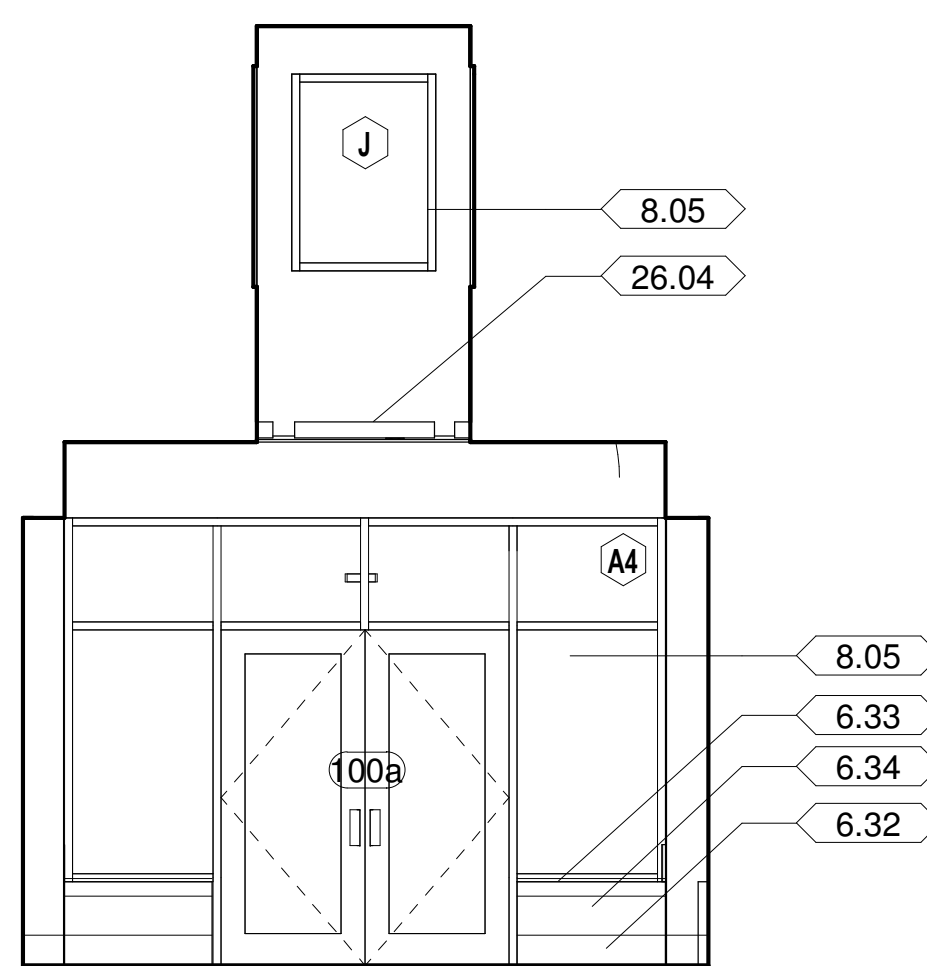
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ENLARGED PLANS - TOWER

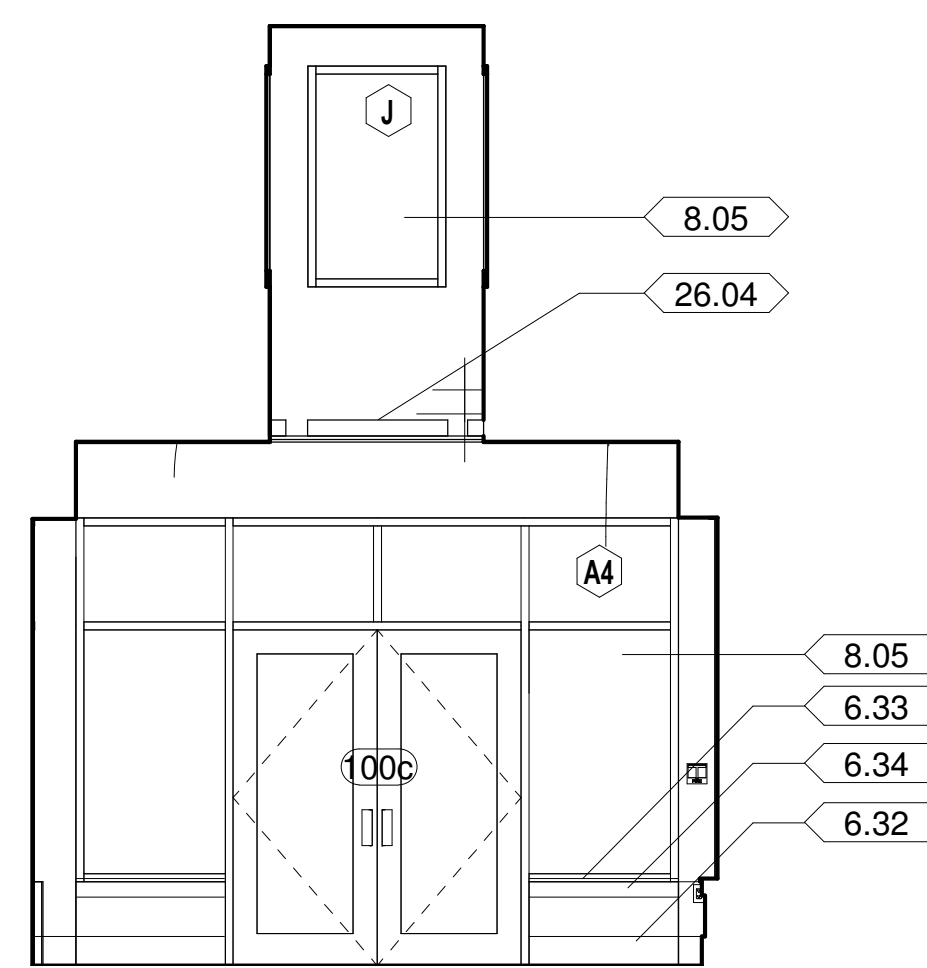
A410



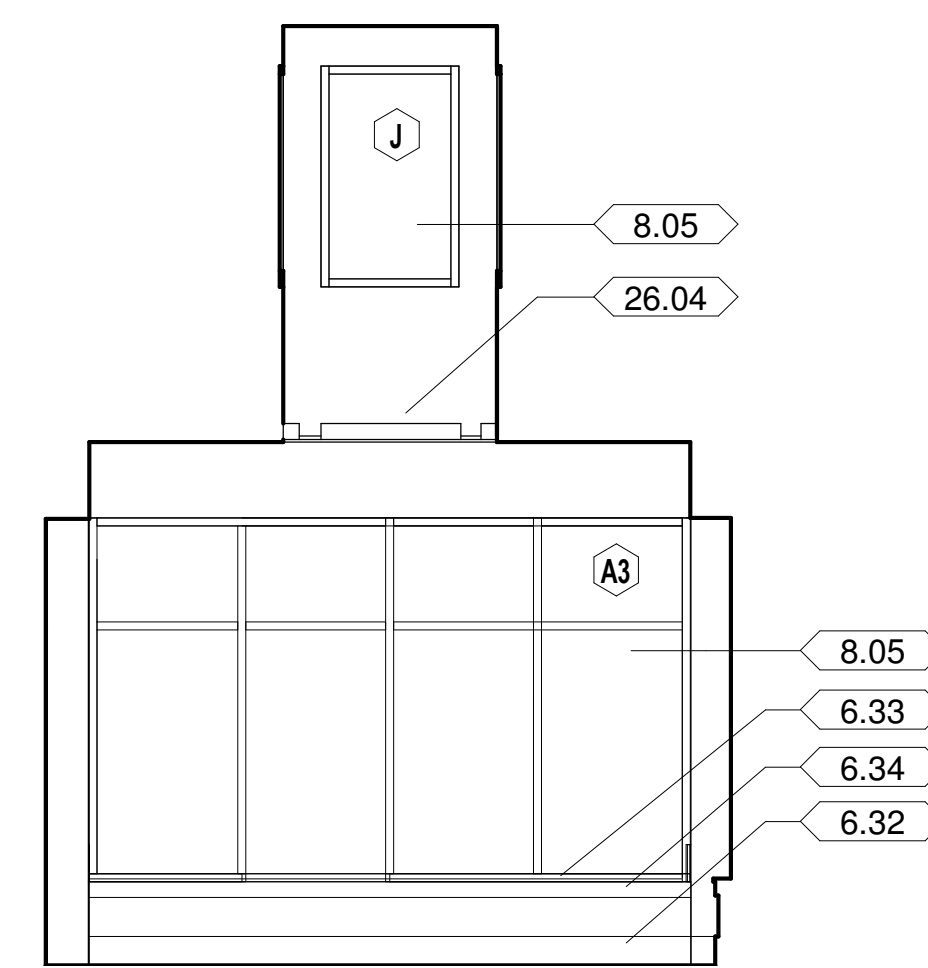
2 TOWER - NORTH
A410 SCALE: 1/4" = 1'-0"



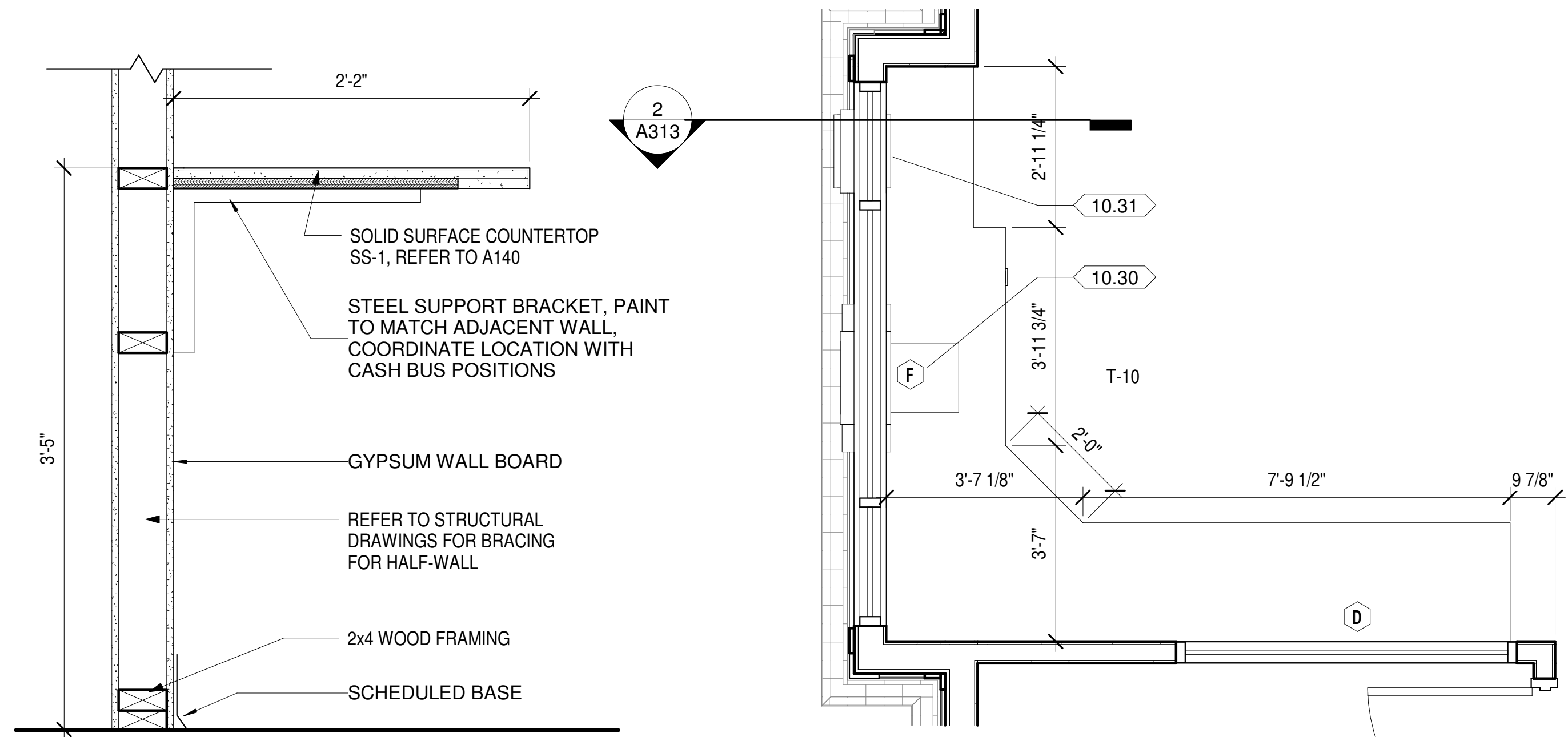
3 TOWER - SOUTH
A410 SCALE: 1/4" = 1'-0"



4 TOWER - WEST
A410 SCALE: 1/4" = 1'-0"

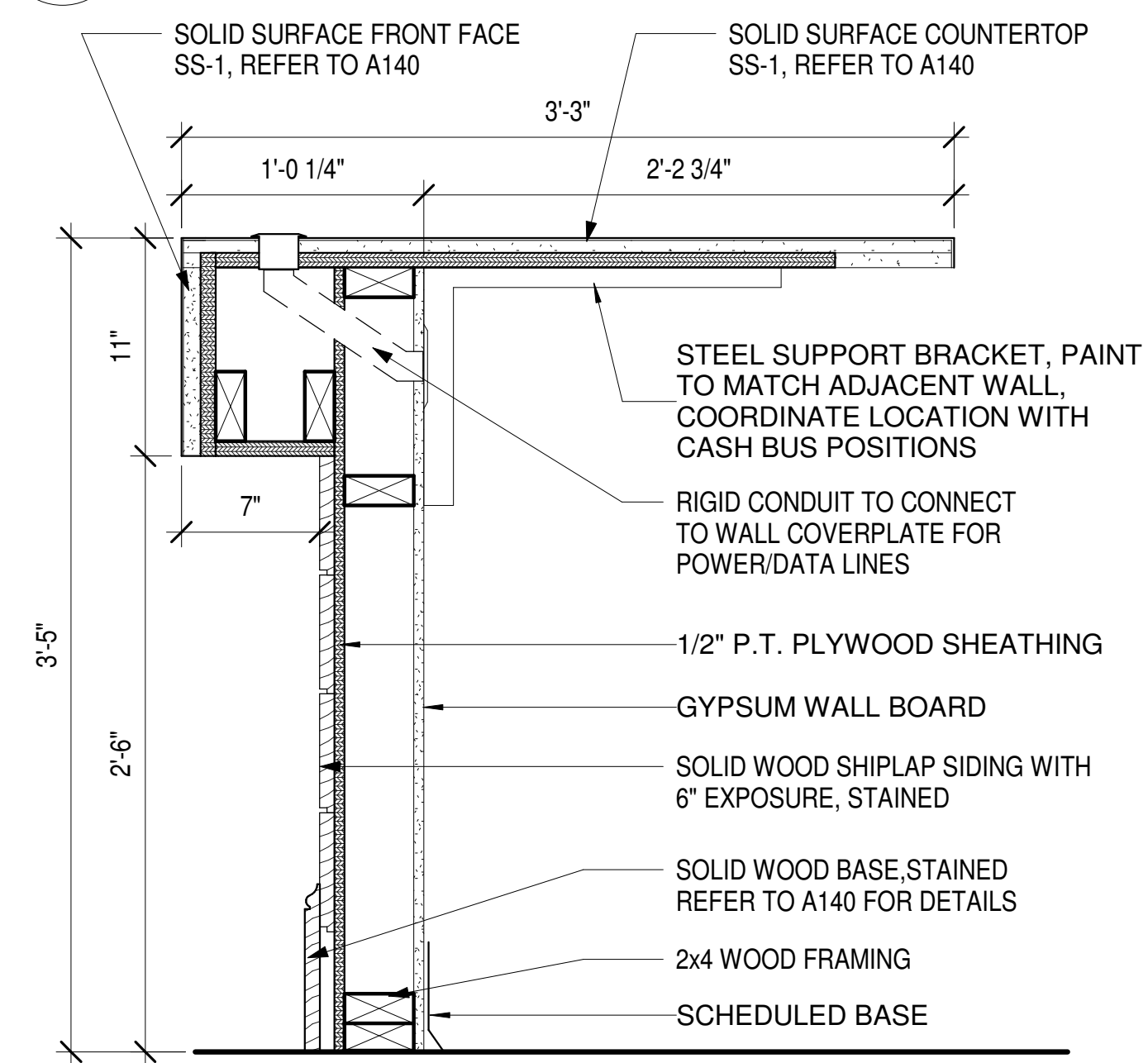


5 TOWER - EAST
A410 SCALE: 1/4" = 1'-0"



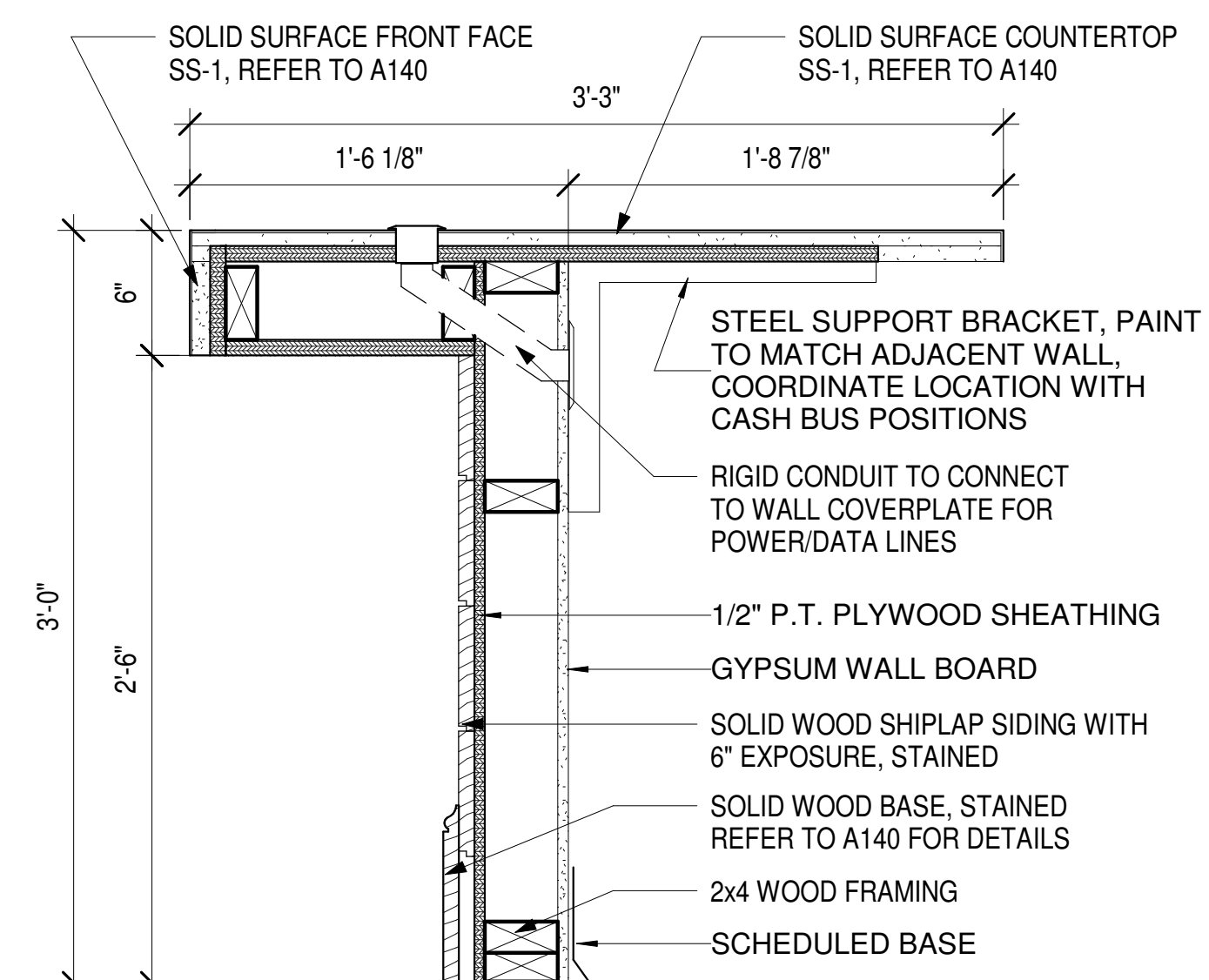
4 TYPICAL WORKSTATION @ WALL

A411 SCALE: 1 1/2" = 1'-0"



5 TYPICAL STATION SECTION DETAIL

A411 SCALE: 1 1/2" = 1'-0"



6 ADA STATION SECTION DETAIL

A411 SCALE: 1 1/2" = 1'-0"

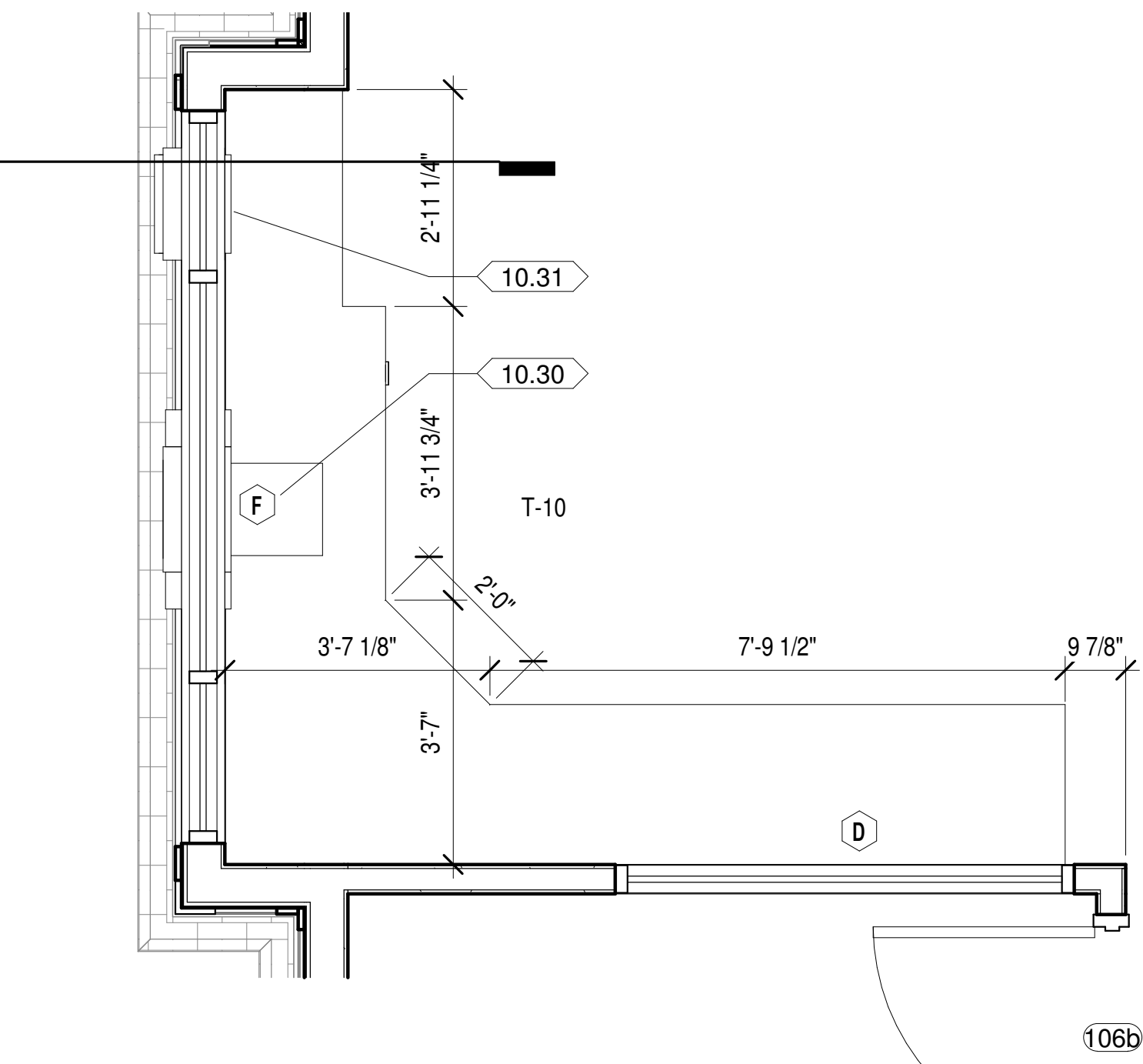
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
1.30	HALF-HIGH WALL, REFER TO ELEVATIONS AND DETAILS, REFER TO STRUCTURAL DRAWINGS FOR SUPPORT AND BRACING
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPLASH WHERE SHOWN
6.31	SOLID SURFACE
6.32	SOLID WOOD BASEBOARD, STAINED, REFER TO DETAIL ON A140
6.38	SOLID WOOD SHIPLAP SIDING WITH 6" EXPOSURE, STAINED
6.39	WOOD CABINET WITH ADJUSTABLE SHELF, PAINTED
6.40	WOOD CABINET SHELL WITH OPEN BAY, PAINTED
6.41	SOLID WOOD FIXED CAP, PAINTED
8.31	PLEXIGLASS FACIAL SCREEN WITH PASS-THROUGH IN PAINTED SOLID WOOD FRAME
10.30	BANK DRIVE-THROUGH TRANSACTION STATION WITH INTERCOM, COVENANT SECURITY EQUIPMENT MODEL #CSE-QS-QST-619S OR EQUAL.
10.31	THROUGH WALL NIGHT DEPOSITORY WITH INTERIOR RECEIVING CHEST, AMERICAN VAULT CORPORATION MODEL #85-2034 OR EQUAL

ENLARGED PLAN NOTES

- 1 PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
- 2 MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
- 3 REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
- 4 REFER TO TOILET ACCESSORY SCHEDULE ON A501.

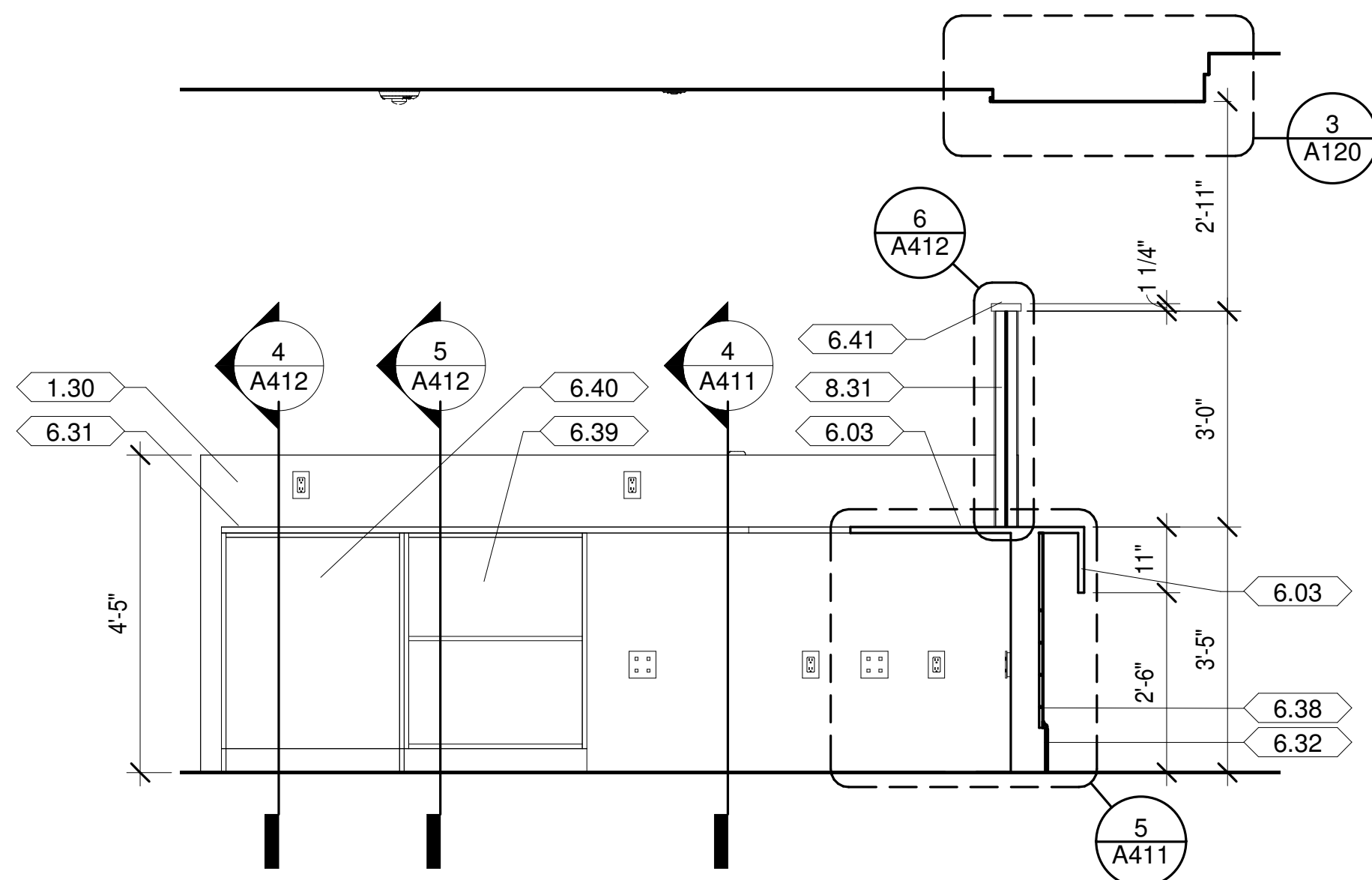
WORKSTATION NOTES

- 1 AN INTERIOR WORKSTATION MOCKUP WITH PLEXIGLASS FACIAL SCREEN IS TO BE PROVIDED FOR TELLER STATION "T-9" FOR APPROVAL IN ADVANCE OF FABRICATION OR INSTALLATION OF ANY OF THE INTERIOR WORKSTATION AREAS.
- 2 REFER TO CASEWORK NOTES ON A700



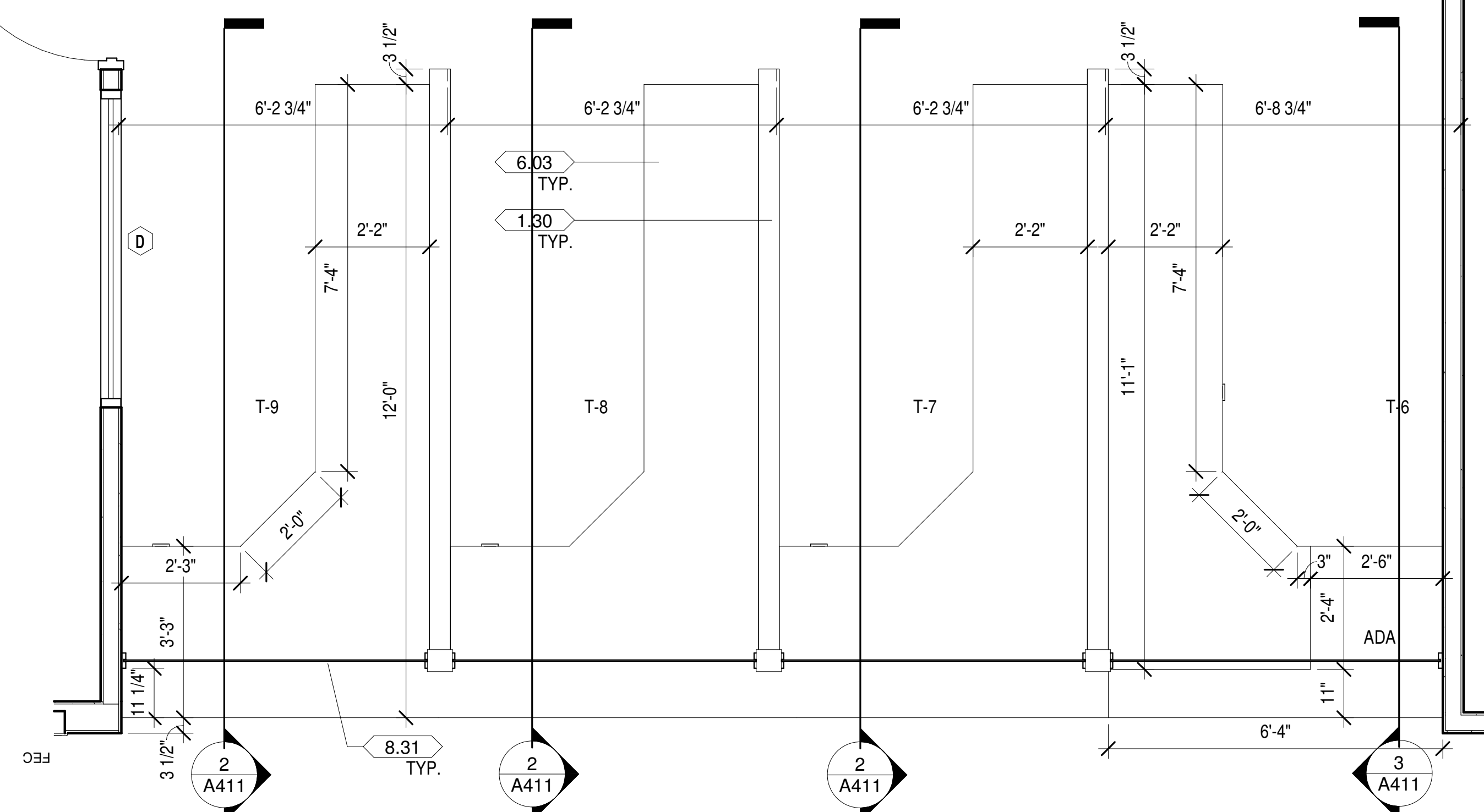
1 ENLARGED PLAN - TREASURER'S

A411 SCALE: 1/2" = 1'-0"



2 SECTION/ ELEVATION AT TYPICAL STATION

A411 SCALE: 1/2" = 1'-0"

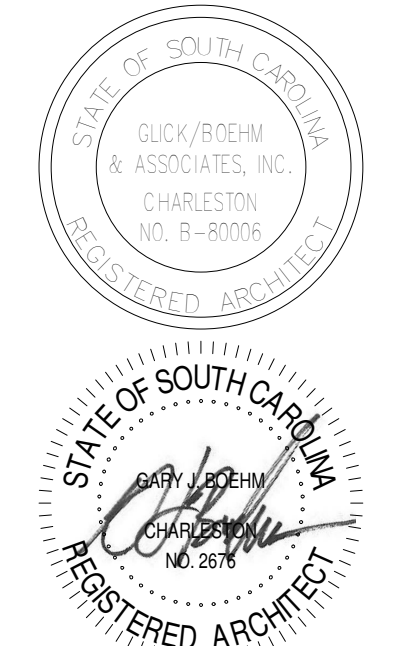


3 SECTION/ ELEVATION AT ADA STATION

A411 SCALE: 1/2" = 1'-0"



REV.	DATE	DESCRIPTION

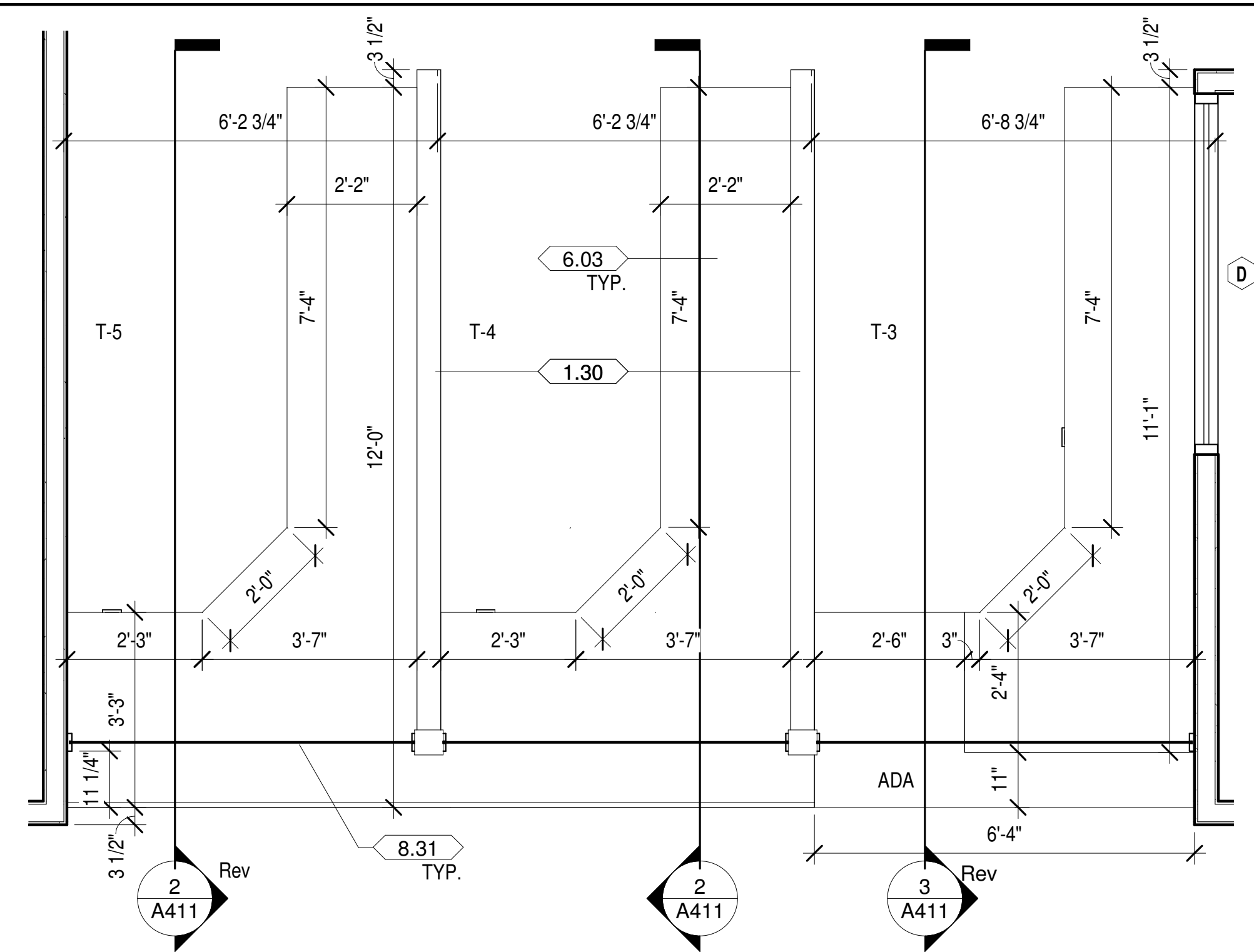


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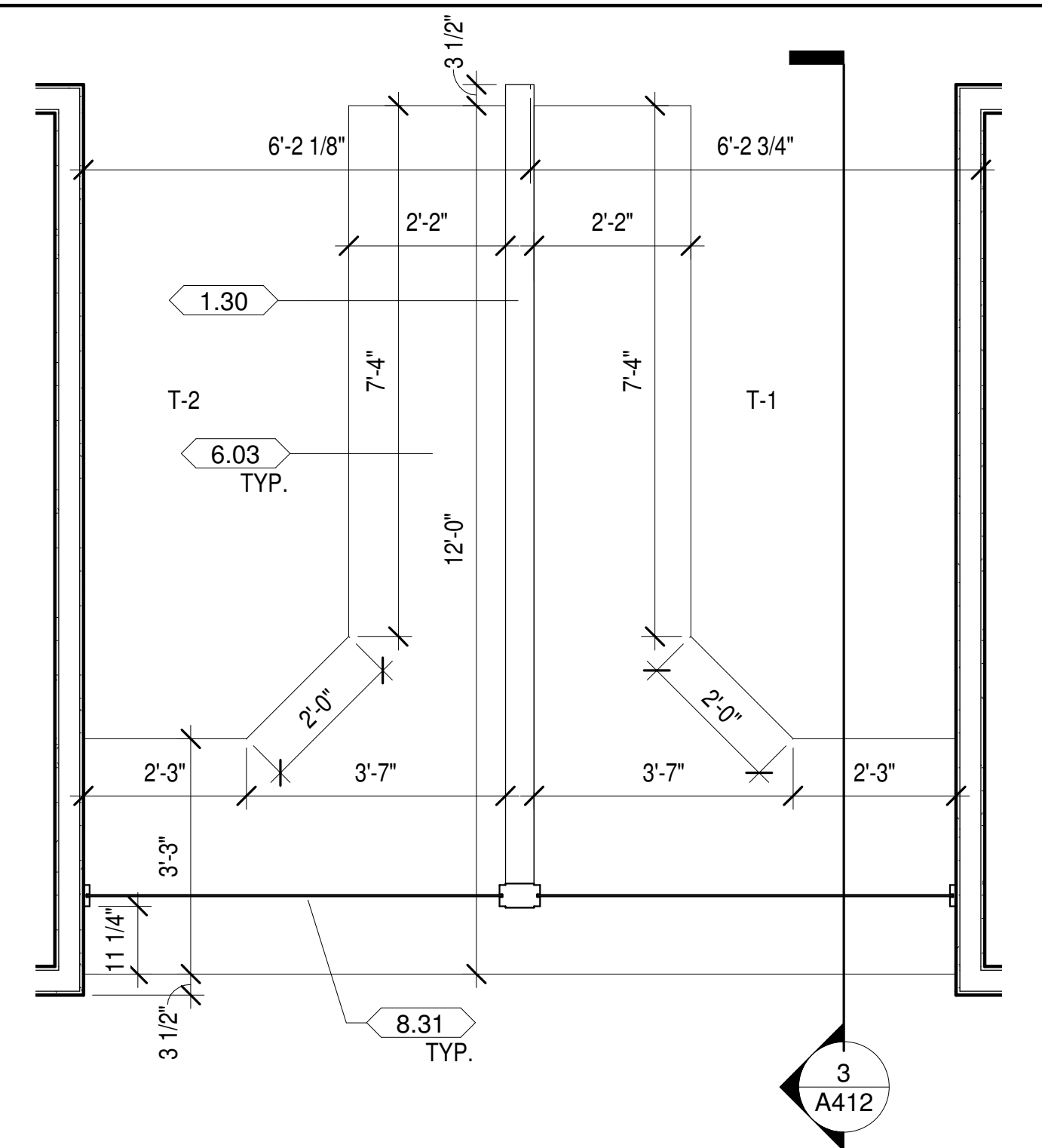
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ENLARGED PLANS & DTLS - TREASURER

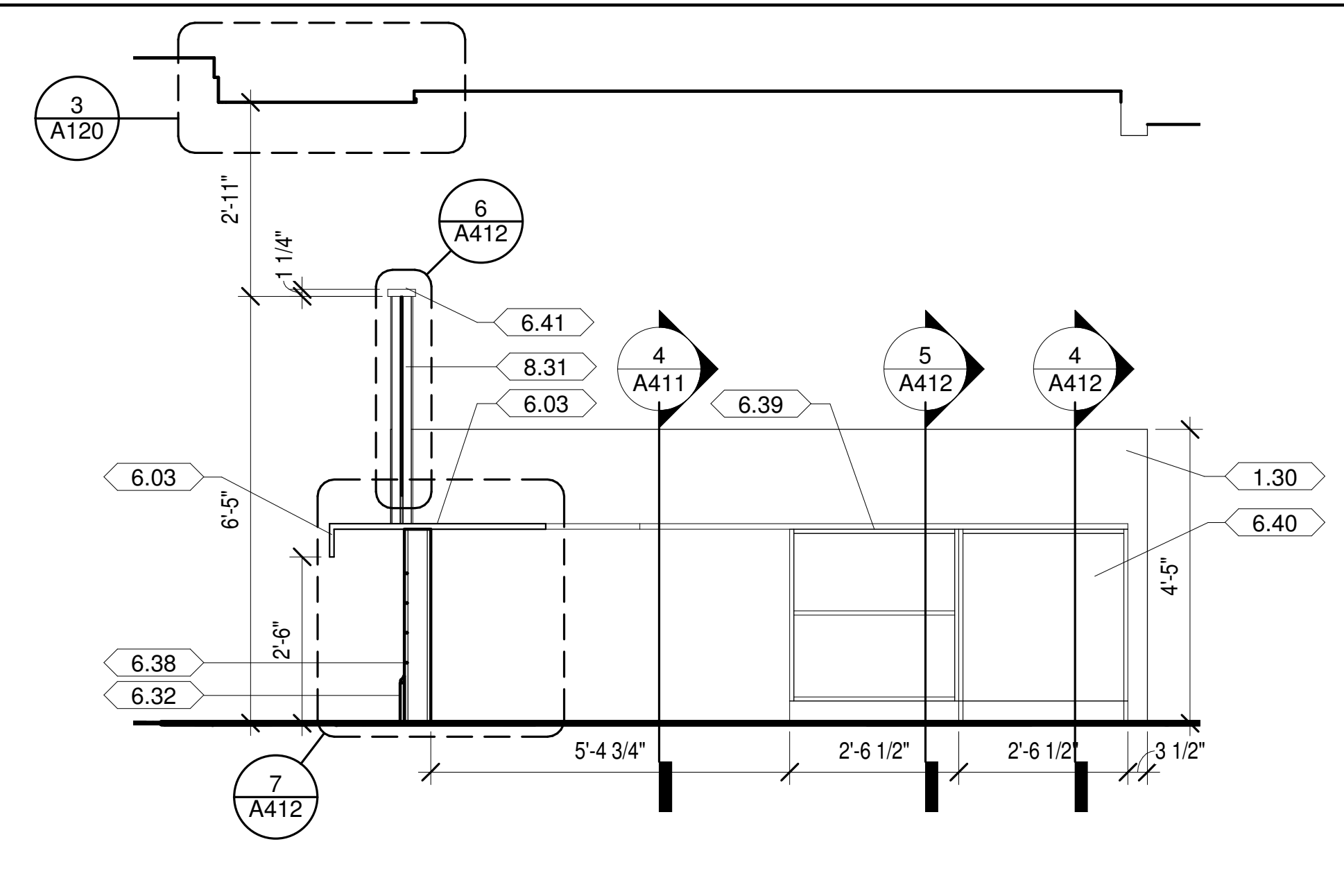
A411



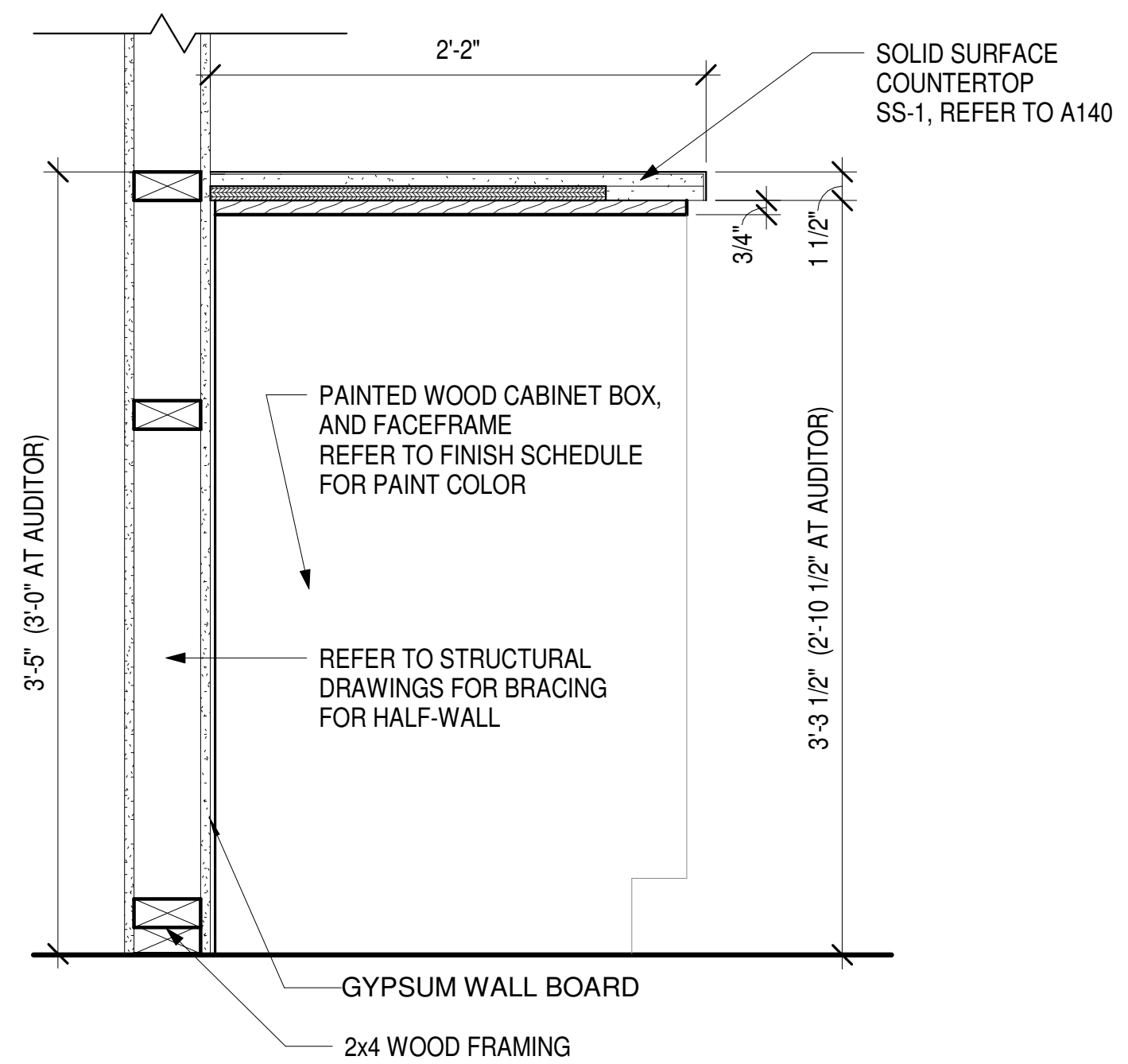
1 ENLARGED PLAN - DELINQUENT TAX
A412 SCALE: 1/2" = 1'-0"



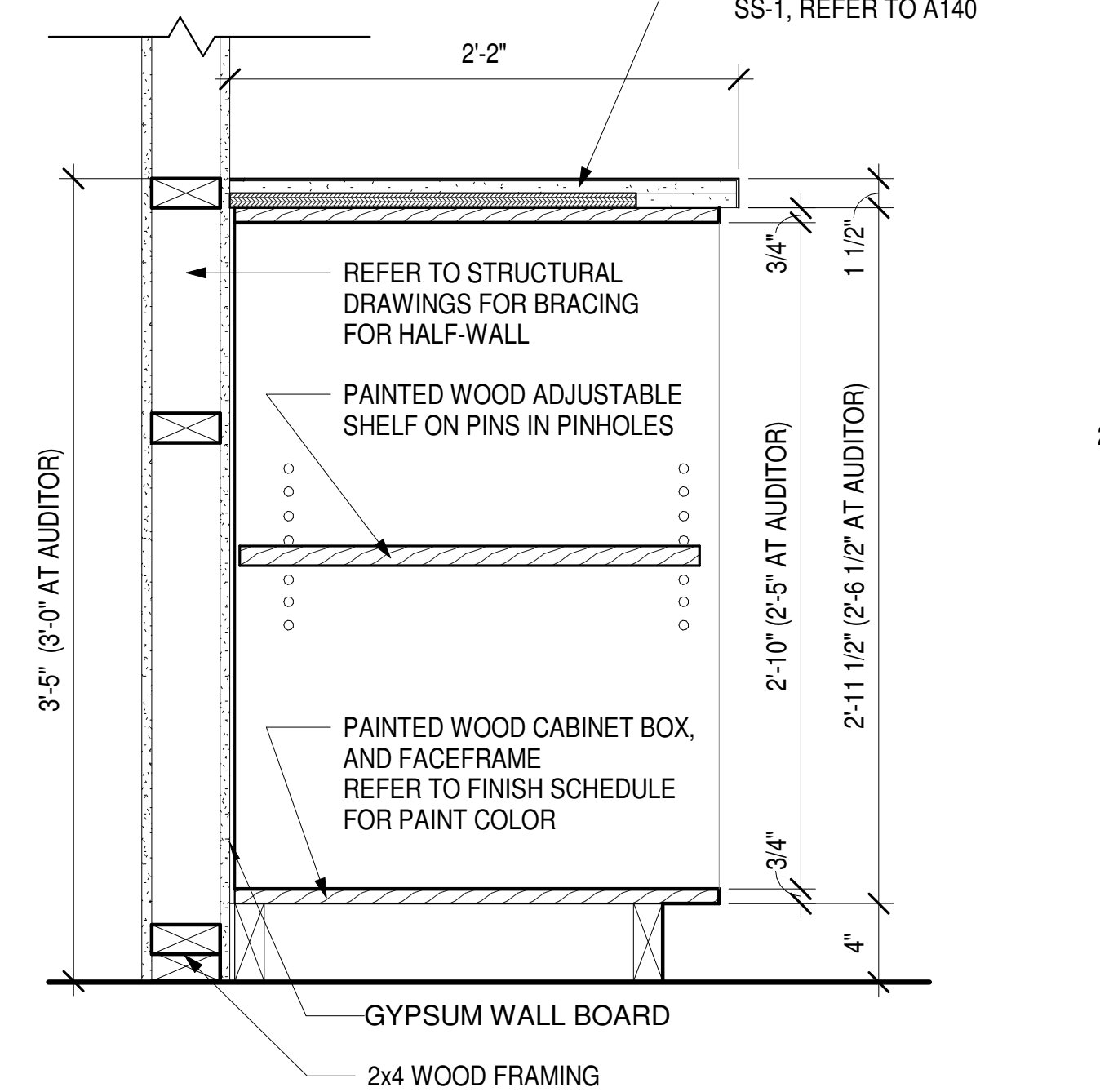
2 ENLARGED PLAN - AUDITOR'S
A412 SCALE: 1/2" = 1'-0"



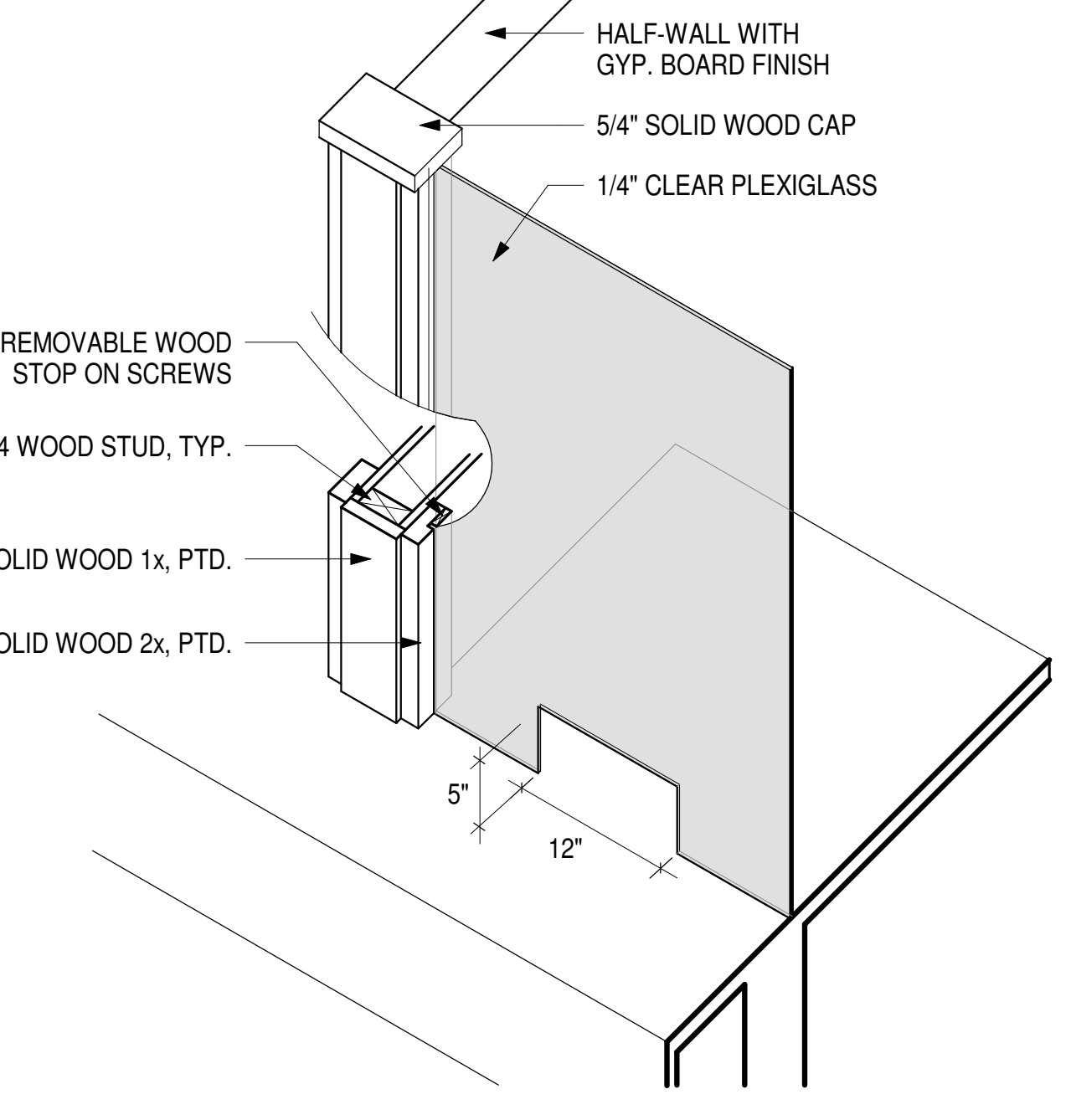
3 SECTION/ELEVATION AT AUDITORS STATION
A412 SCALE: 1/2" = 1'-0"



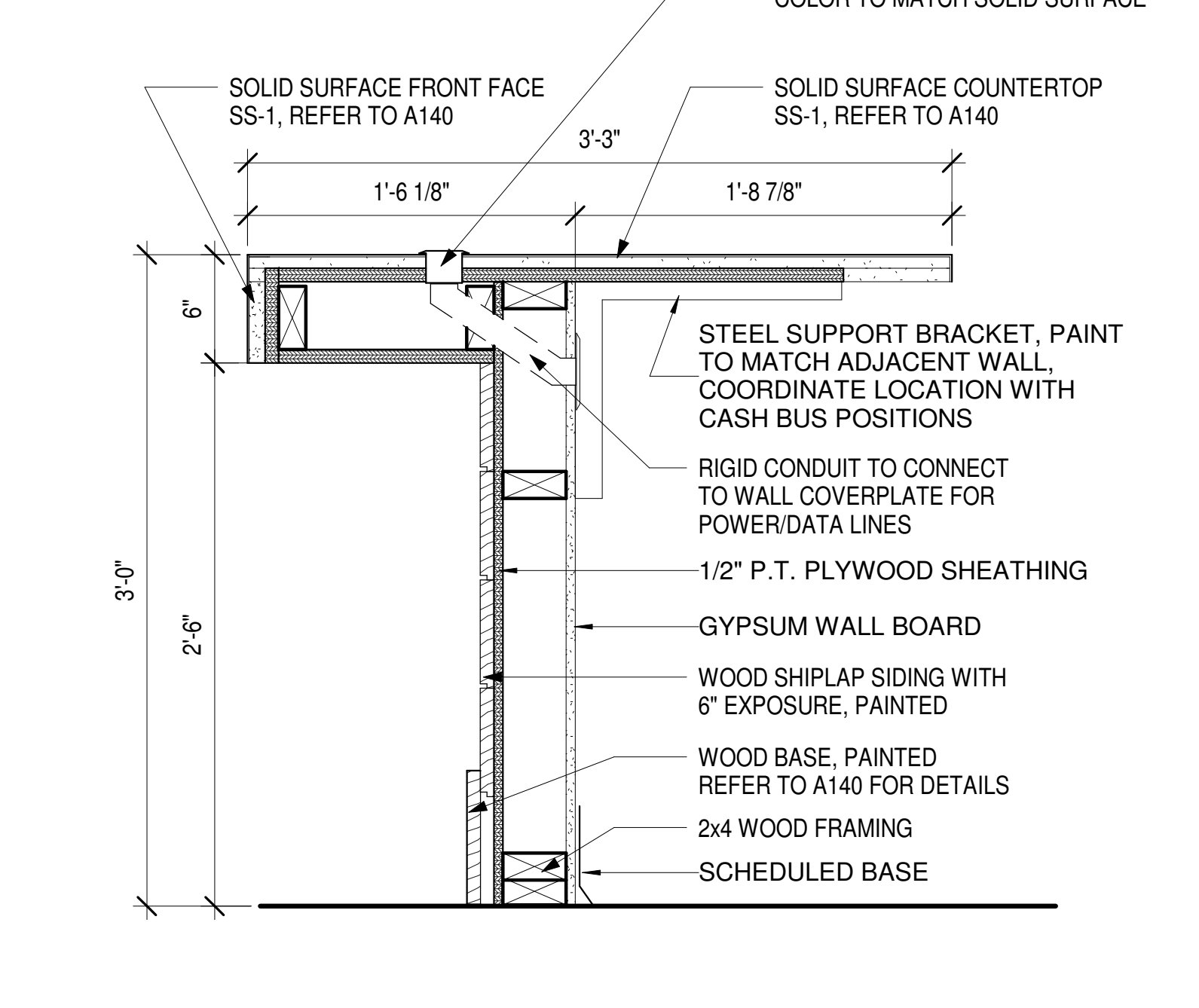
4 WORKSTATION CASEWORK DETAIL
A412 SCALE: 1 1/2" = 1'-0"



5 WORKSTATION CASEWORK DETAIL
A412 SCALE: 1 1/2" = 1'-0"



6 FACIAL SCREEN DETAIL
A412 SCALE: 1" = 1'-0"



7 AUDITOR STATION SECTION DETAIL
A412 SCALE: 1 1/2" = 1'-0"

KEYNOTE LEGEND

KEY VALUE	KEYNOTE TEXT
1.30	HALF-HIGH WALL, REFER TO ELEVATIONS AND DETAILS, REFER TO STRUCTURAL DRAWINGS FOR SUPPORT AND BRACING
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPASH WHERE SHOWN
6.32	SOLID WOOD BASEBOARD, STAINED, REFER TO DETAIL ON A140
6.38	SOLID WOOD SHIPLAP SIDING WITH 6\" EXPOSURE, STAINED
6.39	WOOD CABINET WITH ADJUSTABLE SHELF, PAINTED
6.40	WOOD CABINET SHELL WITH OPEN BAY, PAINTED
6.41	SOLID WOOD FIXED CAP, PAINTED
8.31	PLEXIGLASS FACIAL SCREEN WITH PASS-THROUGH IN PAINTED SOLID WOOD FRAME

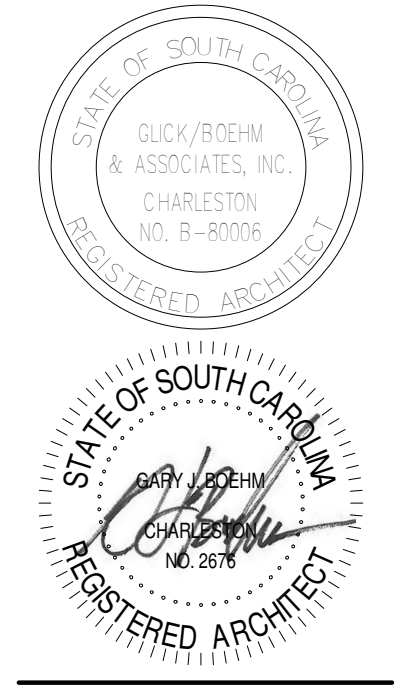
ENLARGED PLAN NOTES

- PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
- MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
- REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
- REFER TO TOILET ACCESSORY SCHEDULE ON A501.

WORKSTATION NOTES

- AN INTERIOR WORKSTATION MOCKUP WITH PLEXIGLASS FACIAL SCREEN IS TO BE PROVIDED FOR TELLER STATION "T-9" FOR APPROVAL IN ADVANCE OF FABRICATION OR INSTALLATION OF ANY OF THE INTERIOR WORKSTATION AREAS.
- REFER TO CASEWORK NOTES ON A700

REVISION	DATE	DESCRIPTION



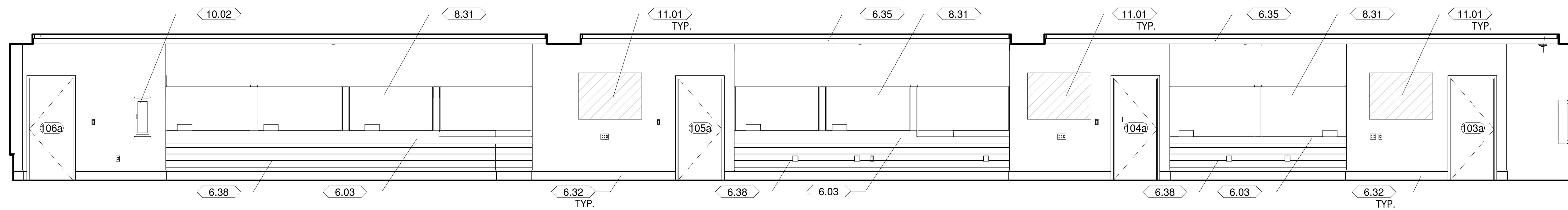
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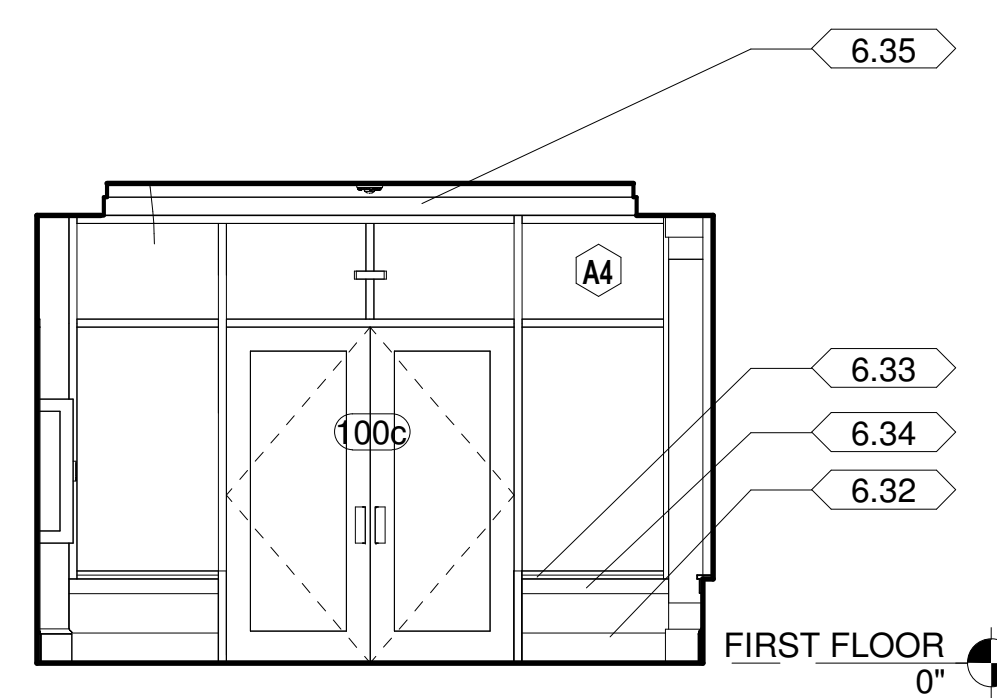
ENLARGED PLANS & DTLS - DELINQUENT TAX & AUDITOR A412

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
6.03	SOLID SURFACE COUNTERTOP, WITH BACKSPLASH WHERE SHOWN
6.32	SOLID WOOD BASEBOARD, STAINED, REFER TO DETAIL ON A140
6.33	SOLID WOOD 5/4 WINDOW SILL, PAINTED
6.34	SOLID WOOD 1x4 WINDOW APRON, PAINTED
6.35	TWO-STEP SOLID WOOD CORNICE TRIM, PAINTED, REFER TO DETAIL ON A120
6.36	SOLID WOOD 1x6, PAINTED
6.38	SOLID WOOD SHIPLAP SIDING WITH 6" EXPOSURE, STAINED
8.05	ALUMINUM STOREFRONT
8.31	PLEXIGLASS FACIAL SCREEN WITH PASS-THROUGH IN PAINTED SOLID WOOD FRAME
9.30	GYPSUM WALL BOARD FINISH AS RECESSED PANEL, PAINTED TO MATCH TRIM
10.02	FIRE EXTINGUISHER CABINET
11.01	WALL MOUNTED TV, BY OWNER; GC TO PROVIDE BLOCKING WITHIN WALL AT THIS LOCATION, VERIFY SIZE AND LOCATION PRIOR TO INSTALLATION

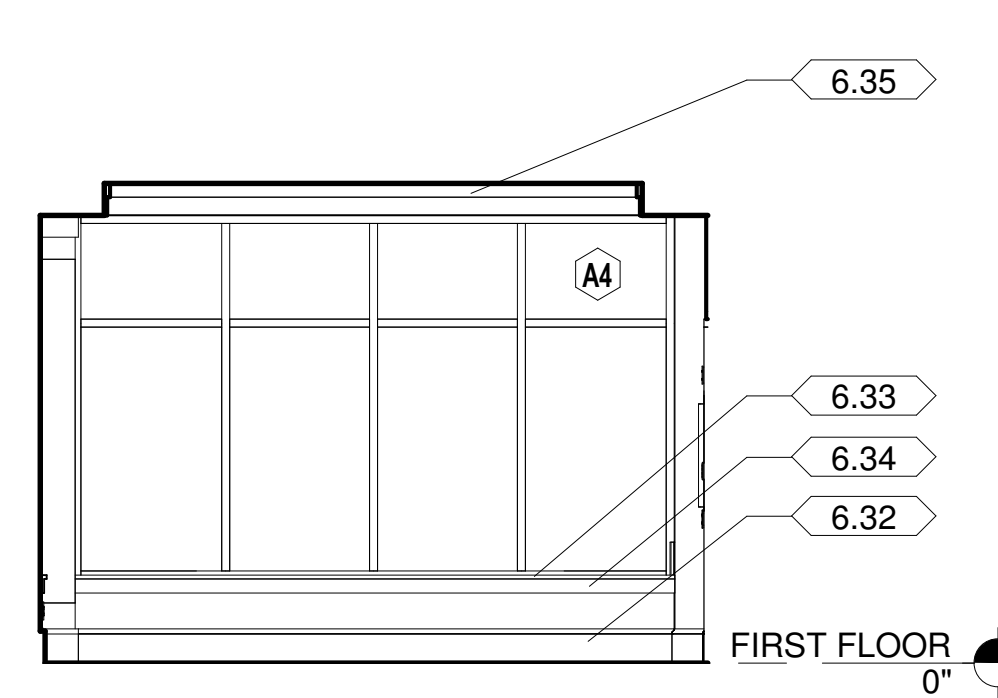
ENLARGED PLAN NOTES	
1	PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING PRIOR TO COVERAGE WITH GYPSUM WALL BOARD WHERE REQUIRED FOR ACCESSORY MOUNTING.
2	MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTHS IN FRONT OF ACCESSORIES FOR WHEELCHAIR ACCESS.
3	REFER TO FINISH SCHEDULE ON SHEET A140 FOR COLOR AND MATERIAL.
4	REFER TO TOILET ACCESSORY SCHEDULE ON A501.



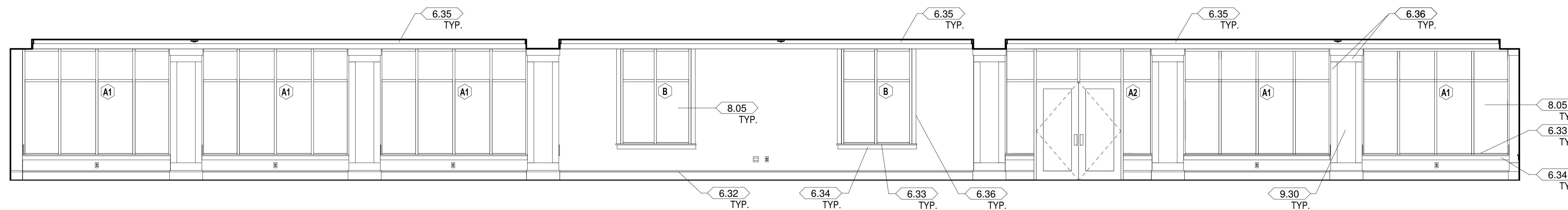
1 INTERIOR LOBBY - NORTH ELEVATION
A420 SCALE: 1/4" = 1'-0"



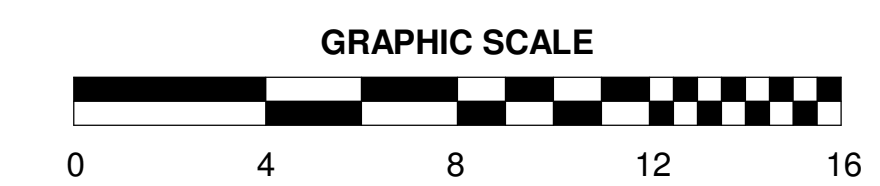
2 INTERIOR LOBBY - EAST ELEVATION
A420 SCALE: 1/4" = 1'-0"



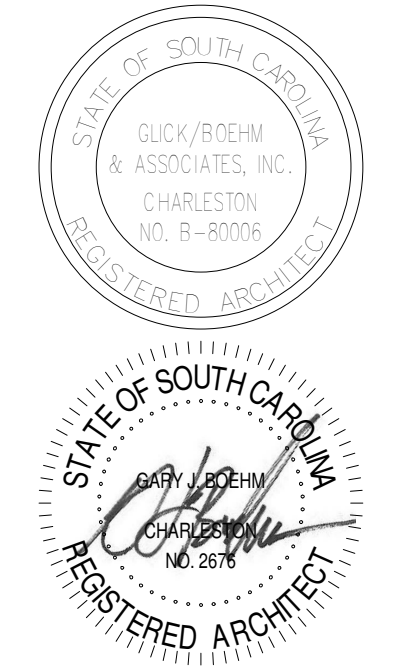
3 INTERIOR LOBBY - WEST ELEVATION
A420 SCALE: 1/4" = 1'-0"



4 INTERIOR LOBBY - SOUTH ELEVATION
A420 SCALE: 1/4" = 1'-0"



REV.	DATE	DESCRIPTION

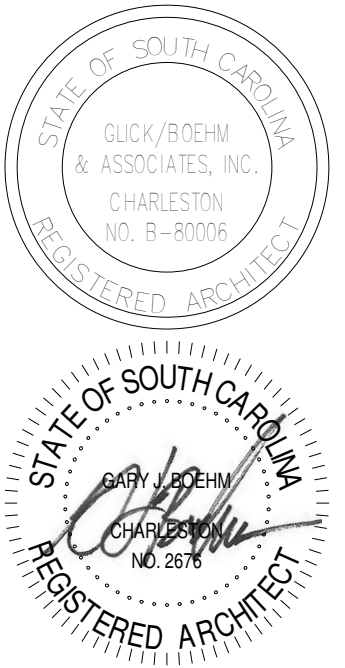


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INTERIOR ELEVATIONS - PUBLIC BUSINESS AREA A420

REV.	DATE	DESCRIPTION

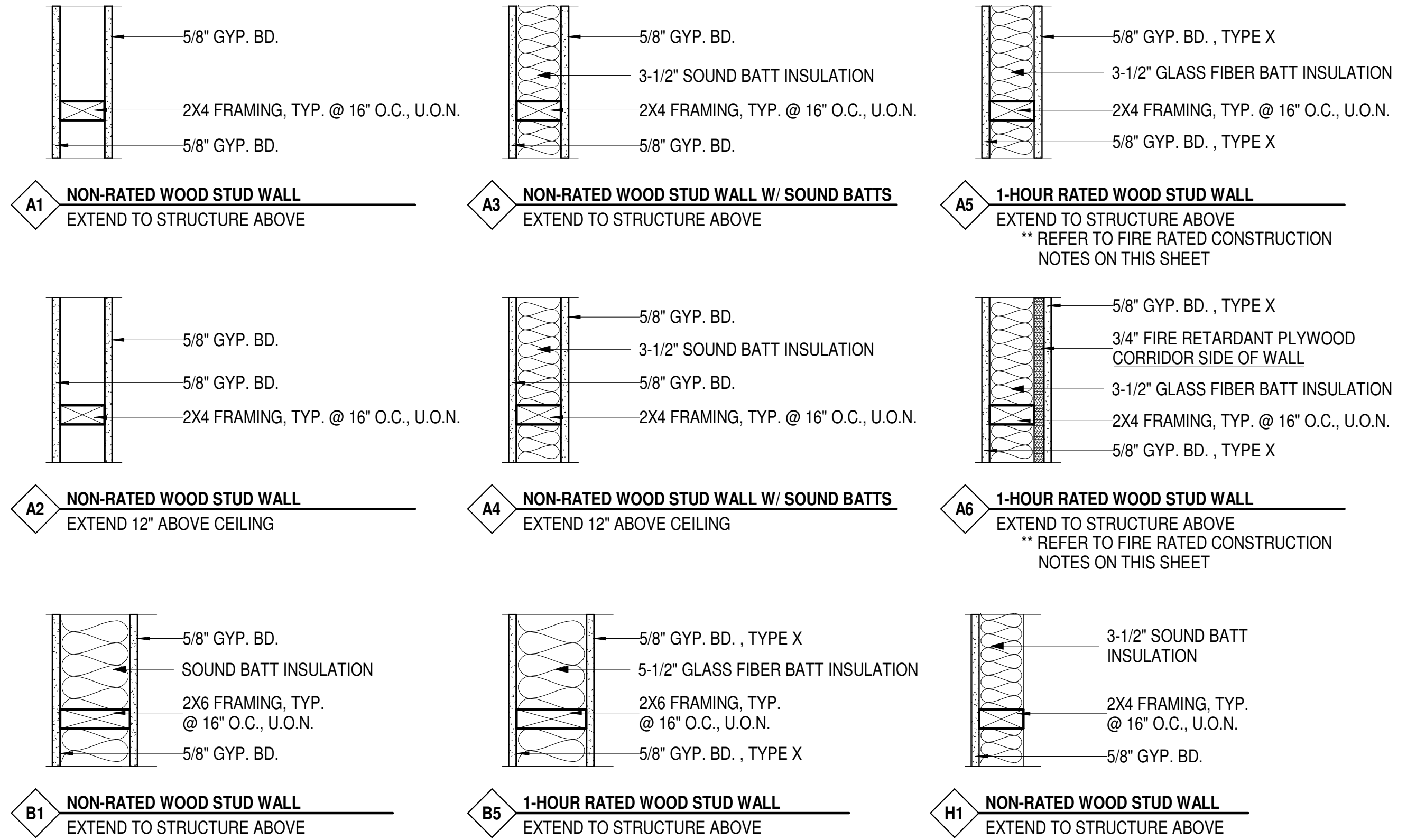


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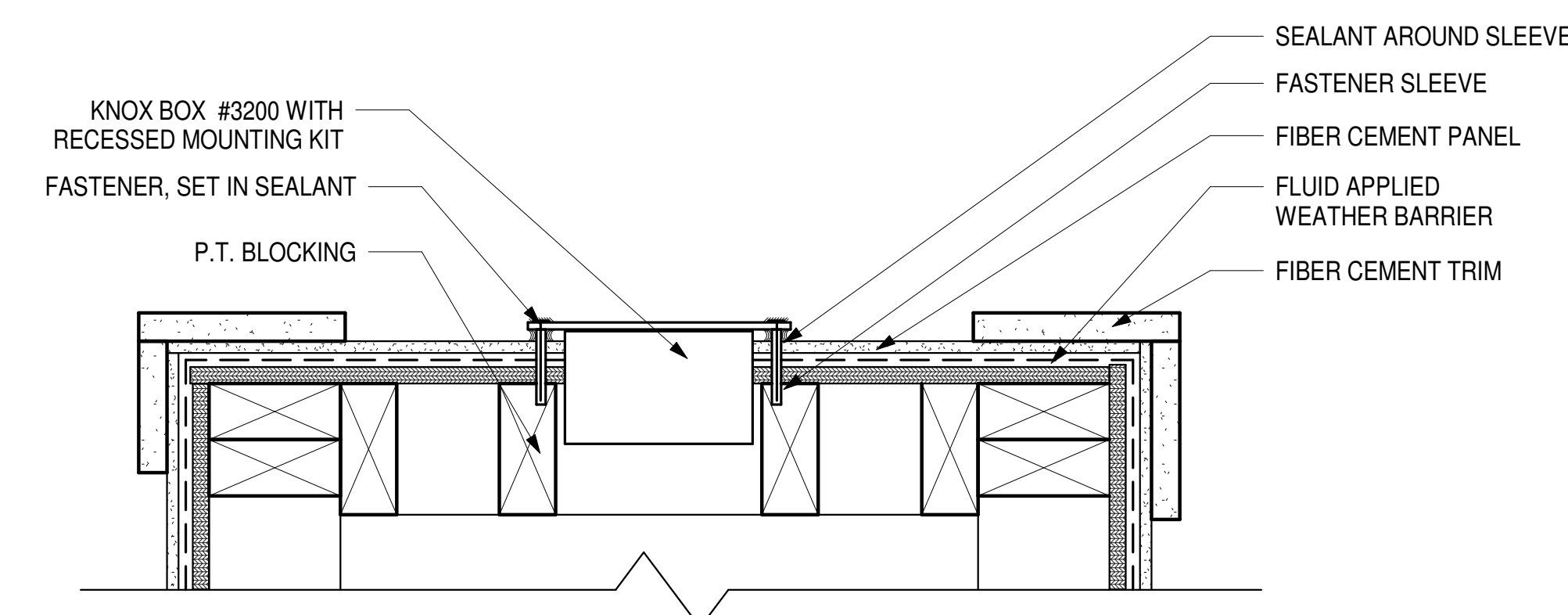
WALL DETAILS

A500



WALL TYPES

SCALE: 1 1/2" = 1'-0"



1 KNOX BOX INSTALLATION - PLAN DETAIL

A500 SCALE: 3" = 1'-0"

FIRE RATED WALL CONSTRUCTION NOTES:

1. SECURE ALL STUDS TO FLOOR SLAB AND STRUCTURE ABOVE.
2. PROVIDE FOR MOVEMENT OF STRUCTURE ABOVE WITH ADJUSTABLE PARTITION HEAD FRAMING AS SPECIFIED IN SECTION 09 20 00. SEAL ALL VOIDS IN FIRE RATED WALL CONSTRUCTION AS SPECIFIED
3. IN SECTION 07 94 00. PERMANENTLY IDENTIFY ALL FIRE RATED WALLS, INCLUDING BUT NOT LIMITED TO FIRE WALLS, FIRE BARRIERS, FIRE PARTITIONS BY PROVIDING EITHER A PERMANENTLY FIXED SIGN OR STENCIL IN ALL CONCEALED SPACES. SEE DETAIL BELOW.

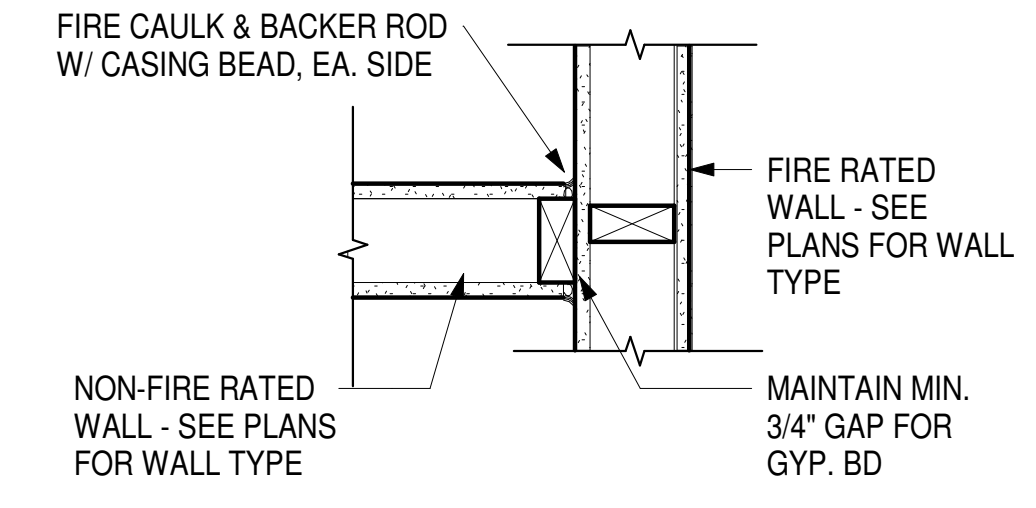
USE 2 FOR TWO HOUR RATED WALLS
 USE 3 FOR THREE HOUR RATED WALLS, ETC.
 3" HIGH LETTERS IN A CONTRASTING COLOR

1 HOUR FIRE AND SMOKE BARRIER PROTECT ALL OPENINGS

SPACE MAXIMUM 12' O.C. ON WALL

FIRE RATED WALL SIGNAGE

NO SCALE



FIRE RATED WALL INSTALLATION GUIDE

SCALE: 1-1/2" = 1'-0"

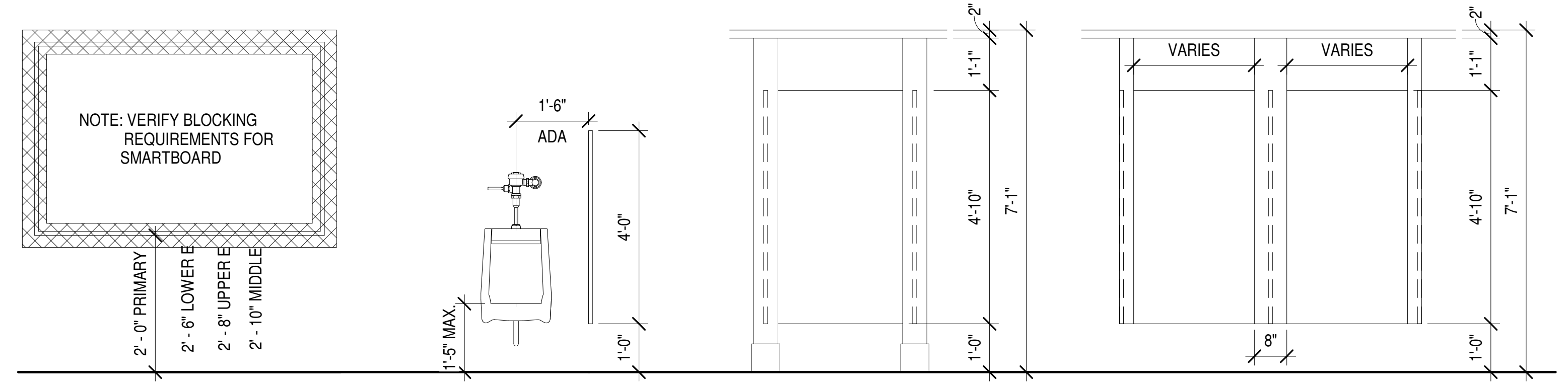
NOTE:
 FRAME 1 HR WALLS BEFORE NON-RATED WALLS.
 FRAME 2 HR WALLS BEFORE 1 HR WALLS.
 FRAME FIRE RATED WALLS BEFORE SMOKE WALLS
 FRAME SMOKE WALLS BEFORE NON-RATED WALLS

FIRE RATED WALL INSTALLATION GUIDE

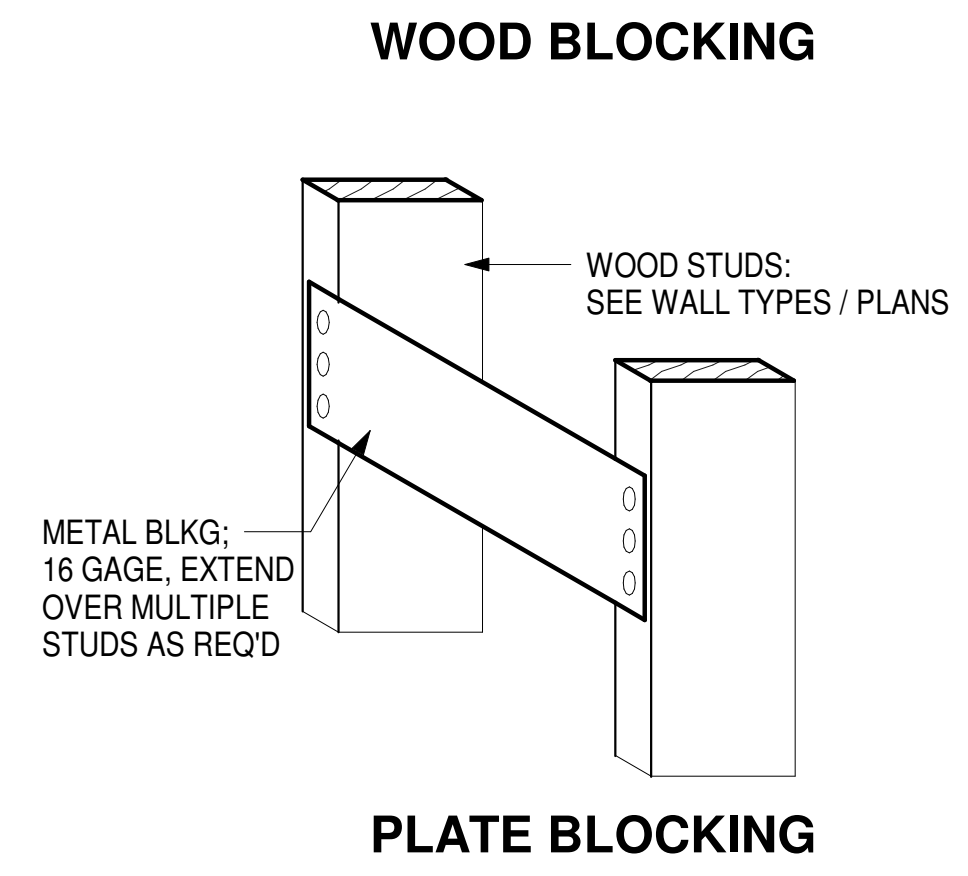
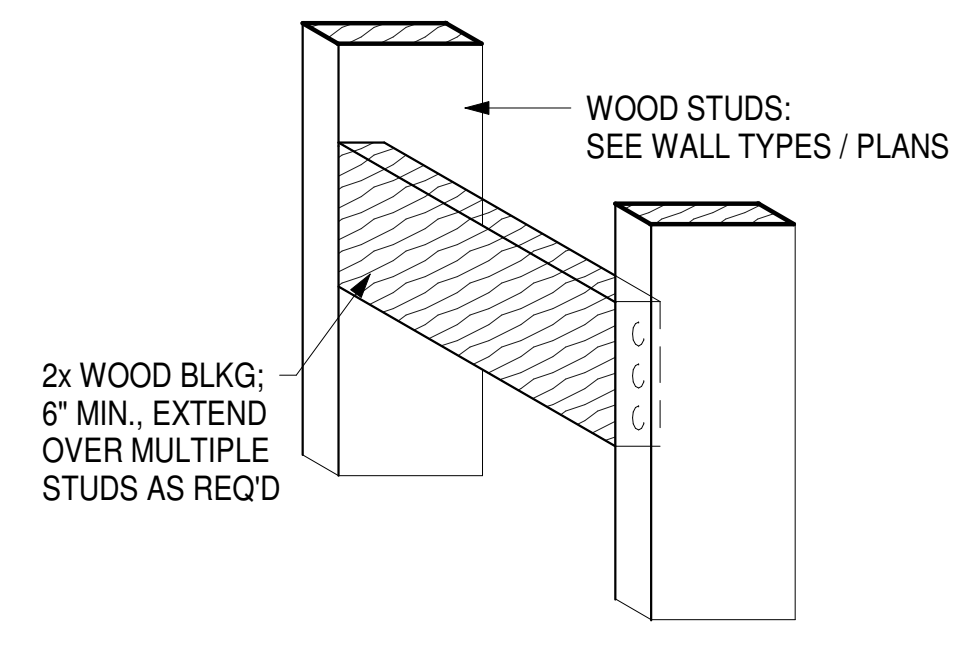
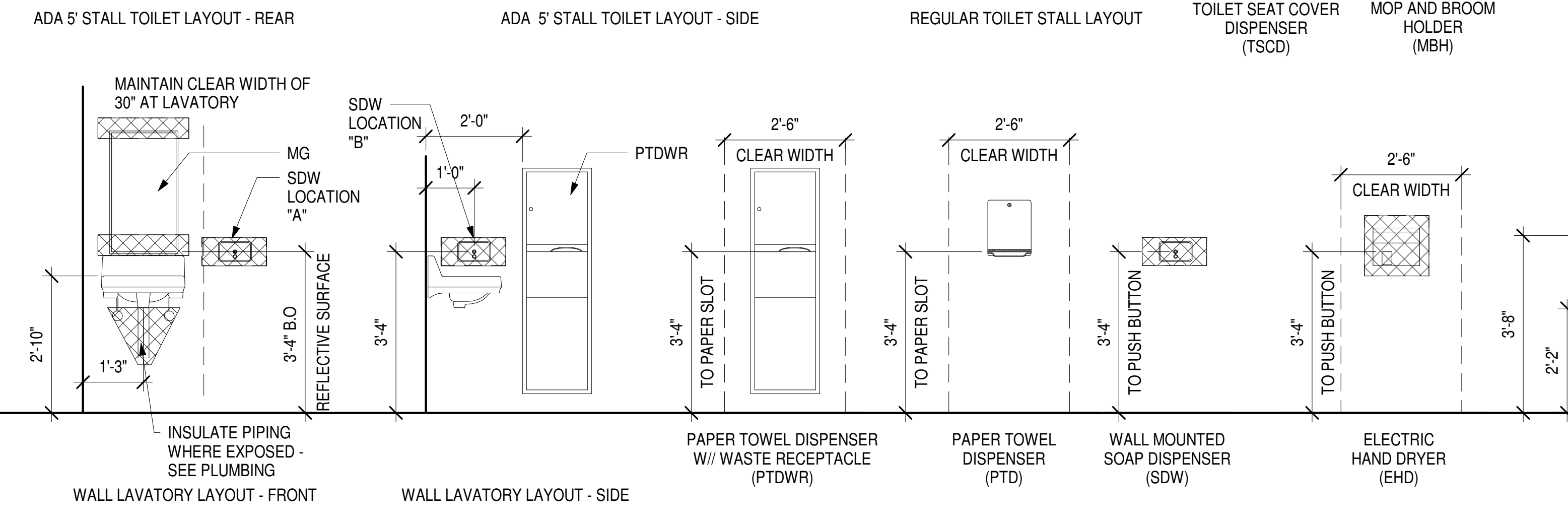
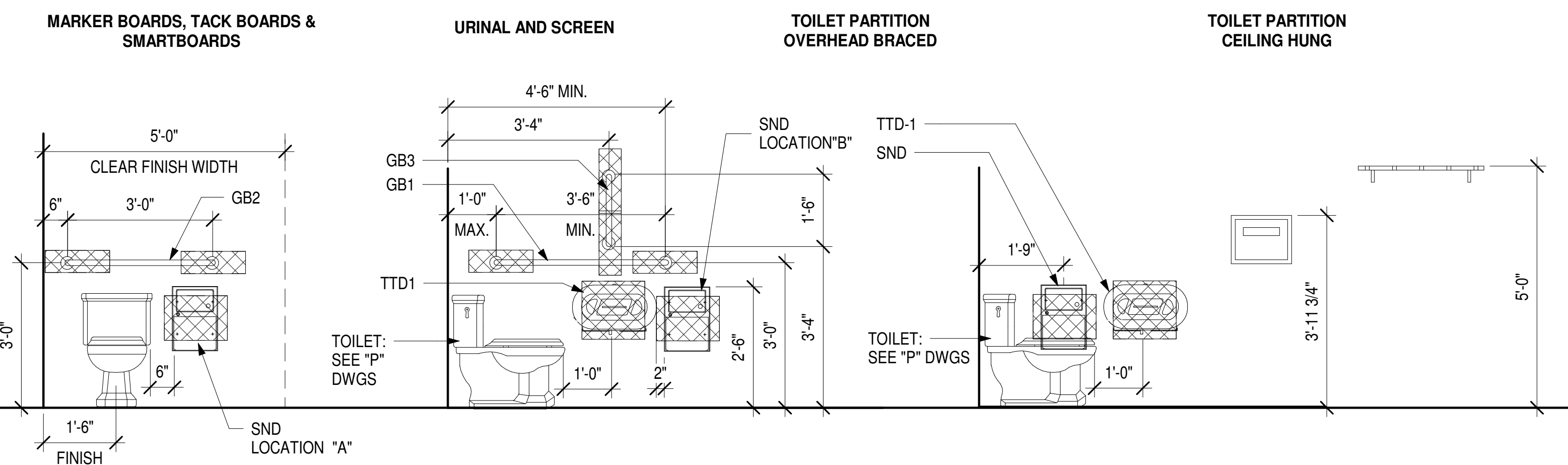
SCALE: 1 1/2" = 1'-0"

TOILET ACCESSORIES SCHEDULE

MARK	DESCRIPTION	MODEL NO.	MANUFACTURER	COMMENTS
DCS	DIAPER CHANGING STATION	KB200-05	KOALA KARE PRODUCTS	
EHD	Adjustable Motor, Adjustable Sensor Operated Warm Air Dryer ELECTRIC HAND DRYER	2902-2873	BRADLEY CORPORATION	
GB1	42" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)	B-5806	BOBRICK WASHROOM EQUIPEMENT, INC.	
GB2	36" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)	B-5806	BOBRICK WASHROOM EQUIPEMENT, INC.	
GB3	18" STAINLESS STEEL GRAB BARS WITH SNAP FLANGE (1 1/4" DIA.)	B-5806	BOBRICK WASHROOM EQUIPEMENT, INC.	
MG1	WALL MOUNTED MIRROR	B-165-2436	BOBRICK WASHROOM EQUIPEMENT, INC.	
MG2	WALL MOUNTED MIRROR	B-165-4836	BOBRICK WASHROOM EQUIPEMENT, INC.	
MG3	WALL MOUNTED MIRROR	B-165-4836	BOBRICK WASHROOM EQUIPEMENT, INC.	
PTD	Surface Mounted Paper Towel Dispenser	B-4262	Bobrick Washroom Equipment, Inc.	
SDW	Soap Dispenser Liquid Soap - Tank Type Vertical	6A00-11	BRADLEY CORPORATION	
SND	SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL	B-270	BOBRICK WASHROOM EQUIPEMENT, INC.	
TSCD	Classic Series Surface Mounted Seat Cover Dispenser	B-221	BOBRICK WASHROOM EQUIPEMENT, INC.	
TTD	SURFACE-MOUNTED MULTI-ROLL TOILET TISSUE DISPENSER	B-2888	BOBRICK WASHROOM EQUIPEMENT, INC.	



- NOTES:** [Cross-hatched symbol] INDICATES AREA OF BLOCKING
- LAYOUTS SHOWN HERE ARE INTENDED TO DEPICT INSTALLATION OF SPECIFIC ACCESSORIES ONLY. SEE SHEETS A401 & A402 FOR LAYOUT OF ACCESSORIES SPECIFIC TO THIS PROJECT.
 - PROVIDE BLOCKING SUPPORT WITHIN STUD WALL FRAMING AS FOLLOWS:
 - A. WOOD STUD WALLS: PROVIDE MINIMUM 18 GAGE SHEET FASTENED TO MINIMUM OF TWO STUDS.
 - B. WOOD STUD WALLS: PROVIDE MINIMUM 2x6, STUD GRADE, FASTENED BETWEEN A MINIMUM OF TWO STUDS.
 - MAINTAIN MINIMUM OF 30 INCHES CLEAR WIDTH IN FRONT OF ACCESSORY FOR WHEELCHAIR ACCESS.
 - SEE SPECIFICATION SECTION 10 28 00 FOR ADDITIONAL INFORMATION ON ACCESSORIES.
 - SEE FINISH SCHEDULE ON SHEET A140 FOR COLOR & MATERIAL.



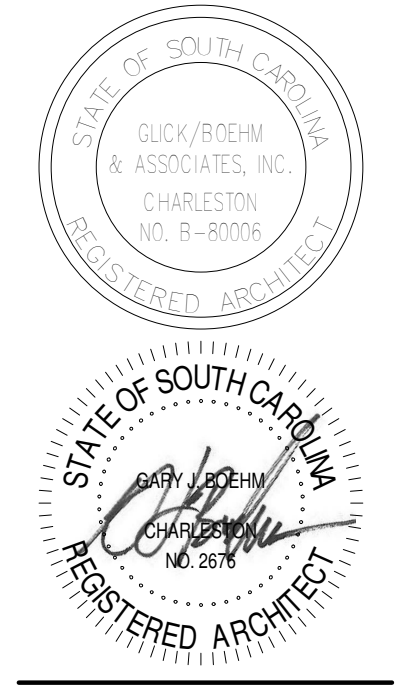
TOILET ACCESSORY MOUNTING HEIGHTS

SCALE: 1/2" = 1'-0"

WALL BLOCKING OPTIONS

SCALE: 1 1/2" = 1'-0"

REV.	DATE	DESCRIPTION

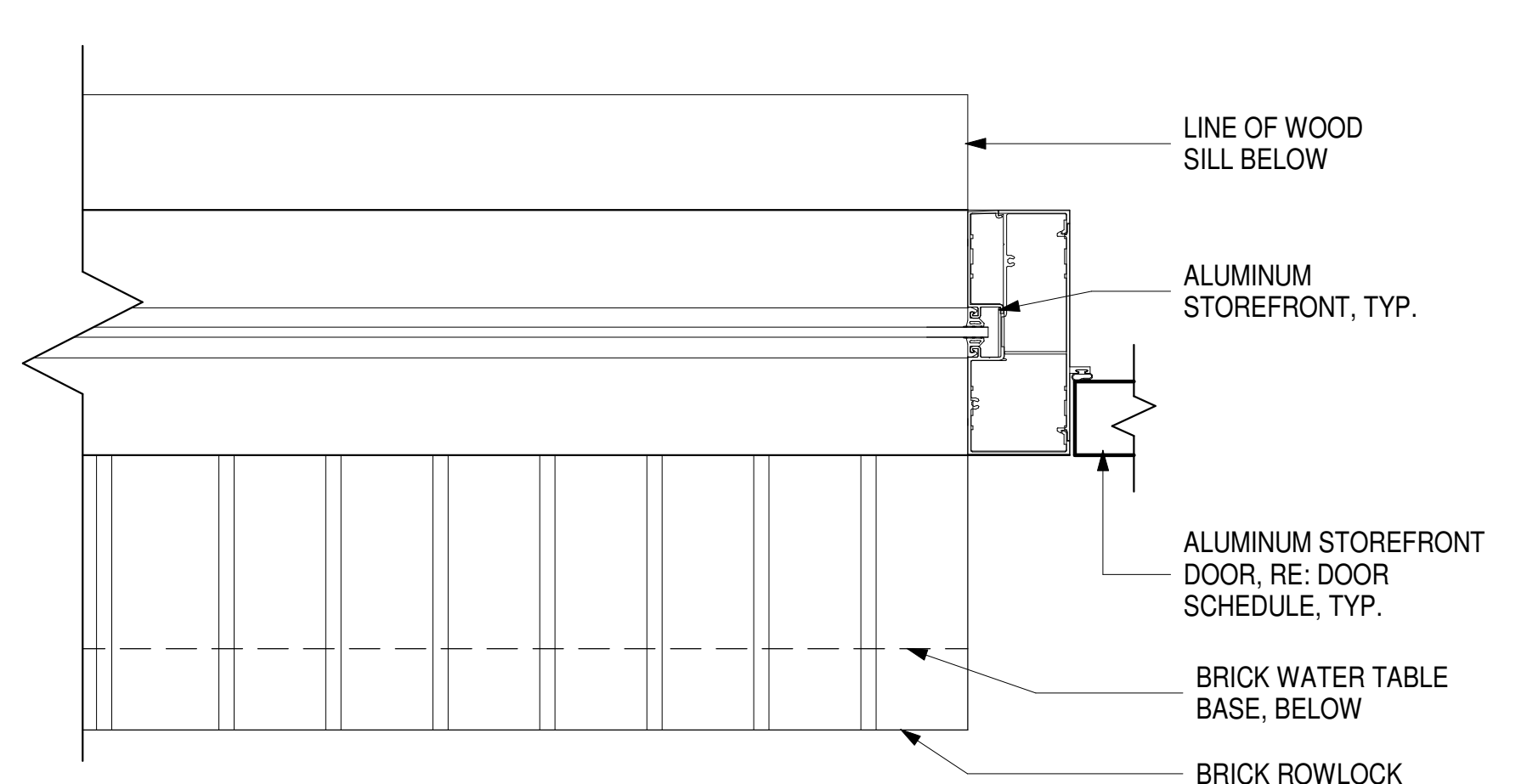


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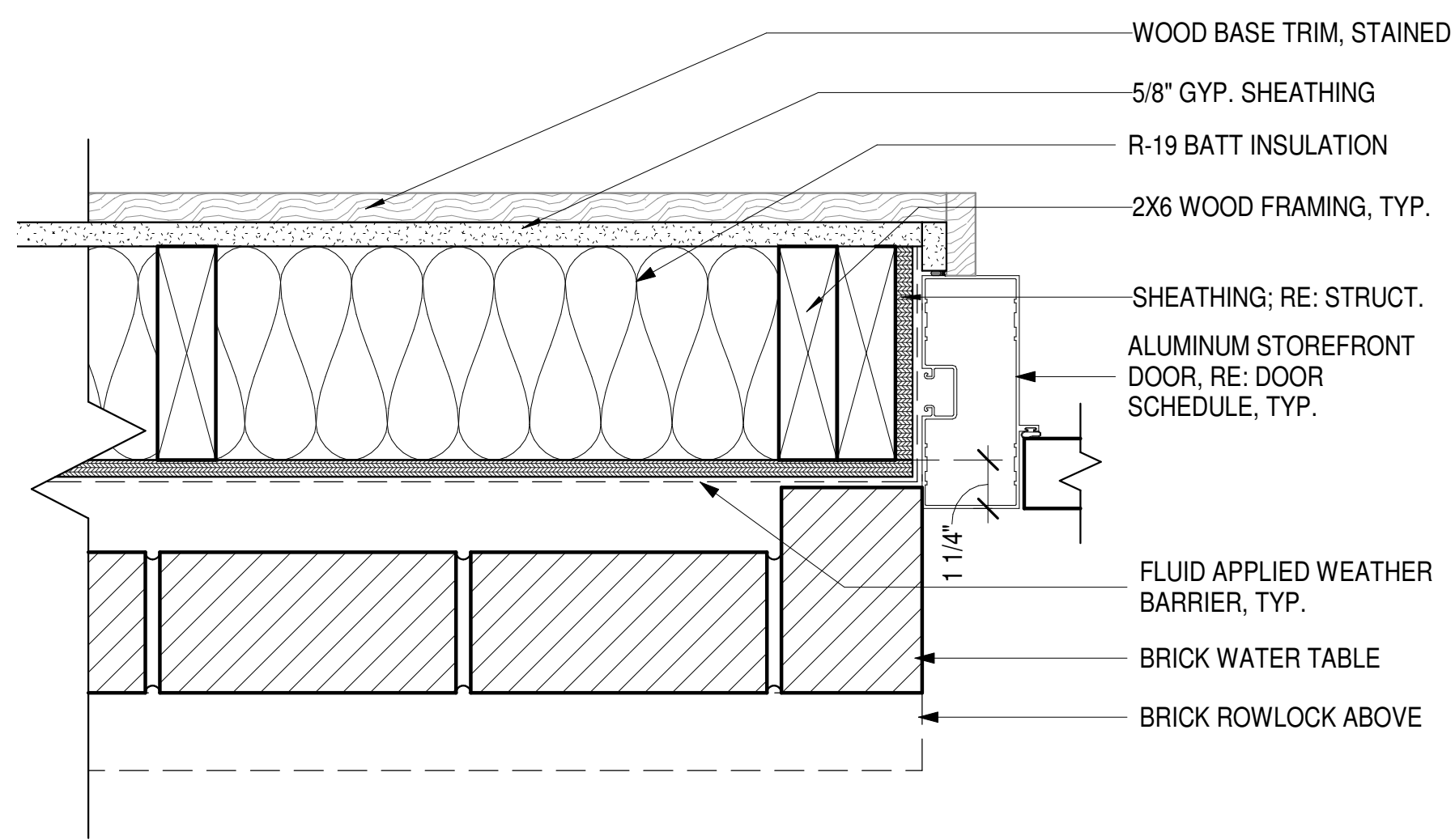
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TYP. MOUNTING HEIGHTS & WALL BLOCKING

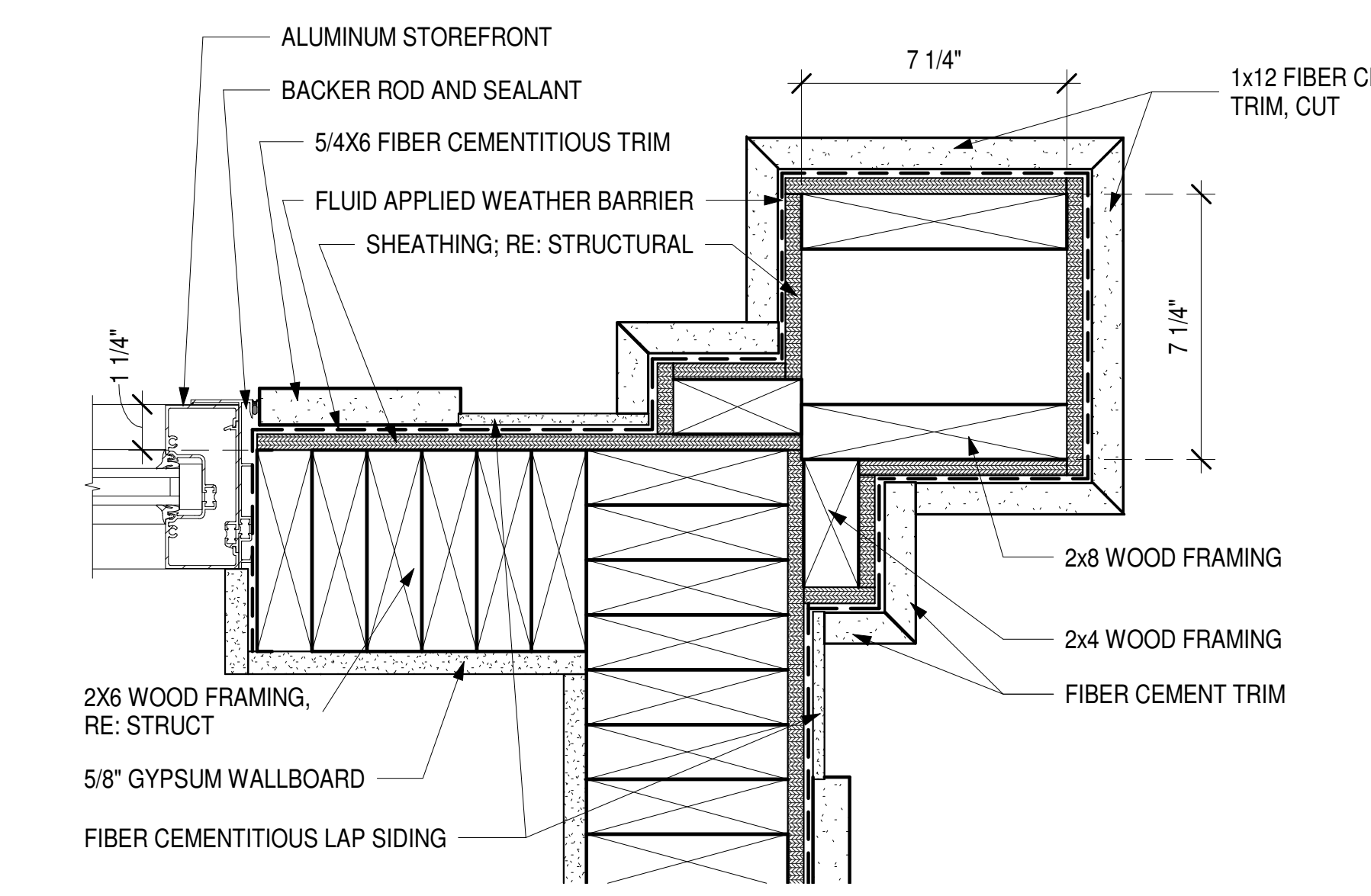
A501



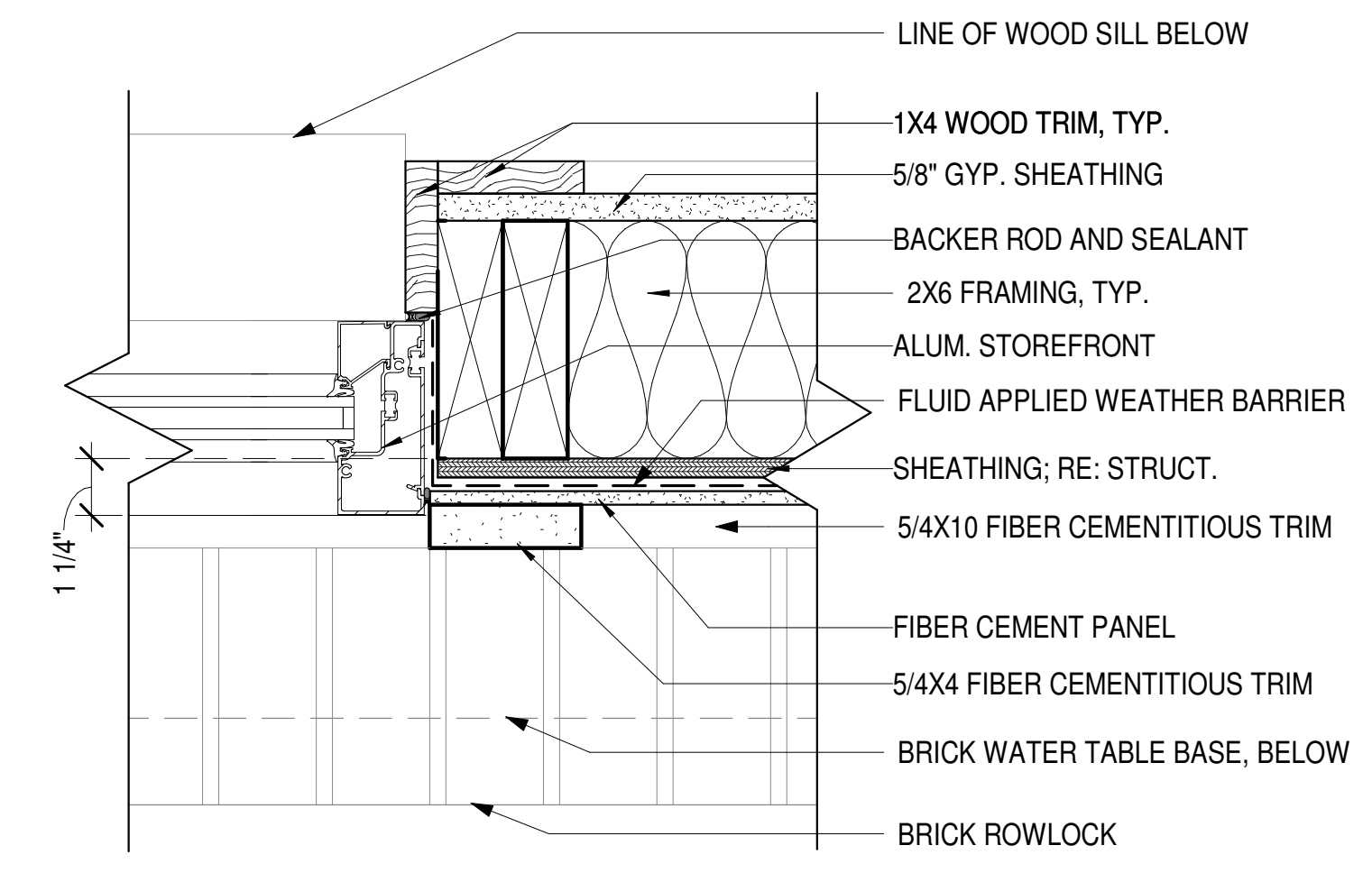
1 STOREFRONT DOOR JAMB @ STOREFRONT
A510 SCALE: 3" = 1'-0"



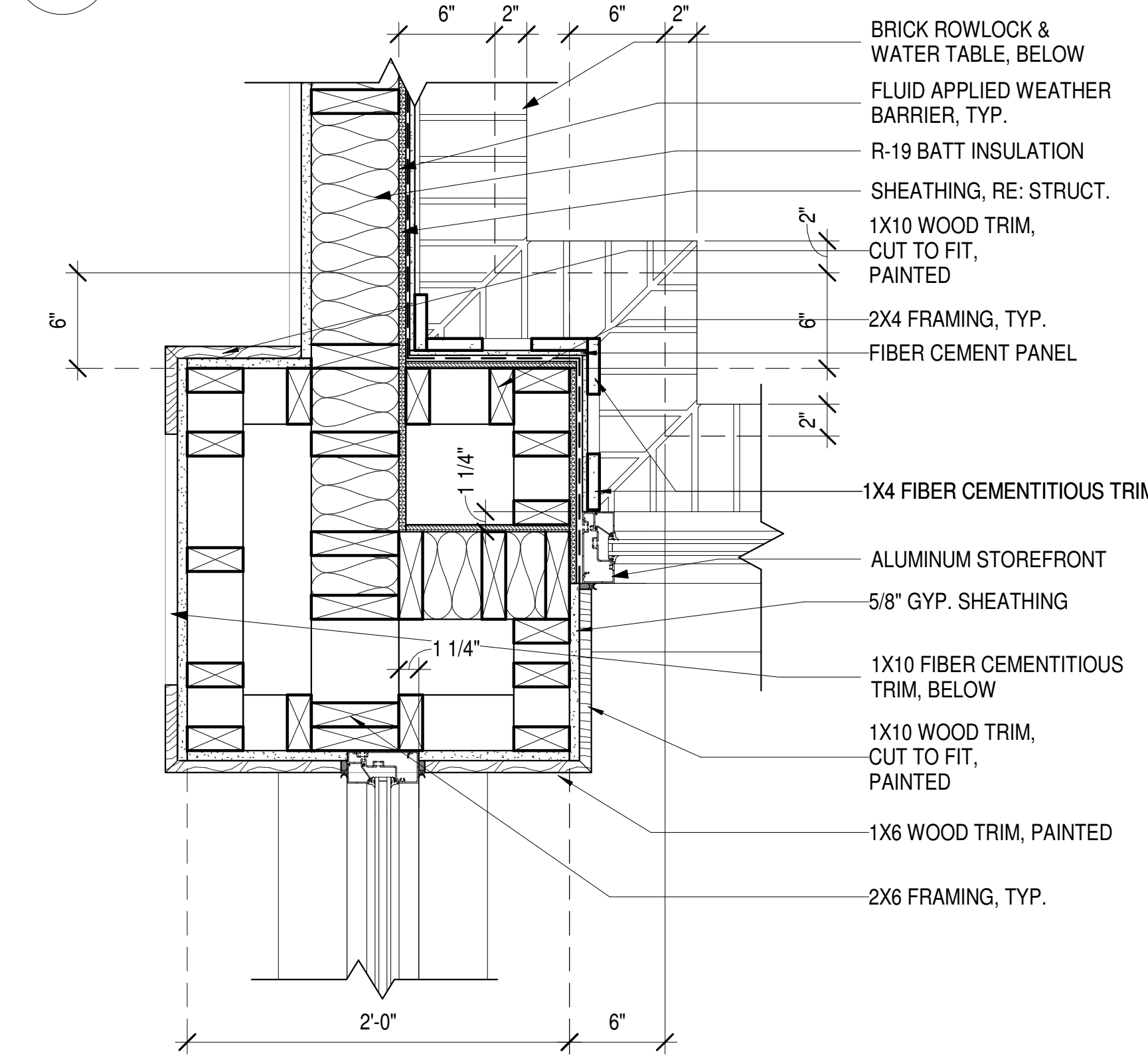
4 STOREFRONT DOOR JAMB @ BRICK BASE
A510 SCALE: 3" = 1'-0"



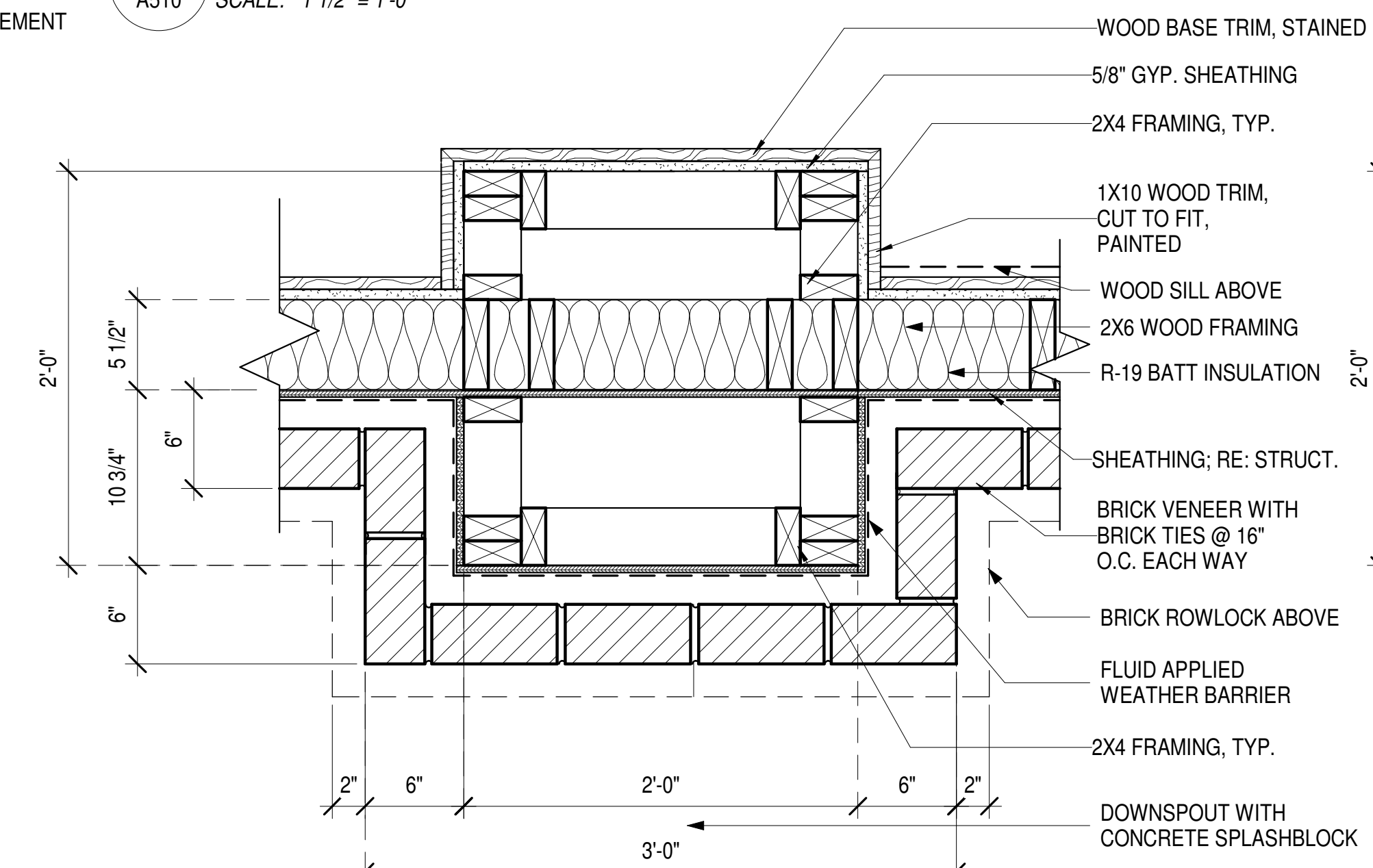
7 PLAN DETAIL @ UPPER TOWER
A510 SCALE: 3" = 1'-0"



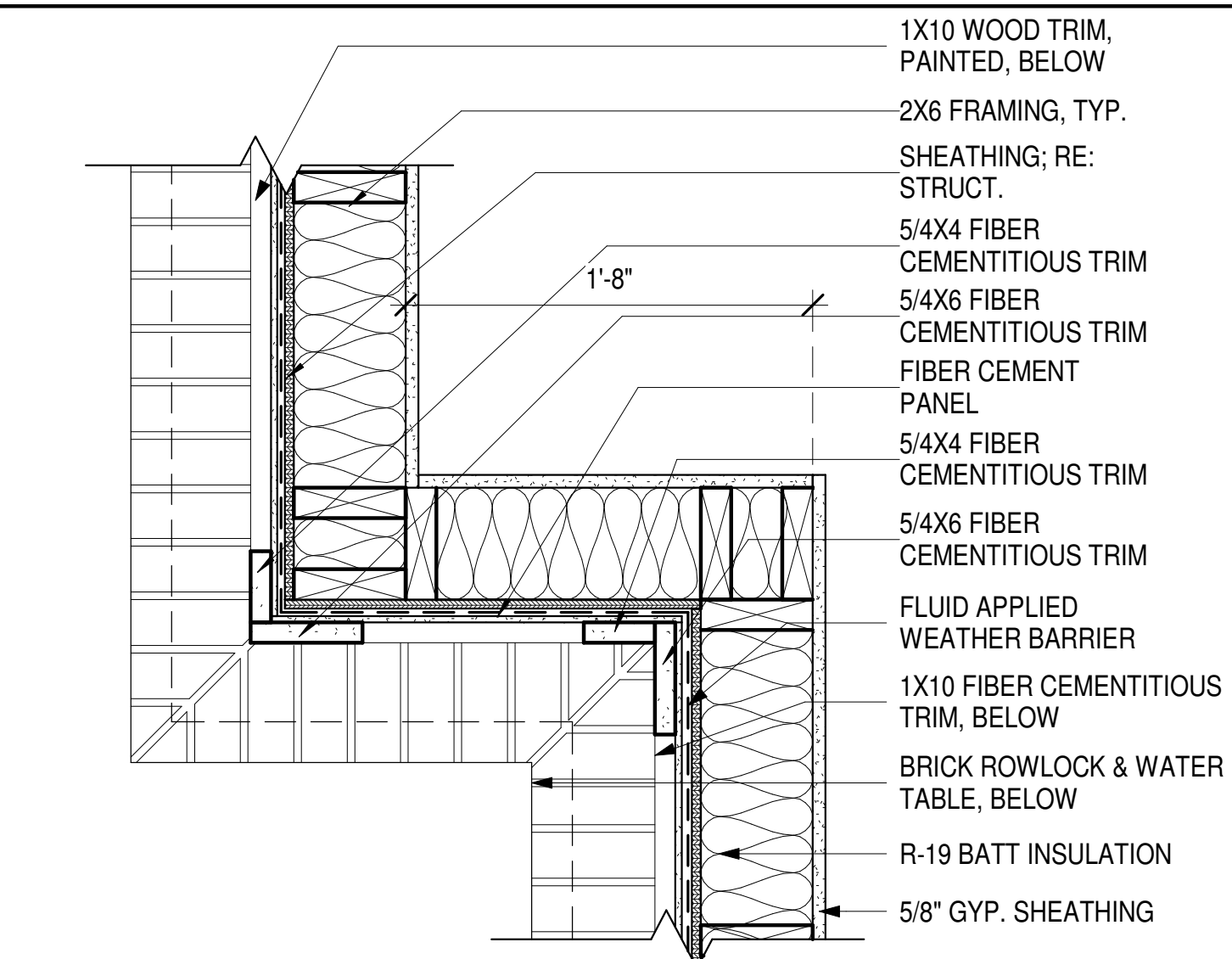
2 STOREFRONT JAMB DETAIL @ EXT. WALL
A510 SCALE: 3" = 1'-0"



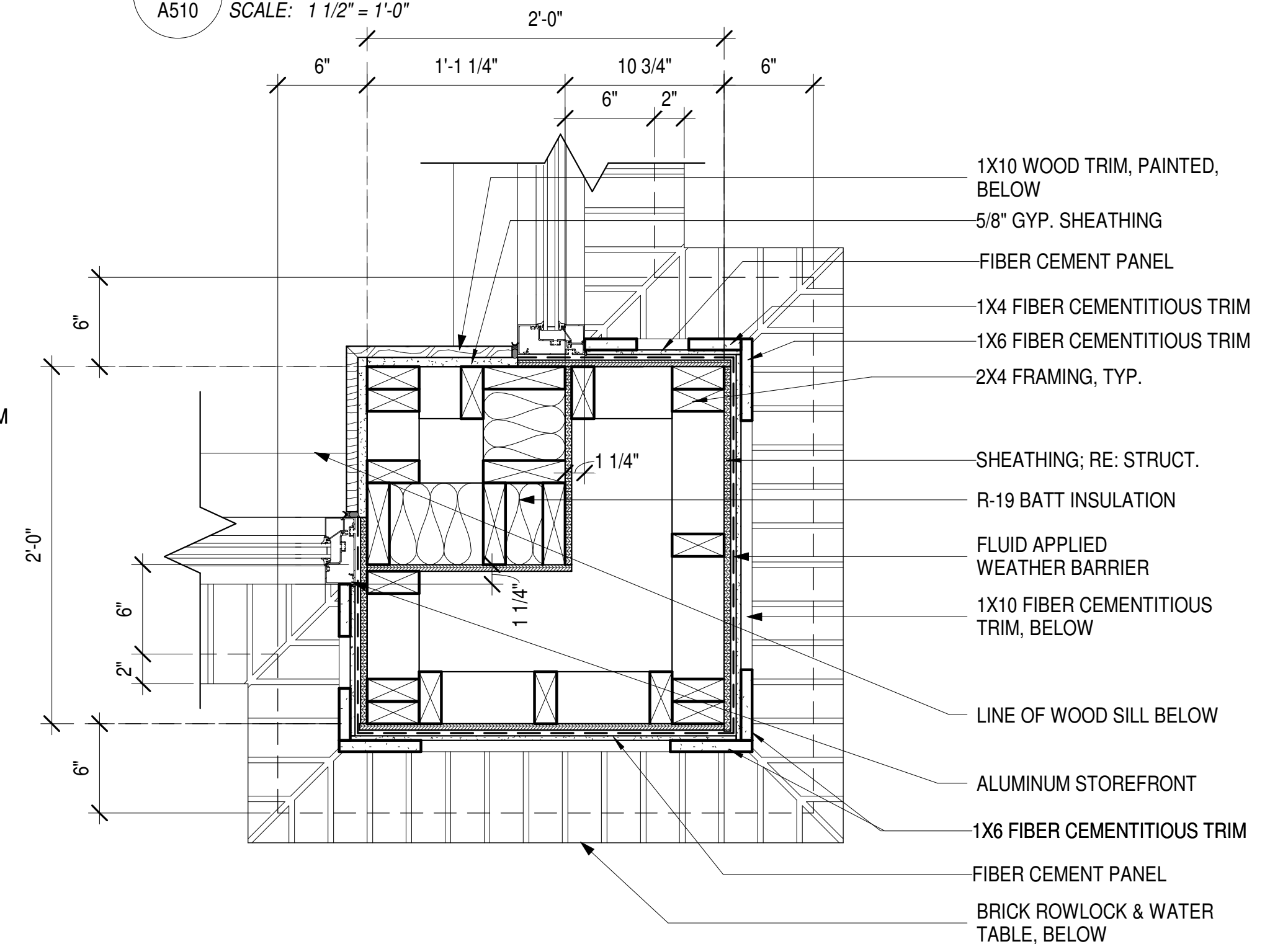
5 COLUMN PLAN DETAIL @ CORNER
A510 SCALE: 1 1/2" = 1'-0"



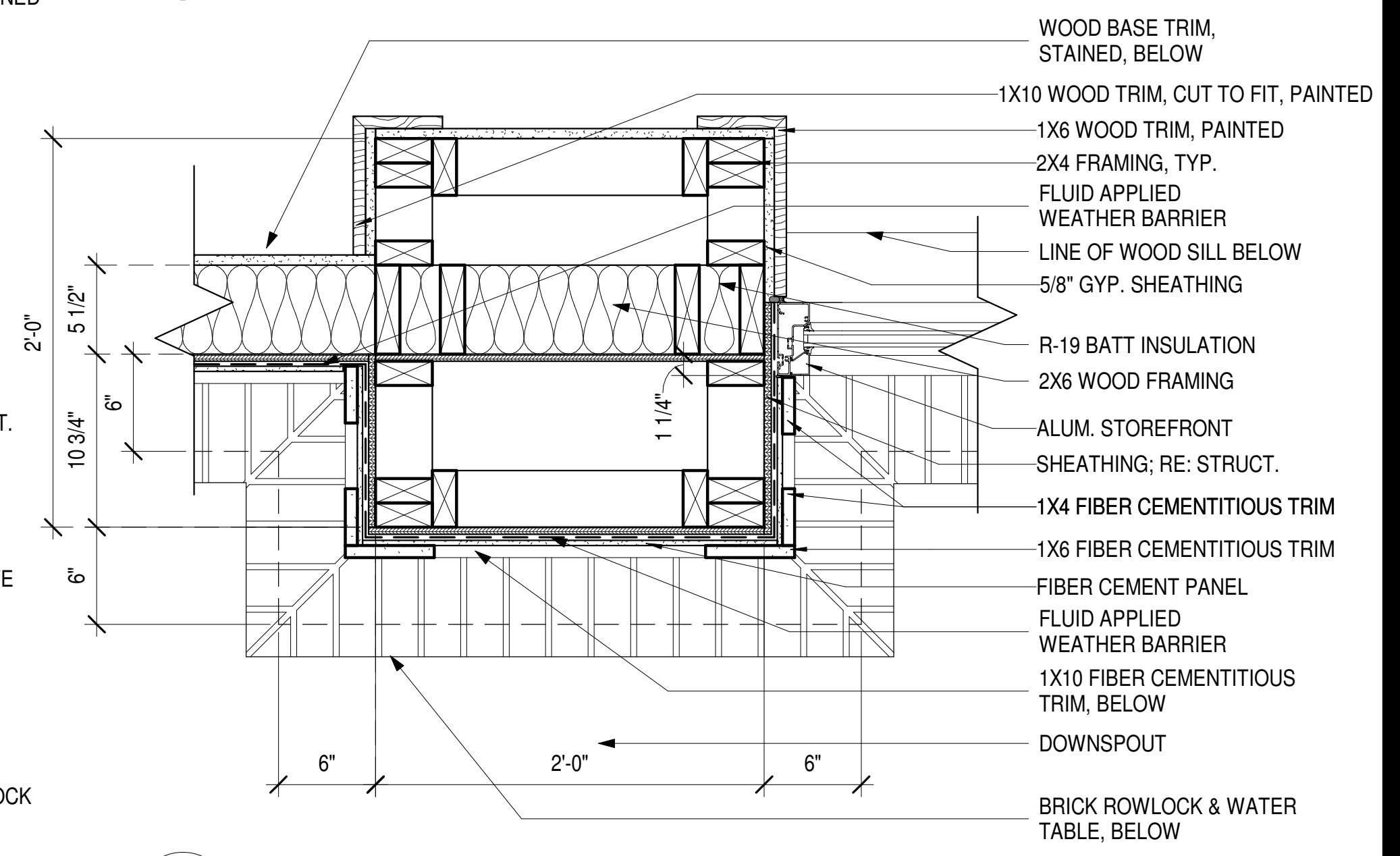
8 COLUMN PLAN DETAIL @ BRICK BASE
A510 SCALE: 1 1/2" = 1'-0"



3 CORNER DETAIL
A510 SCALE: 1 1/2" = 1'-0"

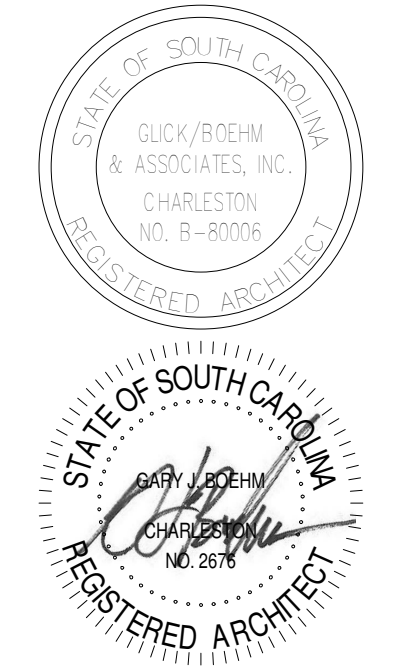


6 COLUMN PLAN DETAIL
A510 SCALE: 1 1/2" = 1'-0"



9 COLUMN PLAN DETAIL @ STOREFRONT
A510 SCALE: 1 1/2" = 1'-0"

REV#	DATE	DESCRIPTION

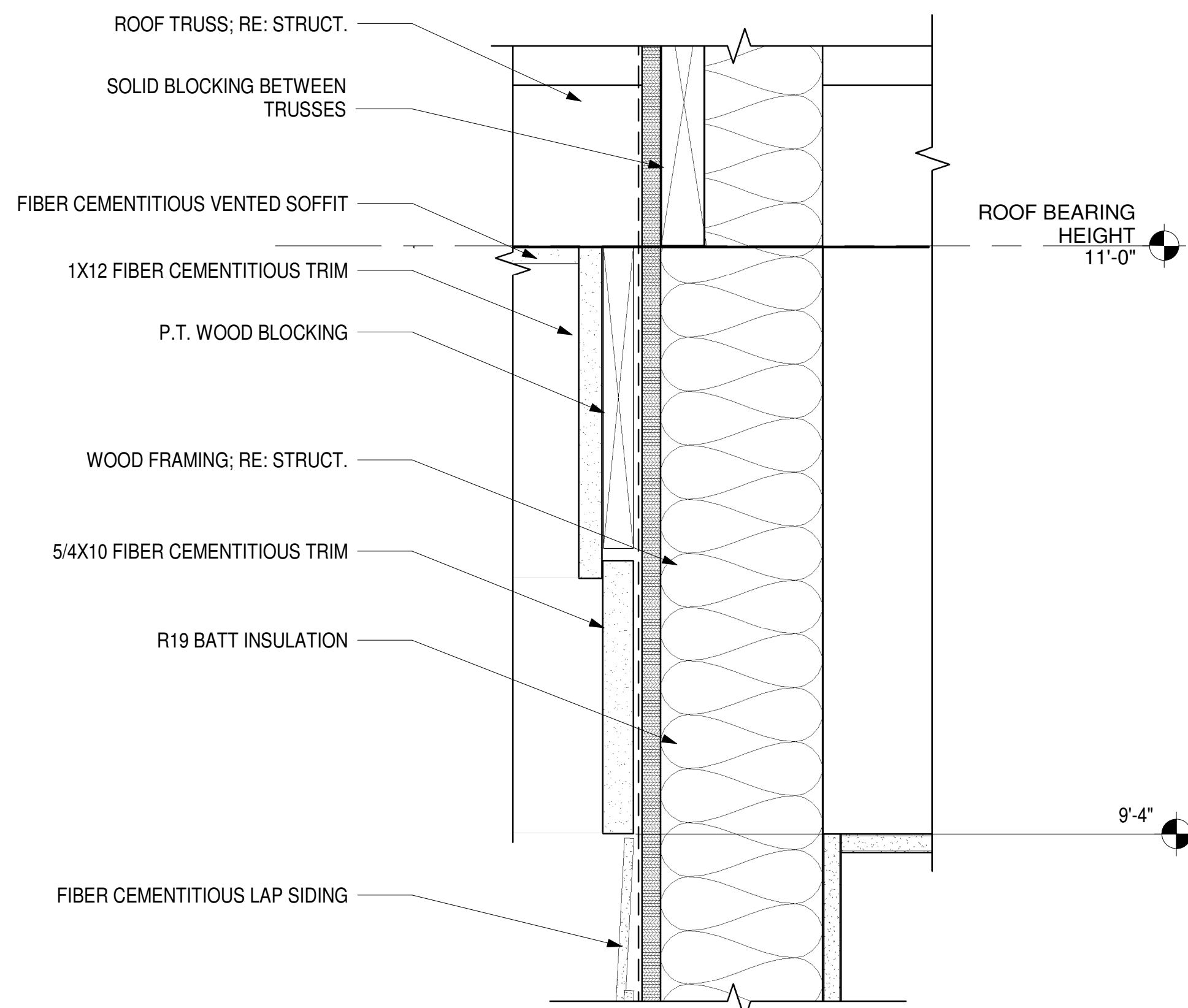


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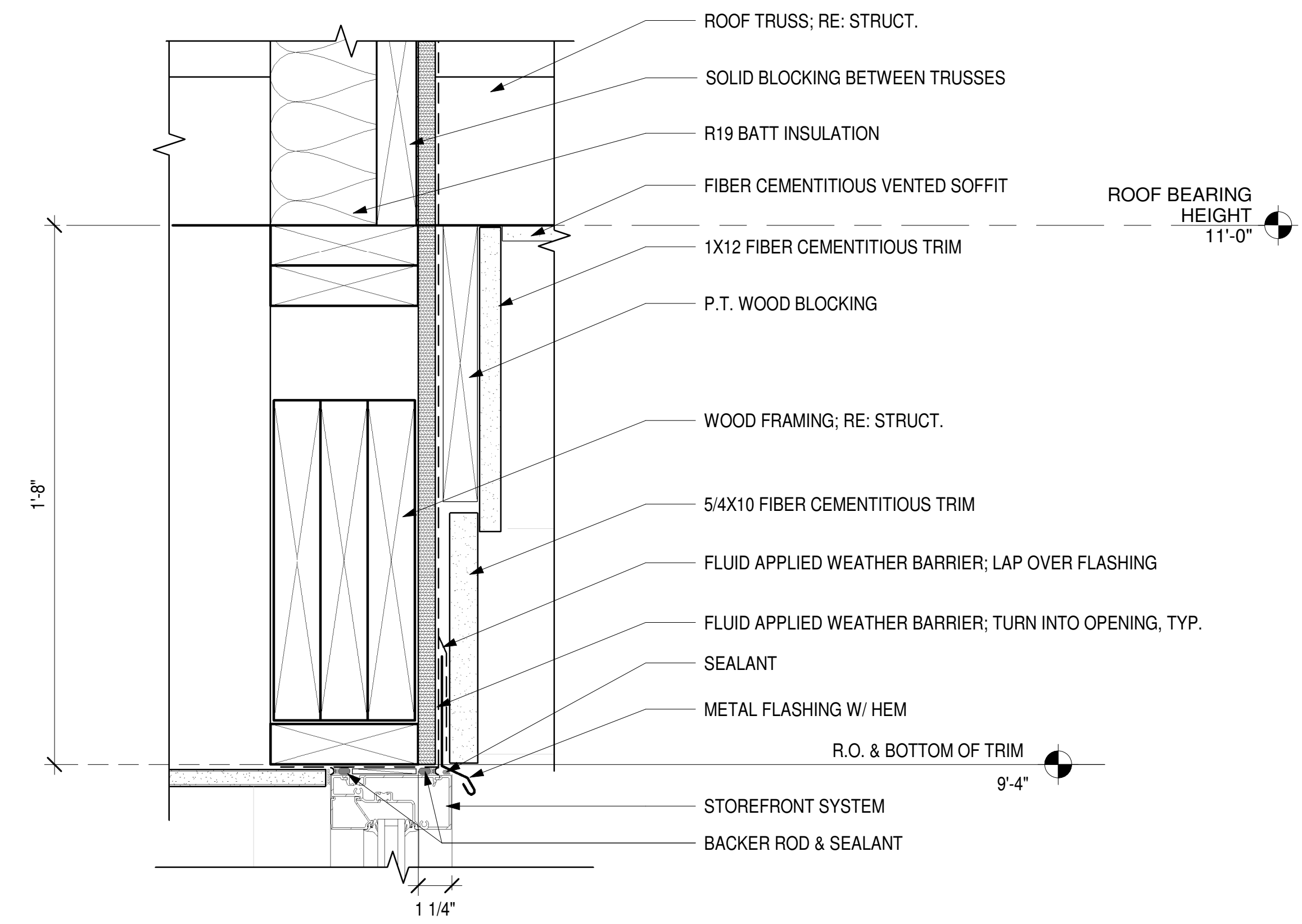
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EXTERIOR WALL PLAN DETAILS

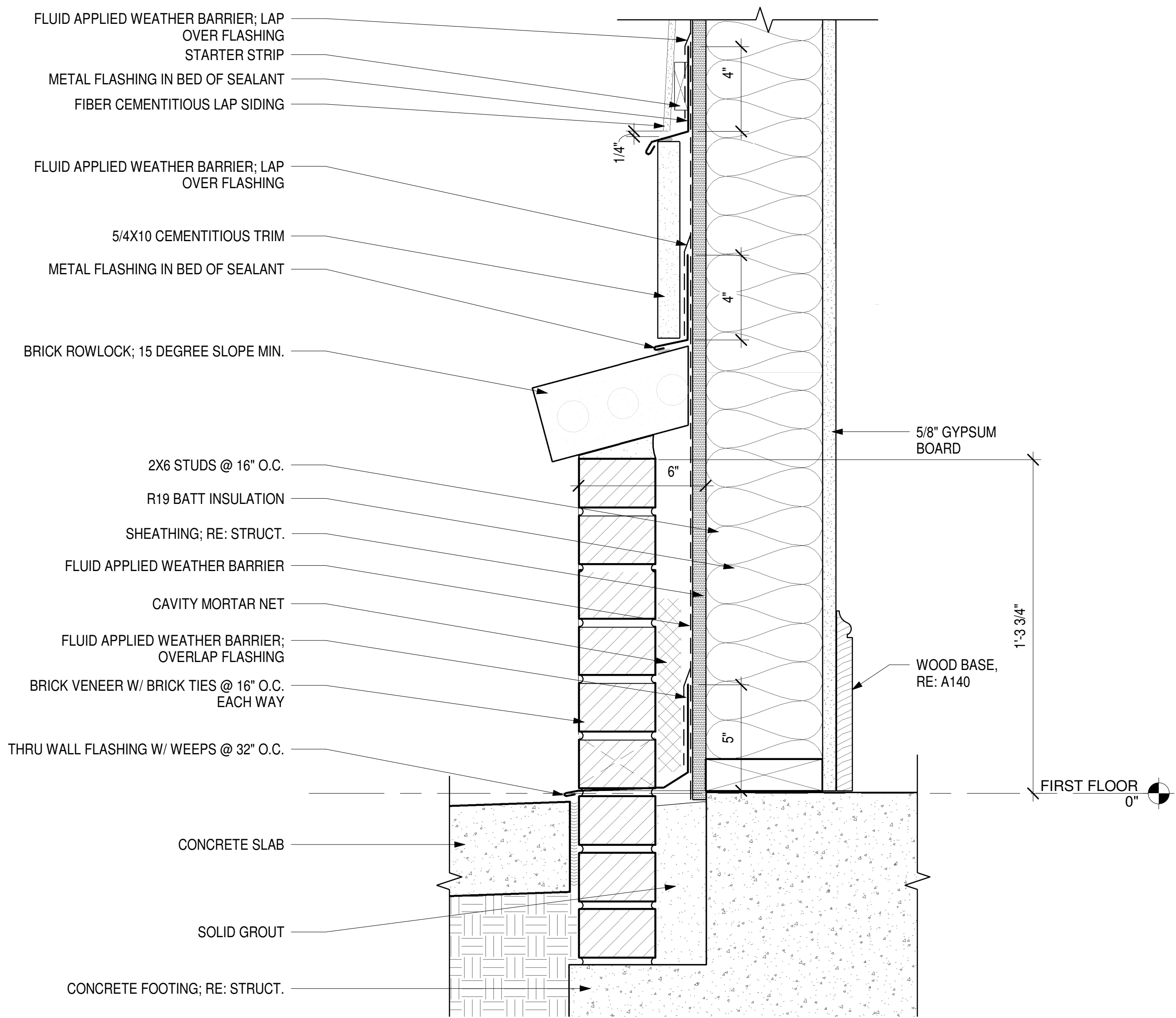
A510



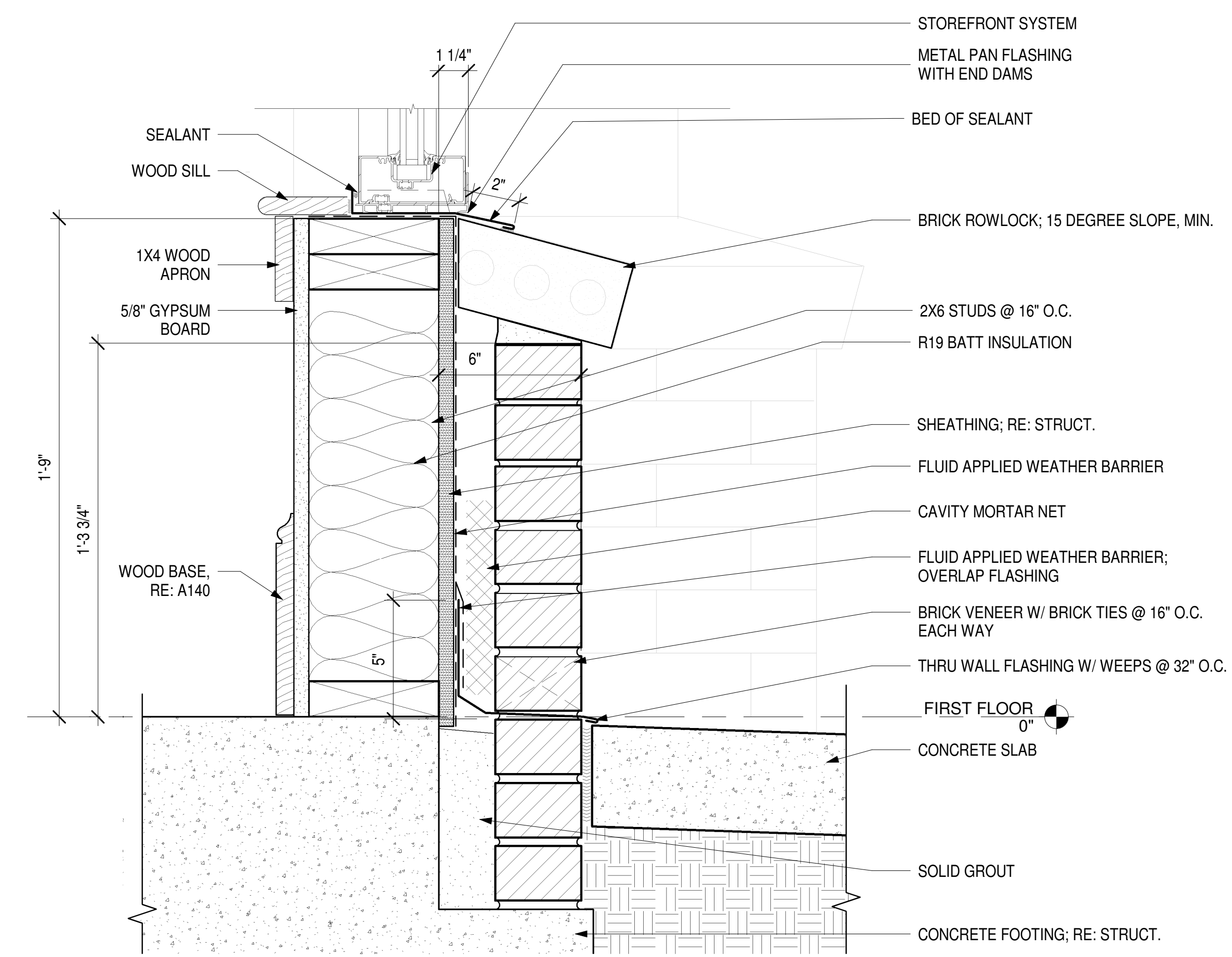
4 WALL SECTION DETAIL
 A520 SCALE: 3" = 1'-0"



2 WALL SECTION DETAIL
 A520 SCALE: 3" = 1'-0"

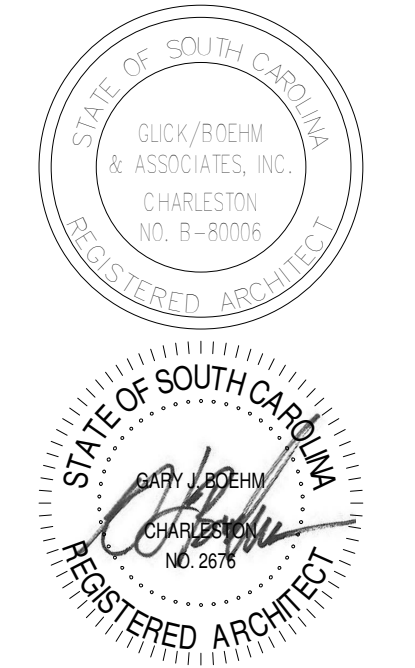


3 WALL SECTION DETAIL
 A520 SCALE: 3" = 1'-0"



1 WALL SECTION DETAIL
 A520 SCALE: 3" = 1'-0"

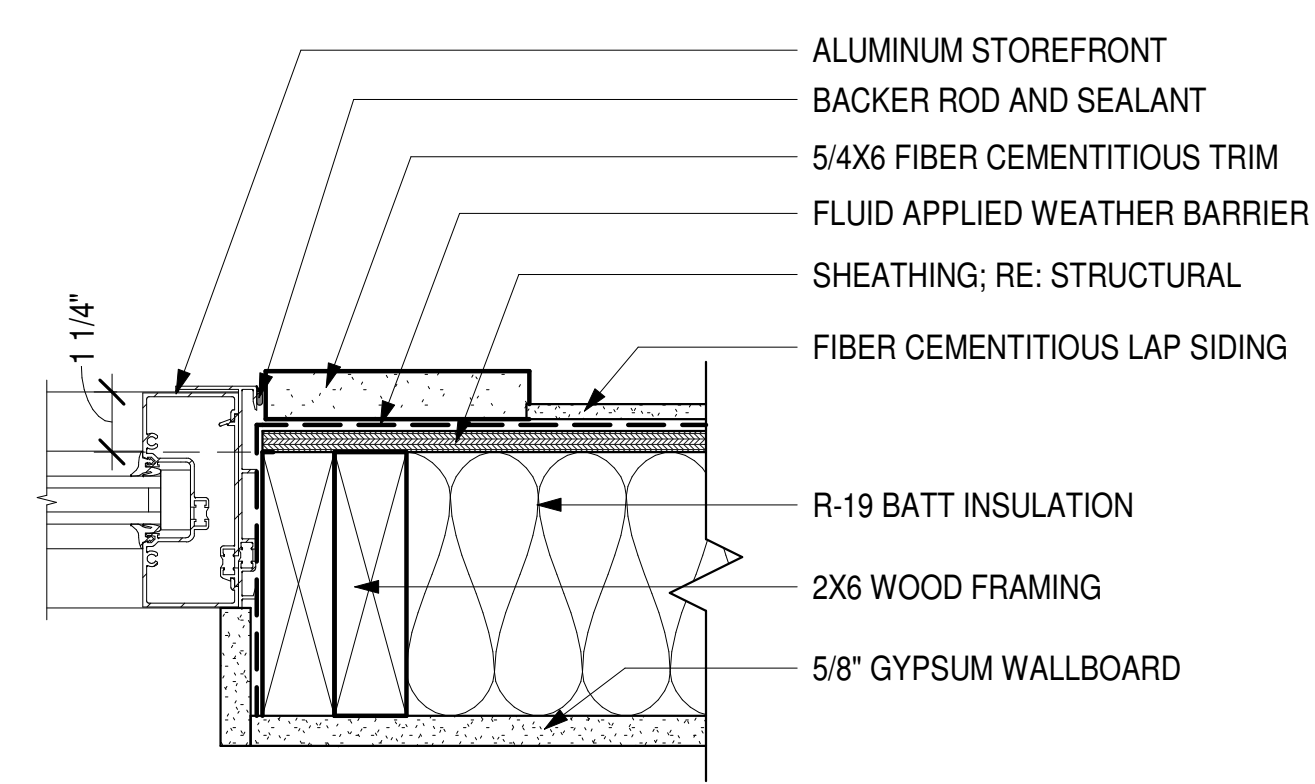
REV.	DATE	DESCRIPTION



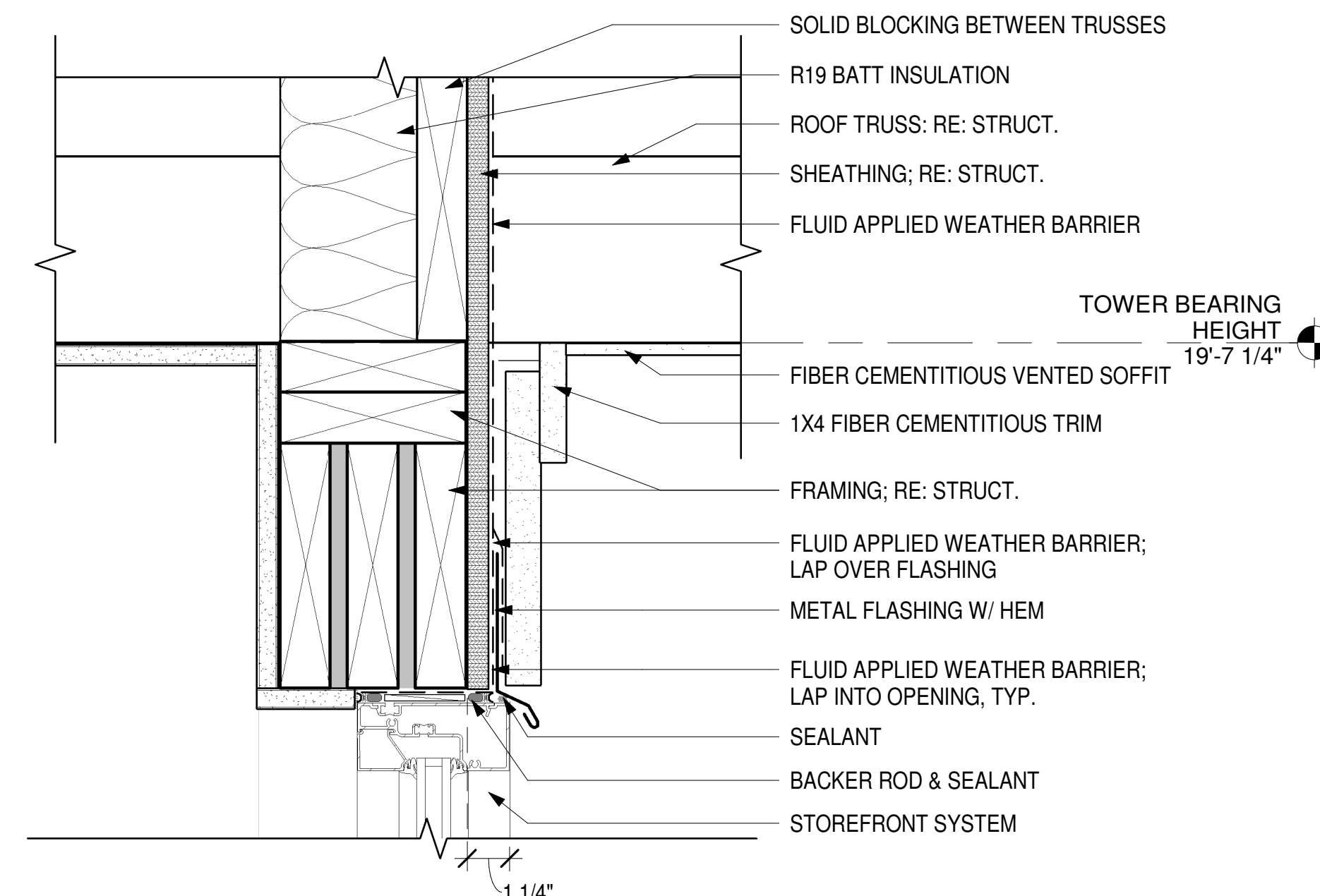
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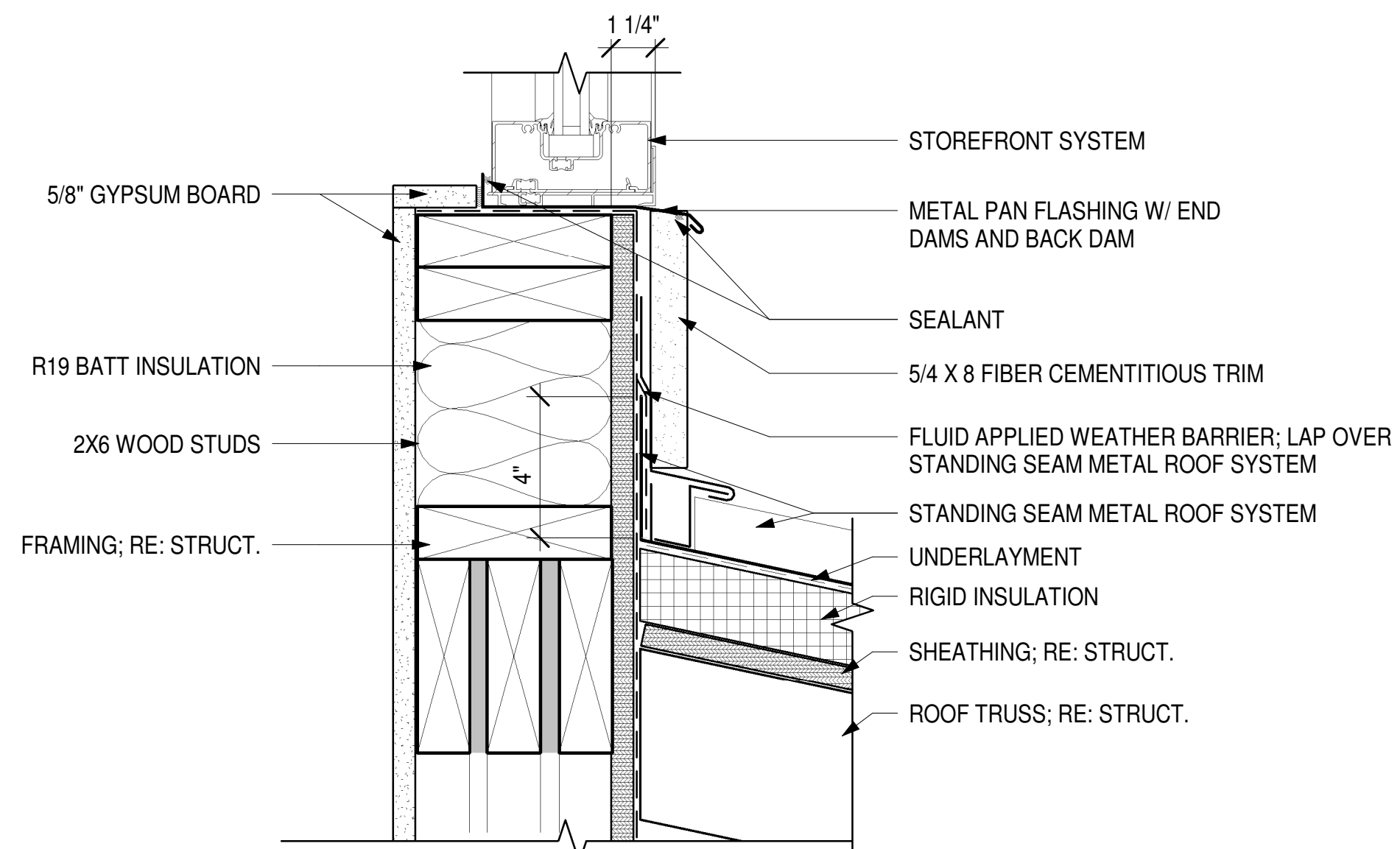
EXTERIOR WALL SECTION DETAILS



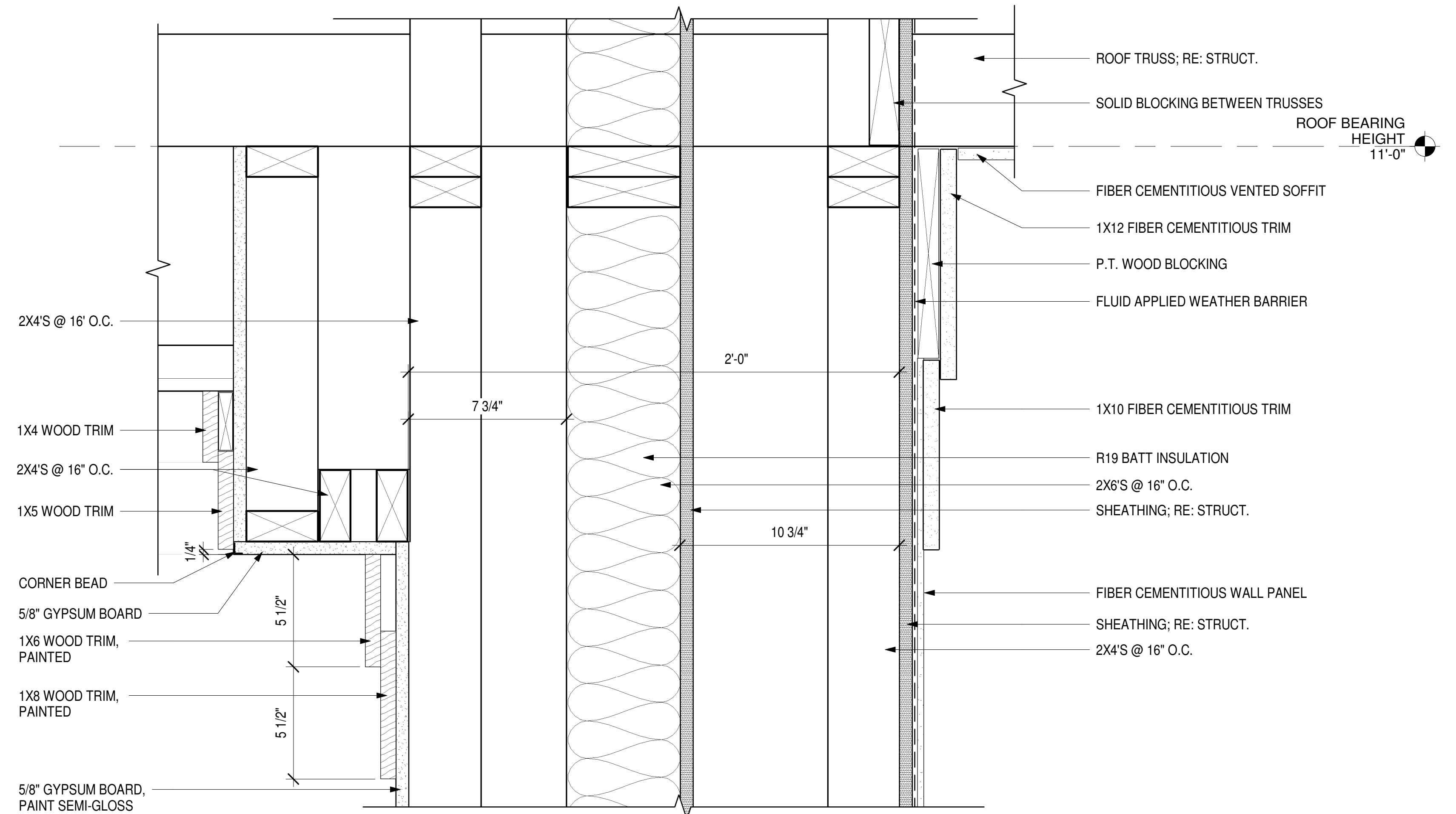
5 STOREFRONT WINDOW JAMB DETAIL
A521 SCALE: 3" = 1'-0"



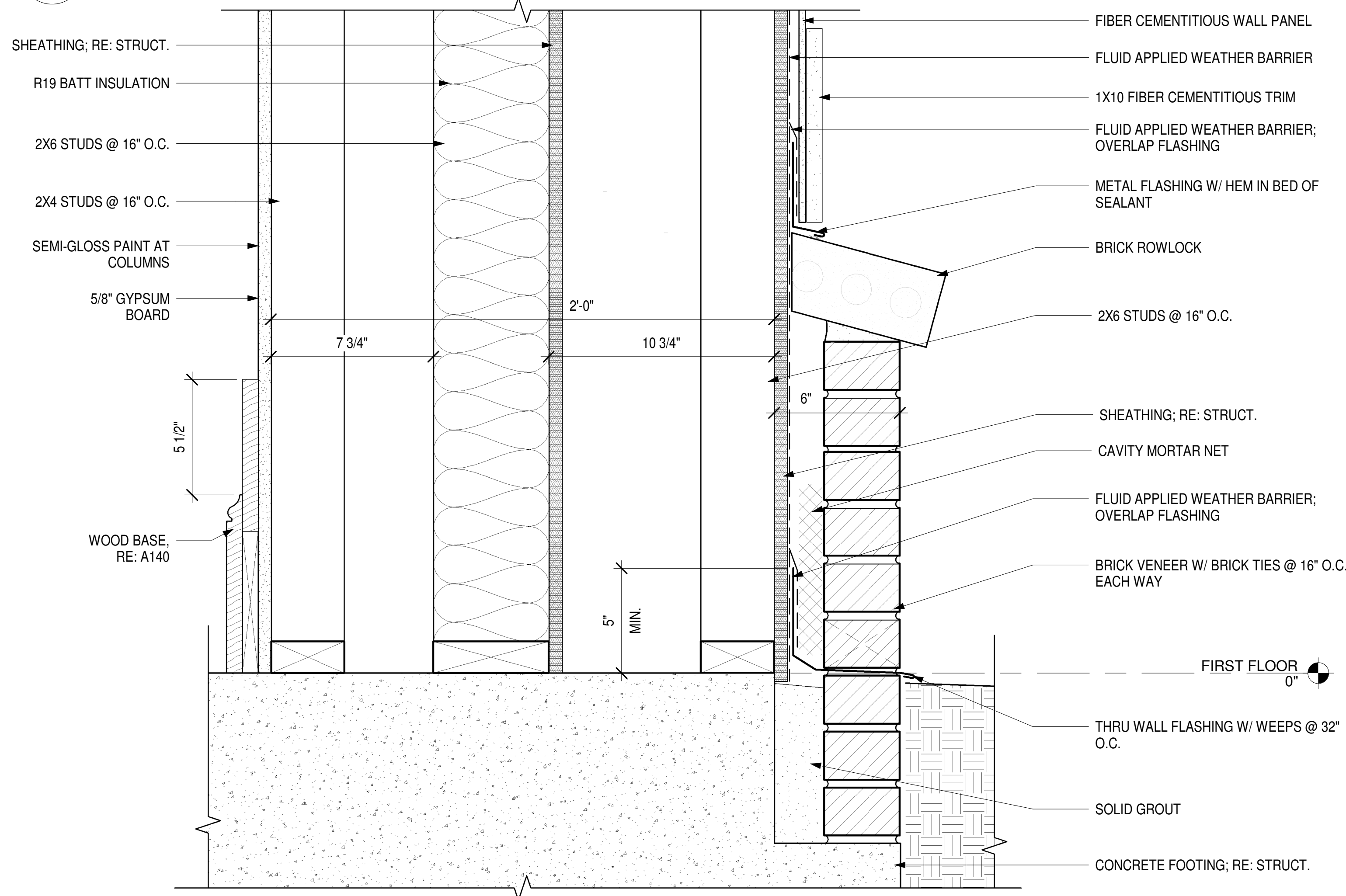
4 WALL SECTION DETAIL
A521 SCALE: 3" = 1'-0"



3 WALL SECTION DETAIL
A521 SCALE: 3" = 1'-0"

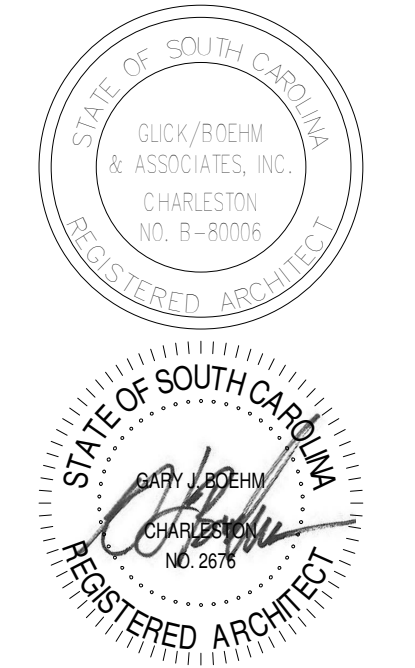


2 WALL SECTION DETAIL
A521 SCALE: 3" = 1'-0"



1 WALL SECTION DETAIL
A521 SCALE: 3" = 1'-0"

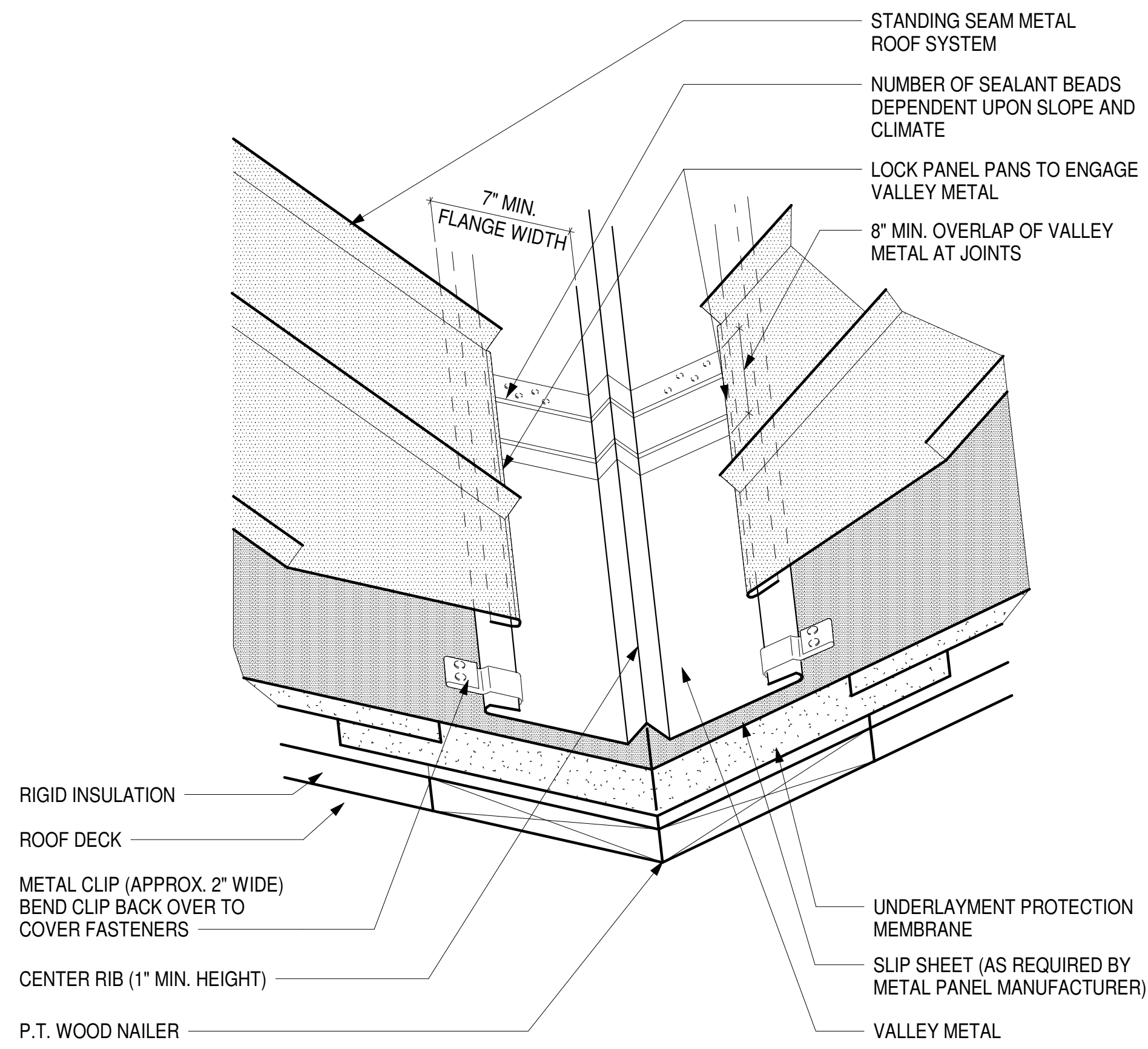
REV.	DATE	DESCRIPTION



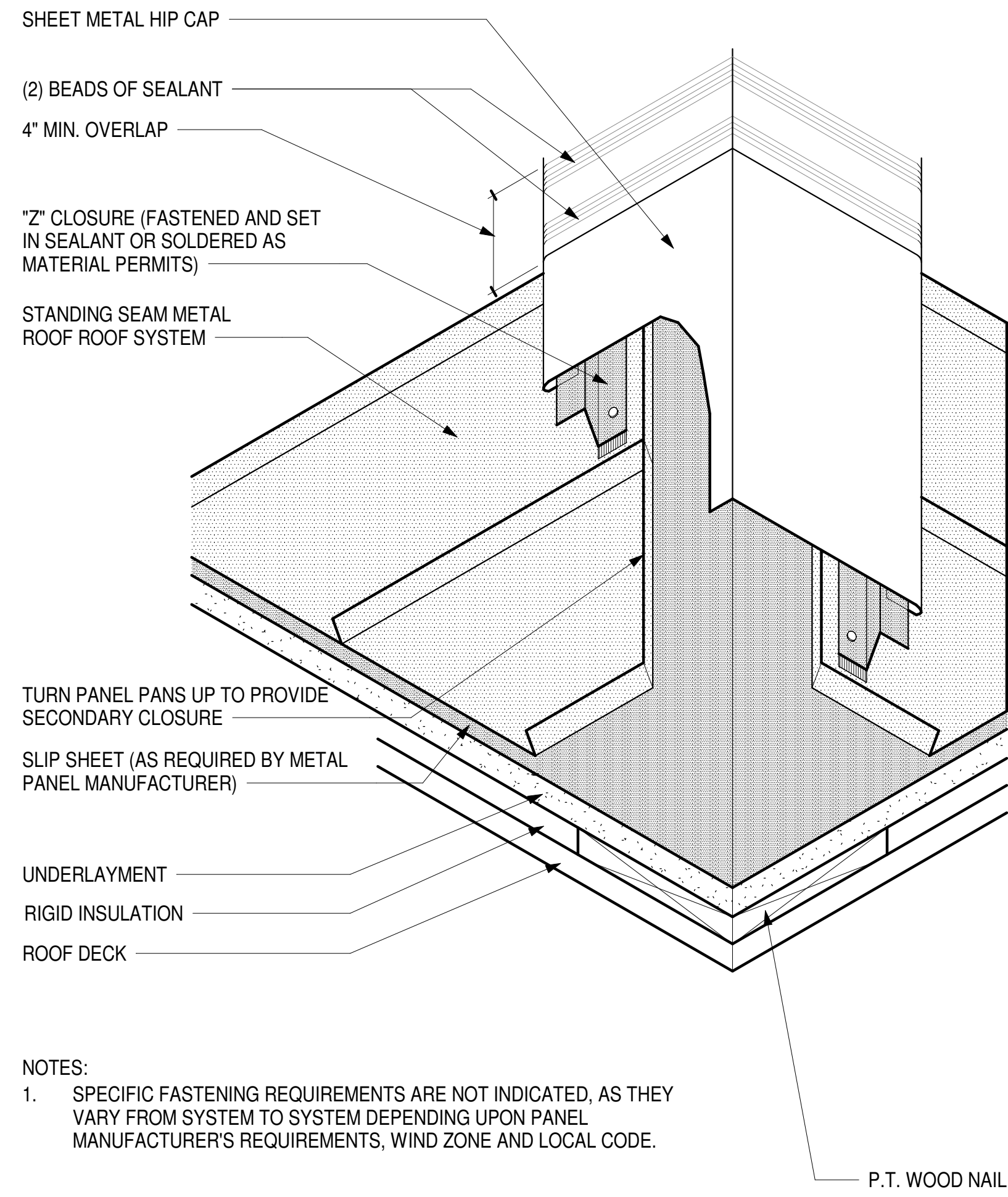
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EXTERIOR WALL SECTION DETAILS
A521



- NOTES:
1. SPECIFIC FASTENING REQUIREMENTS ARE NOT INDICATED, AS THEY VARY FROM SYSTEM TO SYSTEM DEPENDING UPON PANEL MANUFACTURER'S REQUIREMENTS, WIND ZONE AND LOCAL CODE.
 2. MINIMUM SLOPE RECOMMENDED FOR USE OF THIS VALLEY CONSTRUCTION IS 6:12 (50%).



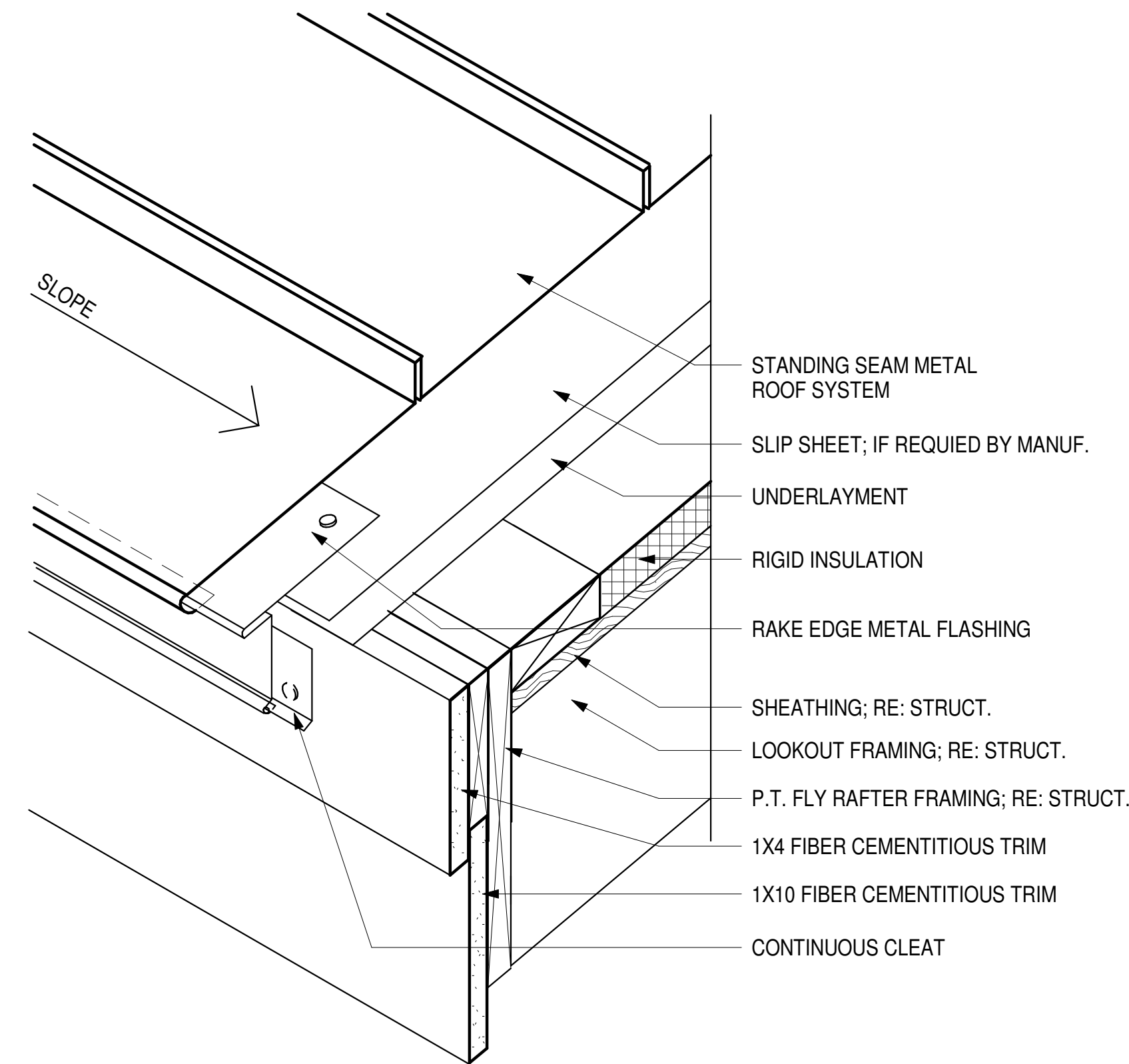
- NOTES:
1. SPECIFIC FASTENING REQUIREMENTS ARE NOT INDICATED, AS THEY VARY FROM SYSTEM TO SYSTEM DEPENDING UPON PANEL MANUFACTURER'S REQUIREMENTS, WIND ZONE AND LOCAL CODE.

1 METAL ROOF VALLEY DETAIL

A530 SCALE: 3" = 1'-0"

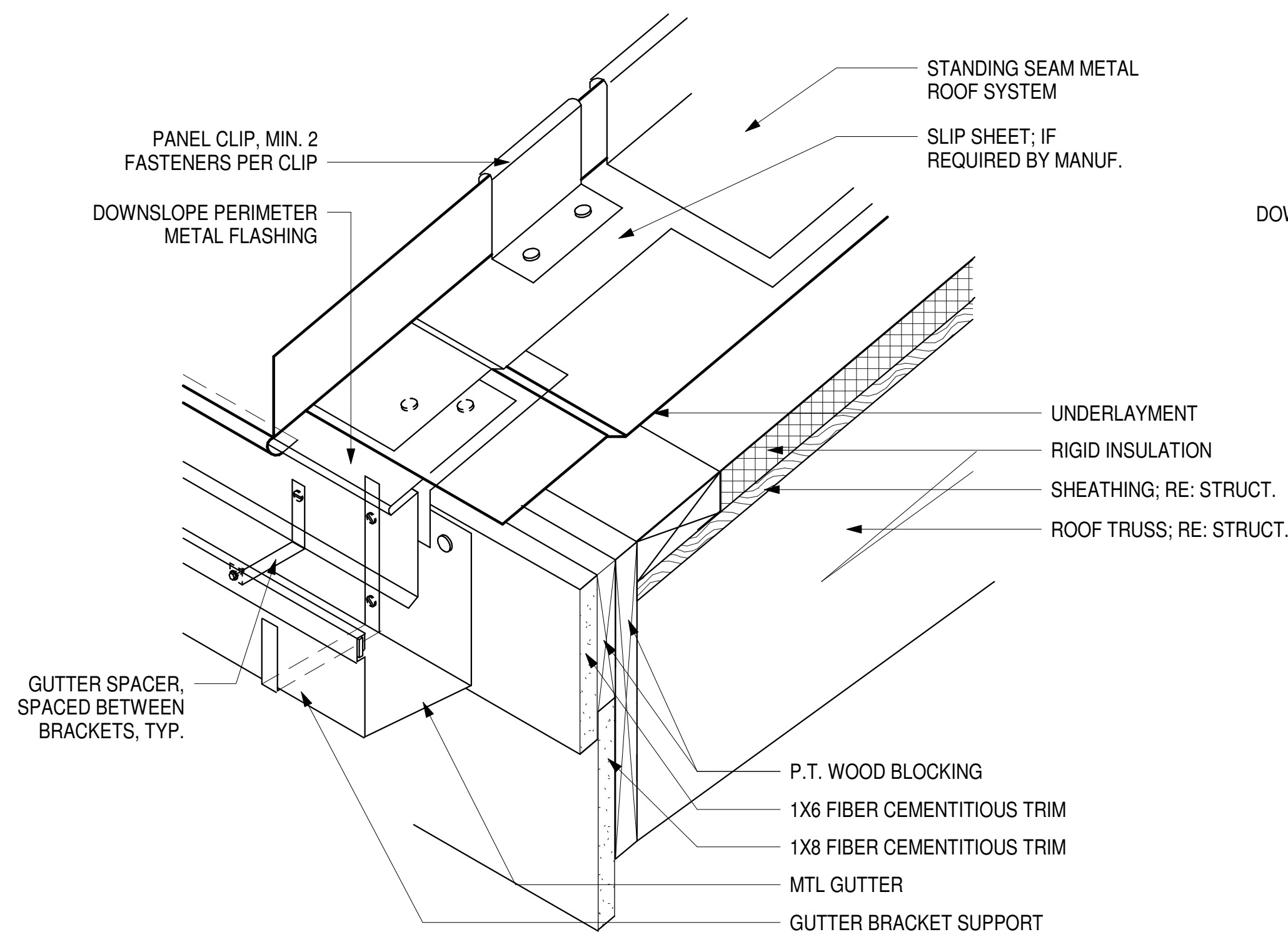
2 METAL ROOF RIDGE DETAIL

A530 SCALE: 3" = 1'-0"



4 METAL ROOF RAKE FLASHING DETAIL

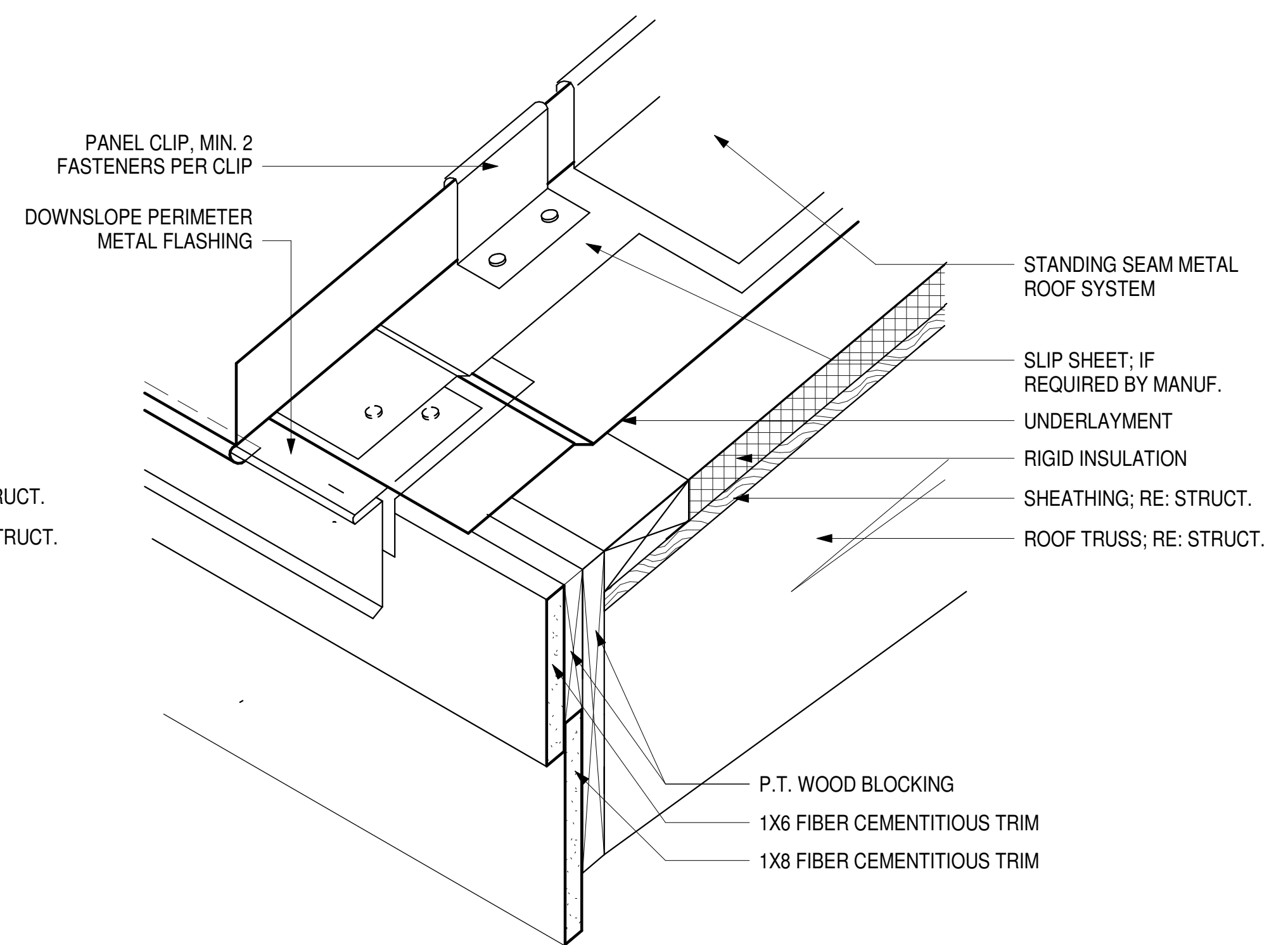
A530 SCALE: 3" = 1'-0"



- NOTES:
1. GUTTER BRACKETS SHALL BE AT LEAST ONE GAUGE HEAVIER THAN GUTTER STOCK.
 2. DESIGN GUTTER EXPANSION JOINTS FOR PLACEMENT AT APPROPRIATE INTERVALS, COMMENSURATE WITH TYPE OF METAL.

5 METAL ROOF GUTTER DETAIL

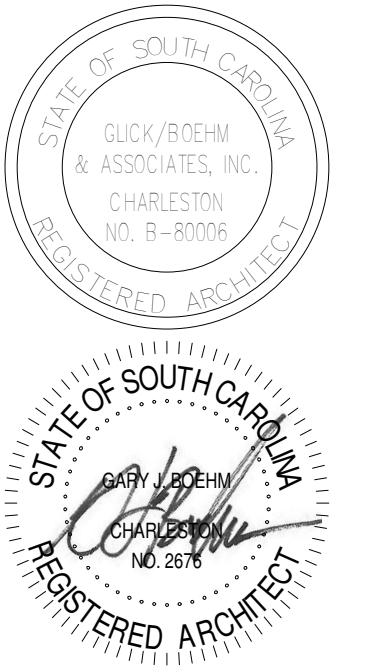
A530 SCALE: 3" = 1'-0"



6 METAL ROOF EDGE DETAIL

A530 SCALE: 3" = 1'-0"

REV.	DATE	DESCRIPTION



TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

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METAL ROOF DETAILS

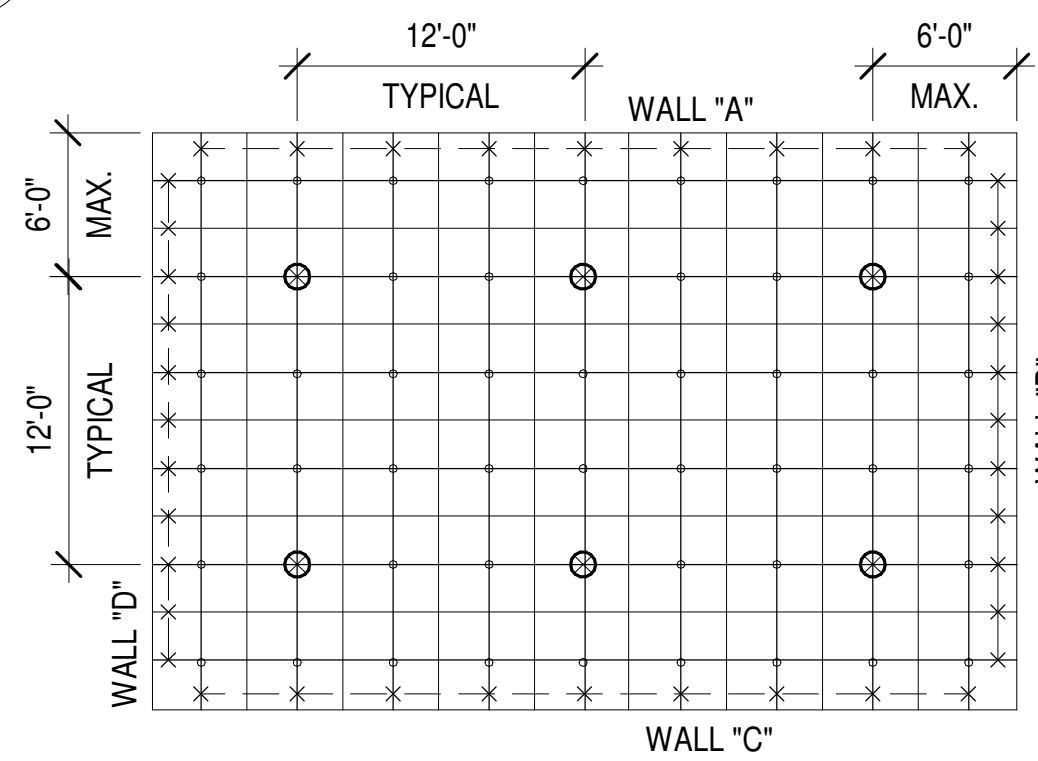
A530

SEISMIC RESTRAINTS FOR SUSP'D ACOUSTICAL CEILINGS

#	CEILING COMPONENT	IBC CATEGORY "C" CISCA ZONES 0-2	IBC CATEGORY "D", "E" OR "F" - CISCA ZONES 3 & 4		DETAIL	REMARKS
			UP TO 1,000 SF	GREATER THAN 1,000 SF		
1.	INTERSECTION STRENGTH AT MAIN / CROSS TEES	60 LBS.	180 LBS.	180 LBS.	5/A570	
2.	HANGER WIRE (MIN. OF 3 TWISTS)	12 GAUGE @ 4' o.c. EACH WAY	12 GAUGE @ 4' o.c. EACH WAY	12 GAUGE @ 4' o.c. EACH WAY		
3.	CONNECTION @ WIRE / STRUCTURE ABOVE	NO MINIMUM REQUIREMENT	100 LBS. MINIMUM	100 LBS. MINIMUM		
4.	MAIN TEE CLASSIFICATION	INTERMEDIATE DUTY OR HEAVY DUTY	HEAVY DUTY	HEAVY DUTY		
5.	MAXIMUM OUT OF PLUMB	1 IN 6 MAXIMUM	1 IN 6 MAXIMUM	1 IN 6 MAXIMUM		
6.	PERIMETER WIRE DISTANCE FROM WALLS	IF WALL ANGLE < 7/8" THEN 8" MAXIMUM	8" MAXIMUM	8" MAXIMUM		
7.	GRID CONNECTION TO PERIMETER WALLS	NOT ALLOWED	ATTACHED TO TWO ADJACENT WALLS	ATTACHED TO TWO ADJACENT WALLS		
8.	PERIMETER TEE ENDS TIED TOGETHER	YES, WITH STABILIZER BAR	YES, WITH STABILIZER BAR	YES, WITH STABILIZER BAR		
9.	PERIMETER MOLDING WIDTH	7/8 INCH MINIMUM	2 INCH MINIMUM	2 INCH MINIMUM		
10.	GRID / WALL CLEARANCE	3/8 INCH MINIMUM	3/4 INCH MINIMUM	3/4 INCH MINIMUM		
11.	SPLAY BRACING 90° APART @ 45° ANGLES	NOT REQUIRED	NOT REQUIRED	REQ'D WITHIN 2" OF TEE INTERSECTION @ 12'-0" o.c. E.W.		
12.	SPLAY BRACING CONNECTION STRENGTH	N/A	N/A	GREATER OF 200 LBS. OR DESIGN LOAD		
13.	COMPRESSION POSTS	NOT REQUIRED	NOT REQUIRED	REQ'D @ 12' O.C. EACH WAY, STARTING 6' FROM WALLS		
14.	PARTITION ATTACHMENT	BRACE INDEPENDENT OF CEILING GRID	BRACE INDEPENDENT OF CEILING GRID	BRACE INDEPENDENT OF CEILING GRID		
15.	SEISMIC SEPARATION JOINT	NOT REQUIRED	NOT REQUIRED	REQUIRED WHERE AREA IS > 2,500 SF		
16.	RIGID BRACING AT CEILING PLANE CHANGES	NOT REQUIRED	YES	YES		
17.	ALL LIGHT FIXTURES ATTACHED TO GRID, TYPICAL	AT 2 POINTS UNLESS INDEPENDENTLY SUPPORTED	AT 2 POINTS UNLESS INDEPENDENTLY SUPPORTED	AT 2 POINTS UNLESS INDEPENDENTLY SUPPORTED		
18.	SURFACE MOUNTED LIGHT FIXTURE	ATTACH TO GRID	ATTACH TO GRID	ATTACH TO GRID		
19.	PENDANT HUNG LIGHT FIXTURE	SUPPORT DIRECTLY FROM STRUCTURE W/ 9 GA. WIRE	SUPPORT DIRECTLY FROM STRUCTURE W/ 9 GA. WIRE	SUPPORT DIRECTLY FROM STRUCTURE W/ 9 GA. WIRE		
20.	RECESSED LIGHT FIXTURE < 10 LBS.	SUPPORT WITH ONE WIRE TO STRUCTURE	SUPPORT WITH ONE WIRE TO STRUCTURE	SUPPORT WITH ONE WIRE TO STRUCTURE		
21.	LAY-IN OR RECESSED LIGHT FIXTURE, 10 TO 56 LBS.	TWO WIRES TO STRUCTURE ON DIAGONAL	TWO WIRES TO STRUCTURE ON DIAGONAL	TWO WIRES TO STRUCTURE ON DIAGONAL		
22.	LAY-IN OR RECESSED LIGHT FIXTURE > 56 LBS.	SUPPORT INDEPENDENTLY FROM STRUCTURE	SUPPORT INDEPENDENTLY FROM STRUCTURE	SUPPORT INDEPENDENTLY FROM STRUCTURE		
23.	AIR TERMINALS < 20 LBS.	POSITIVELY ATTACHED TO GRID	POSITIVELY ATTACHED TO GRID	POSITIVELY ATTACHED TO GRID		
24.	AIR TERMINALS, 20 TO 56 LBS.	POSITIVELY ATTACH TO GRID + 2 WIRES TO STRUCTURE	POSITIVELY ATTACH TO GRID + 2 WIRES TO STRUCTURE	POSITIVELY ATTACH TO GRID + 2 WIRES TO STRUCTURE		
25.	AIR TERMINALS > 56 LBS.	SUPPORT DIRECTLY FROM STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE		
26.	SPRINKLER HEAD CLEARANCE	3/8 INCH ON ALL SIDES	2 INCH MINIMUM OPENING OR SWING JOINT	2 INCH MINIMUM OPENING OR SWING JOINT		
27.	MISC. PENETRATION CLEARANCE	3/8 INCH ON ALL SIDES	2 INCH MINIMUM OPENING OR FLEX JOINT	2 INCH MINIMUM OPENING OR FLEX JOINT		
28.	CABLE TRAYS	MAY BE SUPPORTED BY GRID OR STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE		
29.	CONDUIT AND PIPING	MAY BE SUPPORTED BY GRID OR STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE	SUPPORT DIRECTLY FROM STRUCTURE		
30.	-	-	-	-		

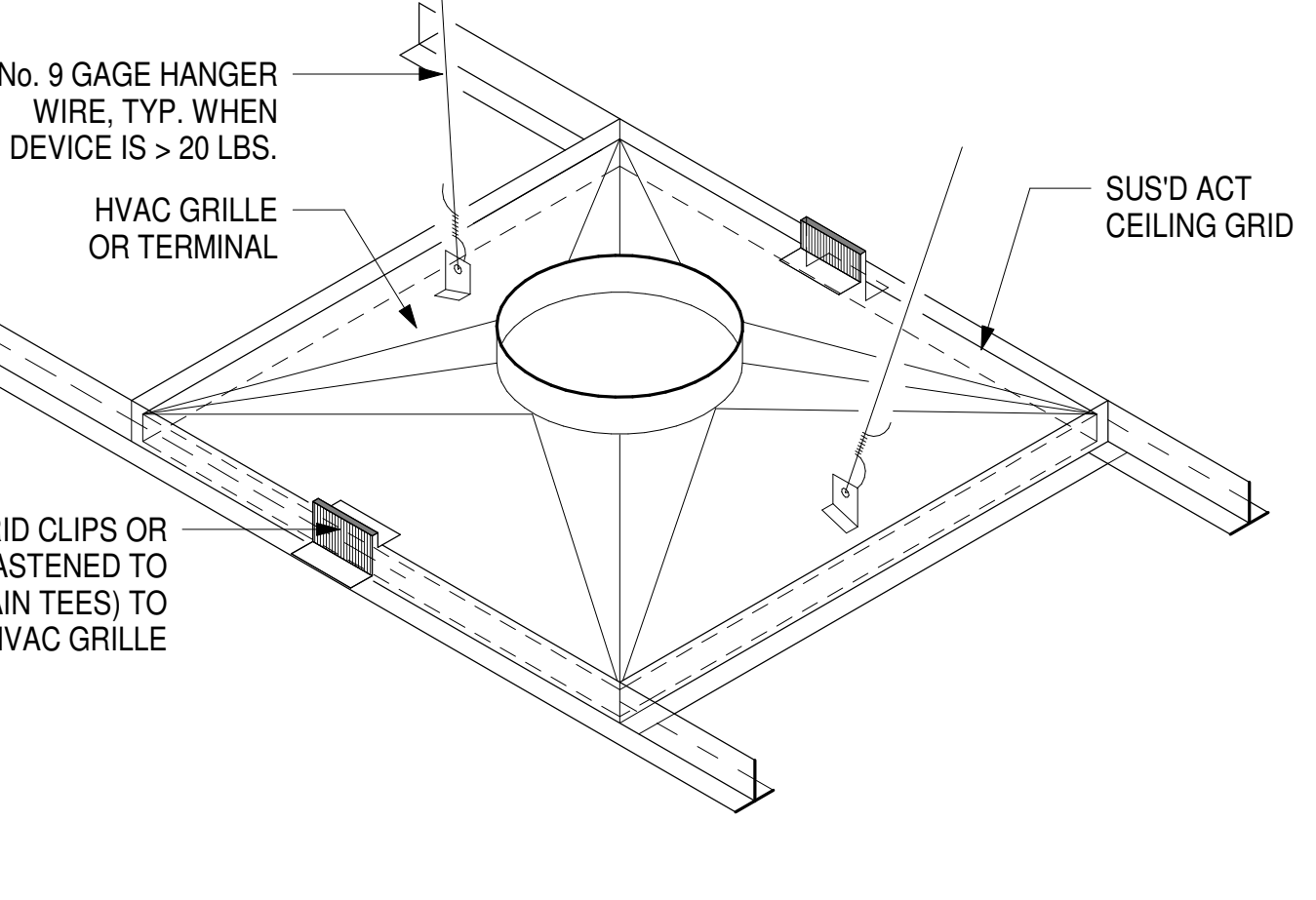
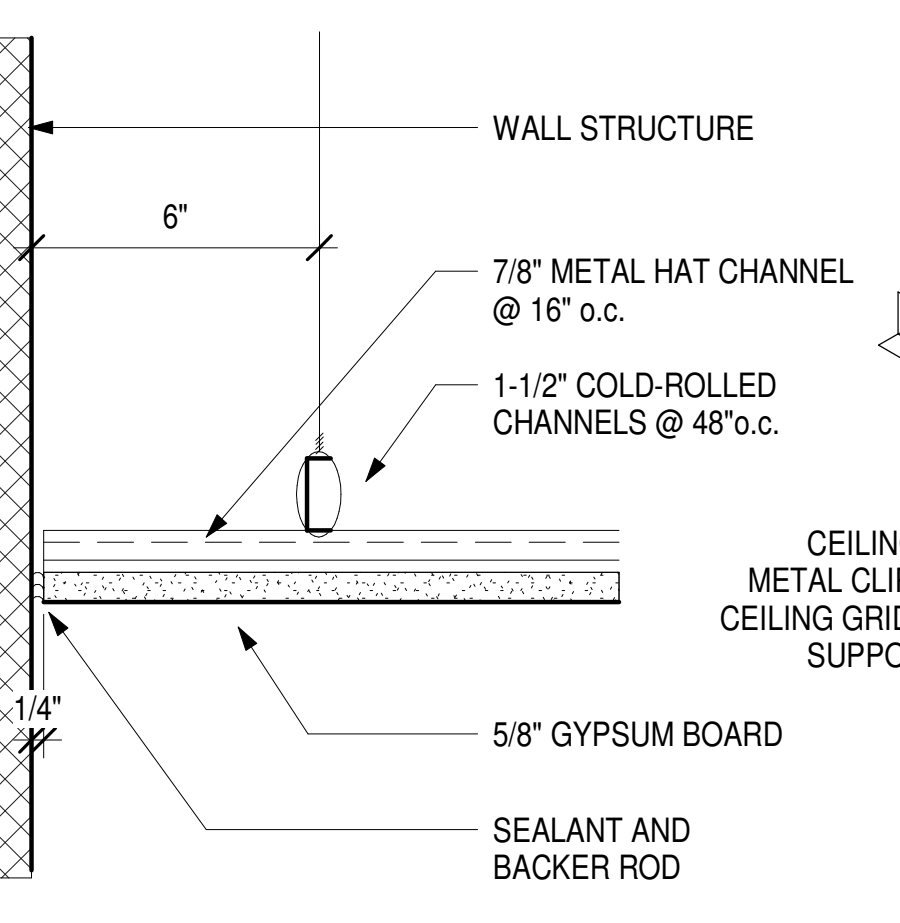
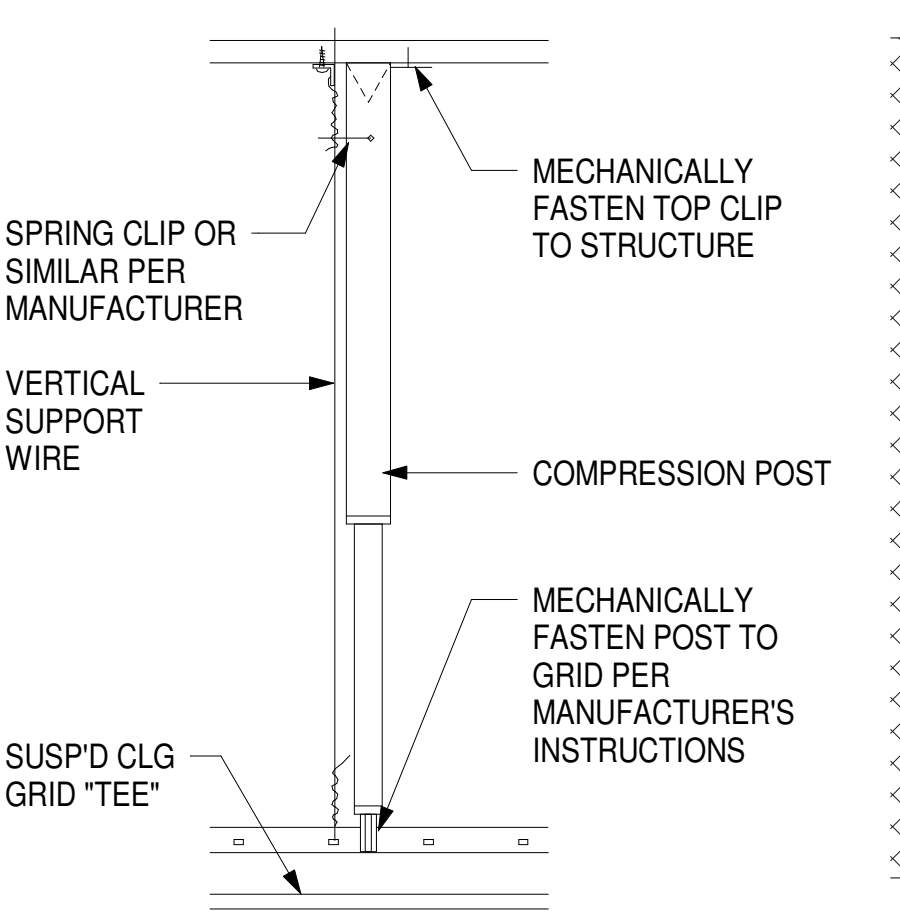
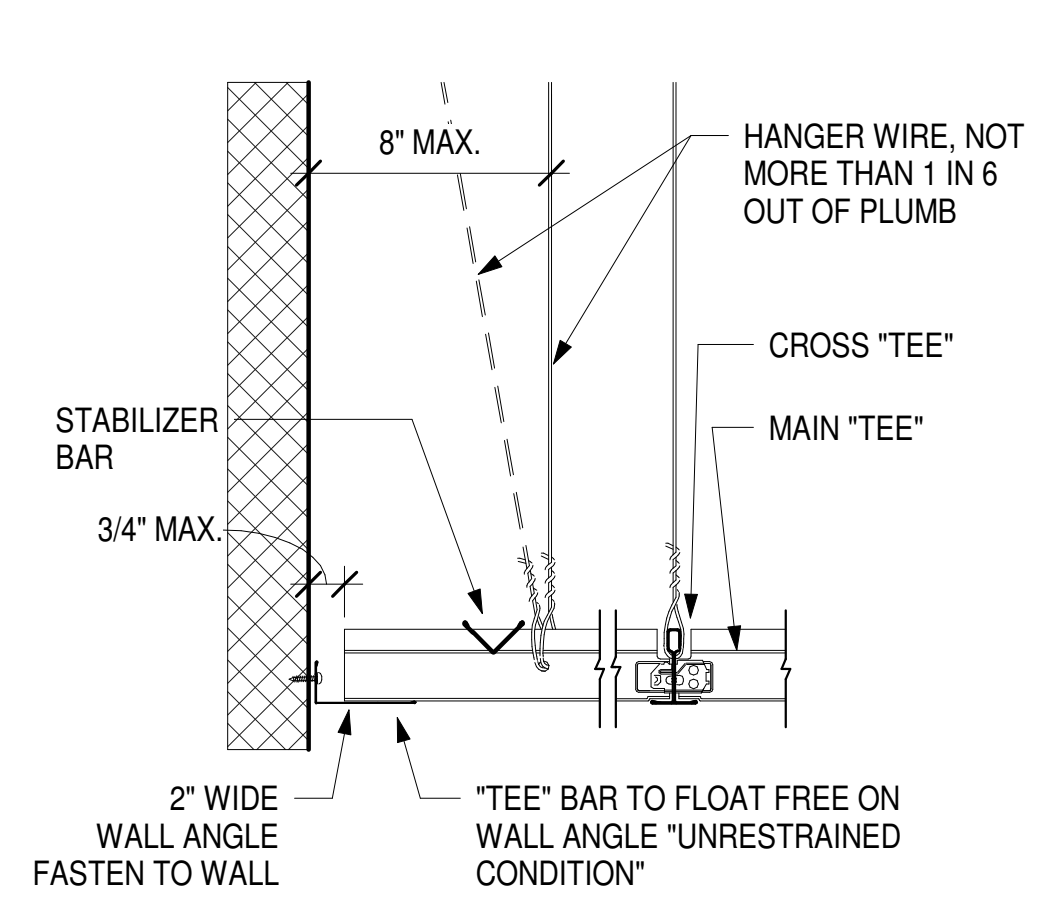
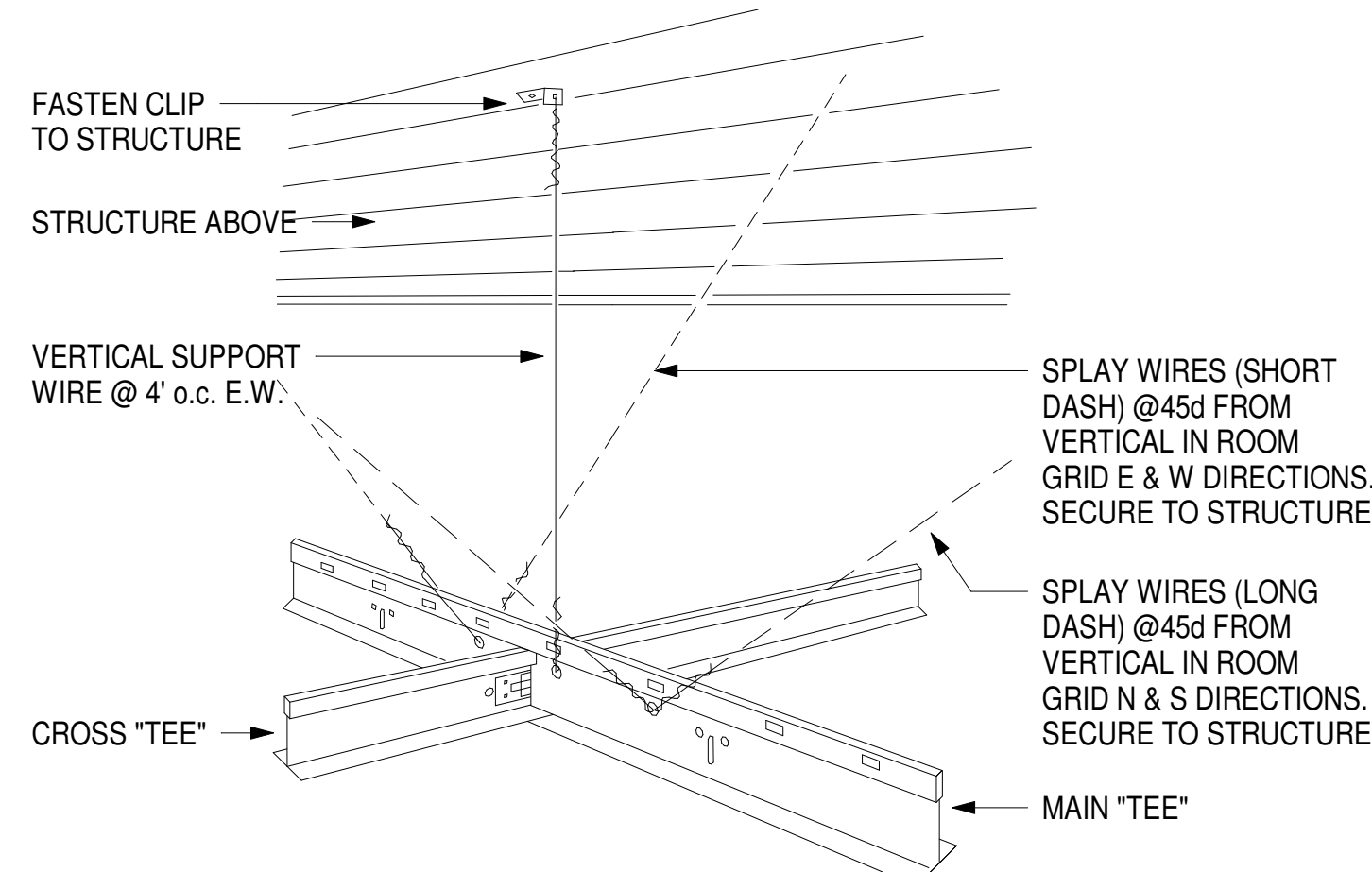
1 GRID WHEN ROOM < 1,000 SF

A570 SCALE: 1/8" = 1'-0"



2 GRID WHEN ROOM > 1,000 SF

A570 SCALE: 1/8" = 1'-0"



3 ACT SEISMIC SPLAY WIRE LAYOUT

A570 SCALE: NOT TO SCALE

4 UNRESTRAINED GRID / WALL

A570 SCALE: 3" = 1'-0"

5 COMPRESSION POST

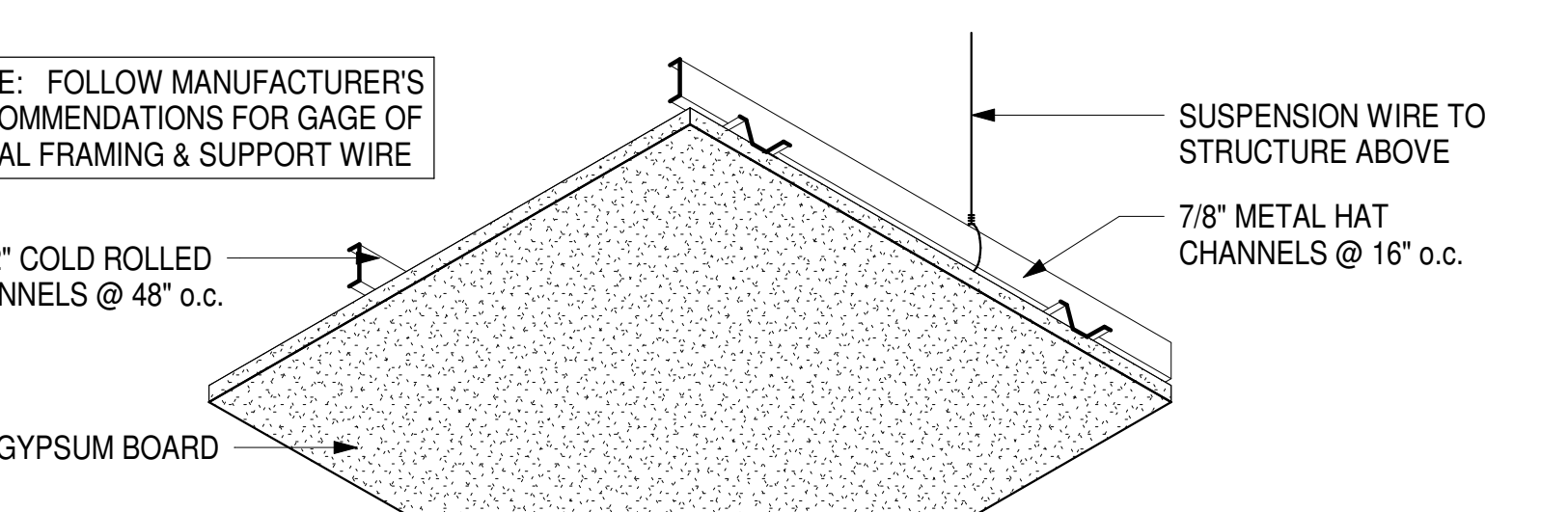
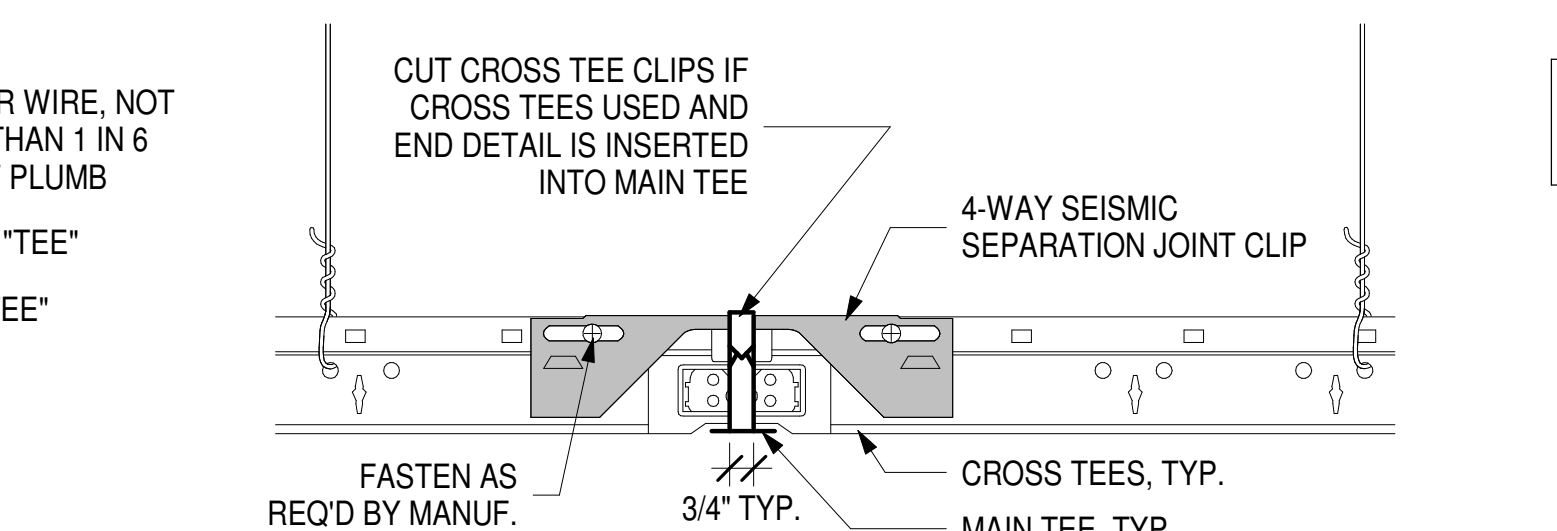
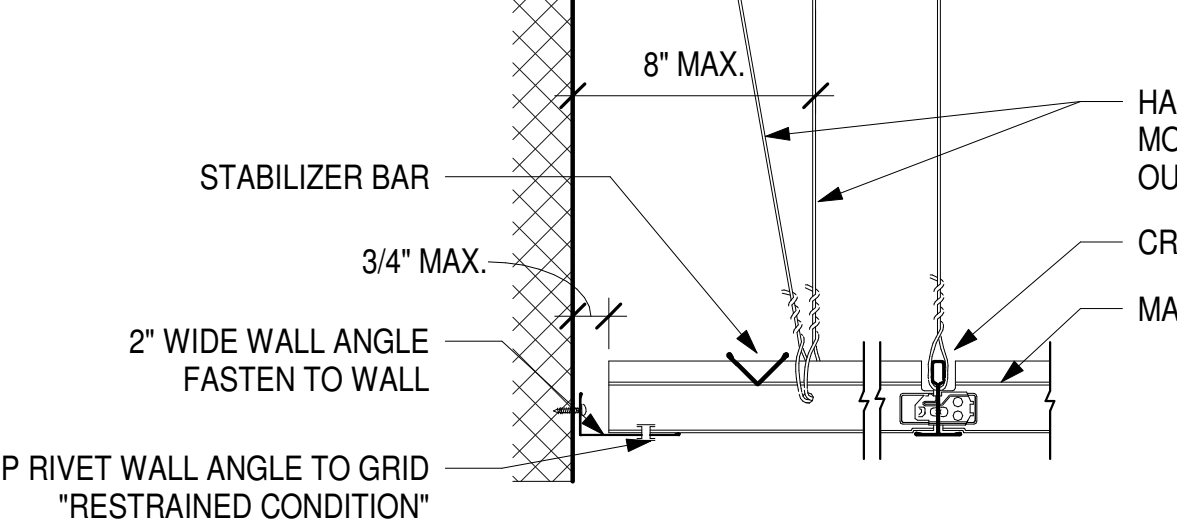
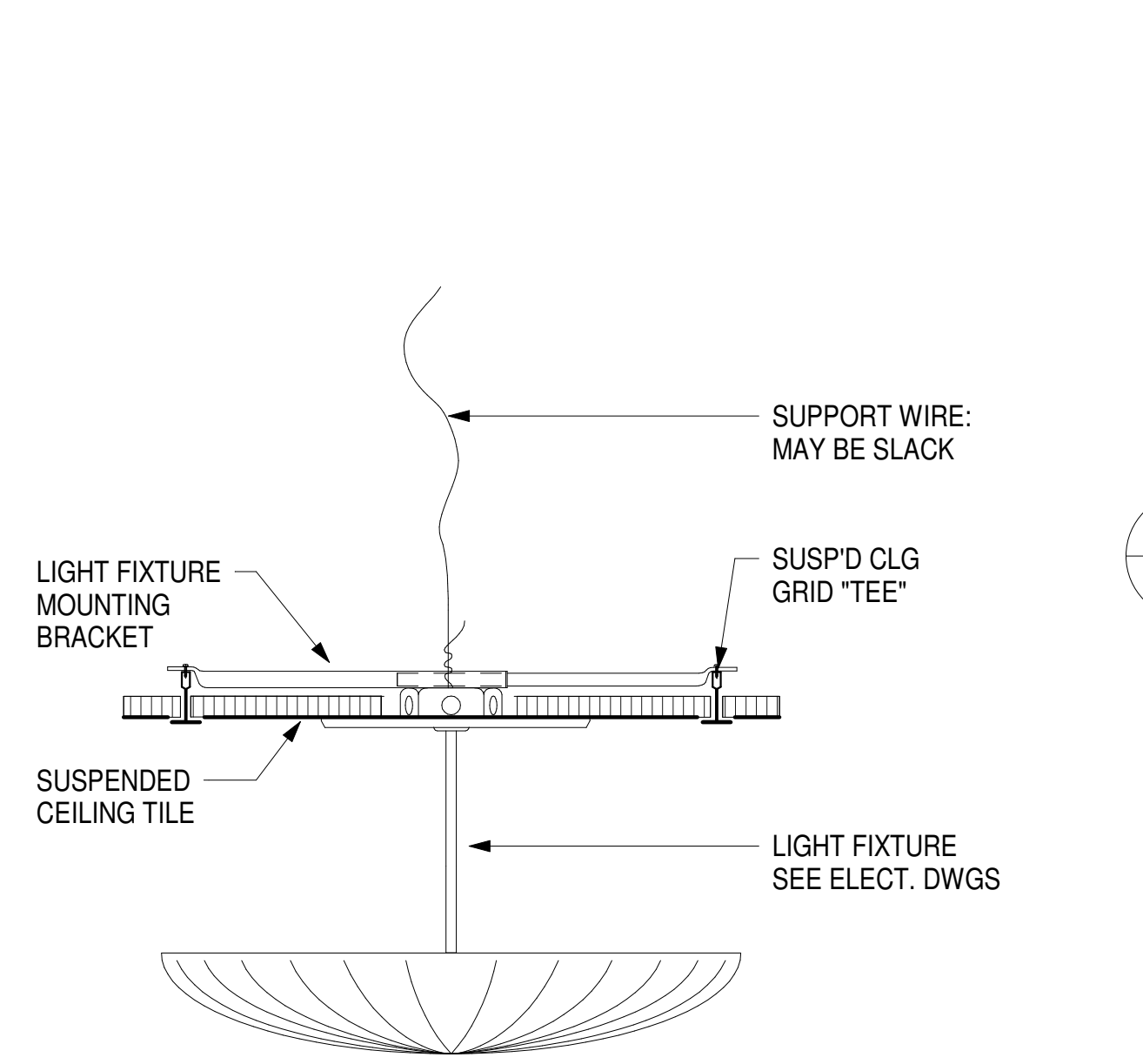
A570 SCALE: 1/64" = 1'-0"

6 CLG @ WALL

A570 SCALE: 3" = 1'-0"

7 AIR TERMINAL ATTACHMENT TO GRID

A570 SCALE: NOT TO SCALE



8 ACT GRID AT WALL

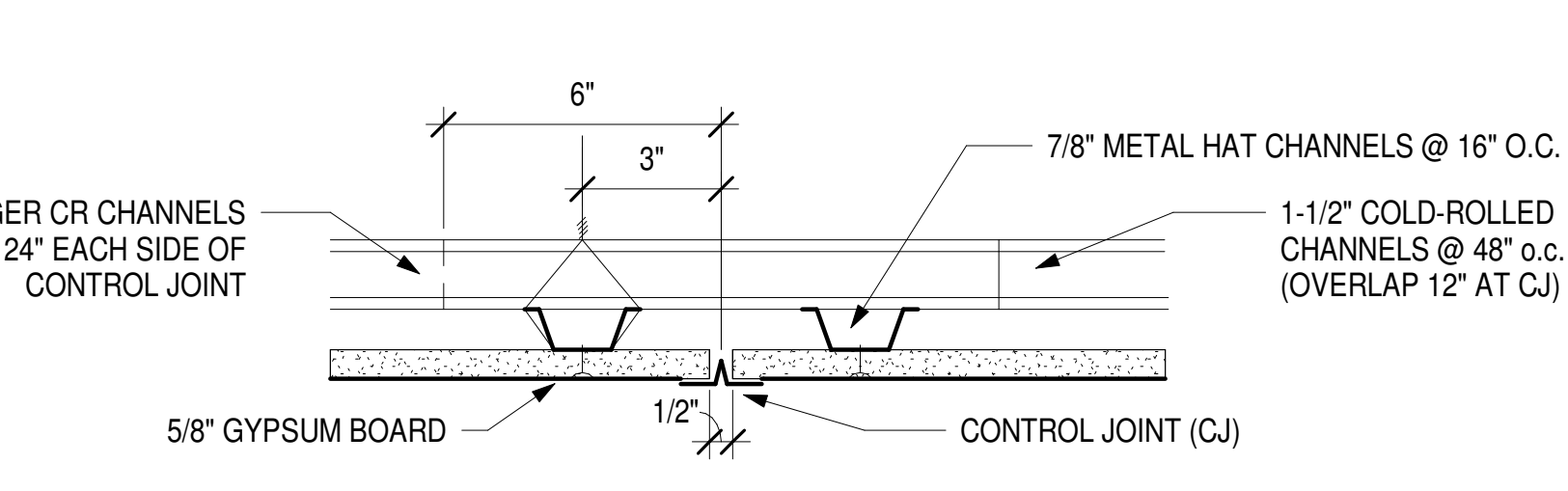
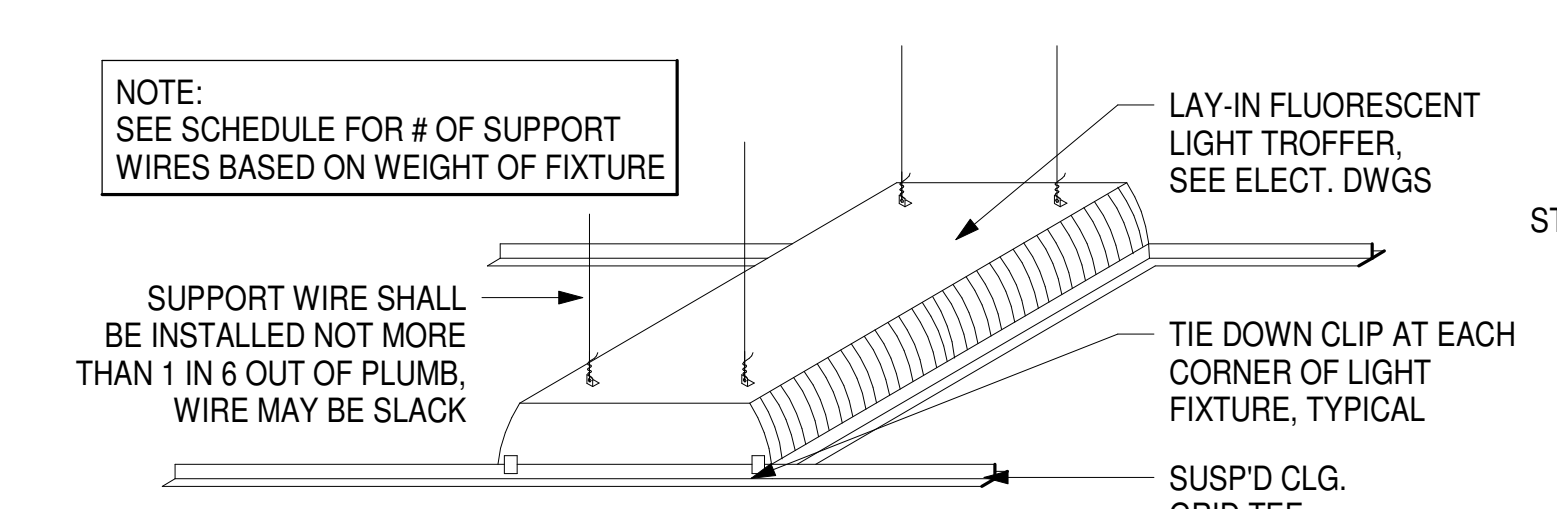
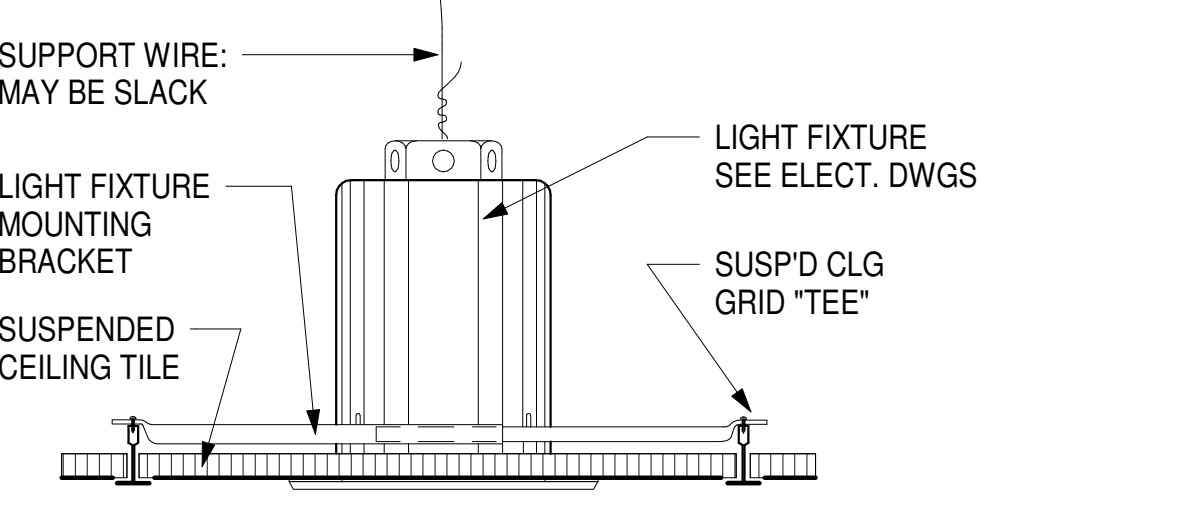
A570 SCALE: 3" = 1'-0"

9 ACT EXPANSION JOINT

A570 SCALE: 3/4" = 1'-0"

10 SUP'D GYPSUM BD. CEILING DETAIL

A570 SCALE: NOT TO SCALE



11 PENDANT LIGHT ATTACHMENT

A570 SCALE: 3/4" = 1'-0"

12 CAN LIGHT DETAIL

A570 SCALE: 3/4" = 1'-0"

13 LAY-IN TROFFER ATTACHMENT

A570 SCALE: NOT TO SCALE

14 GYP. BD. CLG CONTROL JOINT

A570 SCALE: 3" = 1'-0"

REV.	DATE	DESCRIPTION

STATE OF SOUTH CAROLINA
 Glick/Boehm & Associates, Inc.
 CHARLESTON, SC 29405
 REGISTERED ARCHITECT

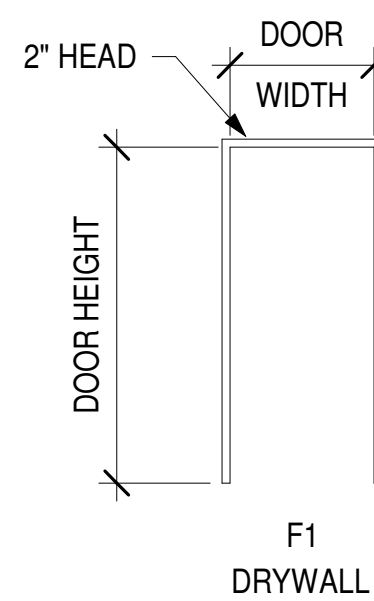
STATE OF SOUTH CAROLINA
 Glick/Boehm & Associates, Inc.
 CHARLESTON, SC 29405
 REGISTERED ARCHITECT

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 COLLETON COUNTY
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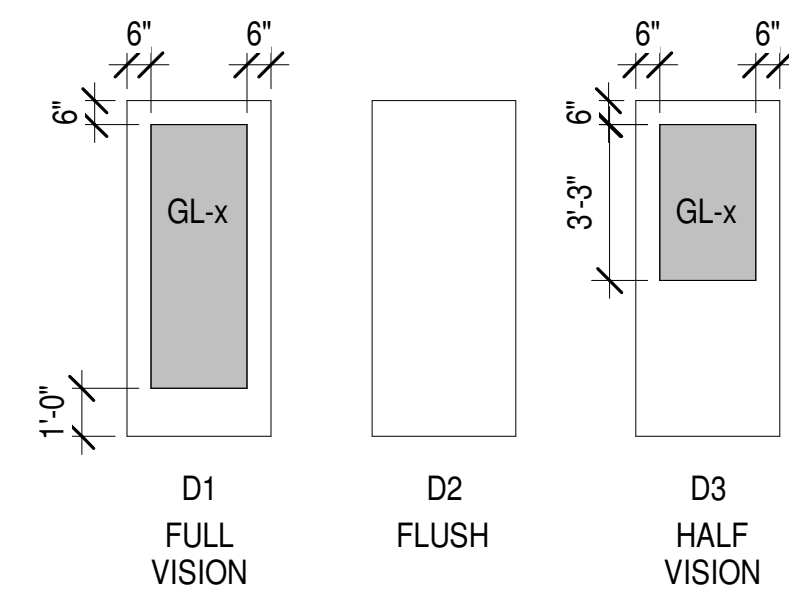
TYPICAL CEILING & SEISMIC DETAILS

A570



DOOR FRAME ELEVATIONS

SCALE: 1/4" = 1'-0"



DOOR TYPE ELEVATIONS

SCALE: 1/4" = 1'-0"

DOOR & FRAME SCHEDULE

TAG	DOOR							GLAZING	FRAME			FIRE RATING	HARDWARE SET	DETAILS			NOTES
	TYPE	HEIGHT	WIDTH	THICKNESS	MATERIAL	FINISH	TYPE		MATERIAL	FINISH	HEAD			JAMB	SILL		
100a	D1	7'-0"	(2x) 3'-0"	2"	ALUM	FF	GL-2	A4	ALUM.	FF	-	HW-02			4/A600	STOREFRONT DOOR SYSTEM	
100b	D1	7'-0"	(2x) 3'-0"	2"	ALUM	FF	GL-2	A4	ALUM.	FF	-	HW-02			4/A600	STOREFRONT DOOR SYSTEM	
100c	D1	7'-0"	(2x) 3'-0"	2"	ALUM	FF	GL-2	A4	ALUM.	FF	-	HW-03			4/A600	STOREFRONT DOOR SYSTEM	
101	D1	7'-0"	(2x) 3'-0"	2"	ALUM	FF	GL-2	A2	ALUM.	FF	-	HW-01			4/A600	STOREFRONT DOOR SYSTEM	
103a	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-07	3/A600	2/A600	1/A600		
103b	D3	7'-0"	3'-0"	1 3/4"	SCW	ST	GL-4	F1	HM	PNT	-	HW-05	3/A600	2/A600	1/A600		
104a	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-07	3/A600	2/A600	1/A600		
104b	D3	7'-0"	3'-0"	1 3/4"	SCW	ST	GL-4	F1	HM	PNT	-	HW-05	3/A600	2/A600	1/A600		
105a	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-07	3/A600	2/A600	1/A600		
105b	D3	7'-0"	3'-0"	1 3/4"	SCW	ST	GL-1	F1	HM	PNT	1 HR	HW-015	3/A600	2/A600	1/A600		
106a	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-010	3/A600	2/A600	1/A600		
106b	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-05	3/A600	2/A600	1/A600		
107	D3	7'-0"	3'-0"	1 3/4"	SCW	ST	GL-4	F1	HM	PNT	1 HR	HW-08	3/A600	2/A600	1/A600		
110	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-06	3/A600	2/A600	1/A600		
111	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	1 HR	HW-08	3/A600	2/A600	1/A600		
112	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-06	3/A600	2/A600	1/A600		
113a	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-09	3/A600	2/A600	1/A600		
113b	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	1 HR	HW-08	3/A600	2/A600	1/A600		
114	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-06	3/A600	2/A600	1/A600		
115	D3	7'-0"	3'-0"	1 3/4"	SCW	ST	GL-4	F1	HM	PNT	-	HW-07	6/A600	5/A600	4/A600		
116a	D2	7'-0"	3'-0"	2"	HM	PNT	-	F1	HM	PNT	1 HR	HW-019	6/A600	5/A600	4/A600		
116b	D2	7'-0"	3'-0"	2"	HM	PNT	-	F1	HM	PNT	1 HR	HW-019	3/A600	2/A600	1/A600		
117	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	1 HR	HW-018	3/A600	2/A600	1/A600		
118	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	-	HW-013	3/A600	2/A600	1/A600		
119	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	1 HR	HW-016	3/A600	2/A600	1/A600		
120	D2	7'-0"	3'-0"	1 3/4"	SCW	ST	-	F1	HM	PNT	1 HR	HW-017	3/A600	2/A600	1/A600		
121	D3	7'-0"	3'-0"	1 3/4"	SC	ST	GL-4	F1	HM	PNT	1 HR	HW-014	3/A600	2/A600	1/A600	PROVIDE DOOR SWEEP AND PERIMETER INTERLOCKING WEATHERSTRIPPING AT INTERIOR SIDE OF JAMB	
122	D2	7'-0"	3'-0"	1 3/4"	SC	ST	-	F1	HM	PNT	1 HR	HW-018	3/A600	2/A600	1/A600		
124	D2	7'-0"	3'-0"	1 3/4"	SC	ST	-	F1	HM	PNT	-	HW-04	3/A600	2/A600	1/A600		
125	D2	7'-0"	3'-0"	1 3/4"	SC	ST	-	F1	HM	PNT	1 HR	HW-011	3/A600	2/A600	1/A600		
126	D2	7'-0"	3'-0"	1 3/4"	SC	ST	-	F1	HM	PNT	1 HR	HW-018	3/A600	2/A600	1/A600		
130	D2	7'-0"	3'-0"	1 3/4"	SC	ST	-	F1	HM	PNT	-	HW-017	3/A600	2/A600	1/A600		

DOOR SCHEDULE NOTES

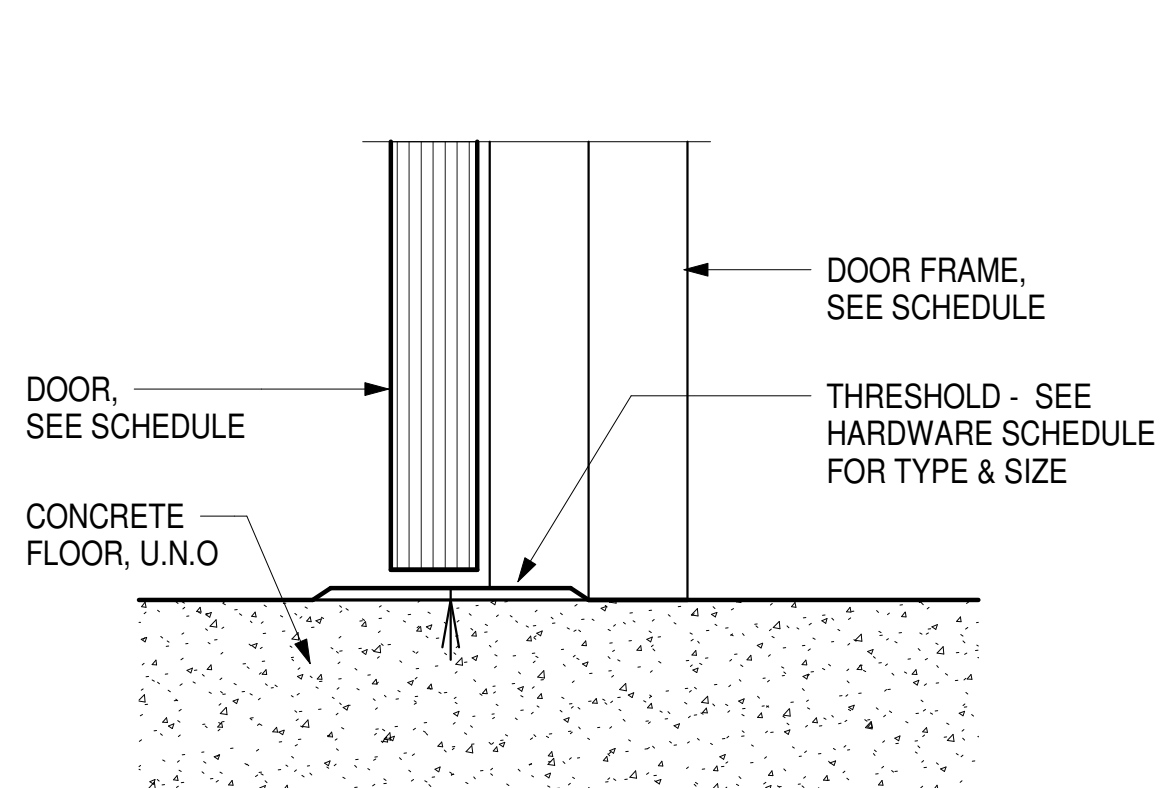
- REFER TO DOOR PANEL TYPES FOR GLAZING TYPES AND LOCATIONS
- REFER TO A610 FOR STOREFRONT ELEVATIONS, GLAZING TYPES AND LOCATIONS.
- REFER TO FINISH SCHEDULE A140 FOR PAINT COLORS, PAINT NOTES

GLAZING TYPES

TYPE	SIZE	DESCRIPTION
GL-1	1 5/16"	TINTED INSULATED GLASS UNIT
GL-2	1 5/16"	TINTED TEMPERED INSULATED GLASS UNIT
GL-4	1/4"	TEMPERED GLASS UNIT

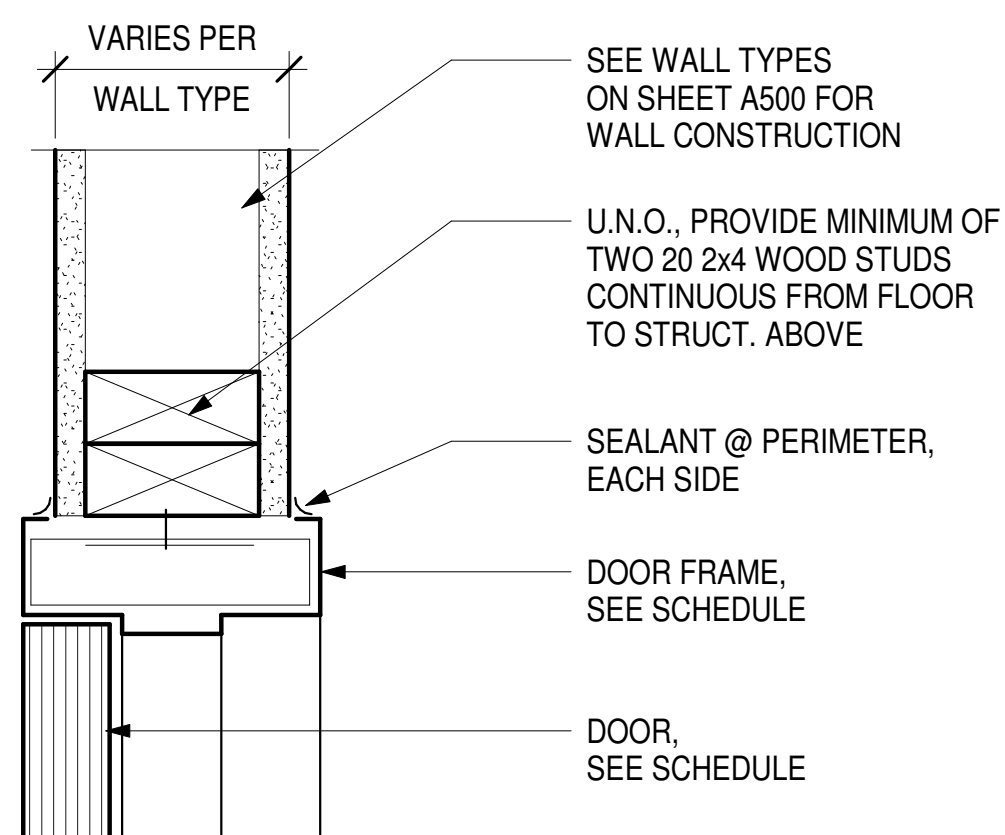
FINISH ABBREV

ACT	ACOUSTICAL CEILING TILE
ACW	ALUMINUM CLAD WOOD
ALUM	ALUMINUM
CONC.	CONCRETE
CP	CARPET
CT	CERAMIC TILE
FF	FACTORY FINISH
GYP BD	GYPSTUM BOARD
MFR	MANUFACTURER FINISH
PNT	PAINT
SCW	SOLID CORE (WOOD DOOR)
ST	STAIN (FACTORY FINISH)
WC	WAINSCOT
WD	WOOD



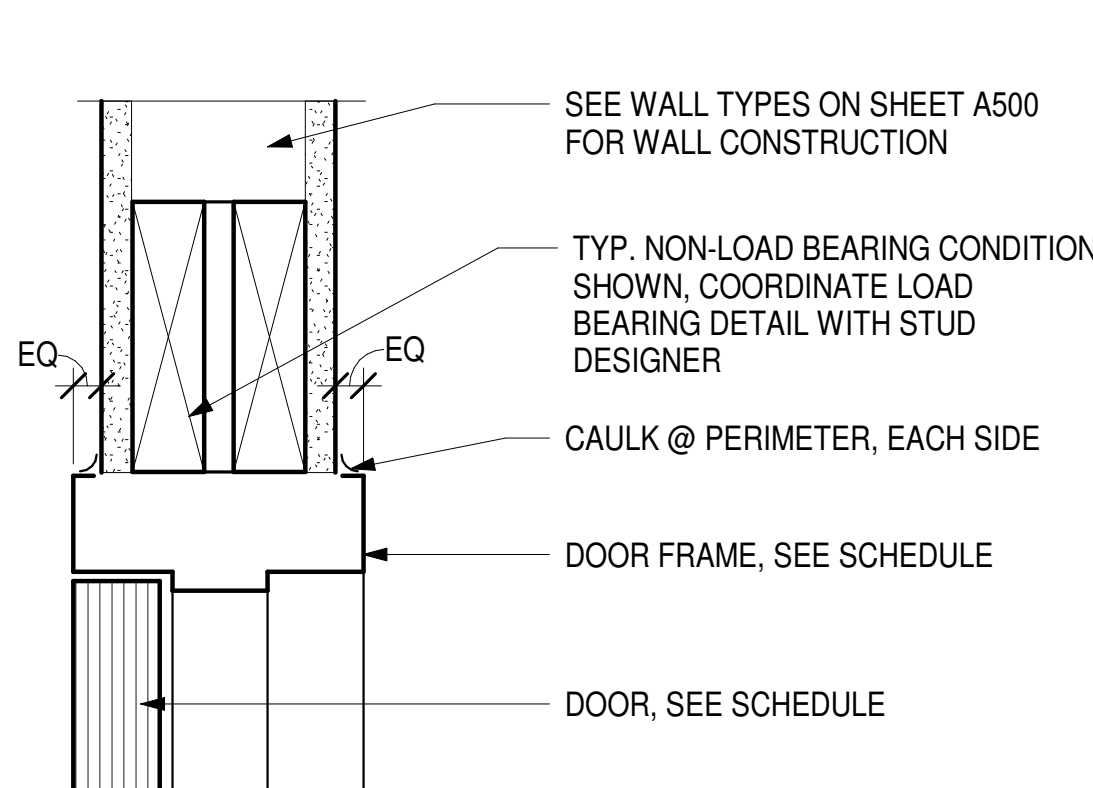
1 DOOR SILL INTERIOR

A600 SCALE: 3" = 1'-0"



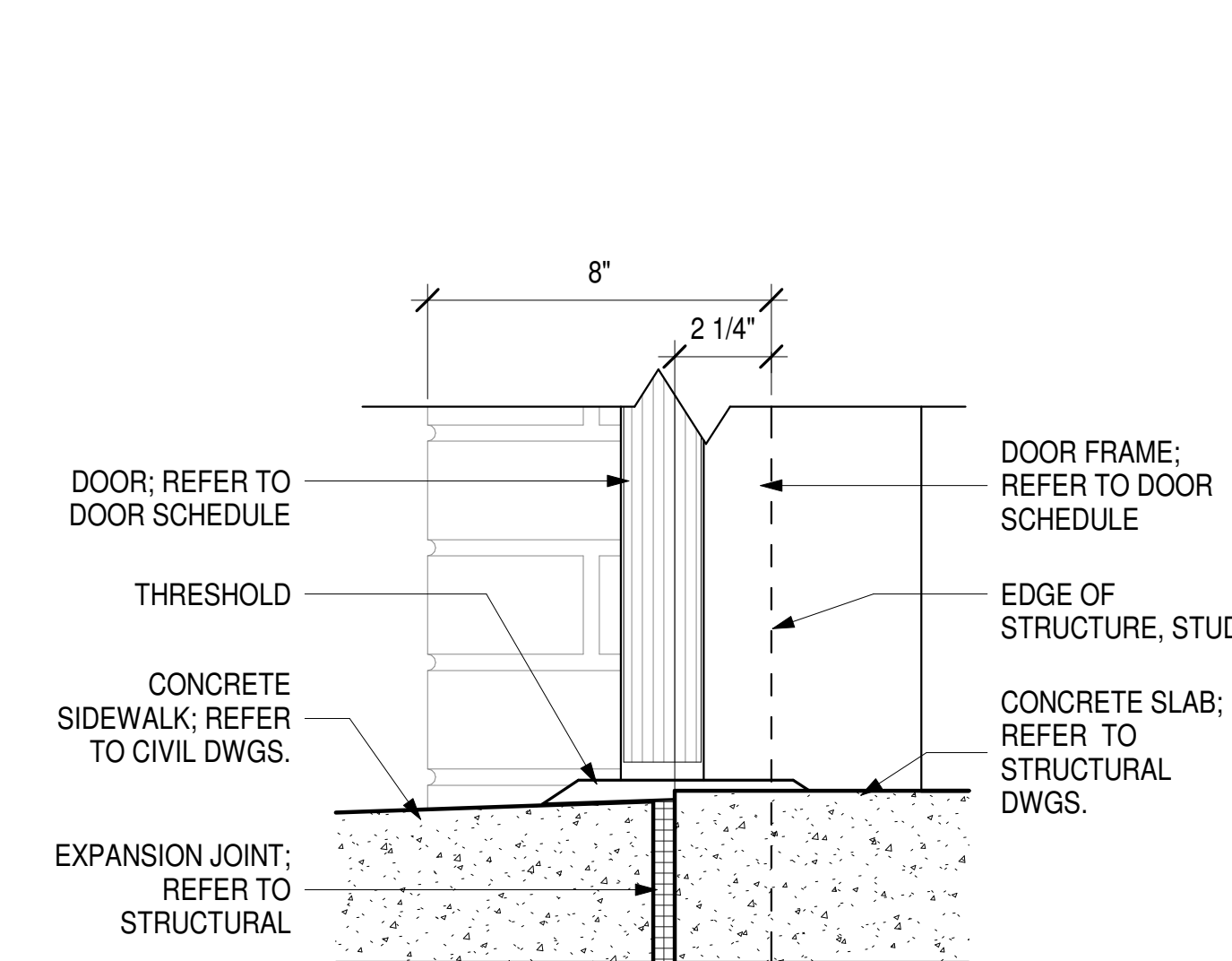
2 DOOR JAMB INT @ WD STUD

A600 SCALE: 3" = 1'-0"



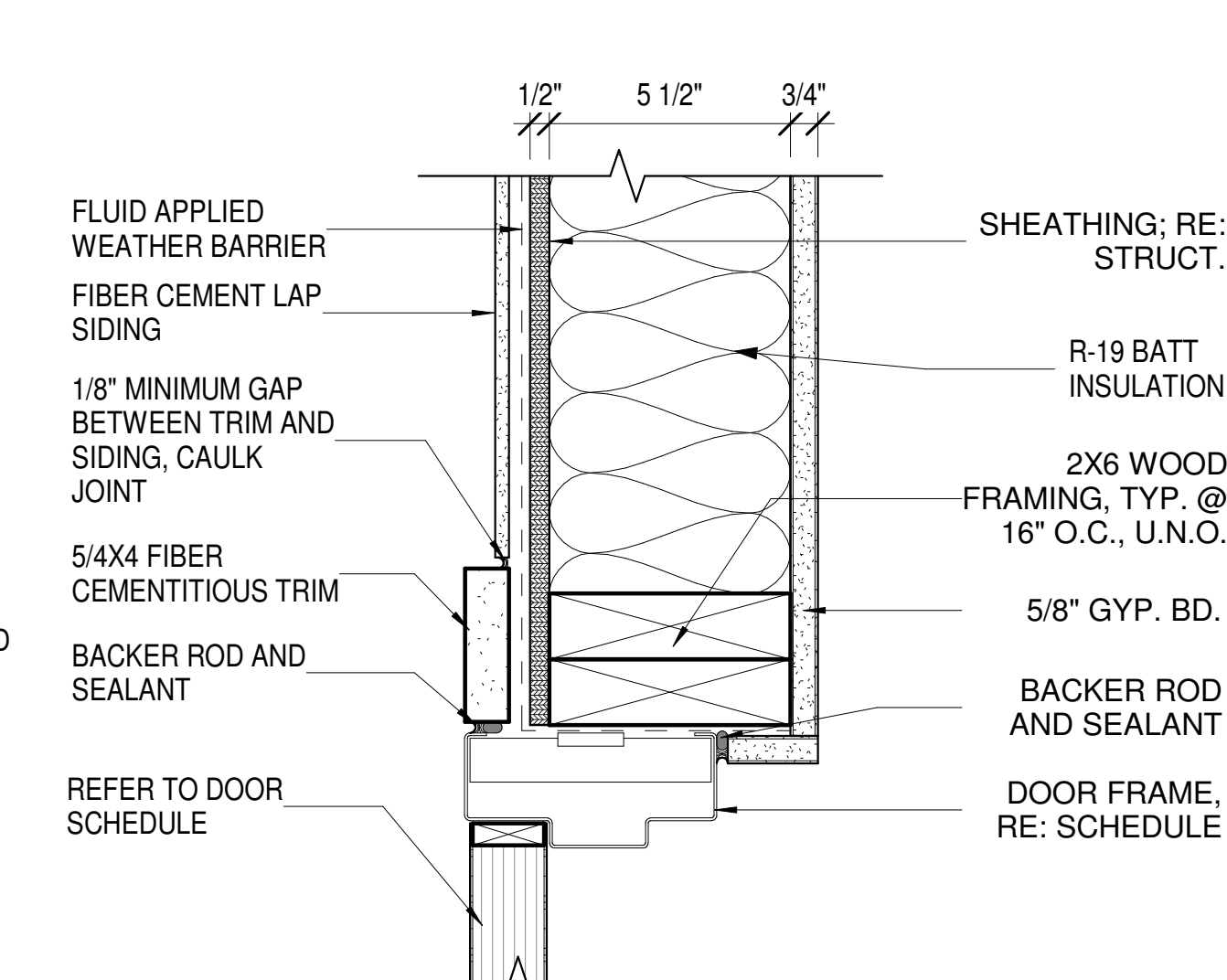
3 DOOR HEAD INT @ WD STUD

A600 SCALE: 3" = 1'-0"



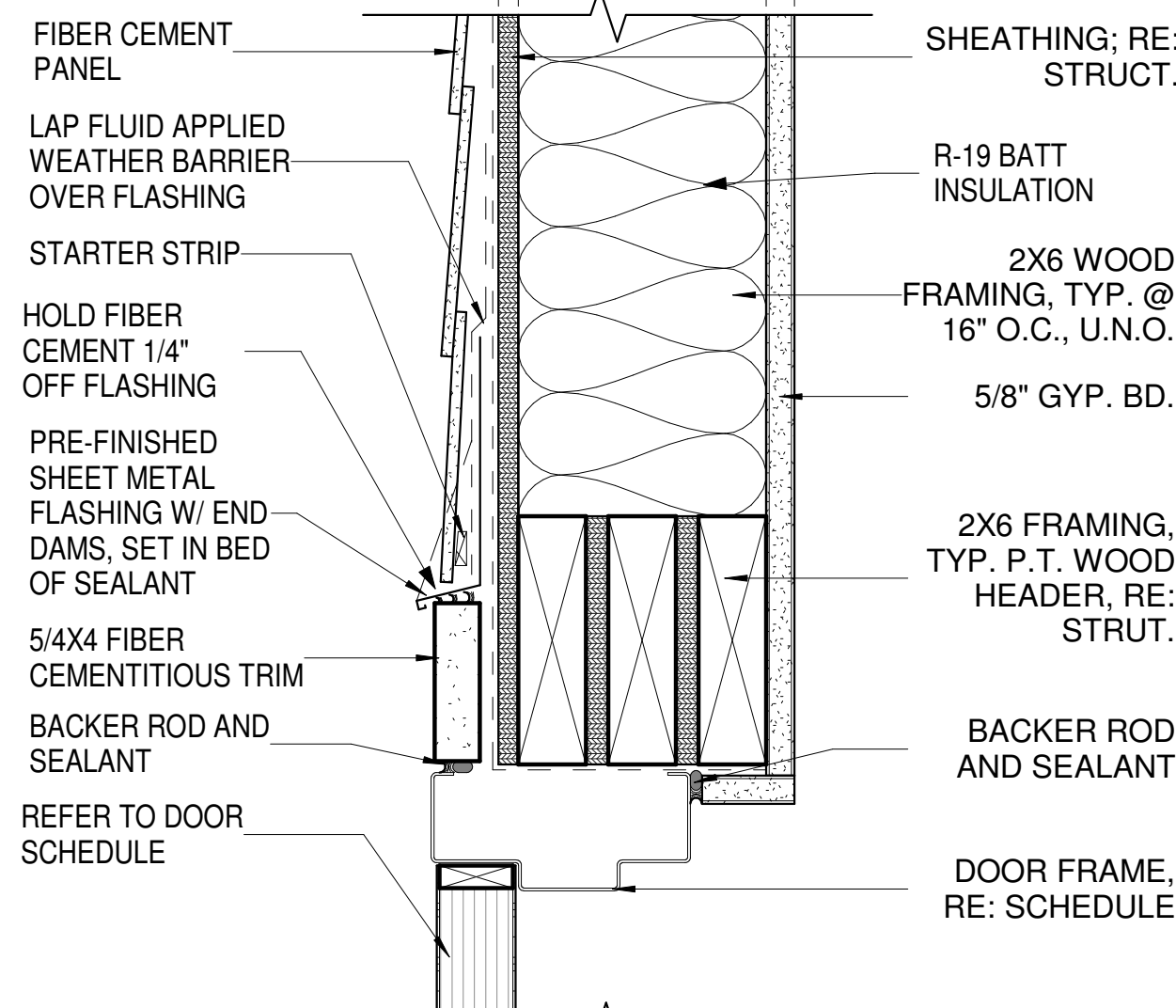
4 EXTERIOR DOOR THRESHOLD

A600 SCALE: 3" = 1'-0"



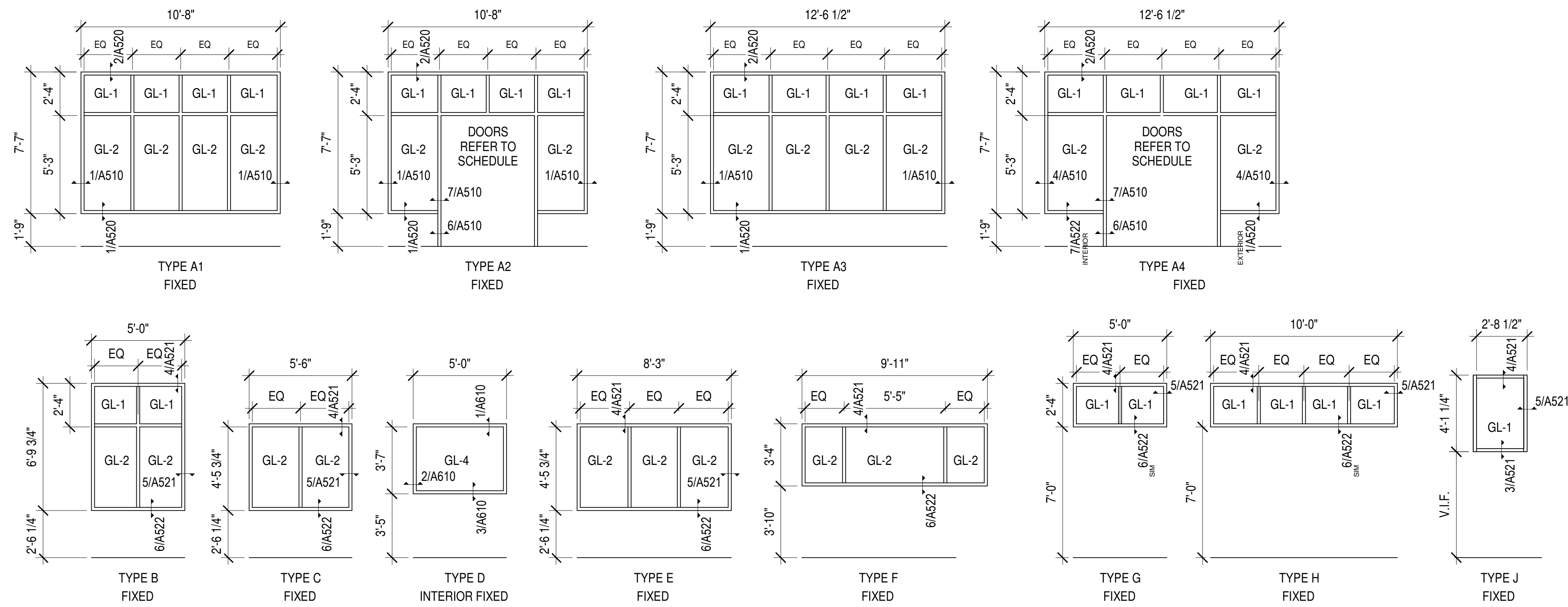
5 EXT. DOOR JAMB

A600 SCALE: 3" = 1'-0"



6 EXT. DOOR HEAD

A600 SCALE: 3" = 1'-0"



STOREFRONT & WINDOW NOTES

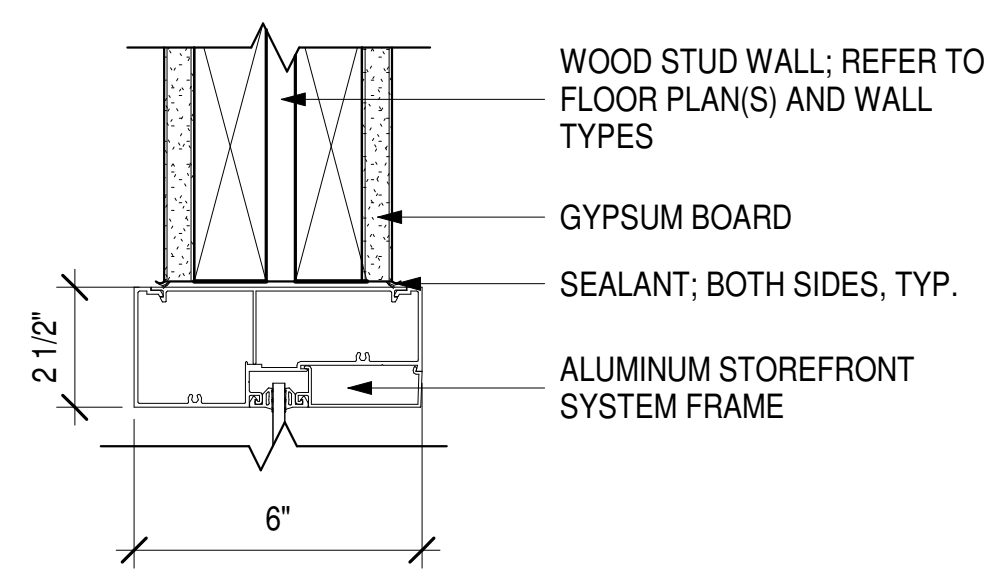
- GLAZING SPECIFIED IN SECTION 08 80 00
- ALL EXTERIOR GLAZING SHALL BE GL-1 UNLESS NOTED OTHERWISE
- ALL INTERIOR GLAZING SHALL BE GL-4 UNLESS NOTED OTHERWISE
- REFER TO A600 FOR GLAZING AT STOREFRONT DOORS
- PROVIDE BRAKE METAL ENCLOSURE AT BOTH SIDE OF STOREFRONT

GLAZING TYPES

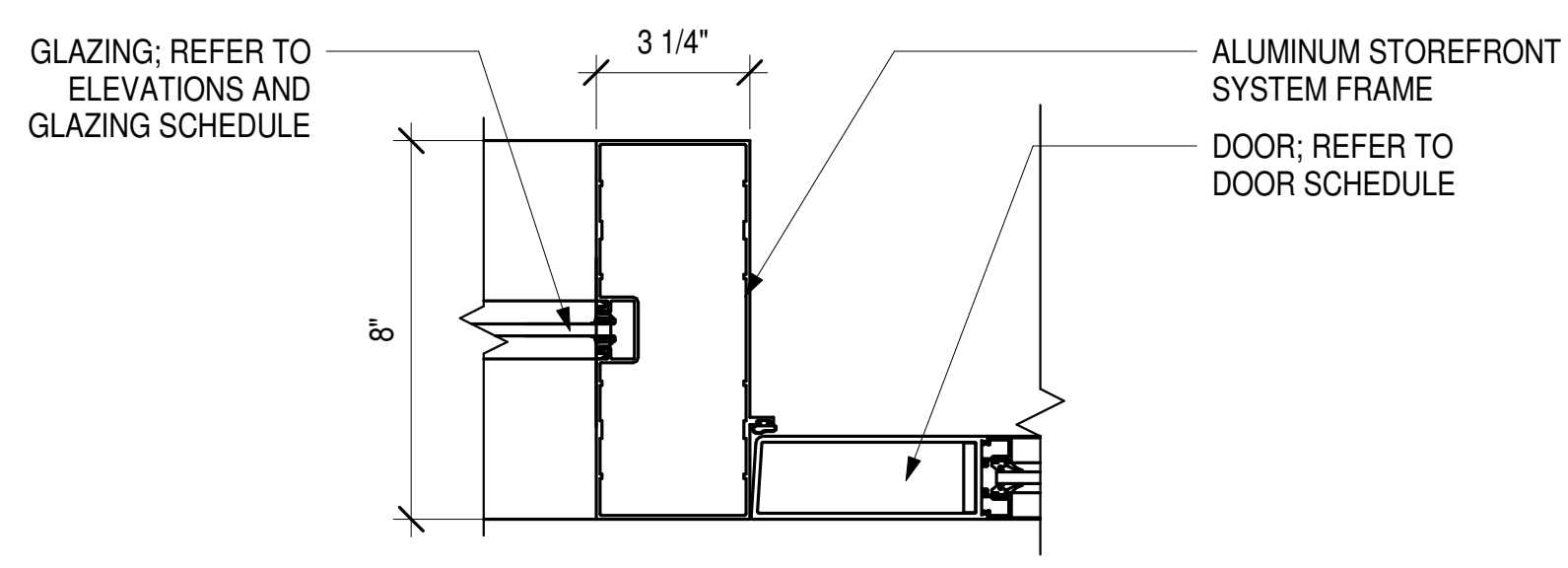
TYPE	SIZE	DESCRIPTION
GL-1	1 5/16"	TINTED INSULATED GLASS UNIT
GL-2	1 5/16"	TINTED TEMPERED INSULATED GLASS UNIT
GL-4	1/4"	TEMPERED GLASS UNIT

STOREFRONT ELEVATIONS

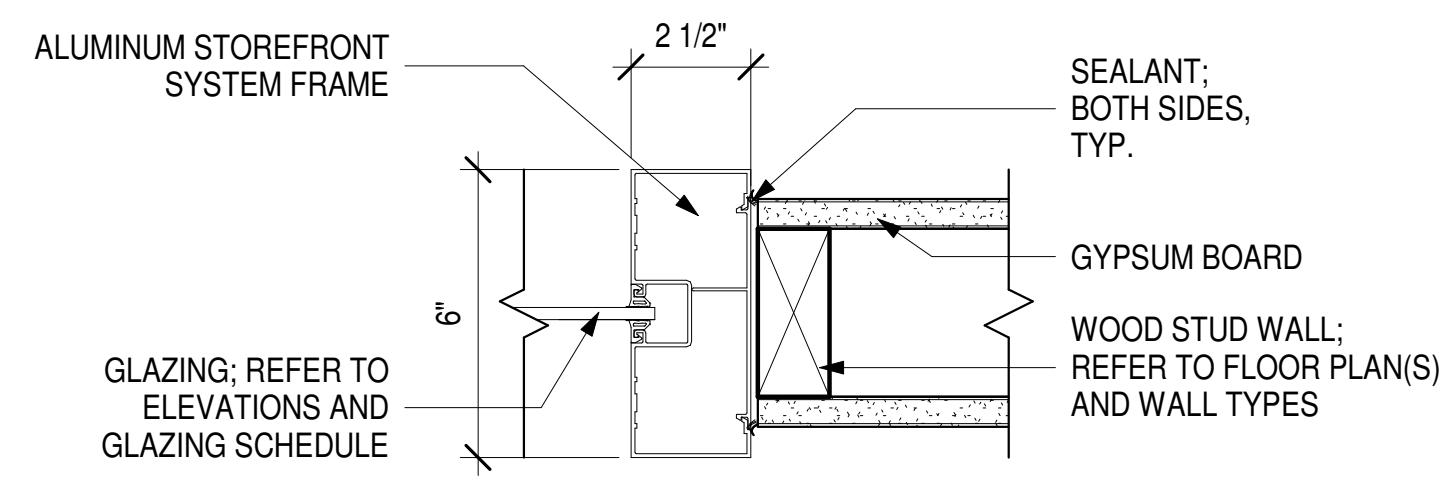
SCALE: 1/4" = 1'-0"



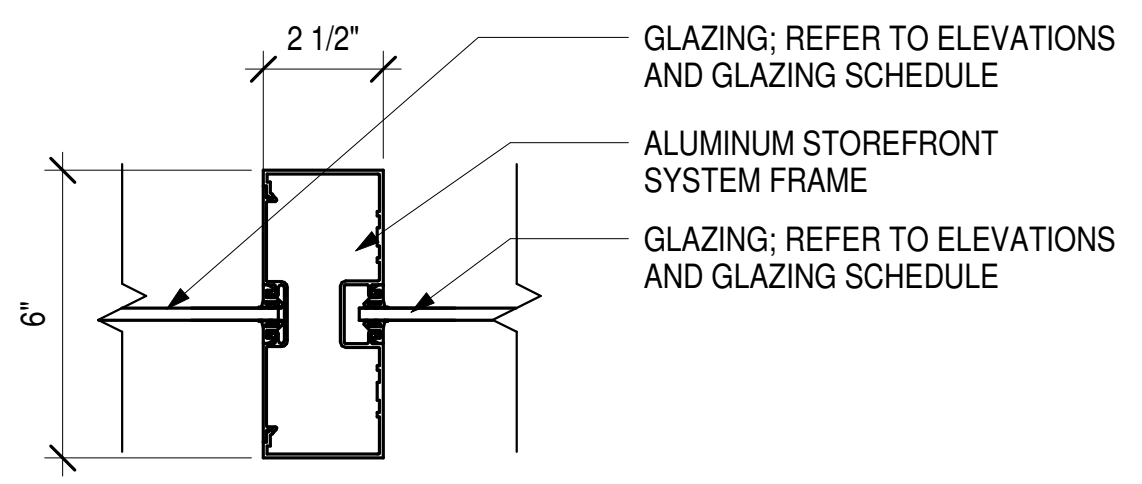
1 INTERIOR S.F. HEAD DETAIL
A610 SCALE: 3" = 1'-0"



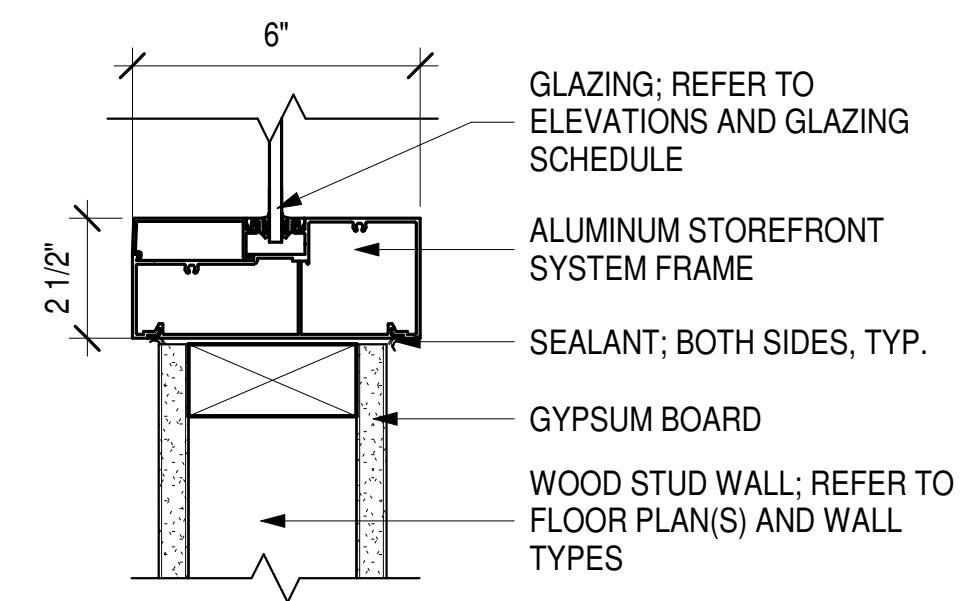
4 INTERIOR S.F. (DOOR JAMB @ SIDELITE)
A610 SCALE: 3" = 1'-0"



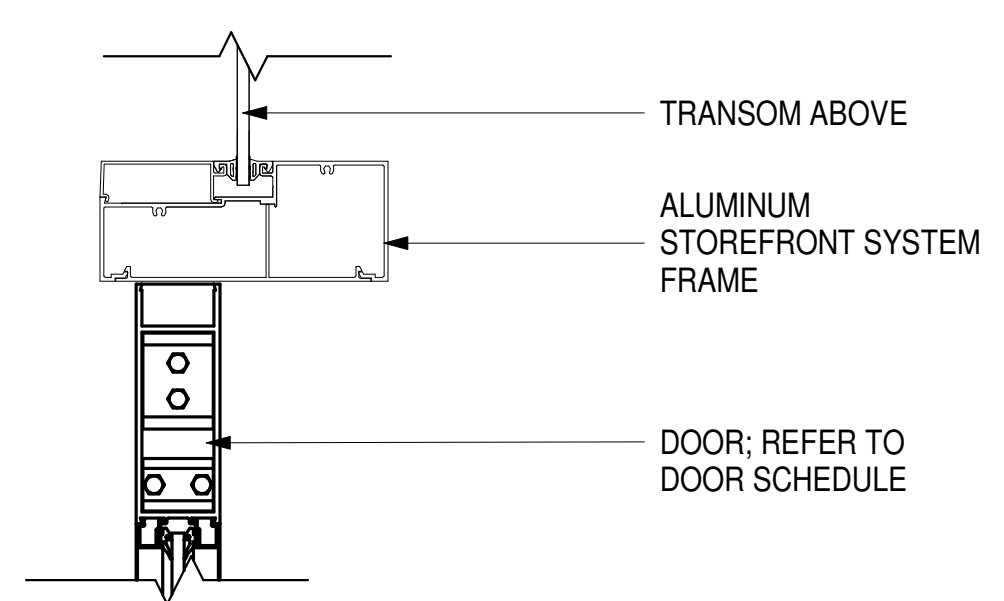
2 INTERIOR S.F. JAMB DETAIL
A610 SCALE: 3" = 1'-0"



5 INTERIOR S.F. (VERTICAL MULLION)
A610 SCALE: 3" = 1'-0"

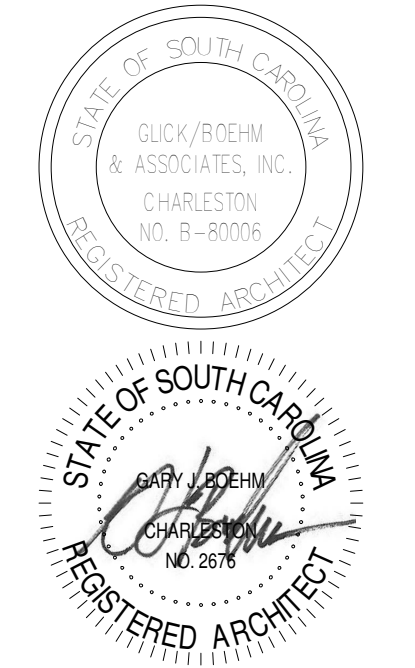


3 INTERIOR S.F. SILL DETAIL
A610 SCALE: 3" = 1'-0"



6 INTERIOR S.F. (DOOR HEAD @ TRANSOM)
A610 SCALE: 3" = 1'-0"

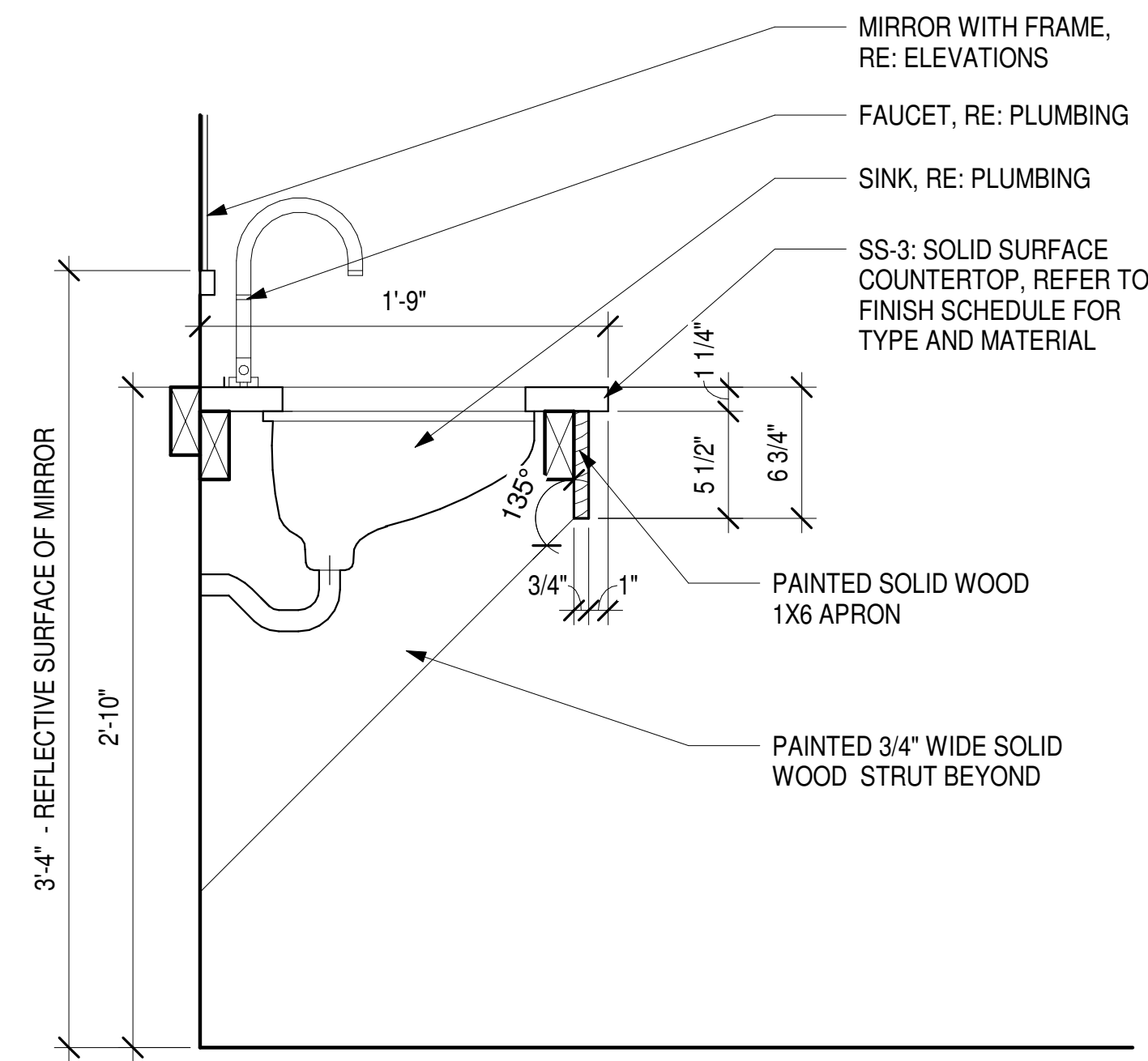
REV.	DATE	DESCRIPTION



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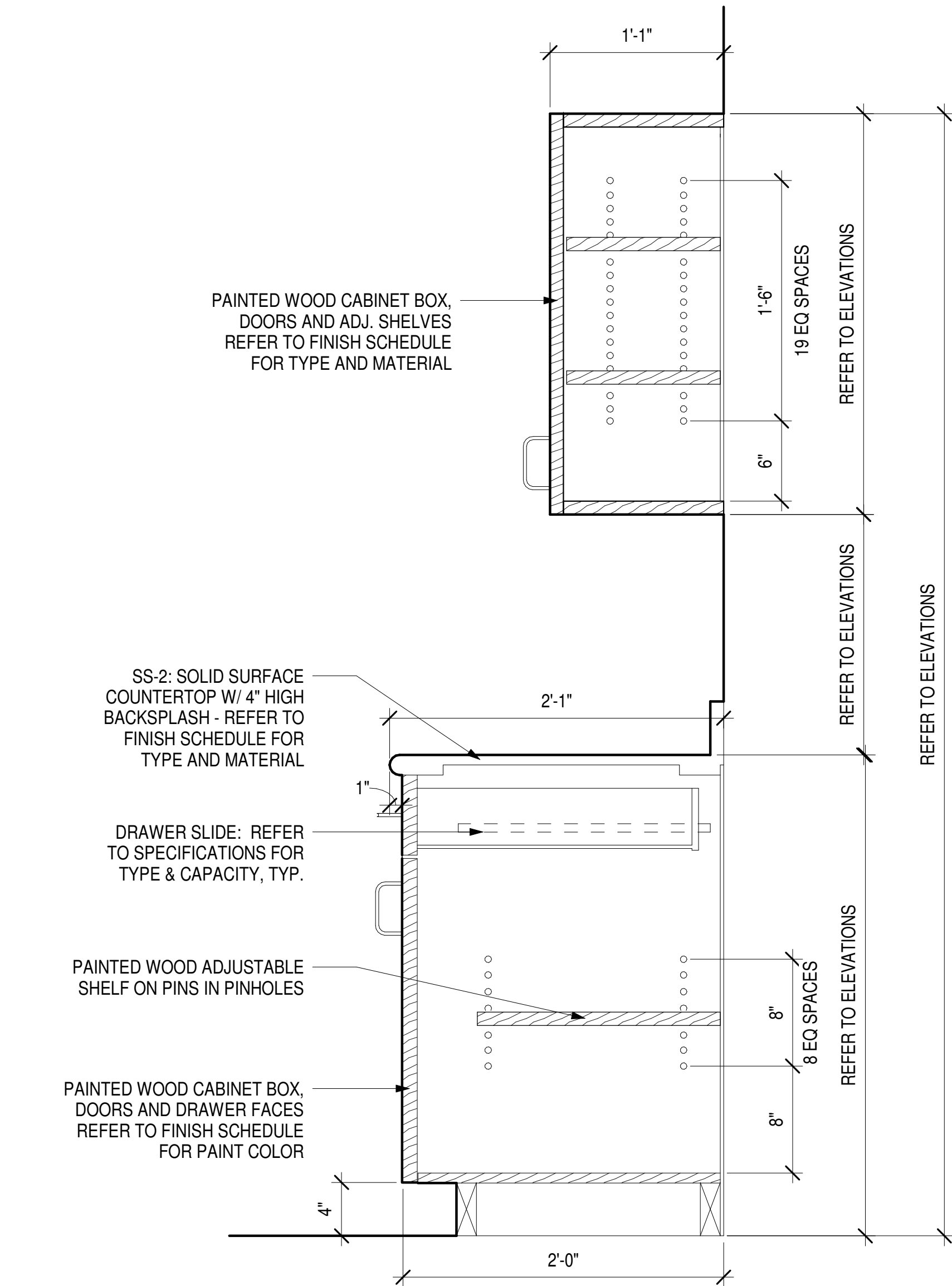
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CDs

STOREFRONT SCHEDULE & DETAILS



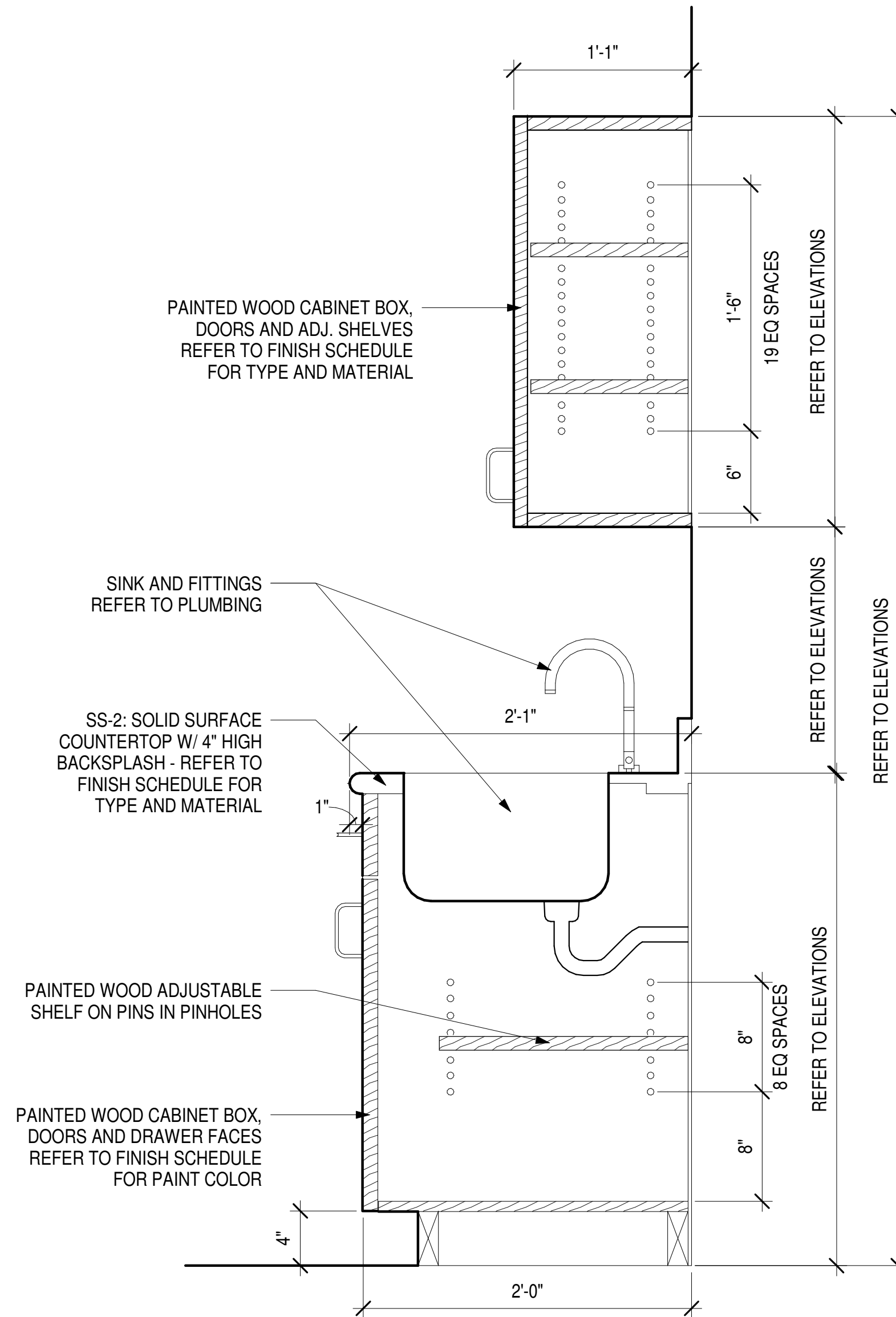
1 TYPICAL SINK CABINET SECTION

A700 SCALE: 1 1/2" = 1'-0"



2 TYP. BASE & WALL CABINET SECTION

A700 SCALE: 1 1/2" = 1'-0"



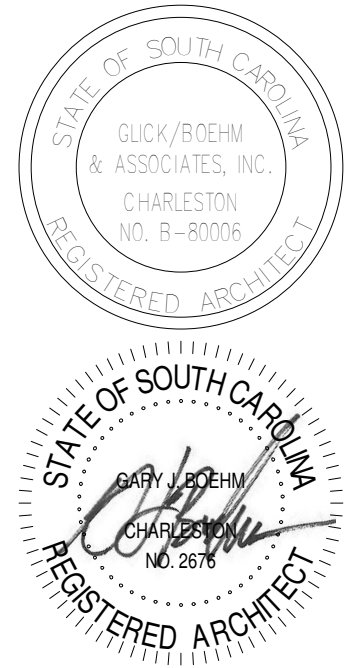
3 TYP. BASE & WALL CABINET SECTION

A700 SCALE: 1 1/2" = 1'-0"

CASEWORK NOTES

- 1 REFER TO GENERAL PROJECT NOTES ON G110.
- 2 CONTRACTOR TO FIELD VERIFY ALL WALL DIMENSIONS AT CASEWORK LOCATIONS PRIOR TO FABRICATION
- 3 PROVIDE GROMMETS IN COUNTERTOPS AS REQUIRED BY OWNER.
- 4 WHEN PROVIDING NEW CASEWORK ADJACENT TO EXISTING CASEWORK, FIELD VERIFY DIMENSIONS TO MATCH EXISTING.
- 5 PROVIDE 4" TOE-KICK, TYPICAL, U.N.O.
- 6 WALL CABINETS ARE 12" DEEP, UNLESS NOTED OTHERWISE
- 7 BASE AND STORAGE CABINETS ARE 24" DEEP, UNLESS NOTED OTHER WISE.
- 8 CABINETS TO RECEIVE BASE TO MATCH ADJACENT WALL BASE, UNLESS NOTED OTHERWISE.
- 9 ALL FILLERSTRIPS TO MATCH ADJACENT CABINETS. PROVIDE EQUAL FILLERSTRIP AT BOTH SIDES, UNLESS NOTED OTHERWISE.
- 10 PROVIDE FINISHED END PANELS WHERE EXPOSED AT BASE AND WALL CABINETS.
- 11 CONTRACTOR TO VERIFY ALL MEP AND DIMENSIONAL ROUGH-IN REQUIREMENTS OF ALL OWNER PROVIDED EQUIPMENT AND APPLIANCES.
- 12 COORDINATE ROUGH-IN FOR ELECTRICAL OUTLETS, SWITCHES AND UNDER CABINET LIGHTING WITH ELECTRICAL DRAWINGS.
- 13 COORDINATE ELECTRICAL AND DATA OUTLET LOCATIONS PRIOR TO ROUGHING IN ELECTRICAL AND/OR PREPARING CASEWORK SHOP DRAWINGS.
- 14 PROVIDE WALL BASE, WALL FINISH AND FLOOR FINISH PER FINISH SCHEDULE UNLESS NOTED OTHERWISE UNDER OPEN COUNTERTOP LOCATIONS.
- 15 COLOR MATCH CAULK WITH EITHER CABINET FINISH OR WALL FINISH, WHICHEVER IS DARKER. CONFIRM WITH ARCHITECT.
- 16 1-1/2" FILLER PANELS SHALL OCCUR AT THE WALL AT ALL CABINETS LOCATIONS ABUTTING A WALL, U.O.N.
- 17 WHEN FILLER PANELS ARE REQUIRED AT BOTH ENDS OF CASEWORK TERMINATION, BOTH FILLER PANELS SHALL BE EQUAL WIDTH.
- 18 PROVIDE 4" BACKSPLASH AND SIDE SPLASH AT ALL COUNTERTOPS WITH SINKS, U.O.N.
- 19 PROVIDE 2" RADIUS AT THE END OUTSIDE CORNERS OF EXPOSED COUNTERTOPS

REV.	DATE	DESCRIPTION



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APPROVED BY: Approver
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CDs

CASEWORK DETAILS

**PLUMBING SYSTEMS
SEISMIC AND WIND REQUIREMENTS
PER IBC-2018/ASCE 7-16**

- A. PER THE 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 7-16.
- 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 7-16.
- 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.

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 IMPORTANCE FACTOR (Ip)

1.0

1.5

COMPONENT IDENTIFICATION	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	3	RESTRAIN ALL	3
SUSPENDED DUCTILE PIPING (STEEL, ALUMINUM, COPPER, ETC.)	>3"	4	>1"	4
SUSPENDED NON DUCTILE PIPING (CAST IRON, PLASTIC, CERAMIC)	RESTRAIN ALL	4	RESTRAIN ALL	4
SUSPENDED PIPE ON TRAPEZE	RESTRAIN IF ANY PIPE ON TRAPEZE > 3" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10 LBS/FT	4	RESTRAIN IF ANY PIPE ON TRAPEZE > 1" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10 LBS/FT	4
COMPONENT CERTIFICATION (SEE NOTE 6)	NOT REQUIRED	5	REQUIRED	5

- 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.

TANKLESS GAS WATER HEATER SCHEDULE

MARK	INPUT CAPACITY (MBH)	FLOW @ 100°F RISE (GPM)	FUEL	GAS SUPPLY SIZE	MINIMUM EFFICIENCY	MANUFACTURER	MODEL
WH-1	199.9	3.8	NG	3/4"	95%	RHEEM	RTGH-C95XLN

- NOTES:**
- SEE ELECTRICAL DRAWINGS FOR VOLTAGE INFORMATION.
 - PROVIDE ANTI-FROST PROTECTION AND ALL REQUIRED ACCESSORIES FOR A COMPLETE EXTERIOR INSTALLATION. INSTALL PER MANUFACTURER'S AND REQUIREMENTS.
 - PROVIDE PRESSURE REGULATING VALVE.
 - PROVIDE CONDENSATE NEUTRALIZATION KIT.

ELECTRIC WATER HEATER SCHEDULE

UNIT ID	VOLUME (GAL)	TOTAL ELEMENT WATTAGE (WATTS)	RECOVERY RATE @ 90°F (GPH)	BASIS OF DESIGN	MODEL
WH-2	7.1	1440	6.8	BOSCH	ES8 3000T

- NOTES:**
- SEE ELECTRICAL DRAWINGS FOR VOLTAGE REQUIREMENTS.
 - INSTALL PER MANUFACTURER'S INSTRUCTIONS.
 - PROVIDE WITH EXPANSION TANK SIZED PER MANUFACTURER'S INSTRUCTIONS.
 - PROVIDE WITH WALL MOUNT PLATFORM / INTEGRAL DRAIN PAN, HOLDRITE QUICK STAND 30-SWHP-WM OR APPROVED EQUAL.

GENERAL PLUMBING 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 HORIZONTAL DOMESTIC WATER PIPING SHALL BE RUN UNDER SLAB. CONCEAL VERTICAL PIPING IN WALL CAVITIES.
- 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.

PLUMBING ABBREVIATIONS

ABBR	DESCRIPTION
A/C	ABOVE CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BFF	BELOW FINISHED FLOOR
BFP	BACKFLOW PREVENTER
C	DOMESTIC COLD WATER SUPPLY
FCO	FLOOR CLEANOUT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H	DOMESTIC HOT WATER SUPPLY
HA	HAMMER ARRESTOR
HB	HOSE BIBB

PLUMBING ABBREVIATIONS

ABBR	DESCRIPTION
HCP	HOT WATER RECIRCULATING PUMP
HR	DOMESTIC HOT WATER RETURN
IN	INCHES
NG	NATURAL GAS
S	SANITARY/WASTE PIPING
TMV	THERMOSTATIC MIXING VALVE
TP	TRAP PRIMER
U/G	UNDERGROUND
V	VENT PIPING
VTR	VENT THRU ROOF
WCO	WALL CLEANOUT
WH	WATER HEATER

PLUMBING SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	BACKFLOW PREVENTER		BALANCING VALVE
	PRESSURE REDUCING VALVE		ISOLATION VALVE
	SWING CHECK VALVE		PIPE DN
	PIPE UP		PIPE STRAIGHT TEE
	PIPE REDUCER		FLOOR CLEANOUT
	PIPE TEE DN		FLOOR DRAIN W FLOOR SLOPED TO DRAIN
	HOSE BIBB - INTERIOR, EXTERIOR		TRAP PRIMER
	VENT THRU ROOF		

PLUMBING PIPING LEGEND

	SANITARY AND WASTE PIPING
	VENT PIPING
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER PIPING
	DOMESTIC HOT WATER RETURN PIPING

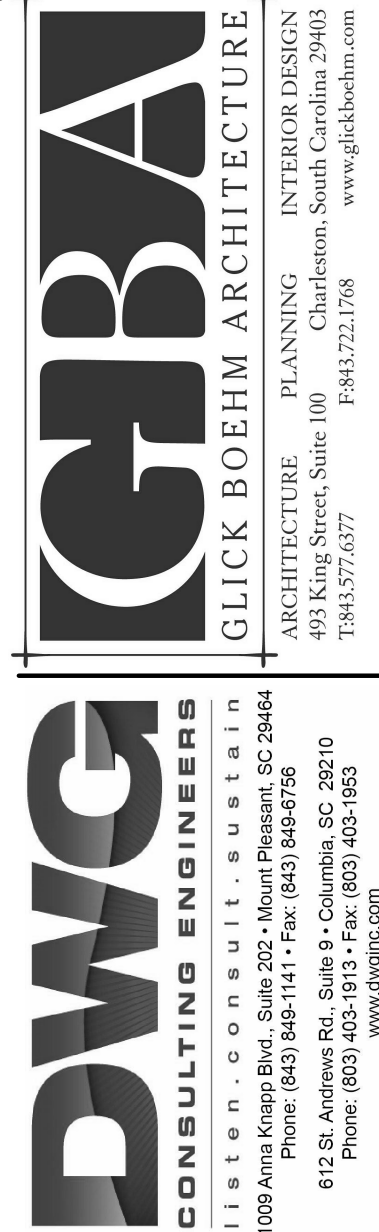
PLUMBING CODES AND STANDARDS

CODE	DESCRIPTION
IBC (2018)	INTERNATIONAL BUILDING CODE
IECC (2009)	INTERNATIONAL ENERGY CONSERVATION CODE
IFGC (2018)	INTERNATIONAL FUEL GAS CODE
IPC (2018)	INTERNATIONAL PLUMBING CODE

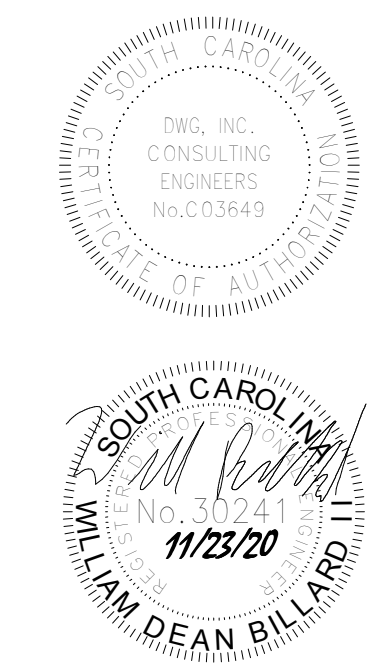
PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE TYPE	FIXTURE DESCRIPTION	HOT WATER	COLD WATER	WASTE	VENT	MANUFACTURER	MODEL
FD-1	FLOOR DRAIN	COATED CAST IRON BODY WITH BOTTOM OUTLET, COMBINATION INVERTIBLE MEMBRANE CLAMP AND ADJUSTABLE COLLAR WITH SEEPAGE SLOTS AND 5" POLISHED NICKEL BRONZE STRAINER ADJUSTABLE AFTER CONCRETE POUR. PROVIDE WITH TRAP PRIMER CONNECTION. PROVIDE SQUARE STRAINER IN TILED FLOORS AND ROUND STRAINER ELSEWHERE.	---	1/2"	3"	1-1/2"	ZURN	Z415
HB-1	HOSE BIBB	BRONZE QUARTER TURN, NON-FREEZE, AUTOMATIC DRAINING HYDRANT WITH STAINLESS STEEL FACE, HOSE CONNECTION, INTEGRAL VACUUM BREAKER, SERVICE SHUTOFF, AND DUAL CHECK VALVE. LOOSE KEY HANDLE AND STAINLESS STEEL BOX WITH COVER OPENING.	---	3/4"	---	---	JR SMITH	5515
P-1	FLOOR MOUNTED WATER CLOSET FLUSH VALVE	FLOOR MOUNTED, FLOOR OUTLET, VITREOUS CHINA WITH ANTIMICROBIAL GLAZE, SIPHON JET WATER CLOSET WITH ELONGATED BOWL (DESIGNED FOR A 1.28 GALLON FLUSH CYCLE) AND MANUAL-OPERATED CHROME-PLATED DIAPHRAGM FLUSH VALVE. WATER CLOSET SHALL BE FITTED WITH ANTIMICROBIAL OPEN FRONT SEAT WITHOUT COVER WITH SELF-SUSTAINING STAINLESS STEEL CHECK HINGES.	---	1-1/4"	4"	3"	ZURN FIXTURE ZURN SEAT ZURN VALVE	Z5655-BWL-AM Z5955SS-EL-AM-ST5 Z6000AV-HET
P-1A	FLOOR MOUNTED WATER CLOSET ADA FLUSH VALVE	ADA HEIGHT, FLOOR MOUNTED, FLOOR OUTLET, VITREOUS CHINA WITH ANTIMICROBIAL GLAZE, SIPHON JET WATER CLOSET WITH ELONGATED BOWL (DESIGNED FOR A 1.28 GALLON FLUSH CYCLE) AND MANUAL-OPERATED CHROME-PLATED DIAPHRAGM FLUSH VALVE. WATER CLOSET SHALL BE FITTED WITH ANTIMICROBIAL OPEN FRONT SEAT WITHOUT COVER WITH SELF-SUSTAINING STAINLESS STEEL CHECK HINGES.	---	1-1/4"	4"	3"	ZURN FIXTURE ZURN SEAT ZURN VALVE	Z5665-BWL-AM Z5955SS-EL-AM-ST5 Z6000AV-HET
P-2	WALL-HUNG URINAL	VITREOUS CHINA, WALL HUNG, INTEGRAL TRAP, WASHDOWN URINAL COMPLETE WITH 3/4" TOP SPUD CONNECTION, CONCEALED UNIVERSAL RETROFIT WALL BRACKET, 2" OUTLET CONNECTION AND VANDAL RESISTANT OUTLET STRAINER. PROVIDE WITH MANUAL-OPERATED CHROME-PLATED DIAPHRAGM FLUSH VALVE AND FLOOR-MOUNTED IN-WALL CARRIER.	---	3/4"	2"	1-1/2"	ZURN FIXTURE ZURN VALVE	Z5755-U Z6003AV-EWS
P-3	UNDERMOUNT LAVATORY	UNDERMOUNT 19" x 16" VITREOUS CHINA BATHROOM SINK WITH FRONT OVERFLOW. THE LAVATORY SHALL BE PROVIDED WITH A 0.5 GPM, 4" CENTERSET, CHROME-PLATED MANUAL FAUCET WITH SINGLE LEVER OPERATION. TRIM TO INCLUDE PERFORATED GRID STRAINER AND ADA OFFSET DRAIN, 1-1/4" CAST BRASS (17 GAUGE) P-TRAP AND LOOSE KEY ANGLE SUPPLIES. DRAIN, TRAP, AND SUPPLIES SHALL BE INSULATED BY MEANS OF A LAV-GUARD KIT. SEE DETAIL FOR ADDITIONAL INFORMATION. PROVIDE ASSE 1070 APPROVED THERMOSTATIC MIXING VALVE AND SET TEMPERED WATER OUTLET TO 105°F.	1/2"	1/2"	1-1/2"	1-1/2"	ZURN FIXTURE ZURN FAUCET WATTS TMV	Z5220 Z81000-XL-3M LFUSG-B
P-4	BREAK ROOM SINK	DOUBLE BOWL 18 GAUGE TYPE 304 STAINLESS STEEL SINK WITH A BOTTOM PAD TO DAMPEN SOUND AND PREVENT CONDENSATION. PROVIDE WITH A SINGLE LEVER 1.75 GPM FAUCET WITH PULL-DOWN SPRAY AND CERAMIC DISC VALVE. PROVIDE ASSE 1070 APPROVED THERMOSTATIC MIXING VALVE AND SET TEMPERED WATER OUTLET TO 105°F.	1/2"	1/2"	1-1/2"	1-1/2"	ELKAY FIXTURE ELKAY FAUCET WATTS TMV	LRADQ331965 LKGT1041 LFUSG-B
P-5	MOP SINK	24" x 24" PRECAST TERRAZZO MOP BASIN WITH 12" HIGH SIDES AND INTEGRAL 3" DRAIN. MOP SINK SHALL BE FITTED WITH STAINLESS STEEL CAPS, PROVIDE WITH CHROME PLATED FAUCET WITH VACUUM BREAKER, INTEGRAL STOPS AND INTEGRAL CHECK VALVES. PROVIDE WITH WALL BACKSPLASH, HOSE, AND MOP HOLDER BRACKETS.	3/4"	3/4"	3"	2"	FIAT FIXTURE T & S BRASS FAUCET WATTS BFP	TSB100 B-0665-BSTP LFN9-CD
P-6	BI-LEVEL WATER COOLER WITH BOTTLE FILLER	BI-LEVEL SELF-CONTAINED WALL-HUNG ELECTRIC REFRIGERATED FILTERED STAINLESS STEEL VANDAL-RESISTANT ADA COMPLIANT 8 GPH WATER COOLER WITH BOTTLE FILLER. ORIFICE HEIGHT SHALL BE ADA COMPLIANT WITH A CANE APRON.	---	1/2"	1-1/2"	1-1/2"	ELKAY	LVRCGRNTL8WSK

- NOTES:**
- PROVIDE ANGLE STOPS, SUPPLY TUBING, P-TRAPS, ESCUTCHEON PLATES, CARRIERS, AND ALL APPURTENANCES FOR A COMPLETE INSTALLATION.
 - ALL SUPPLY AND WASTE LINES SHALL BE CONCEALED IN ADJACENT WALL, FLOOR, AND CEILING UNLESS NOTED OTHERWISE.
 - SEE ARCHITECTURAL DRAWINGS FOR EXACT MOUNTING HEIGHTS, AND FOR THE LOCATIONS OF ADA FIXTURES. COORDINATE HEIGHT OF FLUSH VALVES AND SUPPLIES THROUGH WALLS WITH GRAB BAR LOCATIONS PRIOR TO ORDERING.
 - FOLLOW MANUFACTURER'S INSTALLATION REQUIREMENTS.



REV.	DATE	DESCRIPTION

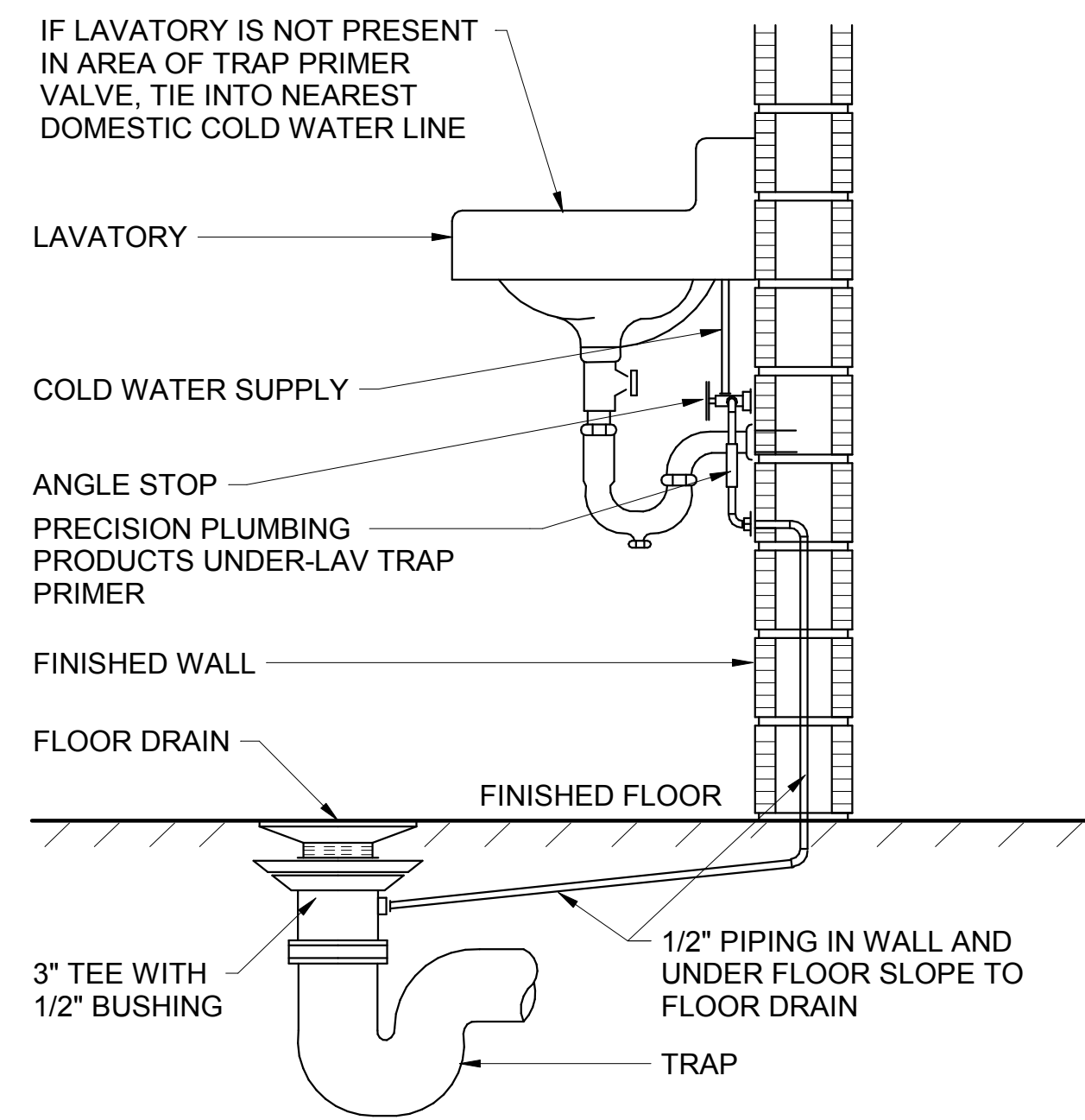


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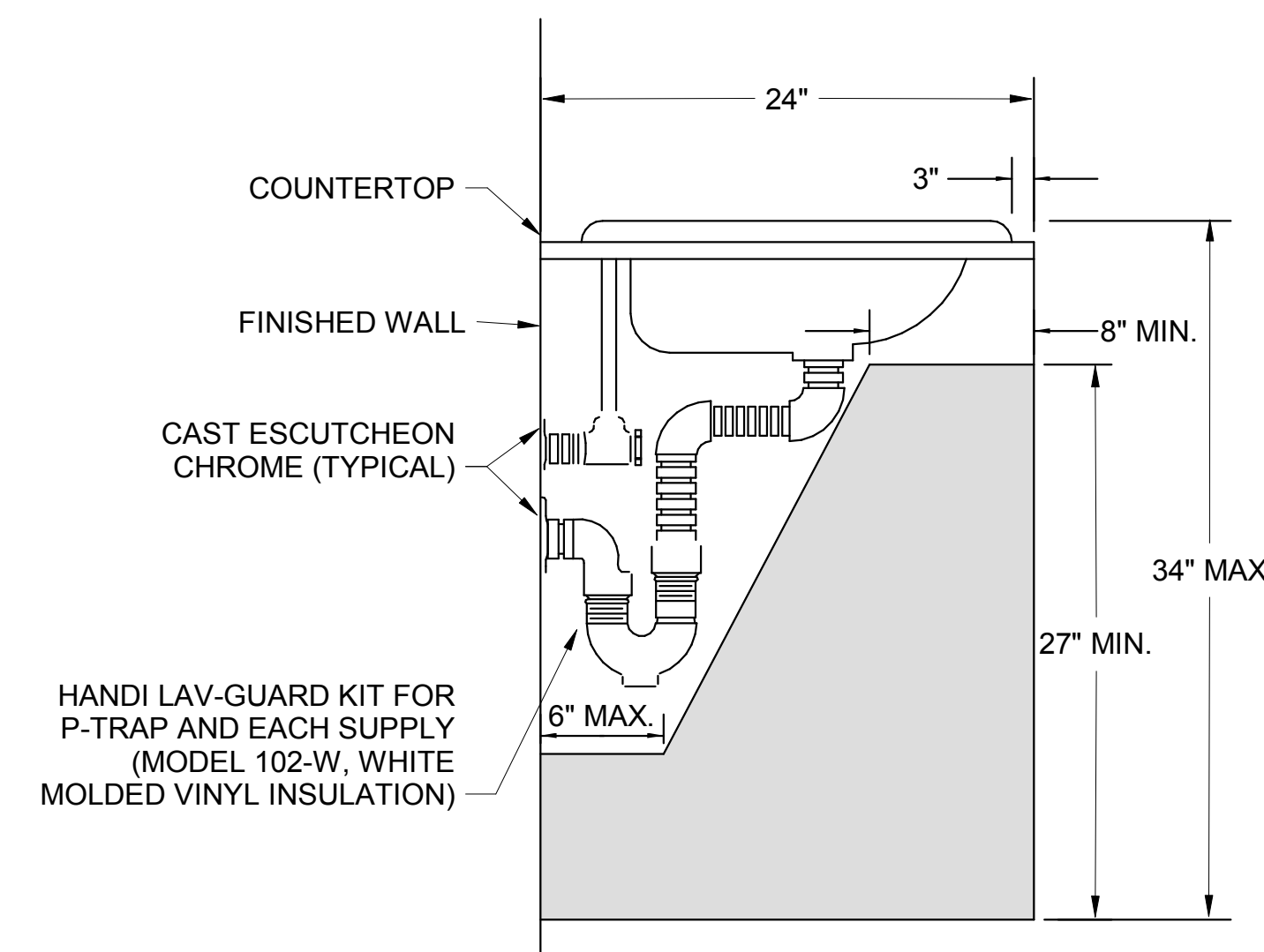
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PROJECT MGR.: WDB
DRAWN BY: CGG/KMM
CHECKED BY: WDB
APPROVED BY: CGG
DATE ISSUED FOR: CD's 11/23/20

PLUMBING NOTES & LEGENDS

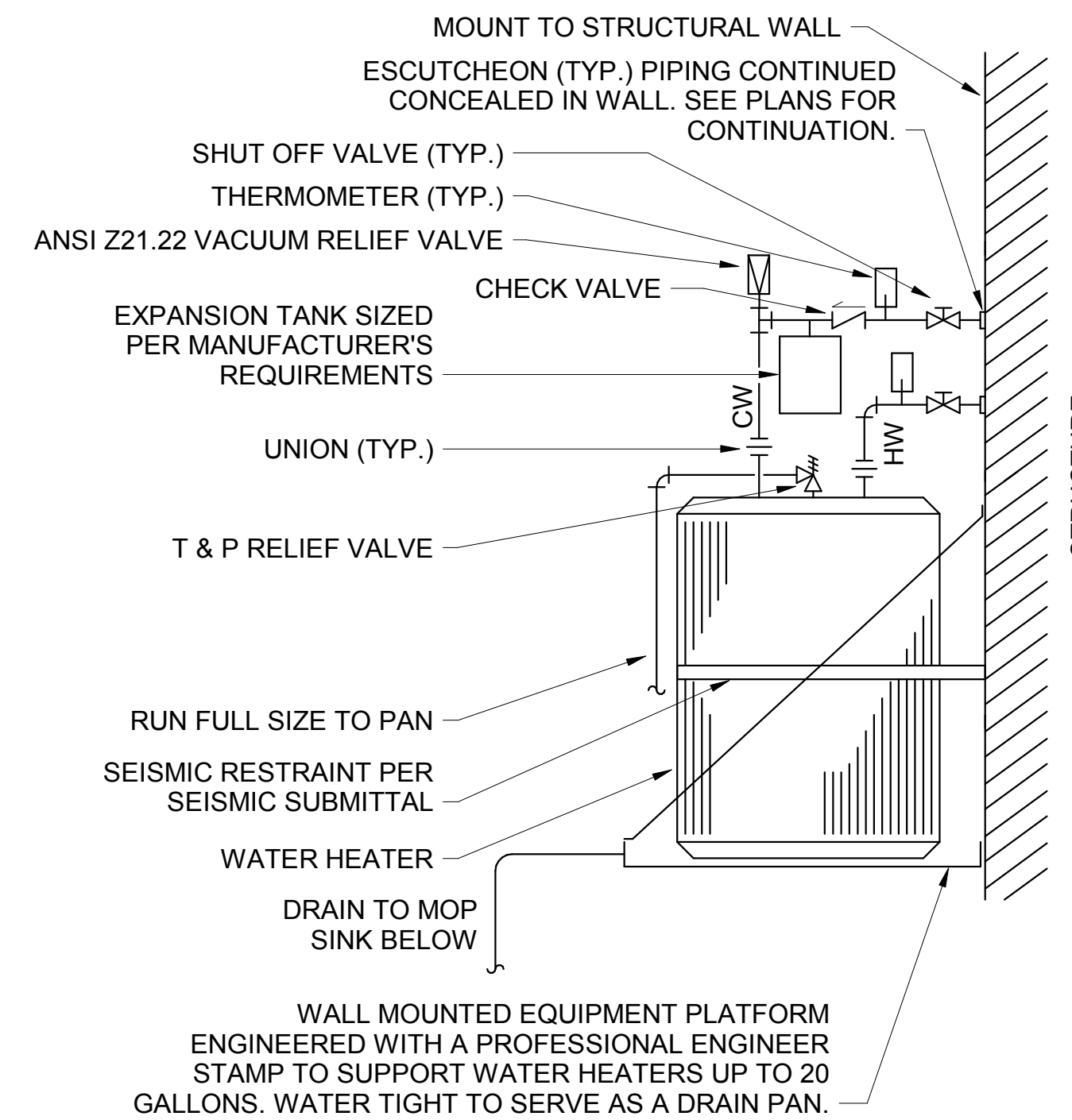
P001



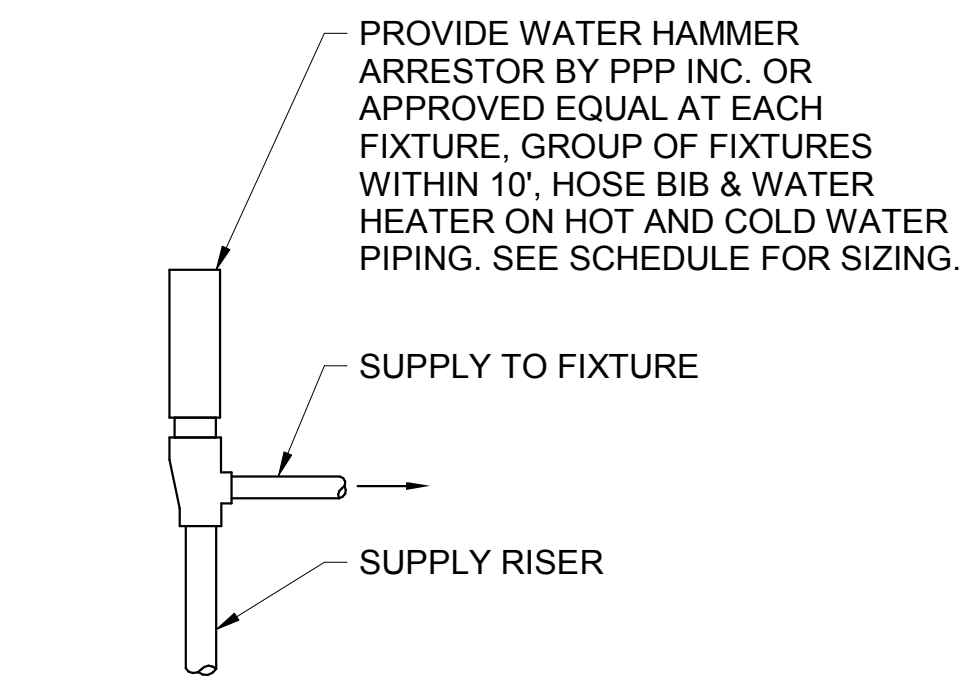
1 TRAP PRIMER VALVE DETAIL
P002 NOT TO SCALE



2 TRAP INSULATION DETAIL WITH ADA CLEARANCES
P002 NOT TO SCALE



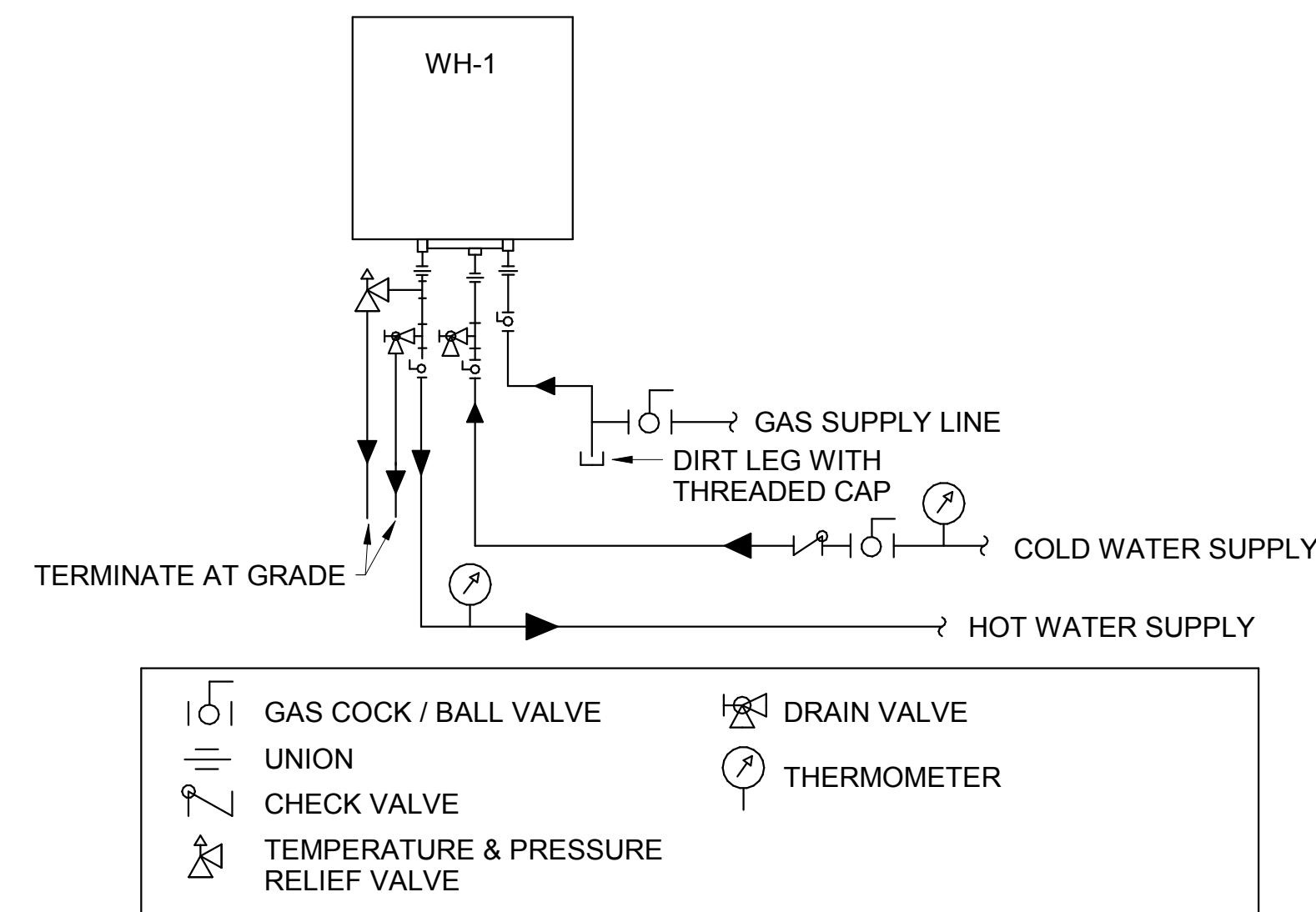
3 WATER HEATER SUPPORT DETAIL - WALL MOUNT
P002 NOT TO SCALE



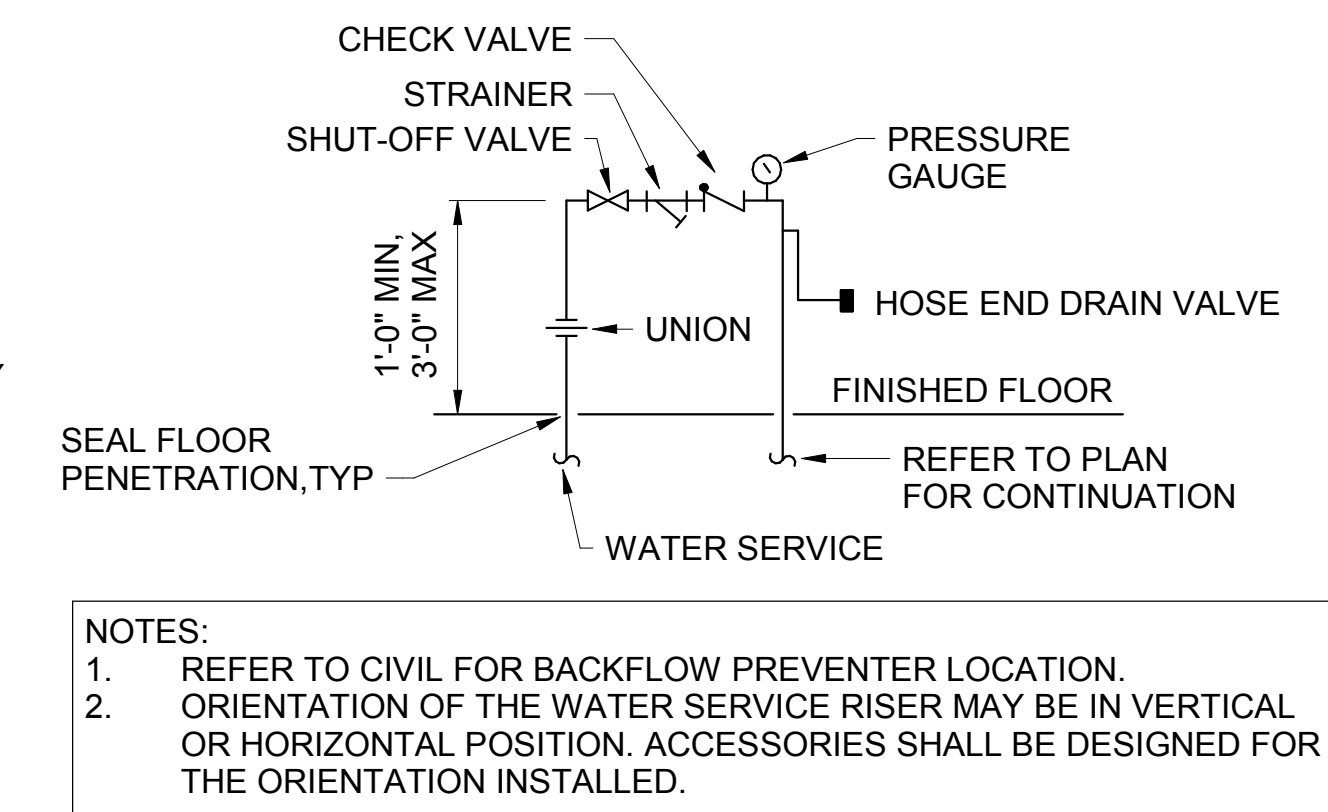
HAMMER ARRESTOR SCHEDULE

UNIT I.D.	PDI UNIT	FIXTURE UNIT	MANUFACTURER
HA A	A	1-11	JOSAM 75000 OR EQUIVALENT ZURN, SMITH
HA B	B	12-32	JOSAM 75000 OR EQUIVALENT ZURN, SMITH
HA C	C	33-60	JOSAM 75000 OR EQUIVALENT ZURN, SMITH
HA D	D	61-113	JOSAM 75000 OR EQUIVALENT ZURN, SMITH
HA E	E	114-154	JOSAM 75000 OR EQUIVALENT ZURN, SMITH

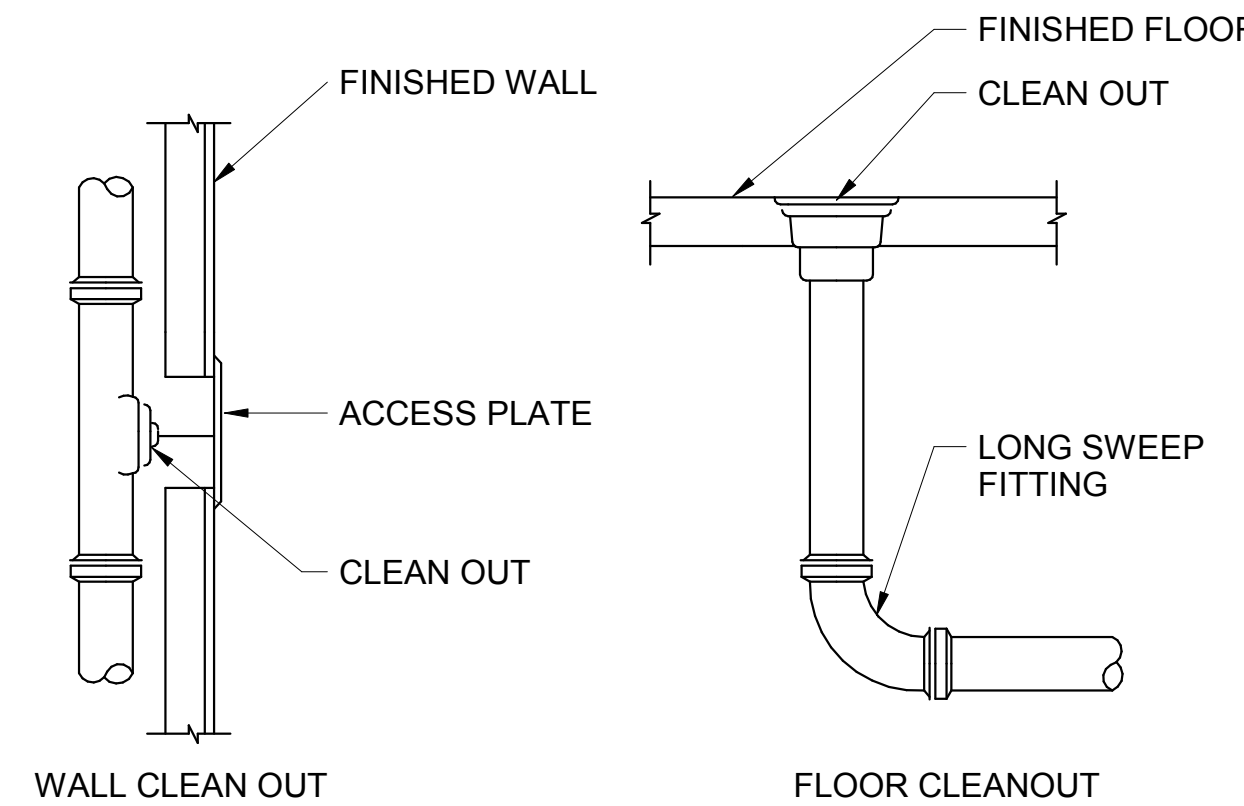
4 WATER HAMMER ARRESTOR DETAIL
P002 NOT TO SCALE



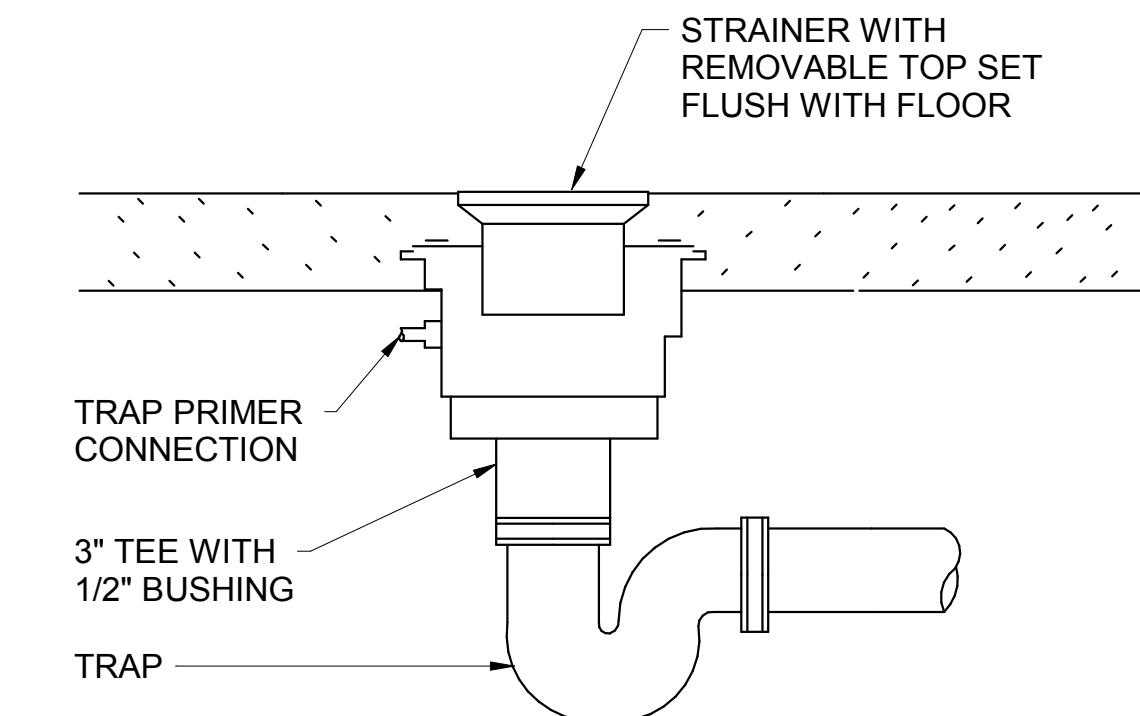
5 TANKLESS WATER HEATER PIPING DETAIL
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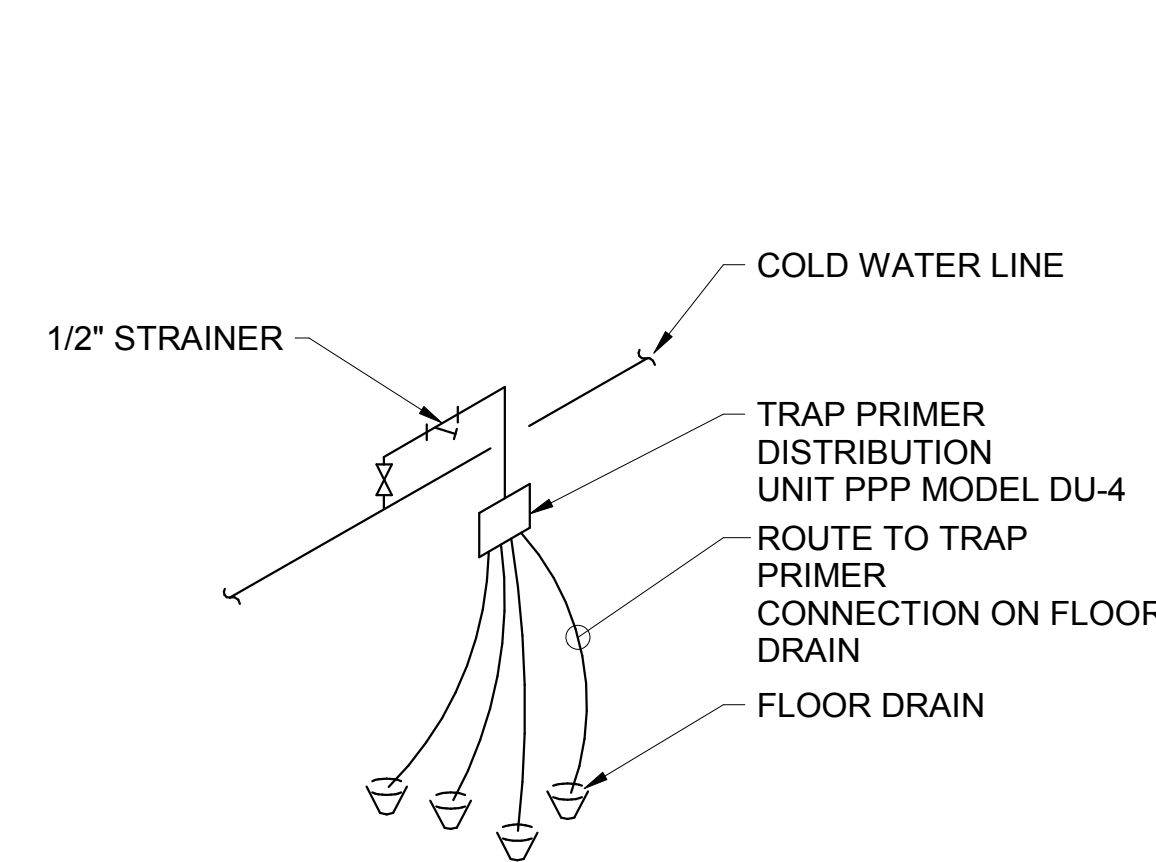
6 WATER SERVICE RISER INSTALLATION DETAIL
P002 NOT TO SCALE



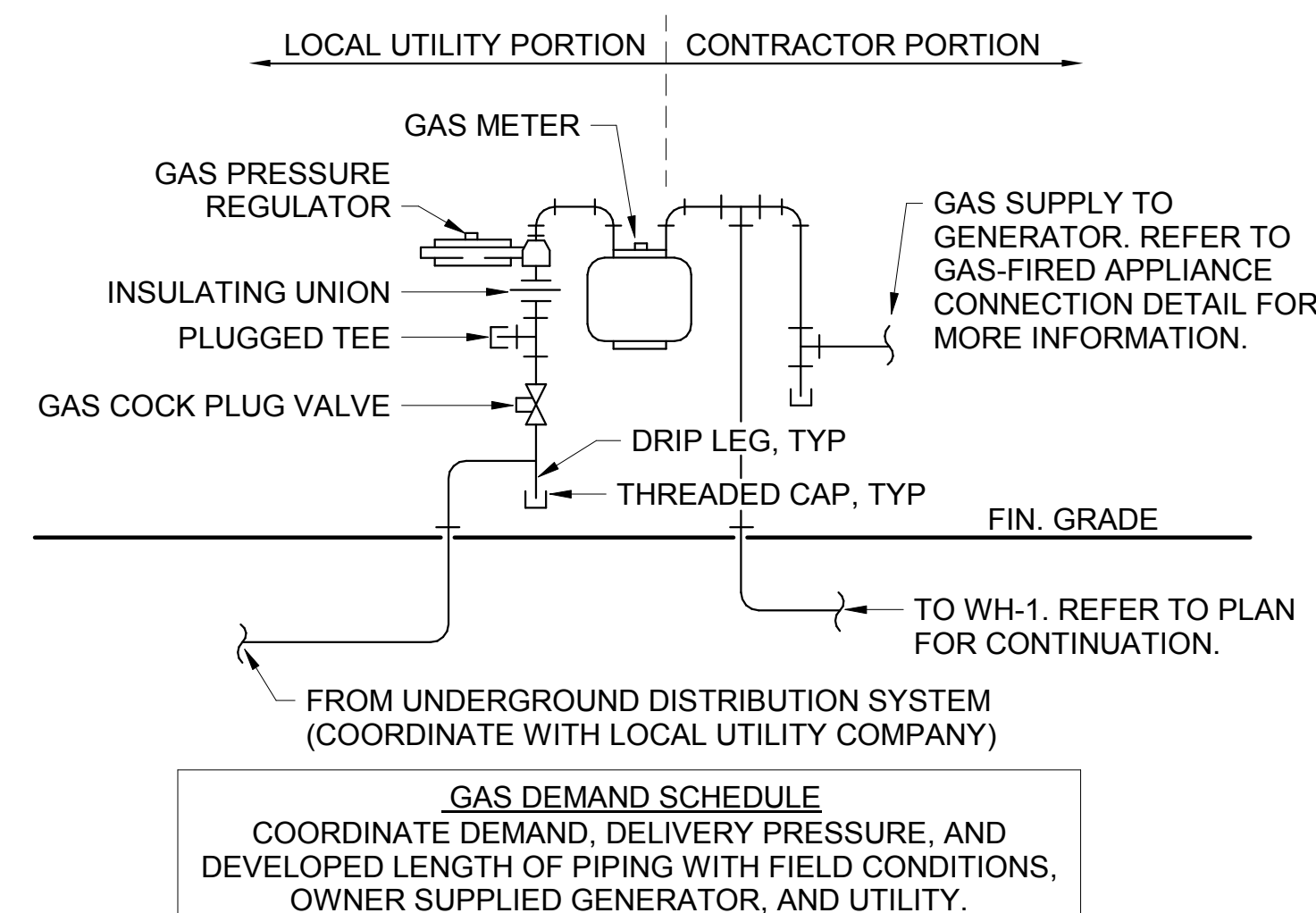
7 CLEANOUT DETAIL
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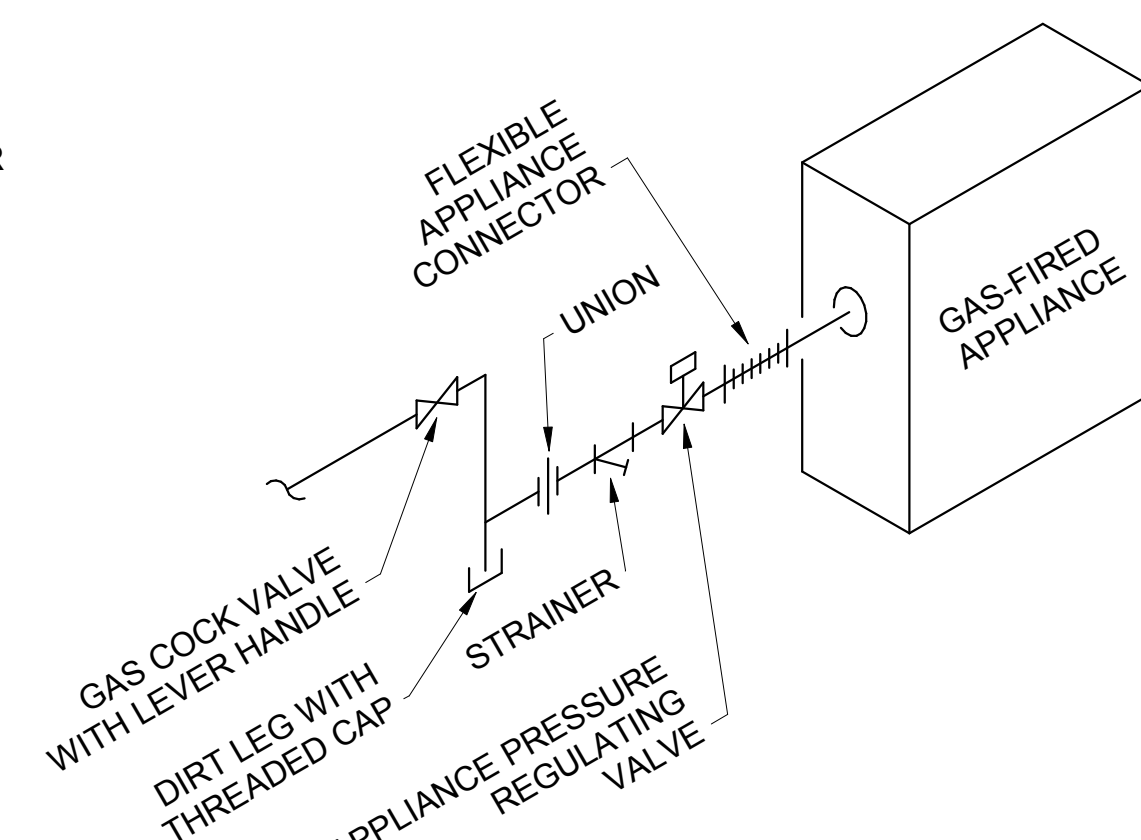
8 FLOOR DRAIN INSTALLATION DETAIL
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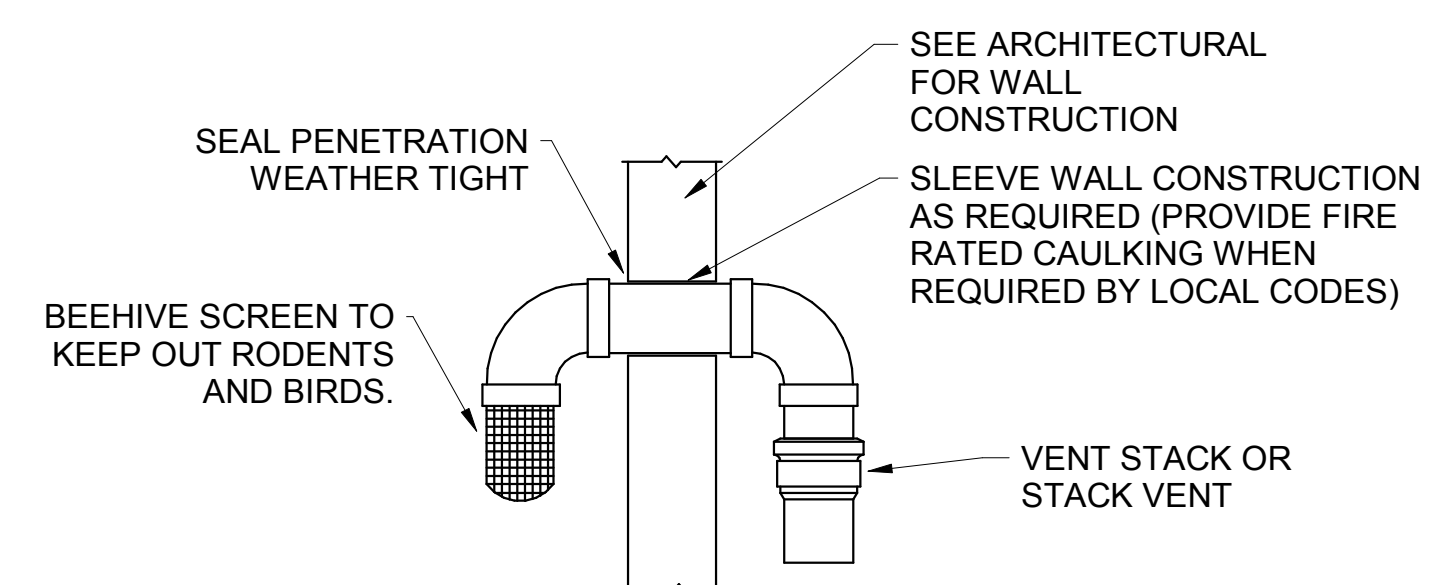
9 TRAP PRIMER DETAIL
P002 NOT TO SCALE



10 NATURAL GAS METER DETAIL
P002 NOT TO SCALE



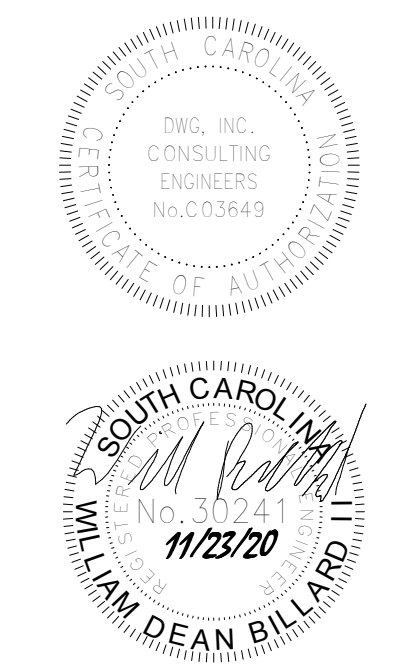
11 GAS-FIRED APPLIANCE CONNECTION DETAIL
P002 NOT TO SCALE



12 SIDEWALL VENT TERMINATION DETAIL
P002 NOT TO SCALE

DESCRIPTION

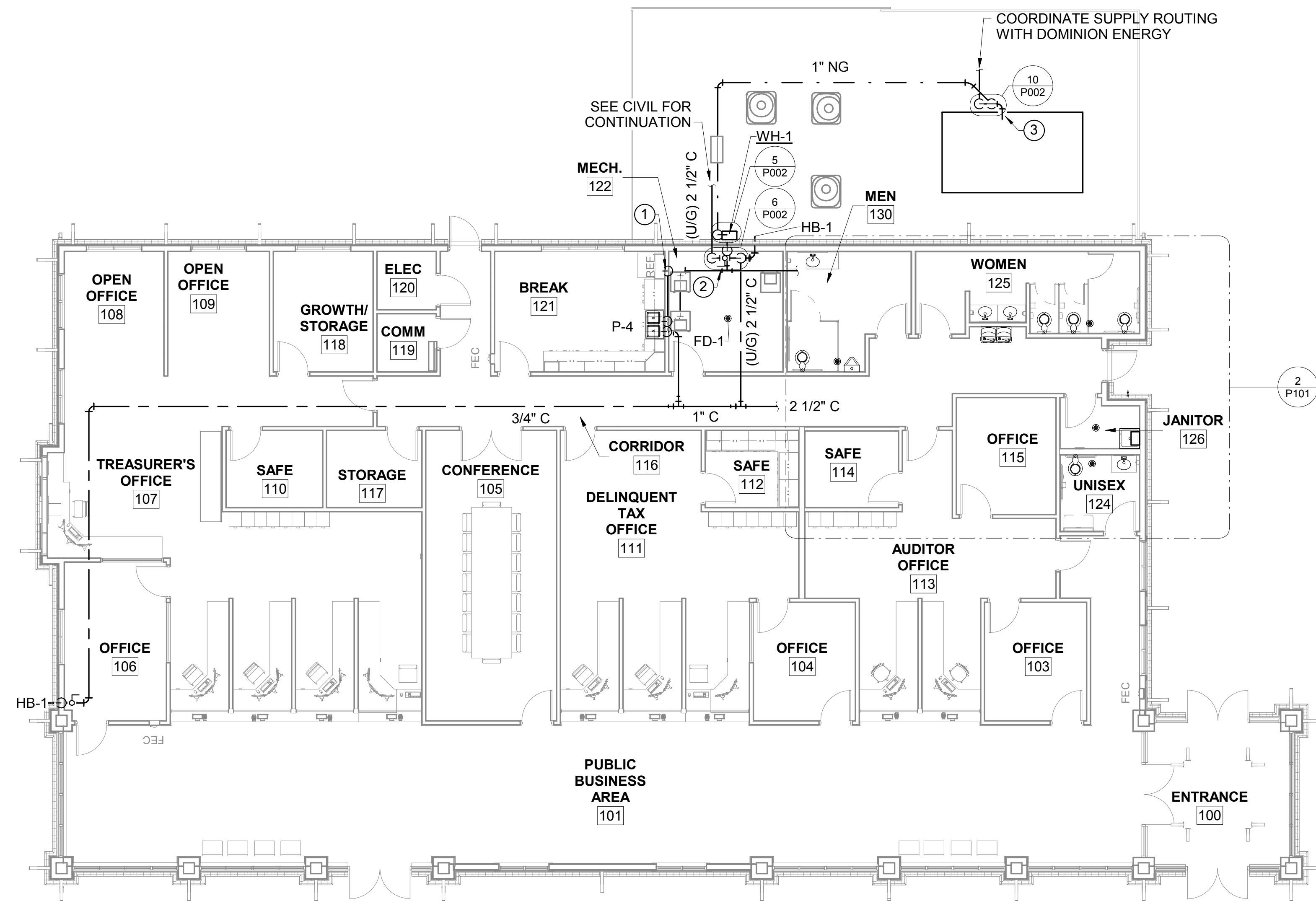
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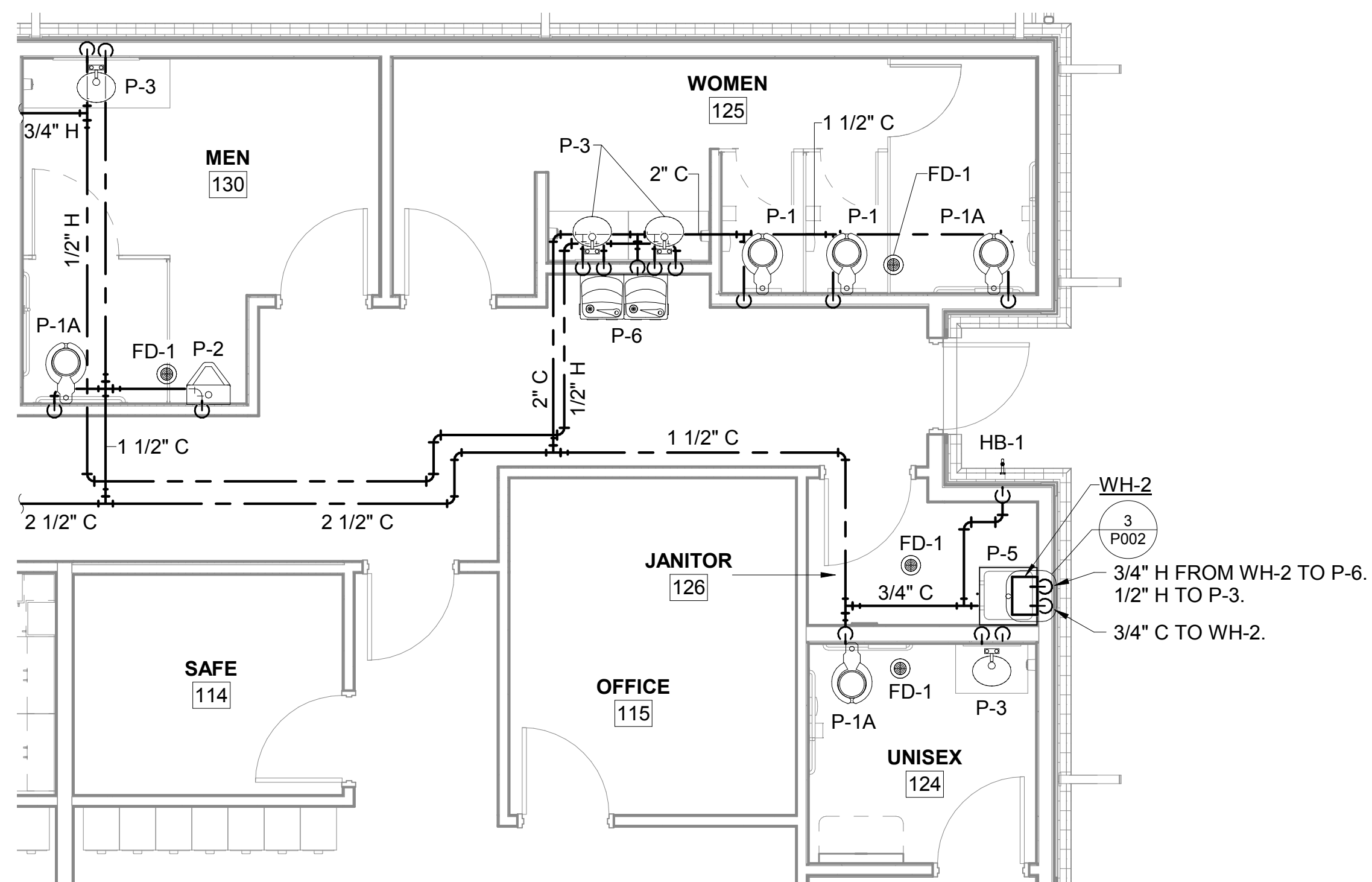
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PLUMBING DETAILS
P002



1 DOMESTIC WATER PLAN
 P101 SCALE: 1/8" = 1'-0"



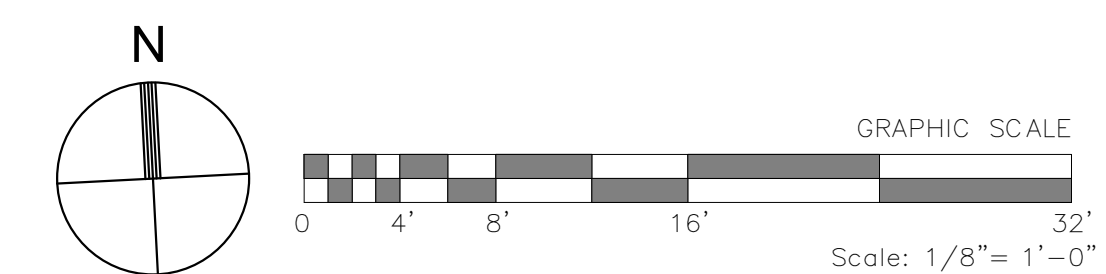
2 DOMESTIC WATER ENLARGED PLAN
 P101 SCALE: 1/4" = 1'-0"

KEYNOTES

- ① PROVIDE ICE MAKER BOX WITH VALVE AND DUAL CHECK VALVE. PROVIDE CONNECTION TO REFRIGERATOR.
- ② PROVIDE 2-1/2" SHUTOFF VALVE WITH STRAINER, CHECK VALVE, AND DRAIN VALVE. REFER TO DETAIL FOR MORE INFORMATION. INSTALL AGAINST WALL AND PROVIDE SUFFICIENT CLEARANCE FOR MAINTENANCE.
- ③ PROVIDE NG SUPPLY TO GENERATOR. CONNECT FROM UTILITY SUPPLY AND MAKE FINAL CONNECTION TO GENERATOR. COORDINATE SERVICE ENTRANCE LOCATION WITH DOMINION ENERGY. REFER TO DETAILS FOR MORE INFORMATION.

GENERAL NOTES

1. INSTALL PIPING UNDER SLAB UNLESS NOTED OTHERWISE.
2. WHERE PIPE RUNOUT SIZE IS NOT SHOWN, REFER TO PLUMBING FIXTURE SCHEDULE FOR RUNOUT SIZE.
3. PROVIDE WITH WATER HAMMER ARRESTORS AT EVERY FIXTURE, GROUP OF FIXTURES, HOSE BIB, AND WATER HEATER. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS. HAMMER ARRESTORS NOT SHOWN FOR CLARITY. SEE DETAIL FOR ADDITIONAL INFORMATION.
4. PROVIDE TRAP PRIMER VALVES AND PIPING TO ALL FLOOR DRAINS AND FLOOR SINKS. VALVES AND PIPING NOT SHOWN FOR CLARITY. SEE DETAIL FOR ADDITIONAL INFORMATION.



DWG
 CONSULTING ENGINEERS
 118 Benson Street
 Waltherboro, SC 29948
 Phone: (803) 405-1913 Fax: (803) 405-1953
 www.dwginc.com

GBA
 GLICK BOEHM ARCHITECTURE
 PLANNING INTERIOR DESIGN
 ARCHITECTURE
 493 King Street, Suite 100
 Charleston, South Carolina 29403
 Phone: (803) 772-1788
 www.glickbohm.com

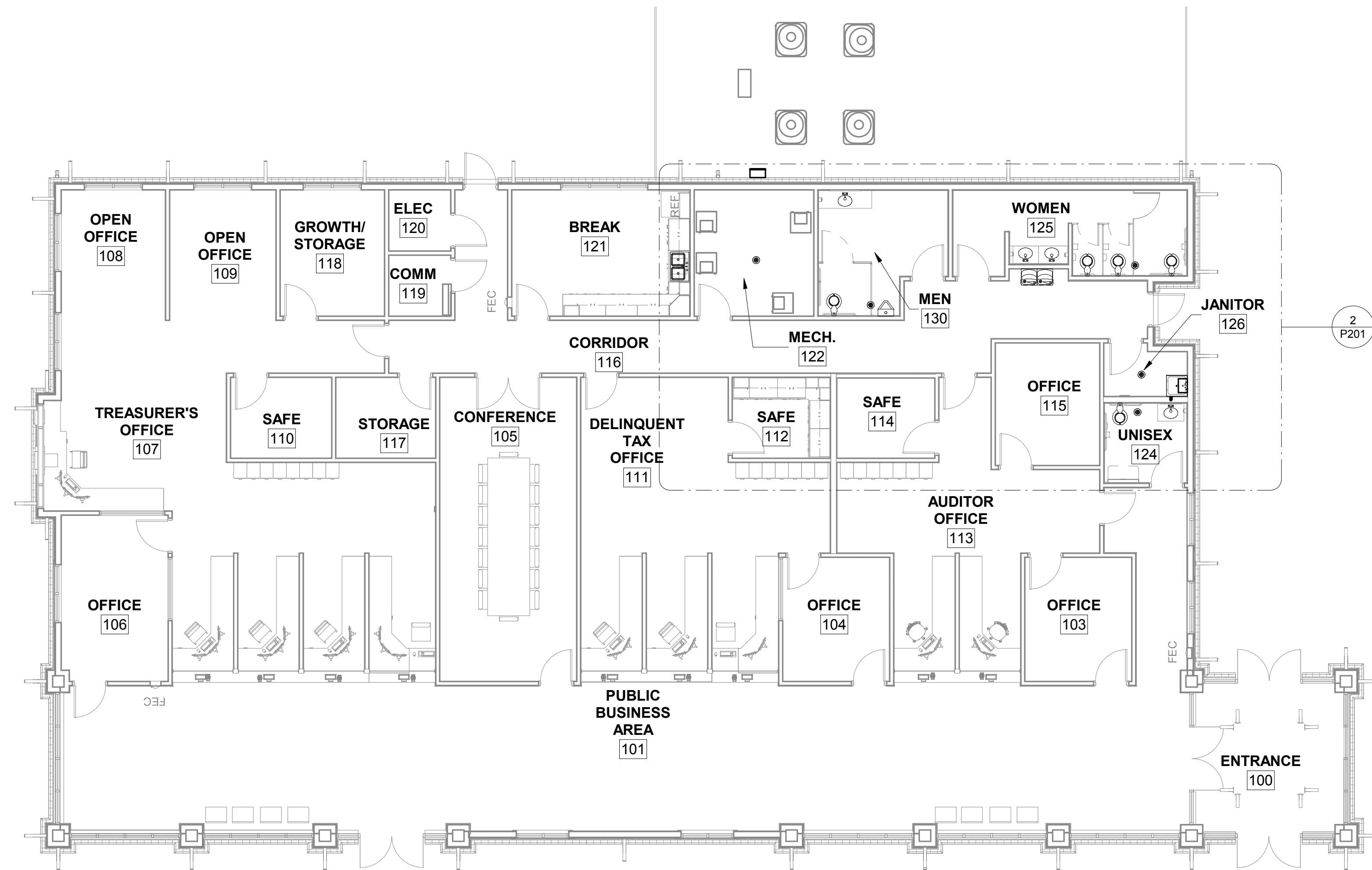
REV.	DATE	DESCRIPTION

PROFESSIONAL SEAL
 WILLIAM DEAN BILLARD, II
 No. 37241
 11/23/20
 SOUTH CAROLINA
 REGISTERED PROFESSIONAL ENGINEER
 No. C-03649
 DWG, INC.
 CONSULTING ENGINEERS

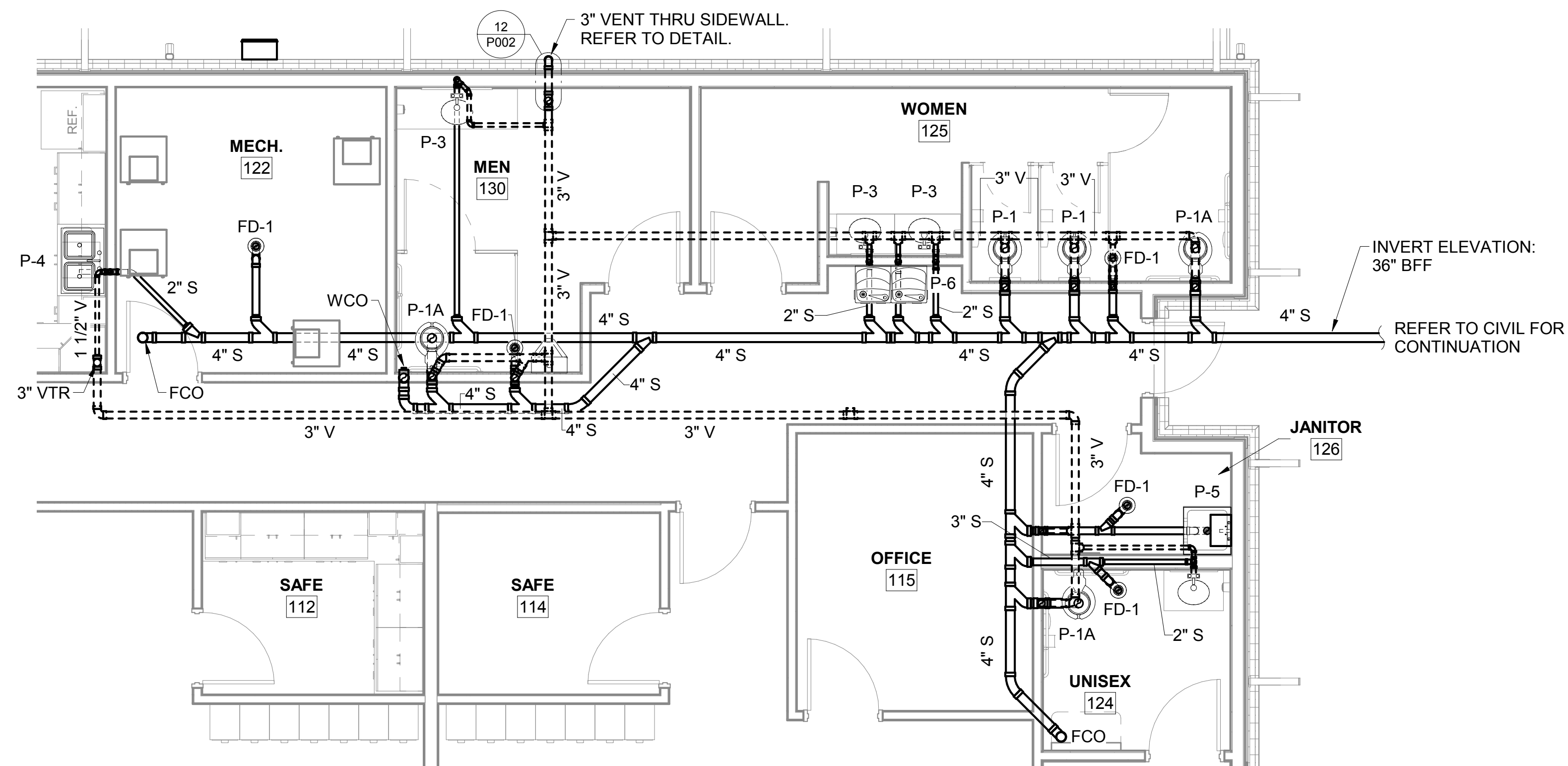
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DOMESTIC WATER PLAN
P101



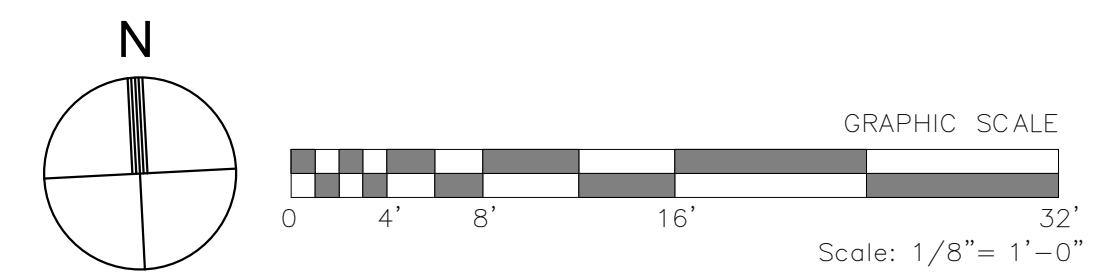
1 SANITARY & VENT PLAN
P201 SCALE: 1/8" = 1'-0"



2 SANITARY & VENT ENLARGED PLAN
P201 SCALE: 1/4" = 1'-0"

KEYNOTES

- GENERAL NOTES
- WHERE PIPE RUNOUT SIZE IS NOT SHOWN, REFER TO PLUMBING FIXTURE SCHEDULE FOR RUNOUT SIZE.
 - ALL UNDERGROUND SANITARY PIPING SHALL BE A MINIMUM OF 2".



DWVG
CONSULTING ENGINEERS
1151 S. GREENWOOD BLVD., SUITE 100
COLUMBIA, SC 29204
PHONE: (803) 732-1144 FAX: (803) 732-1145
WWW.DWVG.COM

GLBA
GLICK BOEHM ARCHITECTURE
ARCHITECTURE PLANNING INTERIOR DESIGN
493 KING STREET, SUITE 100 CHARLESTON, SOUTH CAROLINA 29403
PHONE: (803) 572-6377 FAX: (803) 572-1788
WWW.GLB.COM

REV.	DATE	DESCRIPTION

THE STATE OF SOUTH CAROLINA
WILLIAM DEAN BILLARD
11/23/20
No. 37241
ENGINEER

TAXPAYER SERVICE CENTER
COLLETON COUNTY
118 BENSON STREET
WALTERBORO, SC 29488

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SANITARY & VENT PLAN
P201

MECHANICAL SYSTEMS SEISMIC AND WIND REQUIREMENTS

PER IBC-2018/ASCE 7-16

- A. PER THE 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 7-16.
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 7-16.
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 = 1.0

Ip = 1.5

- ALL HVAC COMPONENTS EXCEPT AS NOTED IN Ip=1.5

SEISMIC DESIGN CATEGORIES D,E,F

COMPONENT IMPORTANCE FACTOR (Ip)

Table with columns for Component Identification, Seismic Restraint Requirement, Notes, and Component Importance Factor (Ip) 1.0 and 1.5. Rows include Roof Mounted, Floor Mounted, Wall Mounted, Component Supports, Suspended Equipment, Suspended Ductile Piping, Suspended Non Ductile Piping, Suspended Pipe on Trapeze, Ductwork, Multiple Ducts on Trapeze, and Component Certification.

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 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.
3. FLEXIBLE CONNECTIONS REQUIRED FOR PIPE CONNECTIONS ONLY.
4. 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.
5. ALL DUCTWORK, REGARDLESS OF SIZE, DESIGNED TO CARRY TOXIC, HIGHLY TOXIC, OR EXPLOSIVE GASES OR USED FOR SMOKE CONTROL MUST BE RESTRAINED.
6. COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.

MECHANICAL ABBREVIATIONS

Table with columns for ABBR and DESCRIPTION. Lists abbreviations such as ADJ (ADJUSTABLE), AFF (ABOVE FINISHED FLOOR), AFG (ABOVE FINISHED GRADE), AH (AIR HANDLER), APD (AIR PRESSURE DROP), BHP (BRAKE HORSE POWER), BOD (BASIS OF DESIGN), CFM (CUBIC FEET PER MINUTE), CO (CLEANOUT), CU (CONDENSING UNIT), DB (DECIBELS), DIA (DIAMETER), DRN (DRAIN), EA (EXHAUST AIR), EF (EXHAUST FAN), EH (ELECTRIC HEATER), ESP (EXTERNAL STATIC PRESSURE), FD (FIRE DAMPER), FPM (FEET PER MINUTE), FRPM (FAN ROTATIONS PER MINUTE), FT (FEET), GPM (GALLONS PER MINUTE), HP (HEAT PUMP), HP (HORSEPOWER), IN (INCHES), LAT (LEAVING AIR TEMPERATURE), MBH (THOUSANDS OF BTU'S PER HOUR), MD (MANUAL DAMPER), NC (NOISE CRITERIA), NO (NORMALLY OPEN), OA (OUTSIDE AIR), PD (PRESSURE DROP), PS (PIPE SUPPORT), RA (RETURN AIR), REFR (REFRIGERANT), RH (RELATIVE HUMIDITY), RM (REMOTE MONITOR), RPM (ROTATIONS PER MINUTE), SA (SUPPLY AIR), SF (SUPPLY FAN), TYP (TYPICAL), UG (UNDERGROUND), UNO (UNLESS NOTED OTHERWISE), W/ (WITH), WMS (WIRE MESH SCREEN), °F (DEGREES FAHRENHEIT).

HVAC SYMBOL LEGEND

Table with columns for SYMBOL and DESCRIPTION. Lists symbols for AIR TERMINAL TAG, AIR TERMINAL DIFFUSER, AIR TERMINAL RETURN GRILLE, AIR TERMINAL EXHAUST GRILLE, AIR TERMINAL ROUND CONE DIFFUSER, SIDEWALL REGISTER / GRILLE, THERMOSTAT, HUMIDISTAT, CO2 SENSOR, FAN POWERED BOX, DUCT MOUNTED SMOKE DETECTOR, EQUIPMENT CLEARANCE, FIRE DAMPER, MANUAL DAMPER, THERMOSTAT (DUCT MOUNTED), HUMIDISTAT (DUCT MOUNTED), COMPONENT TO BE DEMOLISHED, DUCTWORK, TURNING VANES, CONDENSING UNIT, ROOFTOP UNIT, SINGLE DUCT AIR TERMINAL UNIT, ROOF CAP, CEILING MOUNTED EXHAUST FAN, PREINSULATED FLEXIBLE DUCT, CABLE OPERATED DAMPER, PITCH POCKET, FLEXIBLE DUCT CONNECTION, CONNECTION TO EXISTING SYSTEM, and MOTORIZED DAMPER.

MECHANICAL CODES & STANDARDS

Table with columns for CODE and DESCRIPTION. Lists codes such as IBC (2018), IECC (2009), IMC (2018), NFPA 90A (2009), and SMACNA (2005) with their corresponding descriptions.

DESIGN CONDITIONS

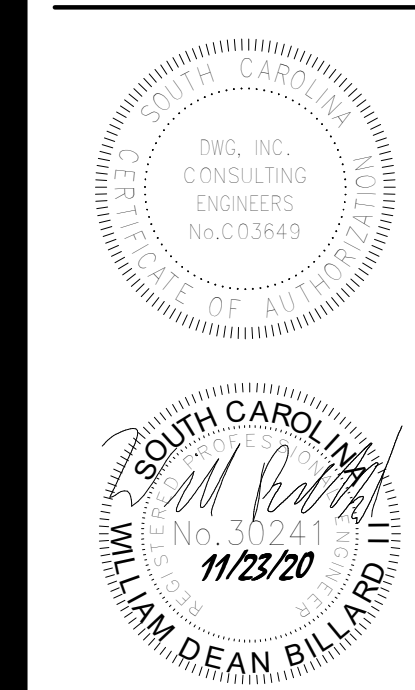
Table with columns for SUMMER and WINTER. Lists outdoor and indoor design conditions for DB and RH.

GENERAL HVAC NOTES

- 1. 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.
2. COORDINATE WORK WITH AUTHORITY HAVING JURISDICTION AND OBTAIN ALL PERMITS AND INSPECTIONS.
3. PROVIDE OWNER WITH CERTIFICATES OF FINAL INSPECTION AND ACCEPTANCE FROM AUTHORITY HAVING JURISDICTION.
4. THE HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS SHALL COMPLY WITH THE 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.
5. DUCT DIMENSIONS ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
6. 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.
7. PROVIDE CURVED RADIUS ELBOW AT FIRST SUPPLY & RETURN FITTING FOR ALL HVAC UNITS. PROVIDE TURNING VANES IN ALL 90 DEGREE ELBOWS IN ALL RECTANGULAR SUPPLY/RETURN/EXHAUST DUCT SYSTEMS. ANY OFFSETS REQUIRED IN DUCT SYSTEMS SHALL BE INSTALLED PER SMACNA 2005 2ND EDITION MANUAL. SHARP ANGLED TRANSITIONS OR OFFSETS WILL NOT BE ALLOWED. PROVIDE DUCT ACCESS DOORS AS REQUIRED.
8. INSTALL ALL DUCT MOUNTED DEVICES (DAMPERS, ACCESS DOORS, ETC.) AND PIPING SPECIALTIES IN EASILY ACCESSIBLE LOCATIONS. ADVISE THE ARCHITECT IN ADVANCE OF INSTALLATION IF ACCESS WILL BE HINDERED SO AN ALTERNATE LOCATION CAN BE SELECTED.
9. ALL DUCT TAKE-OFFS SHALL BE INSTALLED AS SHOWN BY DETAILS ON THE PLANS WITH A MANUAL BALANCING DAMPER AT EVERY TAKE-OFF. WHERE DUCT RUN-OUT SIZE IS NOT SHOWN PROVIDE DUCT SAME SIZE AS GRILLE NECK SIZE. PRE-INSULATED FLEXIBLE DUCT MAY BE USED FOR FINAL CONNECTION TO SUPPLY GRILLES (MAX. LENGTH 5').
10. 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.
11. ALL ROTATING MECHANICAL EQUIPMENT SHALL BE PROVIDED WITH VIBRATION ISOLATION. PROVIDE FLEXIBLE NEOPRENE DUCT CONNECTORS BETWEEN DUCTWORK AND ISOLATED MECHANICAL EQUIPMENT.
12. THE CONTRACTOR SHALL FIRESTOP ALL PENETRATIONS OF FIRE RATED WALLS/FLOORS/CEILINGS BY DUCTWORK PIPING, ETC., WITH U.L. LISTED FIRE STOPPING MATERIAL TO MAINTAIN FIRE RATING OF THE BARRIER.
13. 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.
14. BALANCE ALL AIR DISTRIBUTION DEVICES, EXHAUST FANS, AND OUTSIDE AIR QUANTITIES AS SCHEDULED OR SHOWN ON THE DRAWINGS. PROVIDE MARKERS AT ALL DAMPER LOCATIONS SHOWING FULL OPEN/CLOSED POSITIONS AND DAMPER SETTING FOR REQUIRED AIRFLOW. PROVIDE FINAL TEST AND BALANCE REPORT ALONG W/ SCHEMATIC DRAWINGS SHOWING DIFFUSER LOCATION W/ DESIGN AND ACTUAL CFM. THE DIFFUSER TAGS ON THE DRAWINGS SHALL CORRESPOND TO THE DIFFUSER TAGS ON THE REPORT. THIS REPORT SHALL BE SUBMITTED BEFORE THE FINAL INSPECTION IS PERFORMED. SEE SPECIFICATIONS FOR FURTHER INFORMATION.
15. ALL CONTROL WIRING AND CONTROLS ACCESSORIES NECESSARY TO IMPLEMENT THE OUTLINED SEQUENCES OF OPERATION SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR.
16. WIND LOAD PROTECTION OF ROOF MOUNTED EQUIPMENT AND DUCTWORK SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 16 OF THE INTERNATIONAL BUILDING CODE, 2018 EDITION. ALL WIND LOAD RESTRAINT AND BRACING SHALL BE SUBSTANTIATED BY MANUFACTURER'S SUBMITTALS PER THE SPECIFICATIONS.
17. SEE ARCHITECTURAL DOCUMENTS FOR ROOF PENETRATION AND FLASHING REQUIREMENTS.
18. 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.



Table with columns for REV, DATE, and DESCRIPTION. A vertical table for revision tracking.



TAXPAYER SERVICE CENTER COLLETON COUNTY 118 BENSON STREET WALTERBORO, SC 29488

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HVAC NOTES & LEGENDS

M001

SPLIT SYSTEM HEAT PUMP SCHEDULE

TAG		AIR CAPACITY CFM		ESP INCHES WG	NOMINAL COOLING @ AHRI CONDITIONS		AUXILIARY ELECTRIC HEAT KW	BASIS OF DESIGN	INDOOR MODEL	OUTDOOR MODEL
INDOOR	OUTDOOR	TOTAL	OA		CAPACITY MBH	MINIMUM EFFICIENCY SEER				
AH-1	HP-1	2000	300	0.90	60	14	10.8	TRANE	TAM9A0C60	4TWZ6060
AH-2	HP-2	1200	180	0.90	36	14	7.2	TRANE	TAM9A0C36	4TWZ6036
AH-3	HP-3	1400	210	0.90	42	14	7.2	TRANE	TAM9A0C42	4TWZ6042
AH-4	HP-4	1200	180	0.90	36	14	7.2	TRANE	TAM9A0C36	4TWZ6036

NOTES:
 1. REFER TO ELECTRICAL DRAWINGS FOR VOLTAGE REQUIREMENTS.
 2. PROVIDE INTEGRAL DISCONNECT FOR INDOOR UNITS AND SEE ELECTRICAL DRAWINGS FOR OUTDOOR UNIT DISCONNECTS.
 3. ROUTE AND SIZE REFRIGERANT PIPE PER THE MANUFACTURERS RECOMMENDATIONS.
 4. PROVIDE AH-1 WITH ECONOMIZER CAPABILITIES VIA MICRO-METL MB-GP MIXING BOX AND HONEYWELL JADE CONTROLLER OR APPROVED EQUAL. SEE DETAIL 5/M003 FOR INSTALLATION.

DUCTLESS COOLING ONLY MINI-SPLIT SCHEDULE

TAG		MAXIMUM AIRFLOW CFM	COOLING CAPACITY			BASIS OF DESIGN	INDOOR MODEL	OUTDOOR MODEL
INDOOR	OUTDOOR		TOTAL CAPACITY MBH	SENS CAPACITY MBH	MIN. SEER @ AHRI COND			
AH-5	CU-5	660	24	20	20	MITSUBISHI	MSY-GL24	MUY-GL024

NOTES:
 1. REFER TO ELECTRICAL DRAWINGS FOR VOLTAGE REQUIREMENTS AND DISCONNECT MEANS.
 2. PROVIDE WITH SINGLE POINT POWER CONNECTION.
 3. ROUTE AND SIZE REFRIGERANT PIPE PER THE MANUFACTURERS RECOMMENDATIONS.
 4. PROVIDE WITH HARD WIRED THERMOSTAT.

LOUVER SCHEDULE

TAG	AIR PRESSURE DROP	AIR VELOCITY	CFM	DIMENSION FREE AREA	DIMENSION HEIGHT	DIMENSION WIDTH	SYSTEM	BASIS OF DESIGN	MODEL
L-1	0.10 in-wg	808 FPM	2500	3.10 SF	2' - 0"	3' - 6"	OUTSIDE AIR	RUSKIN	EME520MD
L-2	0.10 in-wg	1000 FPM	2000	2.67 SF	2' - 0"	8' - 0"	RELIEF AIR	RUSKIN	ELT-E
L-3	0.10 in-wg	708 FPM	490	0.59 SF	1' - 2"	1' - 6"	EXHAUST AIR	RUSKIN	EME520MD

NOTES:
 1. ALL LOUVERS SHALL BE STATIONARY, DRAINABLE, AND ALUMINUM CONSTRUCTION.
 2. COORDINATE EXACT LOUVER LOCATION WITH ARCHITECTURAL PLANS.
 3. L-2 SHALL BE TRIANGULAR SHAPE. BASIS OF DESIGN RUSKIN ELT-E OR APPROVED EQUAL.
 4. FINISH COLOR SHALL BE COORDINATED WITH ARCHITECT IN THE SUBMITTAL PHASE.

AIR DISTRIBUTION SCHEDULE

TAG	NECK SIZE	FACE SIZE	DESCRIPTION	BASIS OF DESIGN	MODEL
Supply Air					
A	8" Ø	24" x 24"	PLAQUE FACE SUPPLY DIFFUSER	PRICE	ASPD
B	10" Ø	24" x 24"	PLAQUE FACE SUPPLY DIFFUSER	PRICE	ASPD
C	6"x 6"	8" x 8"	DOUBLE DEFLECTION LOUVERED SUPPLY GRILLE	PRICE	620
D	6" Ø	12" x 12"	PLAQUE FACE SUPPLY DIFFUSER	PRICE	ASPD
E	8" Ø	12" x 12"	PLAQUE FACE SUPPLY DIFFUSER	PRICE	ASPD
F	6"x 6"	24" x 24"	PLAQUE FACE SUPPLY DIFFUSER	PRICE	ASPD
Return Air					
21	12" x 12"	24" x 24"	PERFORATED FACE RETURN GRILLE	PRICE	APDDR
22	10" x 10"	12" x 12"	PERFORATED FACE RETURN GRILLE	PRICE	APDDR
23	6"x 6"	8" x 8"	SINGLE DEFLECTION LOUVERED RETURN GRILLE	PRICE	610

NOTES:
 1. ALL DIFFUSERS AND GRILLES SHALL BE ALUMINUM CONSTRUCTION WITH BAKED ENAMEL WHITE FINISH.
 2. COORDINATE MOUNTING TYPE WITH THE MECHANICAL PLANS AND ARCHITECTURAL CEILING PLAN.
 3. ALL DIFFUSERS SHALL BE 4-WAY BLOW UNLESS NOTED OTHERWISE ON THE DRAWINGS.

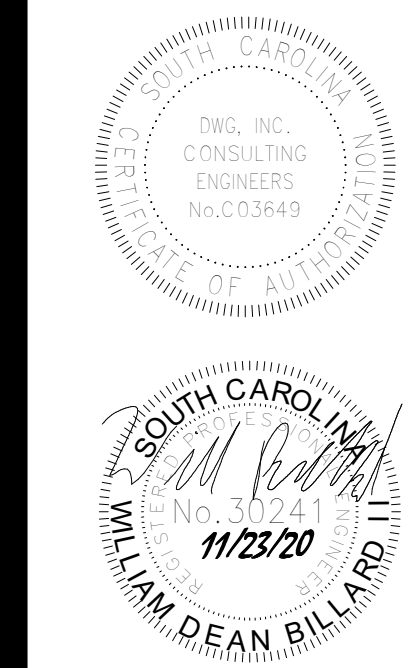
FAN SCHEDULE

TAG	CAPACITY CFM	ESP INCHES WG	FRPM	INPUT WATTS	MAXIMUM SOUND RATING (SONES)	TYPE	SYSTEM SERVED	FAN CONTROL	BASIS OF DESIGN	MODEL
EF-1	210	0.35	915	31	3	CEILING	125 WOMEN	OCCUPANCY SENSOR	GREENHECK	SP-A390-VG
EF-2	140	0.35	1040	21	2	CEILING	130 MEN	OCCUPANCY SENSOR	GREENHECK	SP-A390-VG
EF-3	70	0.25	935	6	1	CEILING	102 UNISEX	OCCUPANCY SENSOR	GREENHECK	SP-80-VG
EF-4	70	0.25	935	6	1	CEILING	126 JANITOR	OCCUPANCY SENSOR	GREENHECK	SP-80-VG

NOTES:
 1. ALL FANS SHALL BE PROVIDED WITH SPEED CONTROLLERS FOR BALANCING PURPOSES.
 2. ALL FANS SHALL BE PROVIDED WITH BACKDRAFT DAMPERS.
 3. REFER TO ELECTRICAL DRAWINGS FOR VOLTAGE REQUIREMENTS.
 4. ALL FANS SHALL BE CONTROLLED VIA OCCUPANCY SENSORS.
 5. PROVIDE ALL FANS WITH AN INTEGRAL DISCONNECT SWITCH.



REV.	DATE	DESCRIPTION

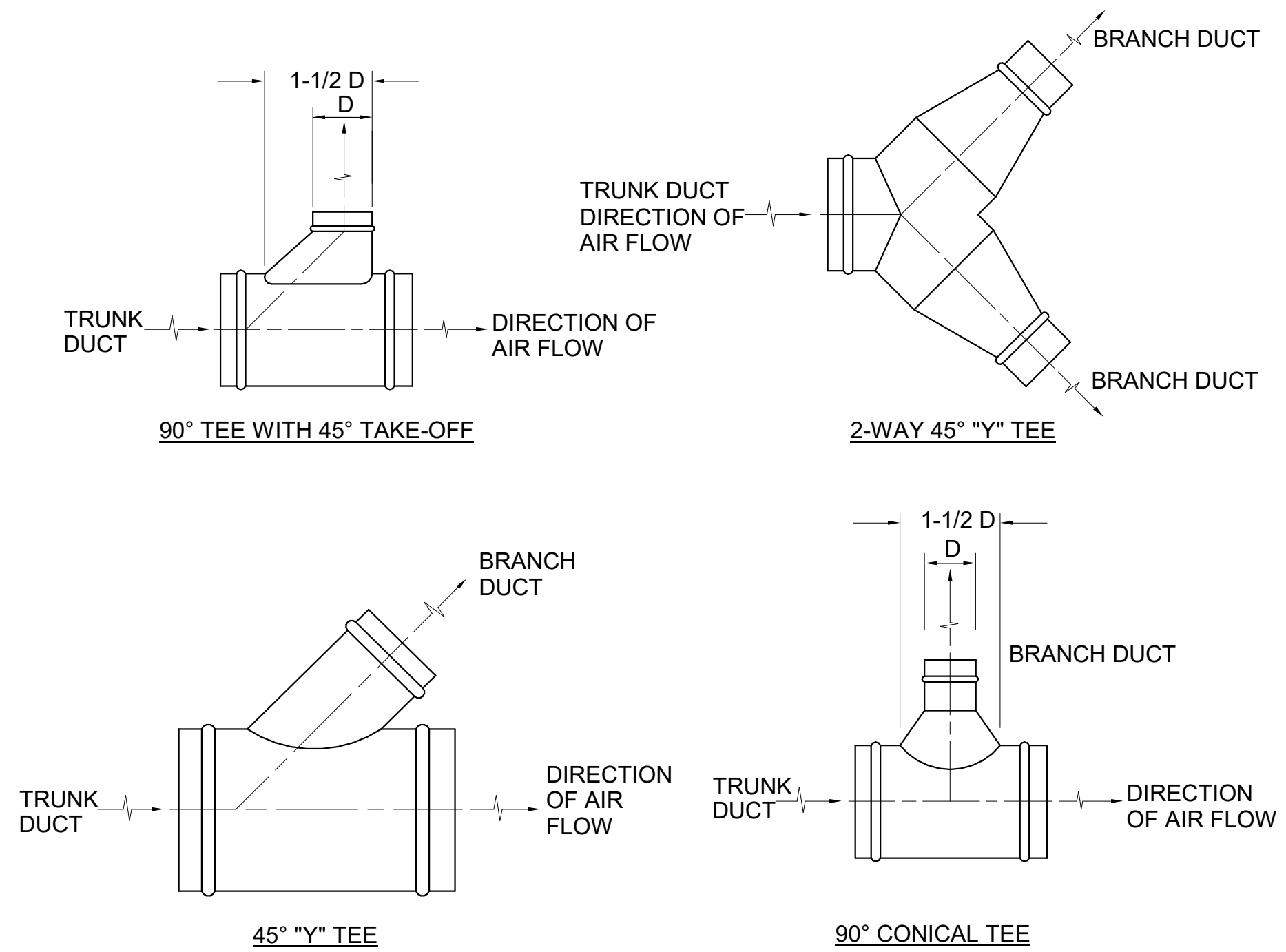


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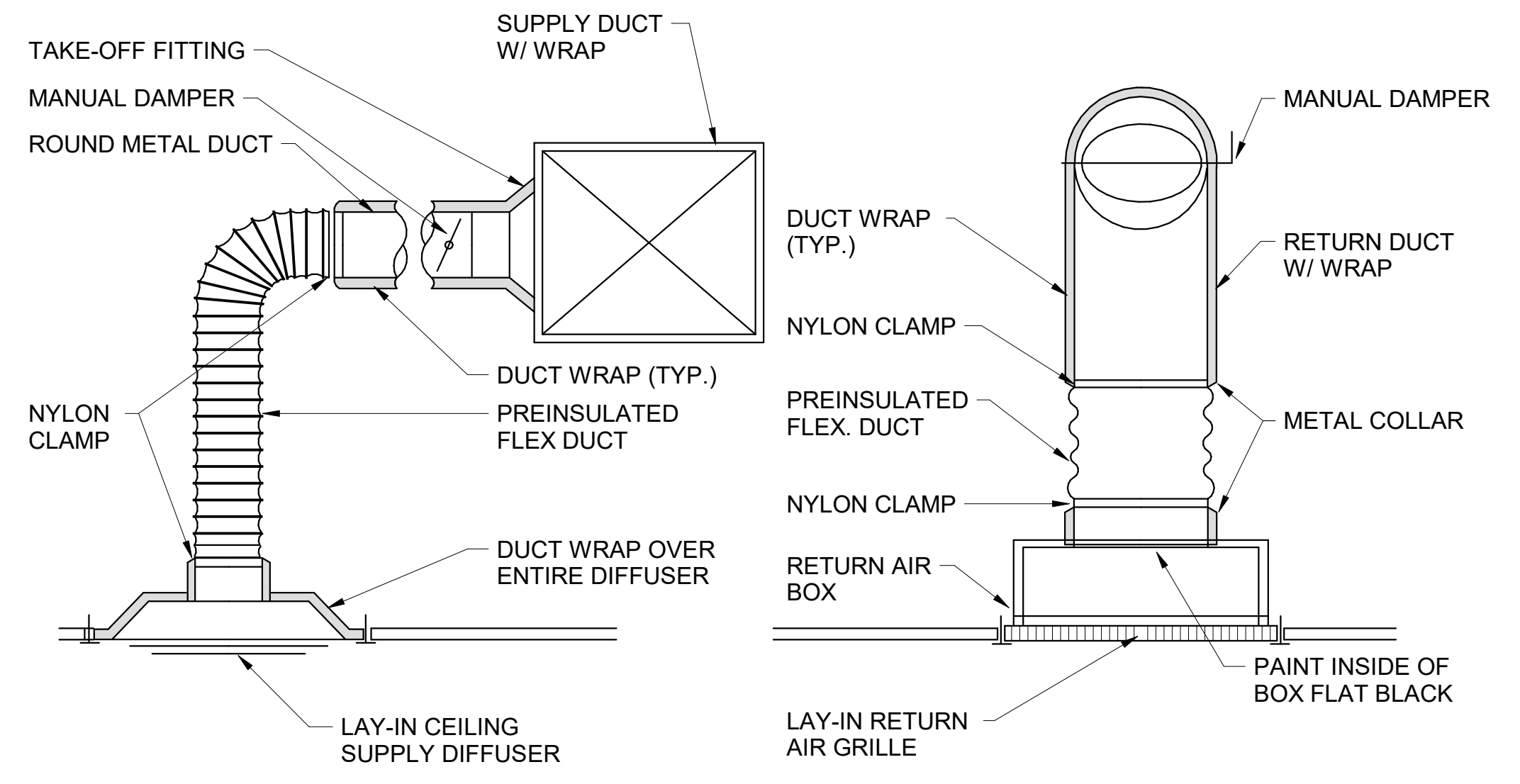
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HVAC SCHEDULES

M002

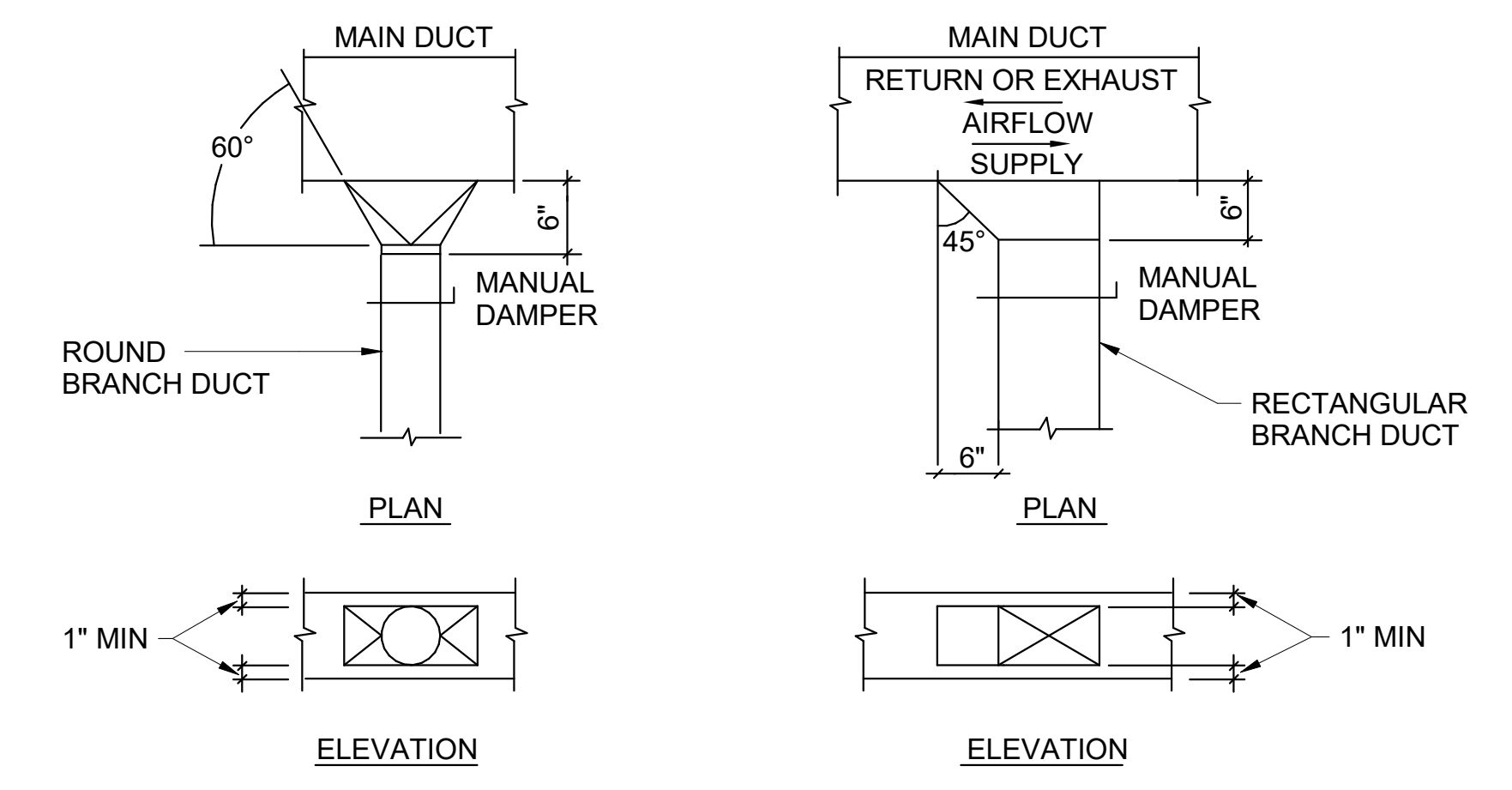


1 ROUND DUCT BRANCH TAKE OFF DETAIL
M003 NOT TO SCALE



- NOTES:
1. INSTALL NYLON CLAMPS ON INNER FLEX DUCT LINER AND OUTER JACKET. TAPE ENDS OF PREINSULATED FLEX. DUCT AT THE DIFFUSER AND THE BRANCH DUCT CONNECTION.
 2. RETURN AIR BOX SHALL BE MINIMUM 12" HIGH. RETURN DUCT MAY TAP INTO THE SIDE OF THE BOX A MINIMUM OF 6" ABOVE GRILLE.
 3. PROVIDE YOUNG REGULATOR REMOTE DAMPER CONTROLLER FOR EACH DIFFUSER AND GRILLE LOCATED IN AREAS WITH INACCESSIBLE CEILINGS. LOCATE CONTROLLER IN A CONCEALED, ACCESSIBLE LOCATION.

2 TYPICAL DIFFUSER/GRILLE INSTALLATION DETAIL
M003 NOT TO SCALE

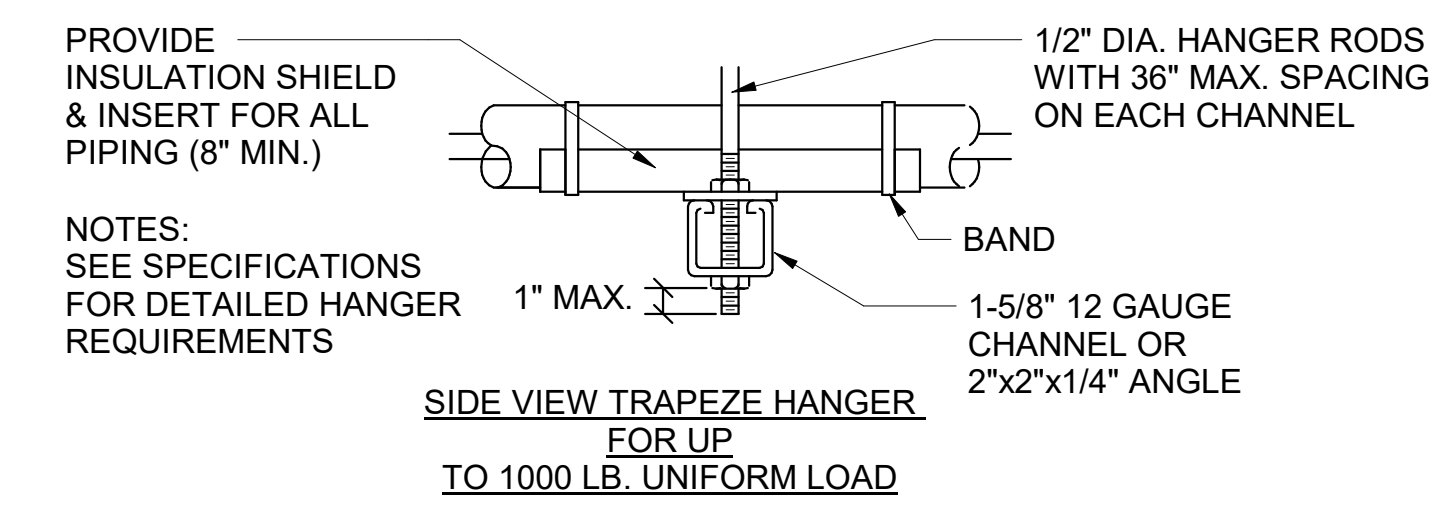


- NOTES:
1. CONTRACTOR MAY SUBSTITUTE FLEXMASTER CB-D, STO, OR STOC FOR INDICATED TAKE-OFF.
 2. CONTRACTOR MAY SUBSTITUTE CROWN 716 FOR INDICATED TAKE-OFF.
 3. FITTINGS 716, STO, AND STOC SHALL BE SCREWED TO THE TRUNK DUCT AND SEALED WITH MASTIC. MASTIC TAPE IS NOT ACCEPTABLE. SEE SPECIFICATIONS.

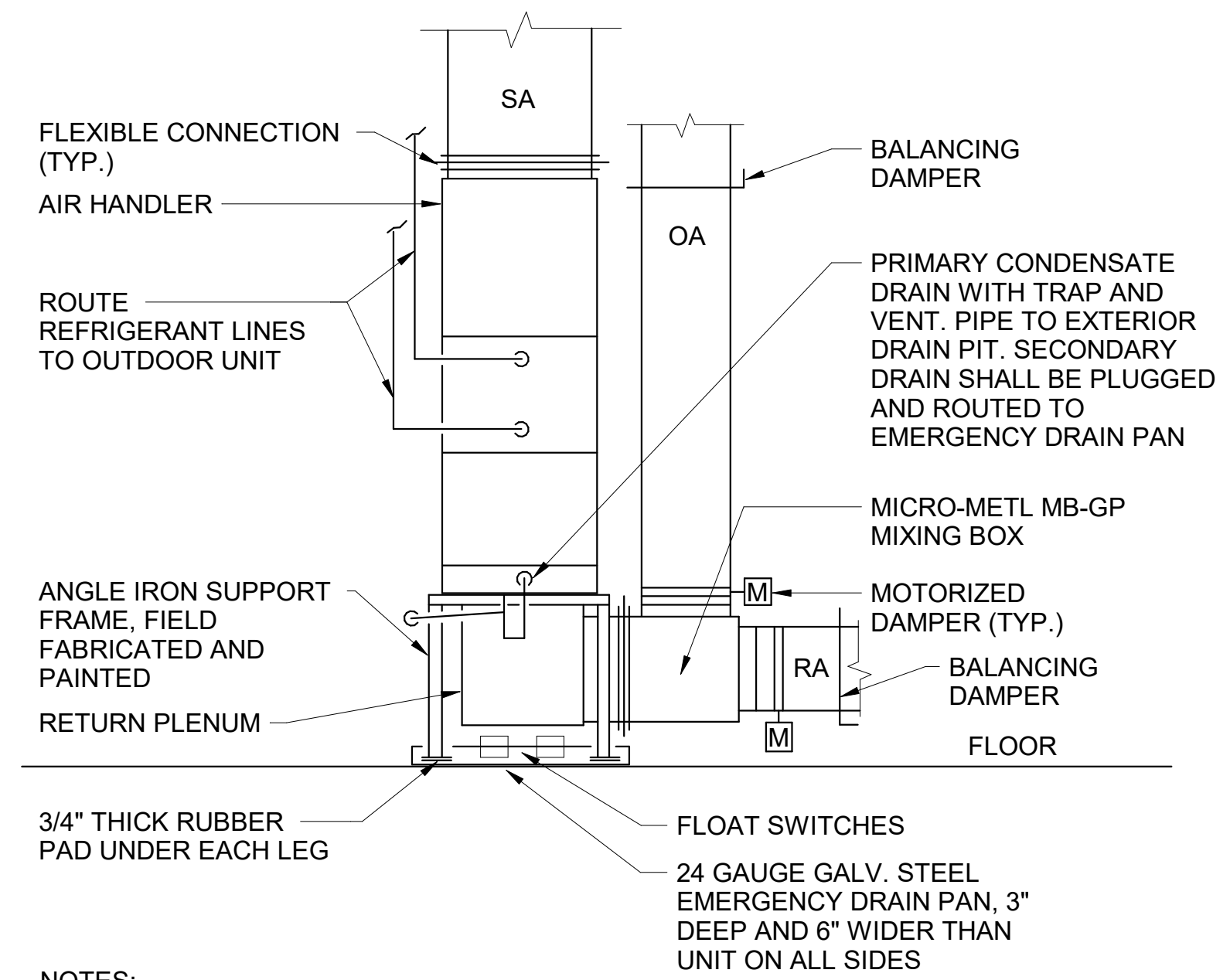
3 TYPICAL DUCT TAKE OFF INSTALLATION DETAIL
M003 NOT TO SCALE

MAXIMUM PIPE/TUBING SUPPORT SPACING						
NOM. SIZE	IN.	THRU 3/4	1	1 1/4	1 1/2	2
PIPE	FT.	7	7	7	9	10
TUBING	FT.	5 FT	6	7	8	8

NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

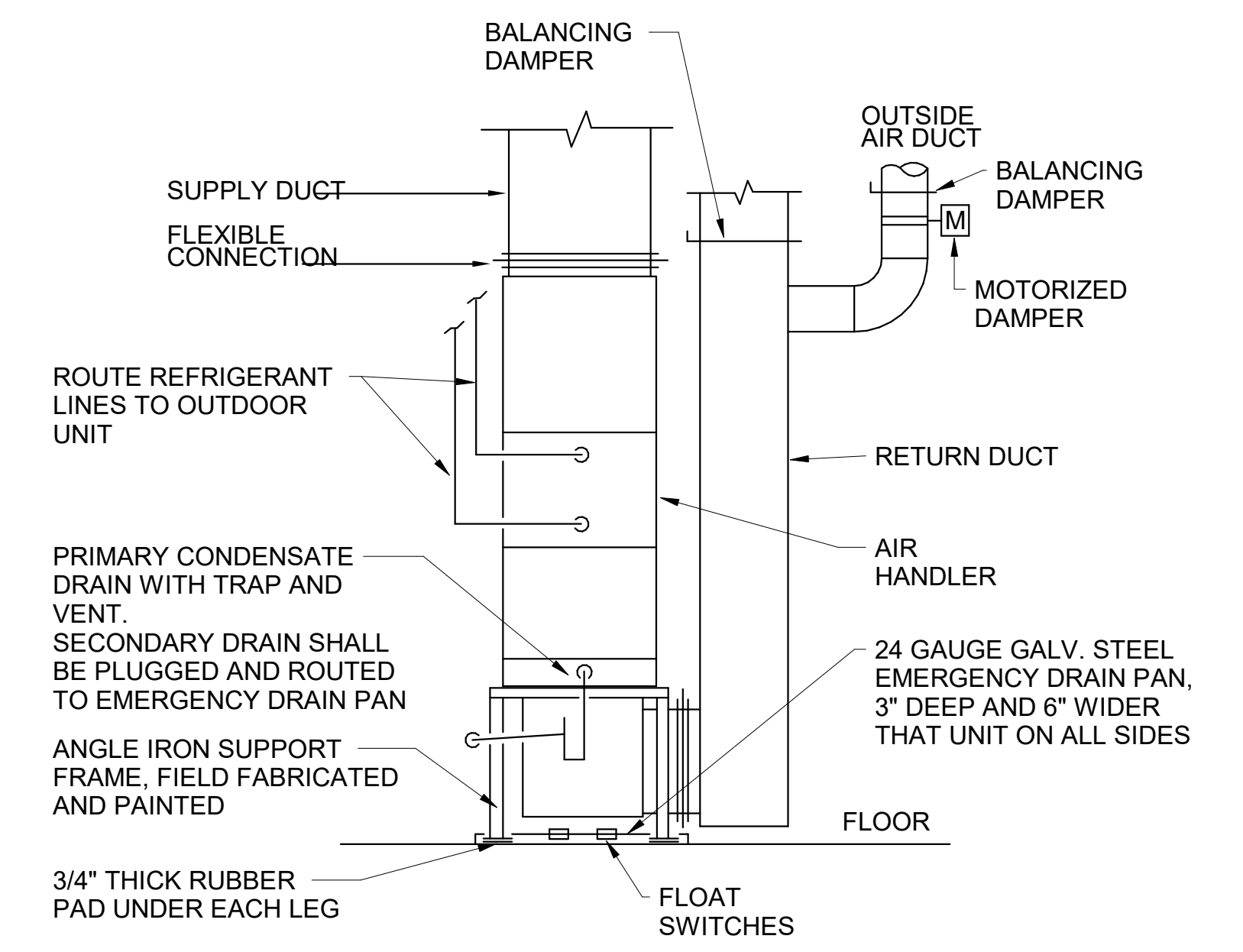


4 MECHANICAL PIPE SUPPORT DETAIL
M003 NOT TO SCALE



- NOTES:
1. PROVIDE MIXING BOX AND CONTROLLER FOR STAND ALONE ECONOMIZER WITH ENTHALPY CONTROL AND ALL ASSOCIATED SENSORS.
 2. THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM VENTILATION LEVEL WHEN IN OCCUPIED MODE AND OPEN TO FULL OPEN WHEN ECONOMIZER IS ENABLED.
 3. MOTORIZED DAMPER SHALL BE INTERLOCKED W/ HEAT PUMP COMPRESSOR. DAMPER SHALL OPEN WHEN COMPRESSOR IS ENERGIZED AND CLOSE WHEN DE-ENERGIZED.

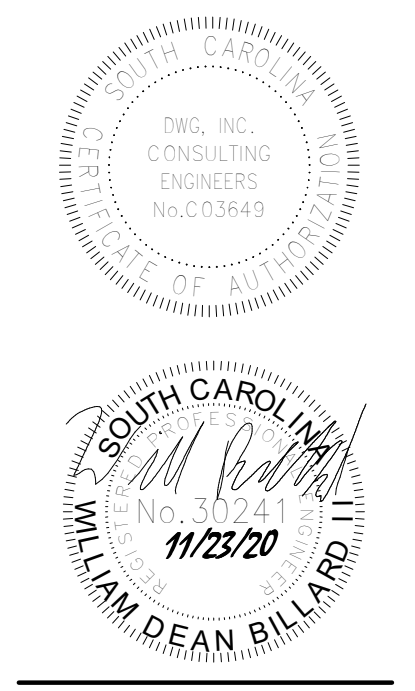
5 AHU-1 INSTALLATION DETAIL
M003 NOT TO SCALE



- NOTES:
1. MOTORIZED DAMPER SHALL BE INTERLOCKED W/ HEAT PUMP COMPRESSOR. DAMPER SHALL OPEN WHEN COMPRESSOR IS ENERGIZED AND CLOSE WHEN DE-ENERGIZED.

6 AHU-2,3,& 4 INSTALLATION DETAIL
M003 NOT TO SCALE

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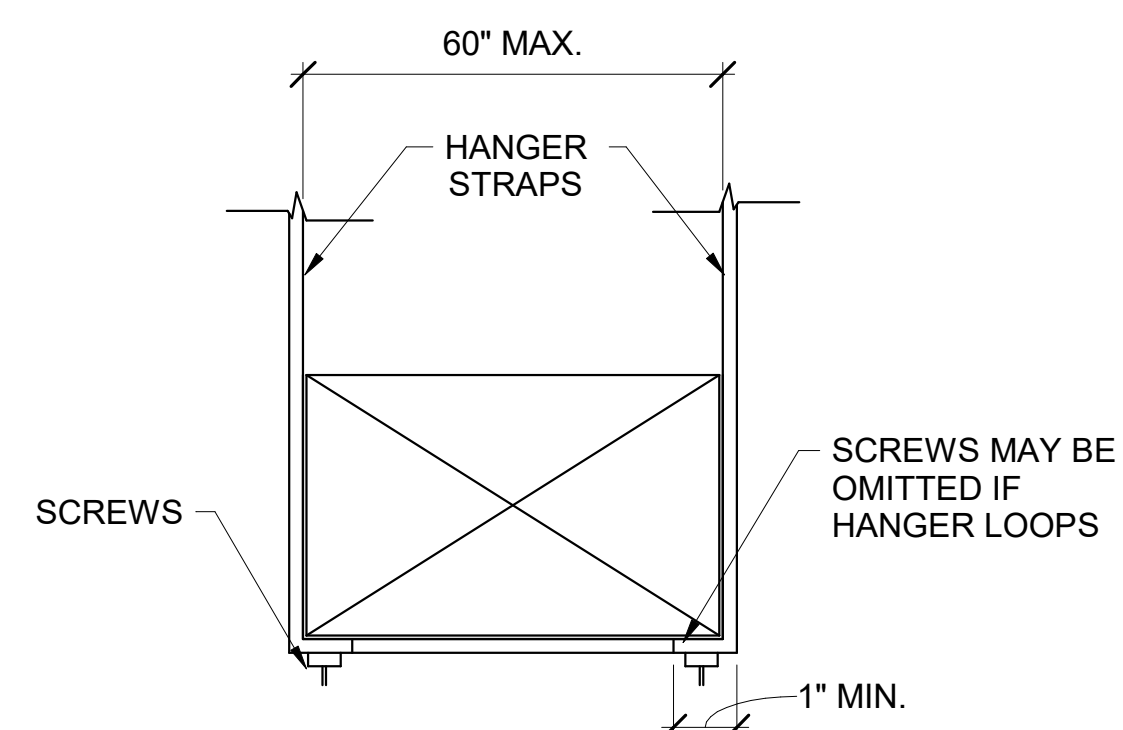
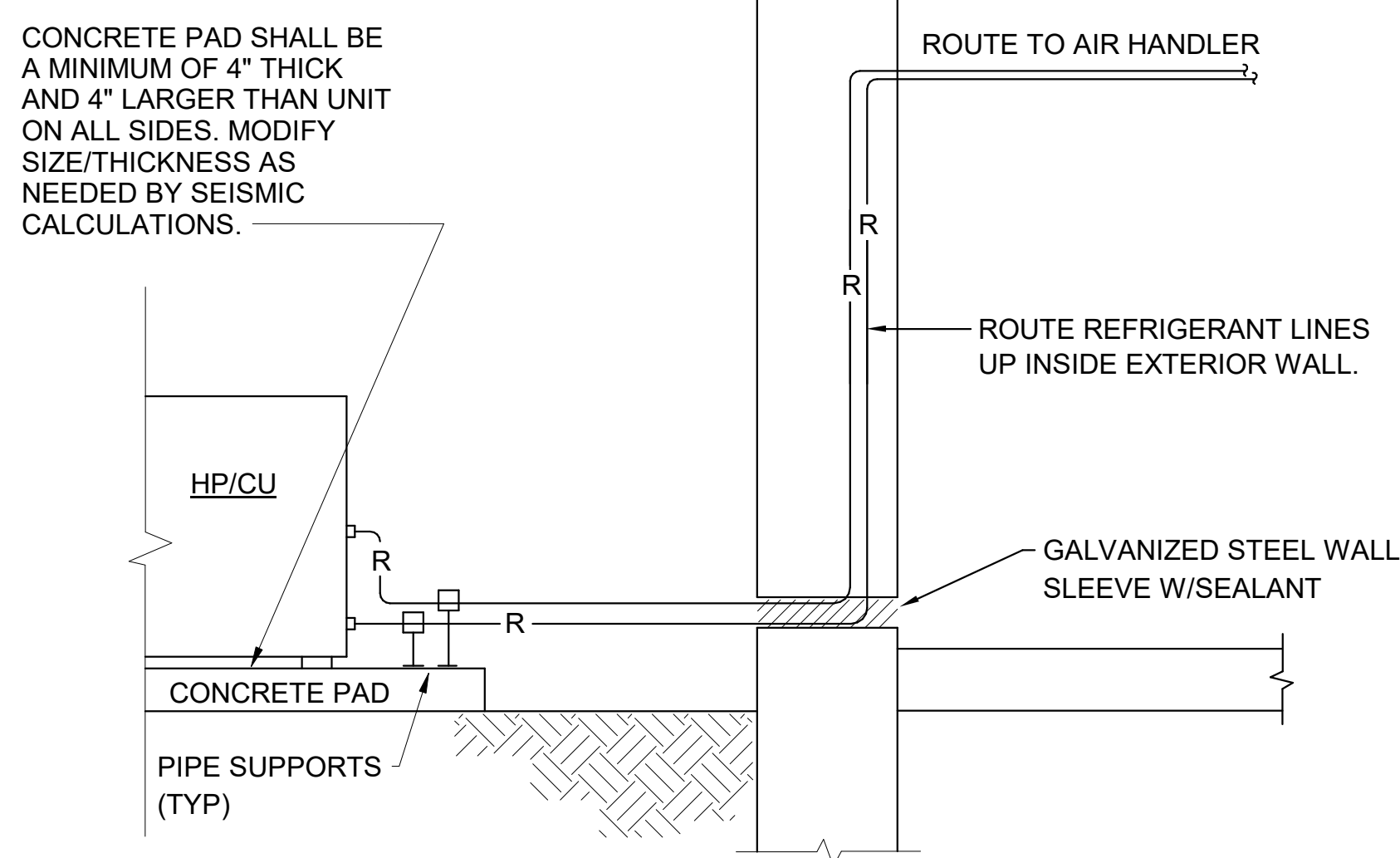


TABLE 4-1 RECTANGULAR DUCT HANGERS MINIMUM SIZE

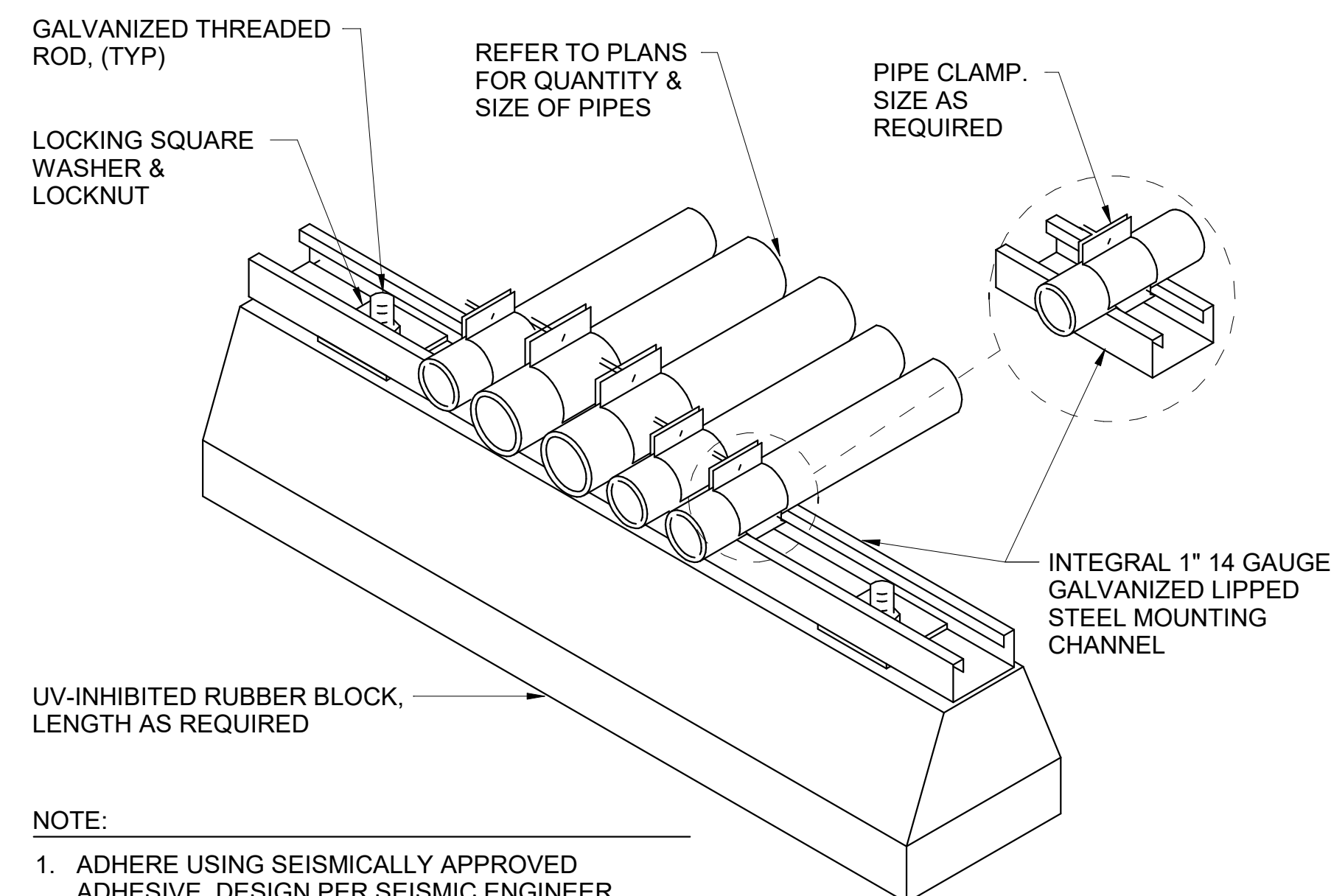
MAXIMUM HALF OF DUCT PERIMETER	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING		
	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD	
P/2= 30"	1" X 22 GA.	10 GA. (.135")	1" X 22 GA.	10 GA. (.135")	1" X 22 GA.	12 GA. (.106")	1" X 22 GA.	12 GA. (.106")	
P/2= 72"	1" X 18 GA.	3/8"	1" X 20 GA.	1/4"	1" X 22 GA.	1/4"	1" X 22 GA.	1/4"	
P/2= 96"	1" X 16 GA.	3/8"	1" X 18 GA.	3/8"	1" X 20 GA.	3/8"	1" X 22 GA.	1/4"	
P/2= 120"	1-1/2" X 16 GA.	1/2"	1" X 16 GA.	3/8"	1" X 18 GA.	3/8"	1" X 20 GA.	1/4"	
P/2= 168"	1-1/2" X 16 GA.	1/2"	1-1/2" X 16 GA.	1/2"	1" X 16 GA.	3/8"	1" X 18 GA.	3/8"	
P/2= 192"	NOT GIVEN	1/2"	1-1/2" X 16 GA.	1/2"	1" X 16 GA.	3/8"	1" X 16 GA.	3/8"	
P/2=193" UP	SPECIAL ANALYSIS REQUIRED								
WHEN STRAPS ARE LAP JOINED, USE THESE MINIMUM FASTENERS 1" X 18, 20, 22 GA. - TWO #10 OR ONE 1/4" BOLT 1" X 16 GA. - TWO 1/4" DIA. 1-1/2" X 16 GA. - TWO 3/8" DIA. PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE.		SINGLE HANGER MAXIMUM ALLOWABLE LOAD							
		STRAP			WIRE OR ROD (DIA.)				
		1" X 22 GA. - 260 LBS.		1/4" - 270 LBS.		1" X 20 GA. - 320 LBS.		3/8" - 680 LBS.	
		1" X 20 GA. - 320 LBS.		1" X 18 GA. - 420 LBS.		1" X 16 GA. - 700 LBS.		1/2" - 1250 LBS.	
		1-1/2" X 16 GA. - 1100 LBS.				5/8" - 2000 LBS.		3/4" - 3000 LBS.	

1 SUPPORT DETAIL
M004 NOT TO SCALE



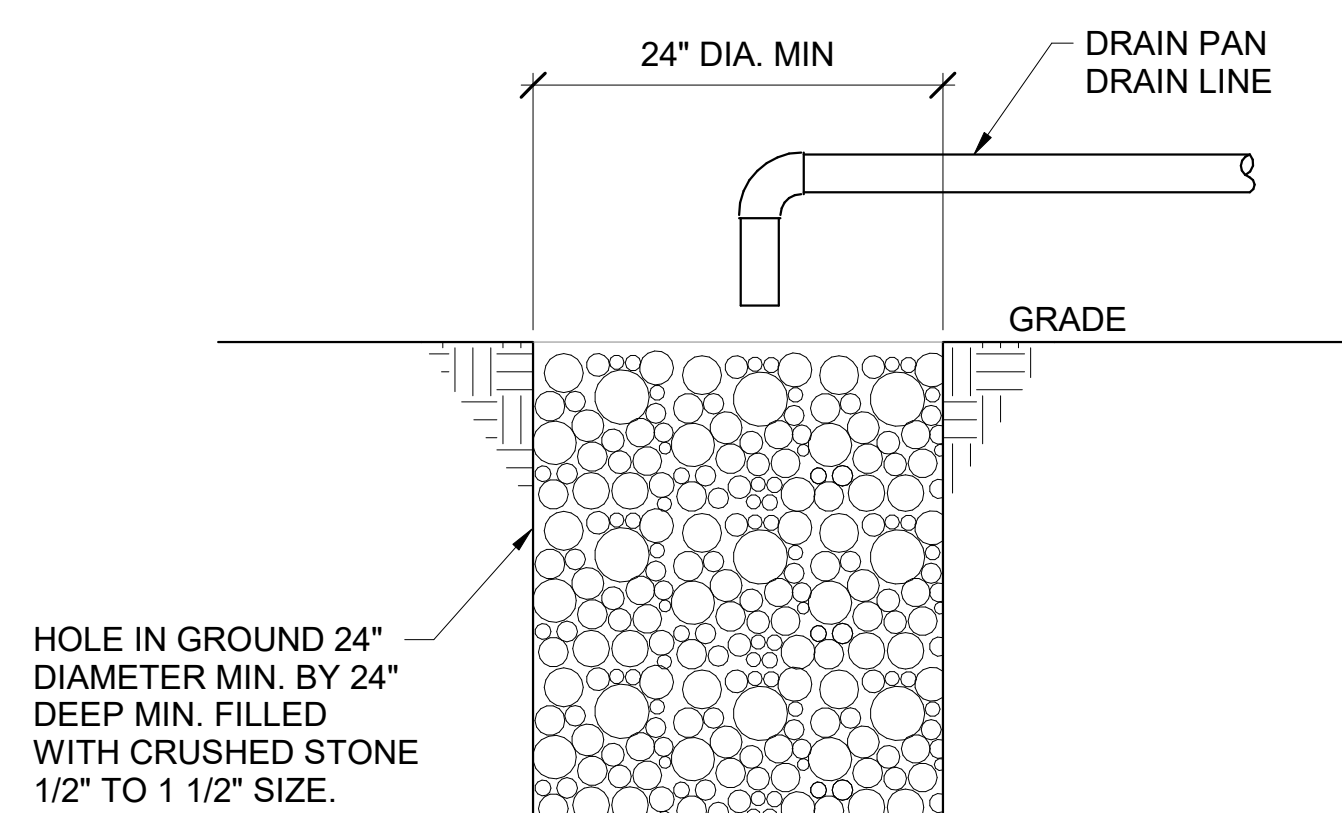
- NOTES:**
- ALL PIPING SHALL BE HARD DRAWN COPPER TUBING WITH SOLDERED JOINTS.
 - EXTERIOR INSULATION SHALL BE PROVIDED WITH ALUMINUM JACKET.

2 HEAT PUMP/CONDENSING UNIT INSTALLATION DETAIL
M004 NOT TO SCALE



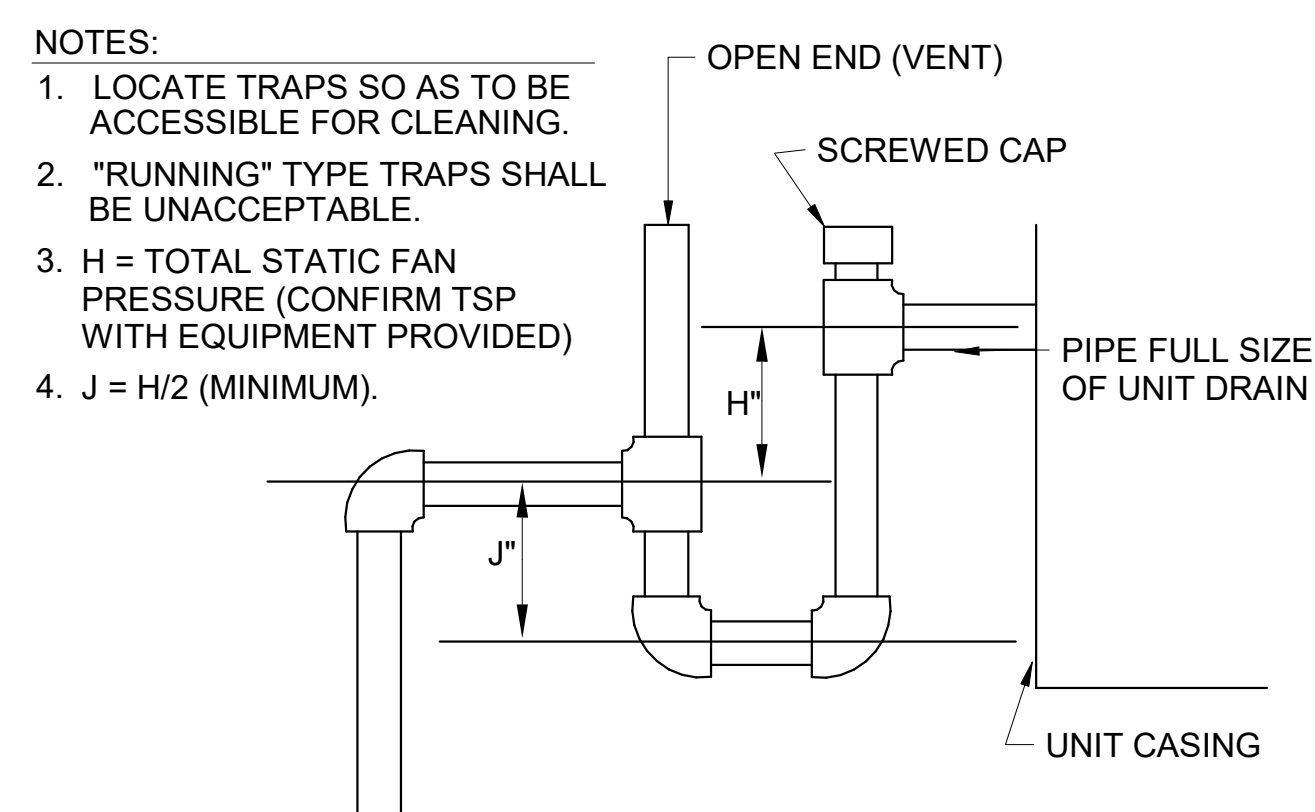
- NOTE:**
- ADHERE USING SEISMICALLY APPROVED ADHESIVE. DESIGN PER SEISMIC ENGINEER.

3 PIPING SUPPORT DETAIL
M004 NOT TO SCALE



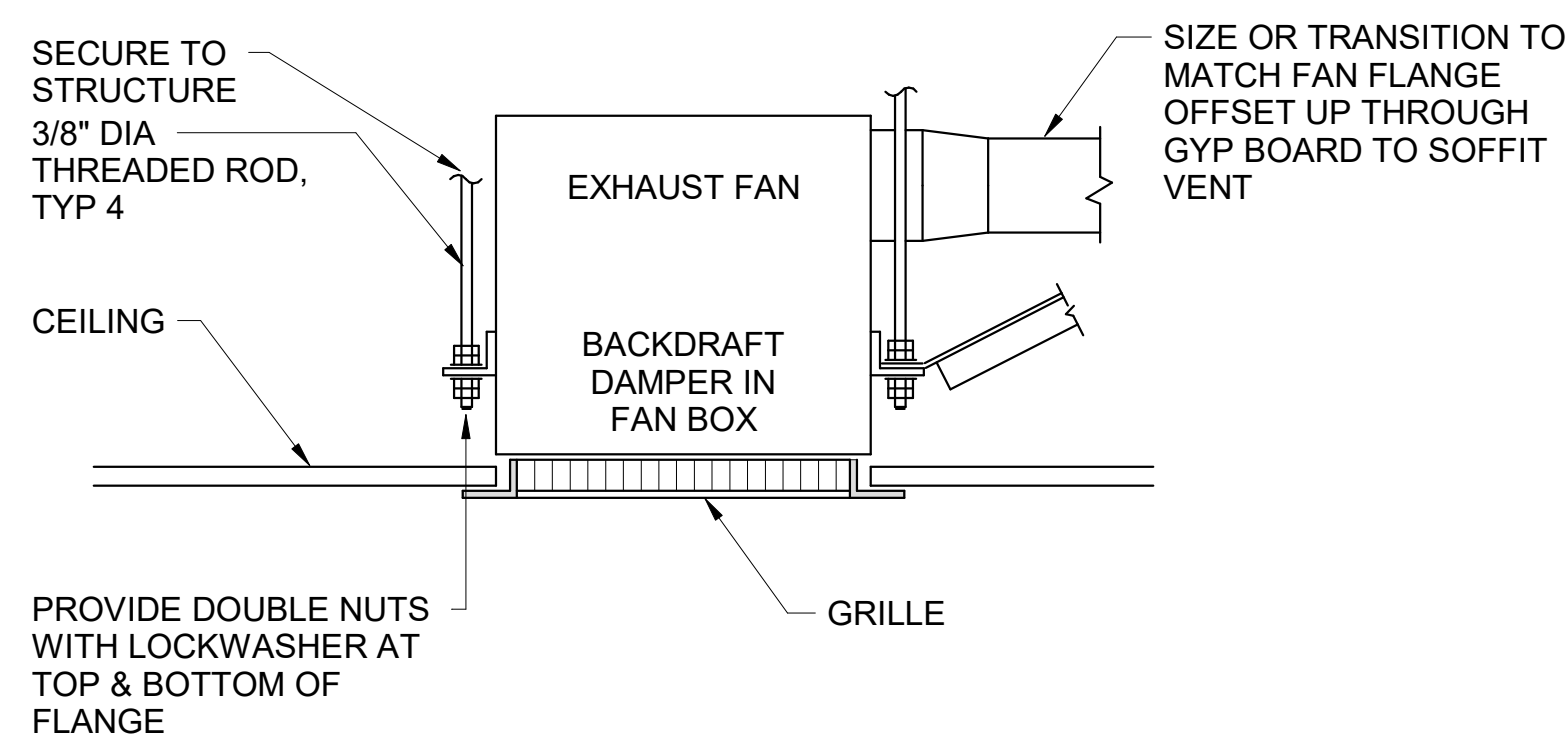
- NOTES:**
- COVER WITH LANDSCAPE AFTER INSPECTION IS COMPLETED.
 - CONTRACTOR SHALL VERIFY THAT THE CONDENSATE DRAIN LINE IS IN WORKING ORDER BY RUNNING WATER DOWN THRU THE DRAIN LINE FROM THE POINT OF THE COIL CONNECTION PRIOR TO BURIAL.
 - DRAIN PAN DRAIN LINE SHALL TERMINATE 6" ABOVE FINISHED GRADE OVER TOP OF THE DRAIN PIT.

4 CONDENSATE DRAIN PIT DETAIL
M004 NOT TO SCALE

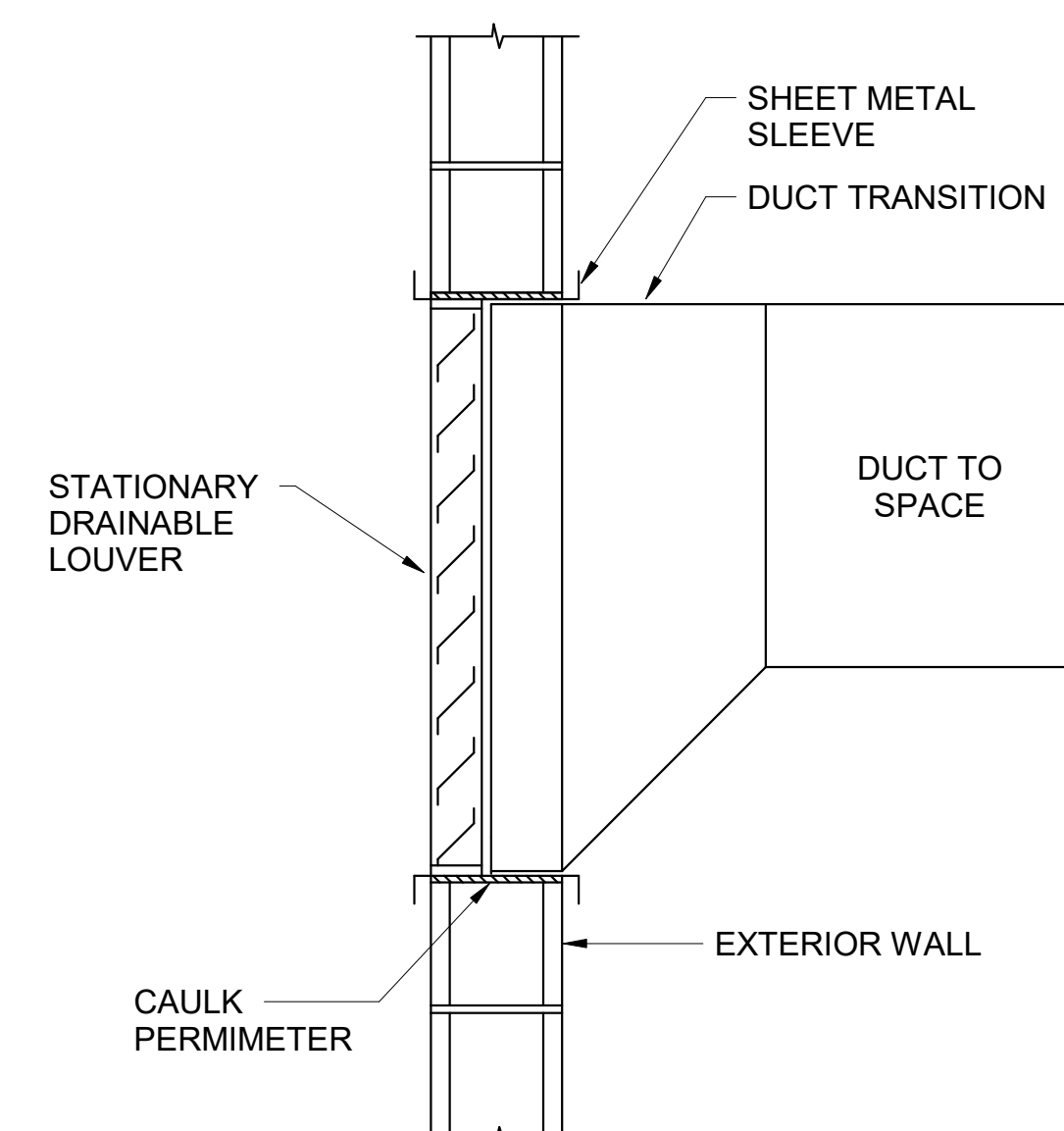


- NOTES:**
- LOCATE TRAPS SO AS TO BE ACCESSIBLE FOR CLEANING.
 - "RUNNING" TYPE TRAPS SHALL BE UNACCEPTABLE.
 - H = TOTAL STATIC FAN PRESSURE (CONFIRM TSP WITH EQUIPMENT PROVIDED)
 - J = H/2 (MINIMUM).

5 CONDENSATE DRAIN TRAP INSTALLATION DETAIL
M004 NOT TO SCALE

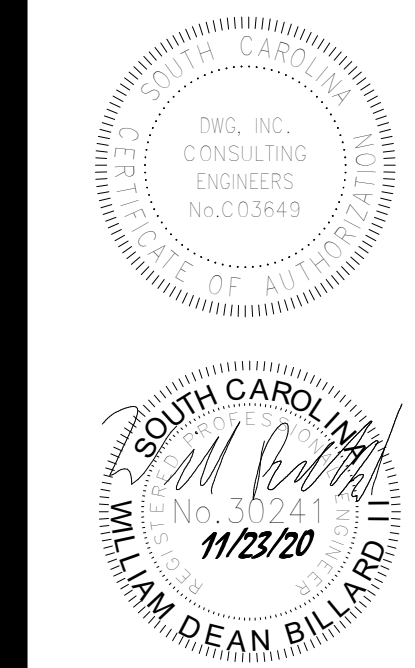


6 TYPICAL EXHAUST FAN DETAIL
M004 NOT TO SCALE



7 DUCTED LOUVER INSTALLATION DETAIL
M004 NOT TO SCALE

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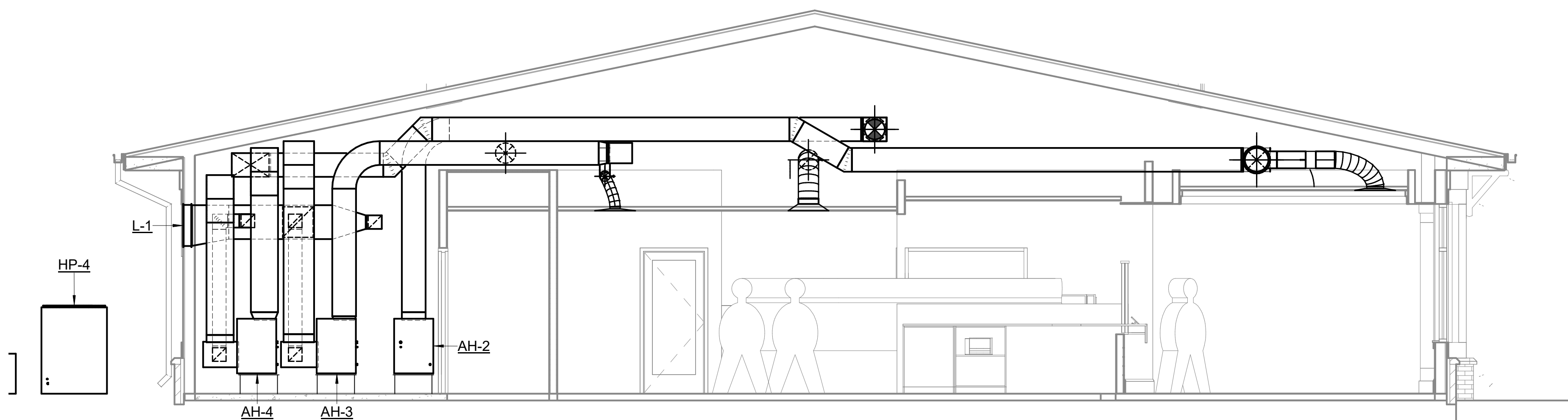


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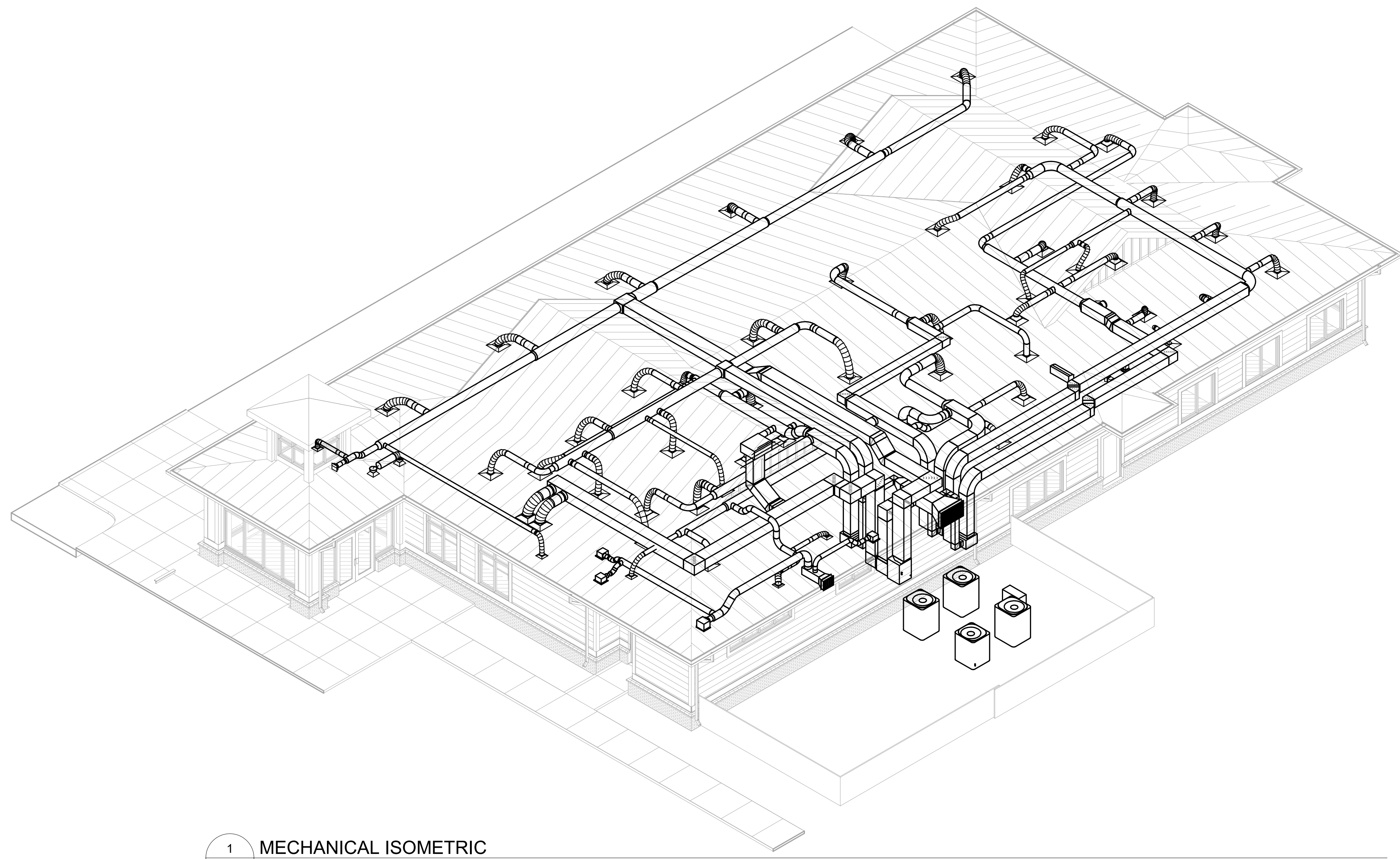
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HVAC DETAILS

M004



2 MECHANICAL SECTION
 M010 SCALE: 1/4" = 1'-0"



1 MECHANICAL ISOMETRIC
 M010 SCALE:

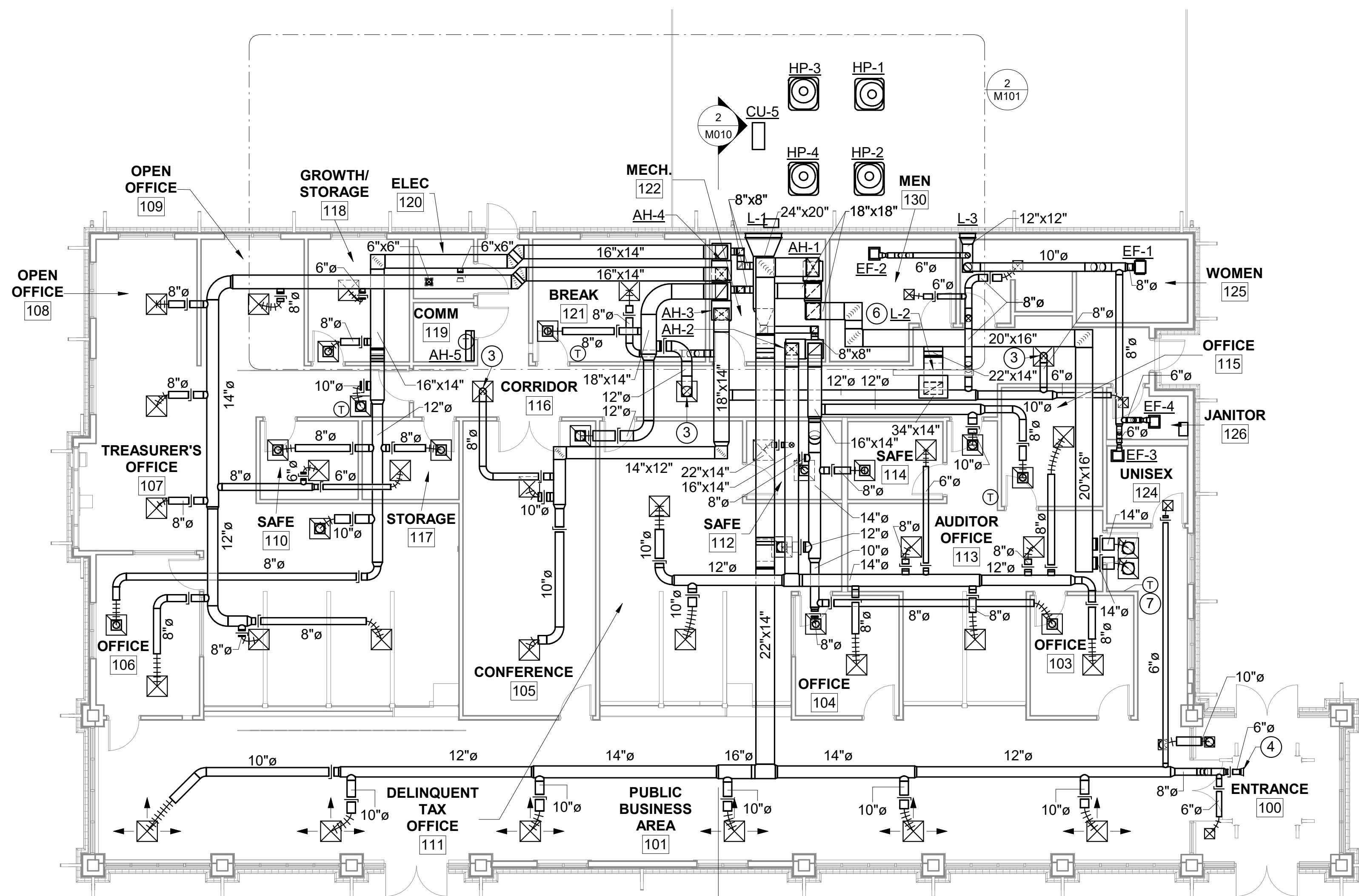
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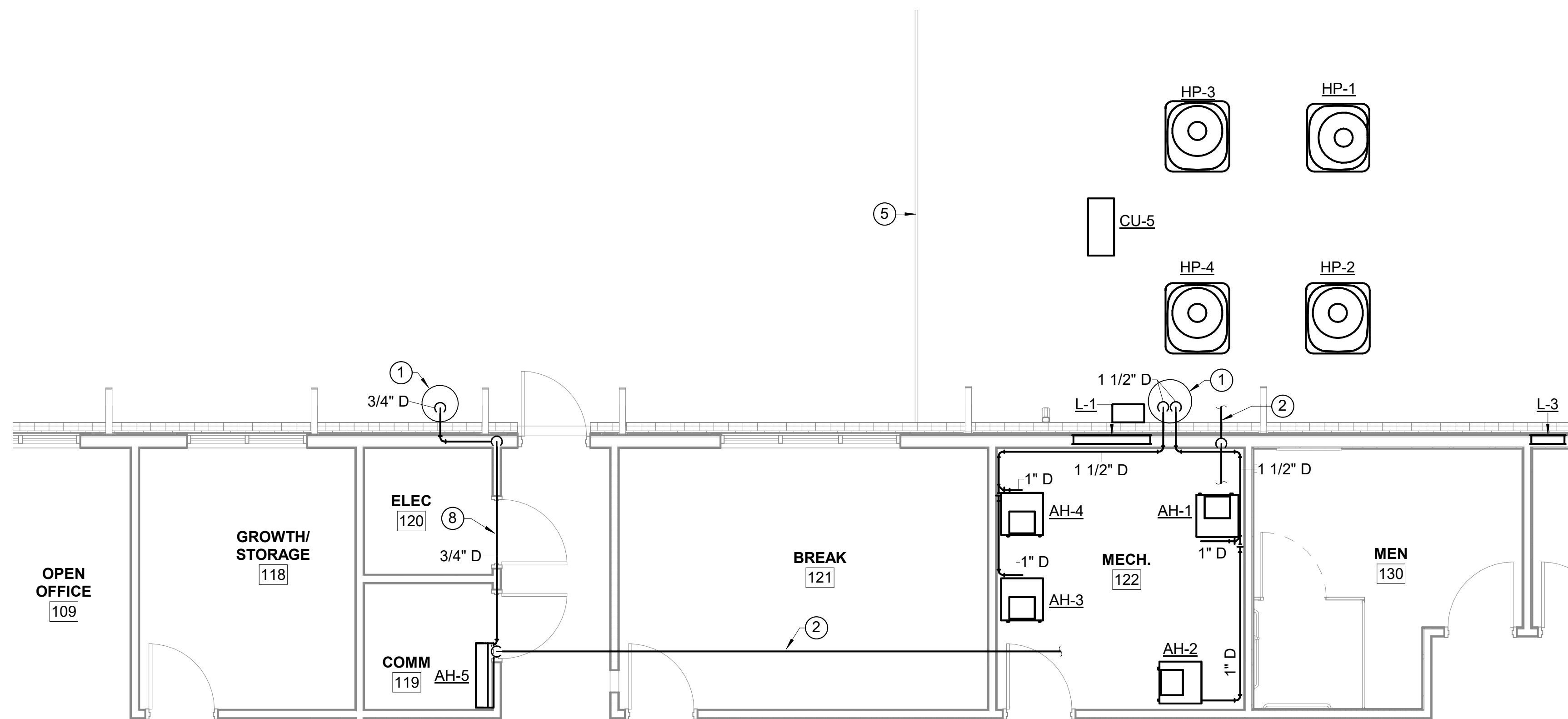
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MECHANICAL ISOMETRIC & SECTION
M010



1 MECHANICAL PLAN
M101 SCALE: 1/8" = 1'-0"



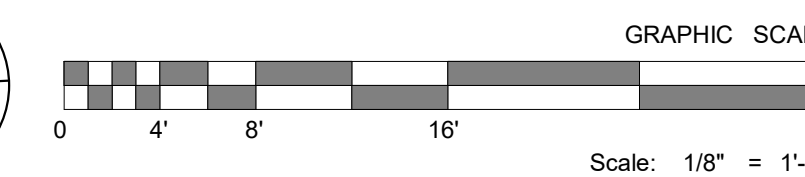
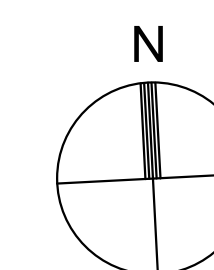
2 MECHANICAL PIPING ENLARGED PLAN
M101 SCALE: 1/4" = 1'-0"

KEYNOTES

- 1 PROVIDE DRAIN PIT FOR CONDENSATE. SEE DETAIL FOR ADDITIONAL INFORMATION.
- 2 TYPICAL REFRIGERANT PIPE ROUTING. SEAL EXTERIOR WALL PENETRATION AIR TIGHT. SIZE PER THE MANUFACTURER'S RECOMMENDATIONS.
- 3 PROVIDE FIRE DAMPER IN VERTICAL DUCT PENETRATION THROUGH RATED CEILING.
- 4 PROVIDE DOUBLE DEFLECTION GRILLE DIRECTED UPWARD INTO TOWER.
- 5 APPROXIMATE EXTENTS OF MECHANICAL ENCLOSURE, REFER TO ARCHITECTURAL PLANS.
- 6 TRIANGULAR SHAPED LOUVER LOCATED IN EXTERIOR WALL OF THE GABLE ABOVE. COORDINATE LOCATION WITH ARCHITECTURAL DRAWINGS.
- 7 PROVIDE THERMOSTAT WITH A CLEAR LOCKABLE COVER.
- 8 ROUTE CONDENSATE INSIDE THE WALL TO THE EXTERIOR.

GENERAL NOTES

1. WHERE DUCT RUNOUT SIZE IS NOT SHOWN, REFER TO AIR DISTRIBUTION SCHEDULE FOR RUNOUT SIZE.
2. BUILD RETURN AIR PLENUM OFF THE BACK OF AIR HANDLING UNITS FOR RETURN AIR AND OUTSIDE AIR DUCT CONNECTIONS.
3. SEE AIR DISTRIBUTION PLAN FOR GRILLE TAGS AND AIRFLOW BALANCE INFORMATION.



DWG
CONSULTING ENGINEERS

GBA
GLICK BOEHM ARCHITECTURE

118 BENSON STREET, SUITE 100
WALTERBORO, SOUTH CAROLINA 29152
PHONE: (803) 848-1141 • FAX: (803) 848-8725
WWW.GBAARCHITECTURE.COM

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THE SOUTH CAROLINA
REGISTERED PROFESSIONAL
ENGINEERS
No. C.03649

WILLIAM DEAN BILLARD
11/23/20

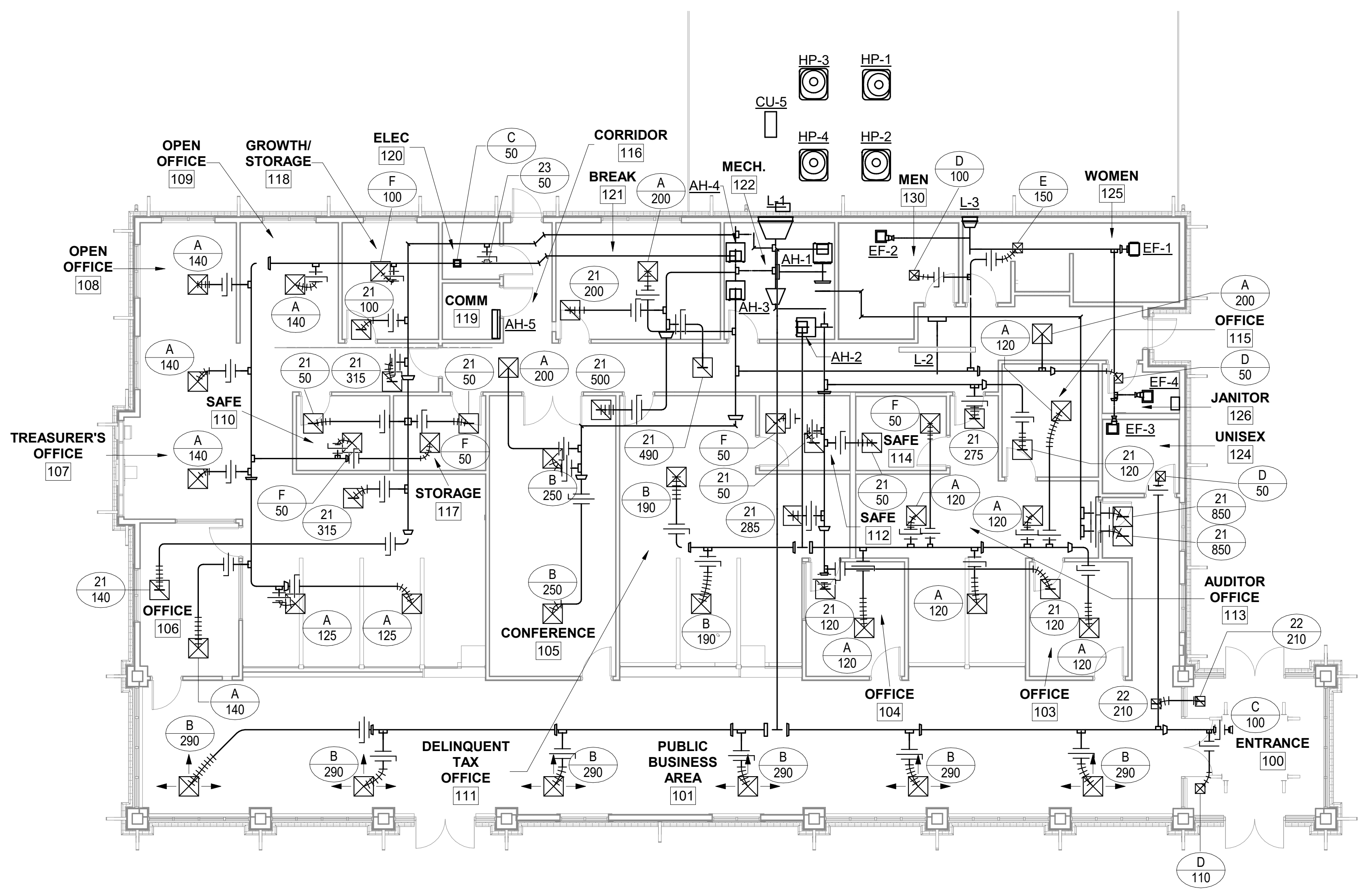
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MECHANICAL
PLAN

M101

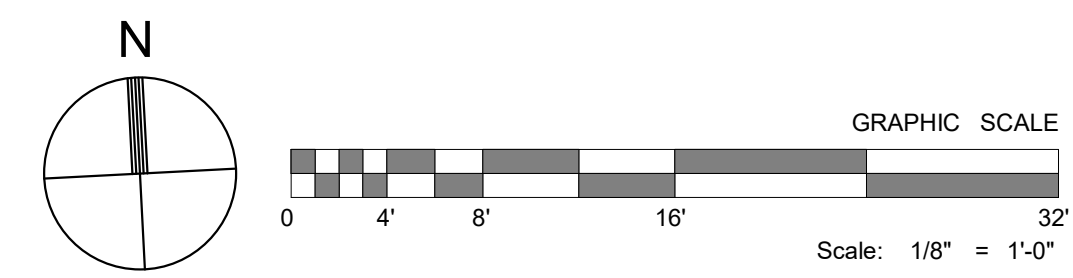


1 MECHANICAL AIR DISTRIBUTION PLAN
 M201 SCALE: 1/8" = 1'-0"

KEYNOTES

GENERAL NOTES

1. DUCT SHOWN DIAGRAMMATICALLY FOR CLARITY.



DWG
 CONSULTING ENGINEERS
 1125 E. GONZALES BLVD. SUITE 100
 CHARLESTON, SOUTH CAROLINA 29403
 Phone: (803) 405-1913 Fax: (803) 405-1955
 www.dwginc.com

GBA
 GLICK BOEHM ARCHITECTURE
 ARCHITECTURE PLANNING
 999 King Street, Suite 100
 Charleston, South Carolina 29403
 Phone: (803) 772-1788
 www.gbaarch.com

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 REGISTERED PROFESSIONAL ENGINEERS
 No. C-33649

SOUTH CAROLINA
 REGISTERED PROFESSIONAL ARCHITECTS
 No. 37241
 11/23/20
 WILLIAM DEAN BILLARD

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MECHANICAL AIR DISTRIBUTION PLAN
M201

GENERAL ELECTRICAL NOTES

- 1. RANCH 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'-0" IN ANY DIRECTION, SHALL BE DONE AT NO 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.
3. COORDINATE THE LOCATION OF ALL FLOOR BOXES WITH THE ARCHITECT PRIOR TO ROUGH IN. ALL FLOOR BOXES SHALL BE INSTALLED TO MAINTAIN THE FIRE RATING OF THE FLOOR. COORDINATE CORE DRILLING HOLES IN FLOOR WITH STRUCTURAL ENGINEER.
4. 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. 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.
5. FEEDER CONDUIT 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 CONDUCTORS/CONDUITS WITH STRUCTURAL FOOTINGS OF BUILDING. FEEDER CONDUITS AND BRANCH CIRCUITS SHALL BE ROUTED OVERHEAD UNLESS PRIOR APPROVAL HAS BEEN GRANTED BY THE ARCHITECT AND ENGINEER.
6. 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.
7. 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. WHEREVER THE WORD "PROVIDE" IS USED ON THE ELECTRICAL DRAWINGS, IT SHALL BE INFERRED TO MEAN "FURNISH AND INSTALL", UNLESS NOTED OTHERWISE.
8. OUTLET BOXES FOR FIRE ALARM AND 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.
9. 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 UNGROUNDED 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.
10. REFER TO THE ARCHITECTURAL DRAWINGS FOR PROJECT PHASING.
11. PROVIDE A U.L. LISTED LIGHTNING PROTECTION SYSTEM.

GENERAL POWER NOTES

- 1. 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 (PAD, PRIMARY CONDUIT, METER, PERMITTING, ETC.) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
2. 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 TRIAD CONFIGURATION APPROXIMATELY 20' APART AND INTERCONNECTED IN DELTA WITH A #4/0 BARE COPPER CONDUCTOR. TOPS OF THE RODS SHALL BE 12" BELOW FINISHED GRADE. CONNECTION TO THE RODS SHALL BE WITH EXOTHERMIC WELDS.
3. 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. EXACT LOCATIONS OF LIGHTING FIXTURES IN MECHANICAL SPACES SHALL BE DETERMINED IN THE FIELD. DO NOT SUPPORT FIXTURES FROM DUCT OR PIPING. PROVIDE CHAIN OR TRAPEZE-TYPE HANGERS WHERE FIXTURES CANNOT BE MOUNTED DIRECTLY TO CEILING.
3. 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.
4. DOUBLE-FACED EXIT FIXTURES SHALL BE OF THE SAME MANUFACTURER AND SERIES AS THE SINGLE-FACED EXIT FIXTURES.
5. REGARDLESS OF CATALOG NUMBER INDICATED IN SCHEDULE, PROVIDE BATTERY BACK-UP FOR ALL FIXTURES INDICATED ON THE DRAWINGS TO BE EMERGENCY TYPE.
6. 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.
7. 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 LOW VOLTAGE NOTES

- 1. EXTEND A (2) 3" CONDUIT WITH PULL STRINGS FROM THE COMMUNICATIONS BACKBOARD TO THE TELECOMMUNICATIONS SERVICE POINT. SEE THE ELECTRICAL SITE PLAN FOR THE ASSUMED LOCATION AND ROUTING. COORDINATE FINAL LOCATION WITH TELECOMMUNICATIONS PROVIDER.
2. TELECOMMUNICATION BACKBOARD (TBB) SHALL BE 8'H X 3/4"D PLYWOOD COVERING ALL THE WALLS OF COMM ROOM WITH THE BOTTOM AT 6" ABOVE FINISHED FLOOR. EXTEND A #6 BARE COPPER GROUNDING CONDUCTOR FROM THE ELECTRICAL SERVICE GROUND TO THE BACKBOARD AND LEAVE WITH SUFFICIENT SLACK TO REACH ANY PLACE THEREON. COAT BACKBOARD WITH A MINIMUM OF TWO COATS OF FIRE RETARDANT PAINT.
3. EXTEND A 1" CONDUIT WITH PULL STRING FROM EACH COMMUNICATION OUTLET, TELEVISION OUTLET, AND WI-FI ACCESS POINT TO ABOVE THE LAY-IN CEILING. TURN CONDUIT INTO CEILING CAVITY A MINIMUM OF 6" ABOVE THE CEILING AND TERMINATE WITH AN INSULATED THROAT BUSHING AT NEAREST CABLE TRAY.
4. THE MAIN TELECOMMUNICATIONS GROUNDING BUSBAR (MTGB) SHALL BE A PRE-DRILLED COPPER BUSBAR WITH STANDARD NEMA BOLT HOLE SIZING THAT IS NO SMALLER THAN 6MM THICK BY 100MM WIDE BY 1 FOOT LONG. THE MCGB SHALL BE BONDED TO THE BUILDING SERVICE GROUND AND ALL COMMUNICATIONS METALLIC RACEWAYS LOCATED IN THE SAME ROOM. MTGB CONNECTIONS SHALL BE LISTED TWO HOLE COMPRESSION TYPE.
5. PROVIDE SLEEVES SIZED FOR 40% EXPANSION THROUGH CORRIDOR WALLS.

GENERAL FIRE ALARM SYSTEM NOTES

- 1. PROVIDE ALL DUCT SMOKE DETECTORS AND ACCESSORIES NECESSARY FOR INTERLOCKING WITH MECHANICAL EQUIPMENT (AHU'S, SMOKE DAMPERS, ETC). COORDINATE WITH MECHANICAL PLANS FOR LOCATIONS AND REQUIREMENTS.
2. INSTALL DUCT SMOKE DETECTORS TO COMPLY WITH NFPA 72. WHERE TWO DETECTOR LOCATIONS ARE SHOWN AT A SINGLE PIECE OF EQUIPMENT, INSTALL ONE DETECTOR IN THE SUPPLY DUCTWORK AND ONE DETECTOR IN THE RETURN DUCTWORK. COORDINATE MOUNTING LOCATION WITH THE MECHANICAL CONTRACTOR. LOCATION SHOWN IS FOR REFERENCE ONLY.

ELECTRICAL ABBREVIATIONS

Table with 2 columns: ABBR, DESCRIPTION. Lists abbreviations such as (E) EXISTING, AFC ABOVE FINISHED CEILING, AFF ABOVE FINISHED FLOOR, etc.

Table with 2 columns: CONTROL PANELS, JUNCTION BOX/SWITCH, RECEPTACLE, LIGHT SWITCH, DATA DEVICE. Lists descriptions for various electrical components like BMS BUILDING MANAGEMENT (AUTOMATION) SYSTEM, AF AUTOMATIC FAUCET, etc.

Table with 4 columns: SYMBOL, DESCRIPTION, SYMBOL, DESCRIPTION. Lists lighting symbols such as LIGHT FIXTURE (TYPICAL ALL DIMENSIONS), LIGHT SWITCH, SINGLE POLE, etc.

Table with 4 columns: SYMBOL, DESCRIPTION, SYMBOL, DESCRIPTION. Lists power and telecommunications symbols such as DUPLEX RECEPTACLE, FOUR PORT COMMUNICATION OUTLET, COMMUNICATION OUTLET, etc.

Table with 4 columns: SYMBOL, DESCRIPTION, SYMBOL, DESCRIPTION. Lists systems symbols such as SMOKE DETECTOR (CEILING MOUNTED), FIRE ALARM TAMPER SWITCH, FIRE ALARM PULL STATION, etc.

Table with 2 columns: DISTANCE, 120V; MINIMUM WIRE SIZE. Lists wire sizes for 20 AMP BRANCH CIRCUITS: 0-90 FEET #12 AWG, 90-230 FEET #10 AWG, 230-446 FEET #8 AWG.

Table with 2 columns: SYMBOL, DESCRIPTION. Lists line legend symbols: EXISTING TO REMAIN, NEW CONSTRUCTION, DEMOLISH.

Table with 2 columns: CODE, DESCRIPTION. Lists electrical codes and standards: IBC (2018) INTERNATIONAL BUILDING CODE, NFPA 70 (2017) NATIONAL ELECTRICAL CODE, etc.

Logos for DWG CONSULTING ENGINEERS and GLICK BOEHM ARCHITECTURE. Includes contact information for both firms.

Table with 2 columns: REV, DATE. A revision table with multiple empty rows for recording changes.

Professional engineering seals for Andrew C. Nolen, State of South Carolina, License No. 36914, dated 11/23/20.

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ELECTRICAL NOTES & LEGENDS

E001

LIGHT FIXTURE SCHEDULE

FIXTURE SPECIFICATIONS				LAMPING			ELECTRICAL		MOUNTING REMARKS	NOTES
TYPE	FIXTURE DESCRIPTION	MANUFACTURER	CAT. #	LAMP TYPE	TOTAL LUMENS	COLOR TEMP.	LOAD	VOLTS		
B1	2X4 RECESSED TROFFER	COLUMBIA LIGHTING	LCAT24-40VWG-EDU	LED	3217	4000 K	28	120 V	RECESSED IN CEILING	
B1E	2X4 RECESSED TROFFER (EMERGENCY)	COLUMBIA LIGHTING	LCAT24-40VWG-EDU-ELL14	LED	3217	4000 K	28	120 V	RECESSED IN CEILING	
D1	6" DOWNLIGHT	INTENSE LIGHTING	SS6G4DRL2408/IC630W-SFW	LED	1500	4000 K	13	120 V	RECESSED IN CEILING	
D1E	6" DOWNLIGHT (EMERGENCY)	INTENSE LIGHTING	SS6G4DRL2408EM7T/IC630W-SFWEM7T	LED	1500	4000 K	13	120 V	RECESSED IN CEILING	
J1	4' LED LINEAR STRIP FIXTURE	COLUMBIA LIGHTING	MPS4-40VW-CW-EDU/CM24SCF3-KIT	LED	3321	4000 K	27	120 V	CABLE MOUNT SO BOF IS AT 8'-0"	
J1E	4' LED LINEAR STRIP FIXTURE (EMERGENCY)	COLUMBIA LIGHTING	MPS4-40VW-CW-EDU-ELL14/CM24SCF3-KIT	LED	3321	4000 K	27	120 V	CABLE MOUNT SO BOF IS AT 8'-0"	
J4	3' LINEAR UPLIGHT WALL MOUNTED FIXTURE	LEIGION LIGHTING	W244L-3L-12-40-RFA-UNV	LED	3300	4000 K	21	120 V	WALL MOUNT IN CUPOLA SO THAT BOTTOM OF FIXTURE IS FLUSH WITH CEILING	
P1	PENDANT MOUNTED ENTRY AND PUBLIC SPACE FIXTURE	TBD	TBD	LED		4000 K	100	120 V	ELECTRICAL CONTRACTOR TO PROVIDE FIXTURE, PROVIDE \$1000 ALLOWANCE PER FIXTURE. COORDINATE FINAL FIXTURE SELECTION WITH OWNER PRIOR TO ORDERING. FIXTURE TO BE INCLUDED IN LIGHTING FIXTURES SUBMITTAL TO ENGINEER.	
S1	16' SQUARE POLE WITH SINGLE TYPE 4 LED FIXTURE	BEACON	VS-15-N-T4-S16	LED	15427	4000 K	136	120 V	POLE MOUNTED AT 16'	
S2	16' SINGLE POLE WITH TWO TYPE 4 LED FIXTURES WITH 180 DEGREE SEPERATION	BEACON	VS-15-N-T4-S16	LED	30854	4000 K	272	120 V	POLE MONTED AT 16'	
S3	16' SQUARE POLE WITH THREE TYPE 4 LED FIXTURES WITH 90 DEGREE SEPERATION BETWEEN EACH FIXTURE	BEACON	VS-15-N-T4-S16	LED	46281	4000 K	408	120 V	POLE MOUNTED AT 16'	
T1	LED WEATHER RESISTANT LANDSCAPE FLOOD FIXTURE WITH MANUFACTURER PROVIDED GROUND STAKE	HUBBELL	BUL-1L4K-U/ TRN-XX/ GP 12BL	LED	1935	4000 K	21	120 V	MOUNTED ON GRADE	
UE	EXTERIOR WALL PACK (INTEGRAL EMERGENCY BATTERY)	LITON LIGHTING	WD1473-B-FR-BIV-EMAC	LED	850	4000 K	11	120 V	WALL MOUNT AT SO BOF IS AT 10'-0" UNLESS NOTED OTHERWISE ON PLAN	
X1	SINGLE FACED EXIT SIGN	CONTECH LIGHTING	RENASFREMC-W	LED			3	120 V	RECESSED IN CEILING	
X2	DUAL FACED EXIT SIGN	CONTECH LIGHTING	RENADFREMM-W	LED			3	120 V	RECESSED IN CEILING	
X3	SINGLE FACED EXIT SIGN- WALL MOUNT	CONTECH LIGHTING	RENASFREMC-W	LED			3	120 V	WALL MOUNTED AT 9'-0"	

GENERAL LIGHT FIXTURE SCHEDULE NOTES:

- COORDINATE ALL FIXTURE FINISHES WITH ARCHITECT.

LIGHT FIXTURE PLAN KEY

SHADING INDICATES EMERGENCY FIXTURE SUPPLIED WITH EMERGENCY BATTERY BACKUP.

A1	d	A1 = UPPERCASE LETTER / NUMBER INDICATE FIXTURE TYPE
	d	d = LOWERCASE LETTER INDICATES SWITCH IDENTIFICATION
NL		NL = INDICATES NON-SWITCHED "NIGHT LIGHT"
NL	A:2	A:2 = DESIGNATES PANEL NAME: CIRCUIT NUMBER

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.

LIGHT CONTROL SCHEME

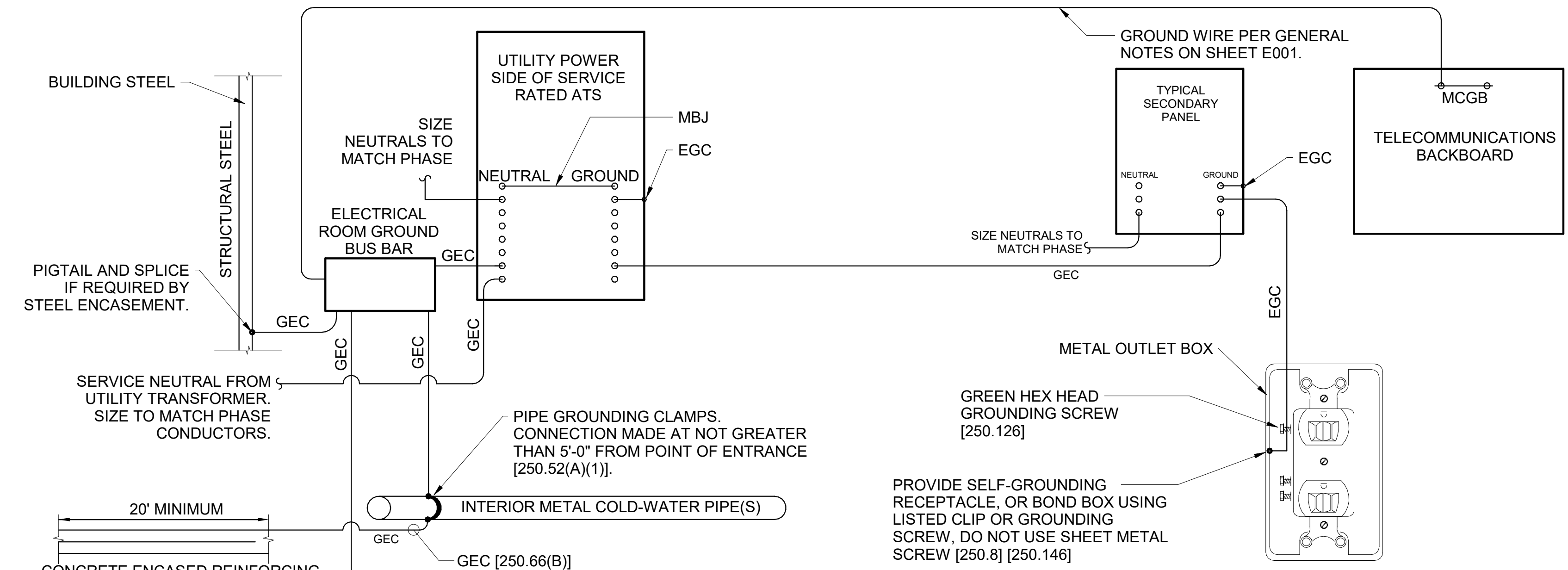
○ LIGHT CONTROL SYMBOL CORRELATES WITH DESIRED CONTROL SCHEME AS INDICATED IN THE LIGHTING CONTROL SCHEME SCHEDULE.

LIGHTING CONTROL SCHEME SCHEDULE

CONTROL SCHEME	CONTROL TYPE DESCRIPTION
13	SCHEDULE ON/OFF DURING BUSINESS HOURS WITH AFTER-HOURS CEILING MOUNTED OCCUPANCY SENSOR CONTROL AND MANUAL DIMMER SWITCH OVERRIDE. SCHEDULE CONTROL MAINTAINED BY LCP.
14	SCHEDULE ON/OFF DURING BUSINESS HOURS. SCHEDULE CONTROL MAINTAINED BY LCP.
15	SCHEDULE ON/OFF DURING BUSINESS HOURS. MANUAL SWITCH DIMMING CONTROL AND OVERRIDE LOCATED IN OFFICE 103. SCHEDULE CONTROL MAINTAINED BY LCP.
16	SCHEDULE ON/OFF WITH PHOTOSENSOR OVERRIDE. PHOTOSENSOR SHALL BE WALL MOUNTED ON EXTERIOR WALL. SCHEDULE CONTROL MAINTAINED BY LCP. PROVIDE MANUAL OVERRIDE 1 HOUR TIMER SWITCH ADJACENT TO LIGHTING CONTROL PANEL IN ELECTRICAL ROOM.
17	SCHEDULE ON/OFF WITH PHOTOSENSOR OVERRIDE. PHOTOSENSOR SHALL BE WALL MOUNTED ON EXTERIOR WALL. SCHEDULE CONTROL MAINTAINED BY LCP.

NOTES:

- CONTROL SCHEME NUMBERS MAY NOT BE SEQUENTIAL; NOT ALL NUMBERS MAY BE PRESENT.



GROUNDING LEGEND

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.	
***	SIZE PER ONE-LINE DIAGRAM.	

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 FOR 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].
- FOR LIGHTNING PROTECTION SYSTEM, PROVIDE LIGHTNING PROTECTION GROUND RODS LOOPED TOGETHER WITH COPPER CABLE, OTHERWISE BONDING CONDUCTOR WILL ONLY CONNECT TO ONE DOWN CONDUCTOR ROD. VERIFY THAT LIGHTNING PROTECTION DOWN CONDUCTORS ARE BONDED TO LOCAL GROUNDED METAL TO PREVENT FLASHOVER.

GROUNDING DETAIL

NOT TO SCALE

UNIT I.D.	VOLTS	# OF POLES	LOAD (VA)	BRANCH CIRCUIT WIRING	DISCONNECT / STARTER	NOTES
DUCTLESS MINI-SPLIT CONDENSING UNIT						
CU-5	208 V	2	3558	2 #12, #12G IN 3/4"C	30A/NF/2P/3R DISCONNECT	
DUCTLESS MINI-SPLIT SYSTEMS						
AH-5	208 V	2	120	2 #12, #12G IN 3/4"C	20A/2P TOGGLE SWITCH	
EXHAUST FAN						
EF-1	120 V	1	31	2 #12, #12G IN 3/4"C	20A/1P MOTOR RATED SWITCH	1
EF-2	120 V	1	15	2 #12, #12G IN 3/4"C	20A/1P MOTOR RATED SWITCH	1
EF-3	120 V	1	15	2 #12, #12G IN 3/4"C	20A/1P MOTOR RATED SWITCH	1
EF-4	120 V	1	15	2 #12, #12G IN 3/4"C	20A/1P MOTOR RATED SWITCH	1
SPLIT SYSTEMS						
AH-1	208 V	3	16200	3 #8, #10G IN 3/4"C	60A/NF/3P/1 DISCONNECT	
AH-2	208 V	2	9984	2 #8, #10G IN 3/4"C	60A/NF/2P/1 DISCONNECT	
AH-3	208 V	2	9984	2 #8, #10G IN 3/4"C	60A/NF/2P/1 DISCONNECT	
AH-4	208 V	2	9984	2 #8, #10G IN 3/4"C	60A/NF/2P/1 DISCONNECT	
SPLIT-SYSTEM HEAT PUMPS						
HP-1	208 V	2	6656	2 #8, #10G IN 3/4"C	60A/NF/2P/3R DISCONNECT	
HP-2	208 V	2	4576	2 #10, #10G IN 3/4"C	30A/NF/2P/3R DISCONNECT	
HP-3	208 V	2	4576	2 #10, #10G IN 3/4"C	30A/NF/2P/3R DISCONNECT	
HP-4	208 V	2	5408	2 #8, #10G IN 3/4"C	60A/NF/2P/3R DISCONNECT	
WATER HEATER						
WH-1	120 V	1	500	2 #12, #12G IN 3/4"C	30A/NF/1P/3R DISCONNECT	
WH-2	120 V	1	1440	2 #12, #12G IN 3/4"C	30A/NF/1P/1 DISCONNECT	

EQUIPMENT CONNECTION SCHEDULE NOTES:

- EXHAUST FAN CONTROL SHALL BE TIED INTO ASSOCIATED ROOM LIGHTING CONTROL SYSTEM. EXHAUST FAN DISCONNECT SHALL NOT BE THE SAME AS CONTROL SWITCH.

DWGL
CONSULTING ENGINEERS

118 BERTHOLD DRIVE
10309 ARDENWOOD DRIVE, SUITE 100
PHOENIX, ARIZONA 85028
PHONE: (602) 844-1141 • FAX: (602) 844-8725

GLICK BOEHM ARCHITECTURE
PLANNING, INTERIOR DESIGN, ARCHITECTURE
199 KING STREET, SUITE 100
CHARLESTON, SOUTH CAROLINA 29403
PHONE: (803) 405-1913 • FAX: (803) 405-1953
WWW.GBAARCHITECT.COM

REV.	DATE	DESCRIPTION

THE STATE OF SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
No. C-03649

ANDREW C. NOLEN
11/23/20

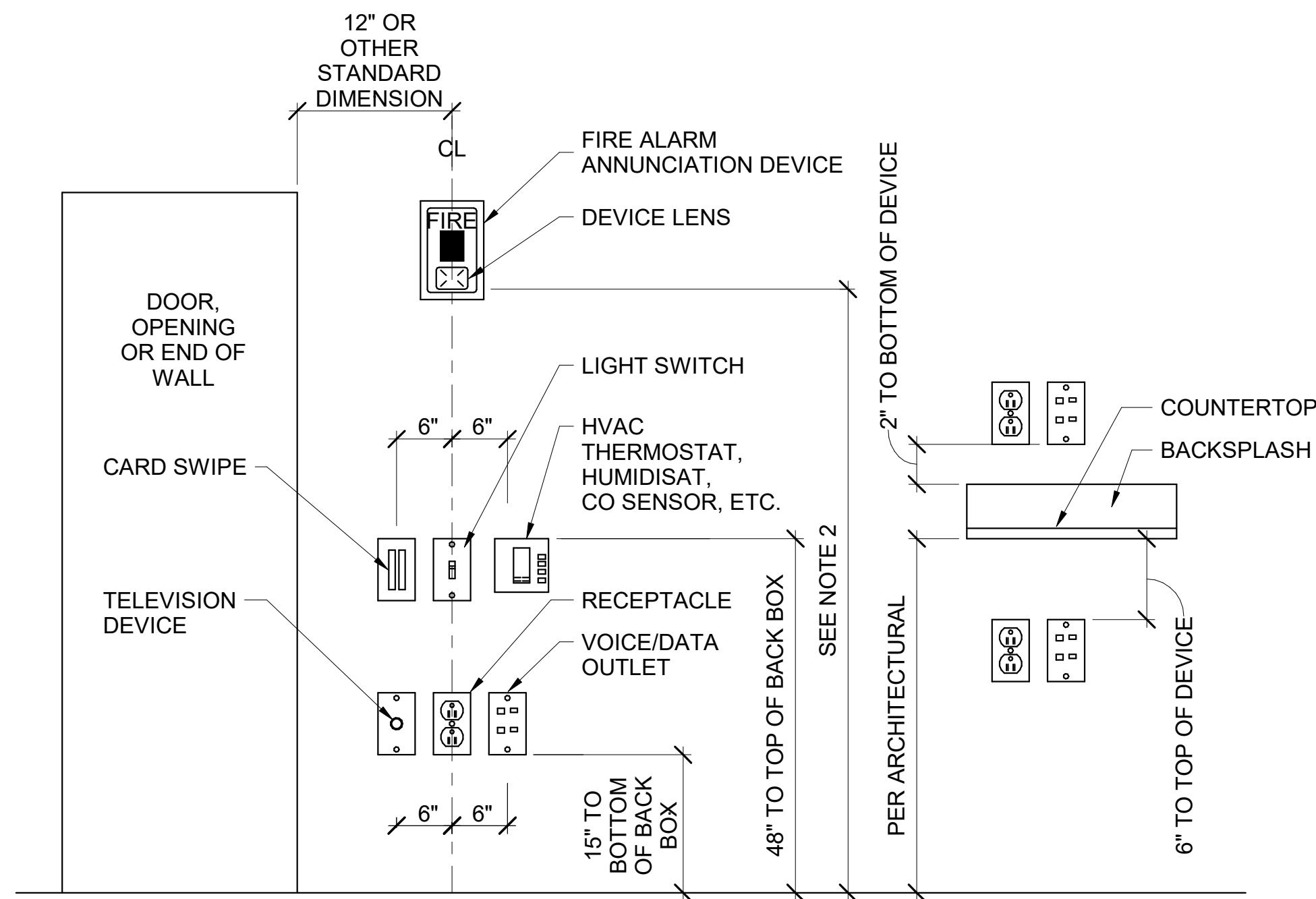
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ELECTRICAL SCHEDULES & DETAILS

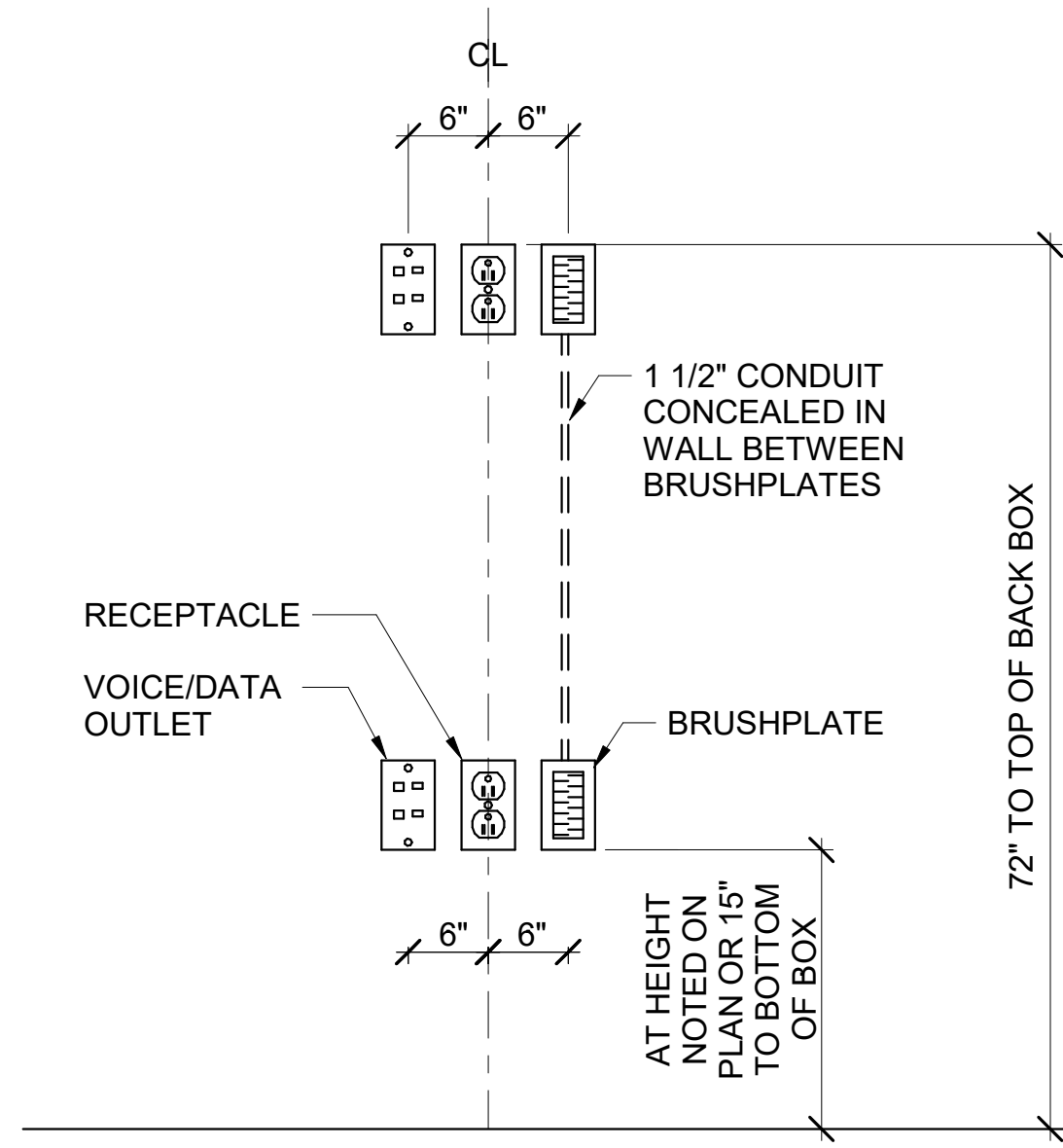
E002



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.

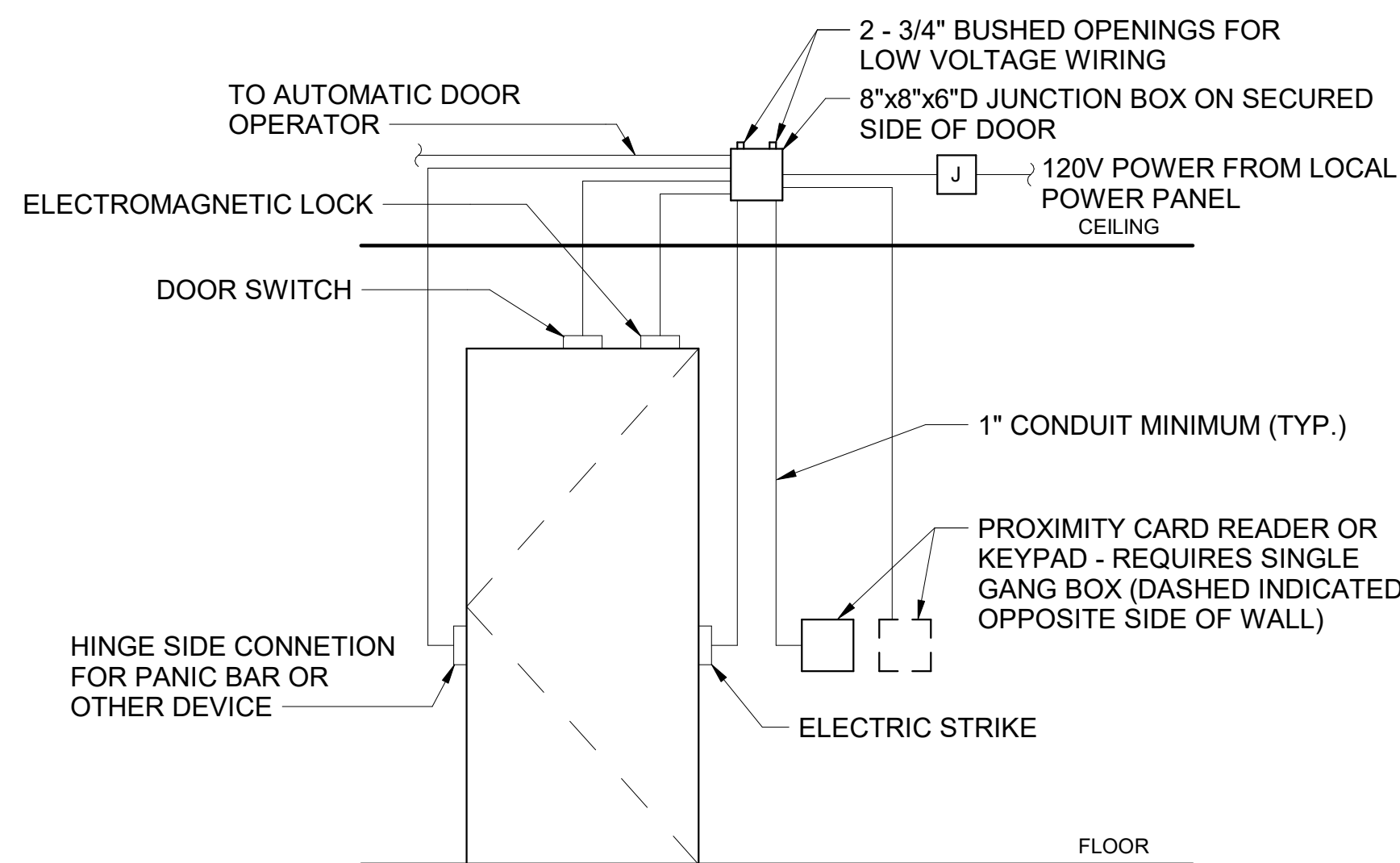
NOTE 2: MOUNT 80" ABOVE FINISHED FLOOR WHERE POSSIBLE. WHERE CEILING HEIGHTS DO NOT ALLOW THIS HEIGHT, MOUNT 6" BELOW CEILING. WHERE OBSTRUCTIONS DO NOT ALLOW THIS HEIGHT, MOUNT 80" TO 96" ABOVE FINISHED FLOOR. ALL MOUNTING HEIGHTS FOR NOTIFICATION DEVICES SHALL BE MEASURED TO THE BOTTOM OF THE LENS.

1 **DEVICE ALIGNMENT DETAIL**
E003 NOT TO SCALE



NOTE 1: BRUSHPLATE DEVICES AND ASSOCIATED CONDUIT SHALL ONLY BE PROVIDED IN TELEVISION LOCATIONS NOTED WITH A BRUSH PLATE SYMBOL.

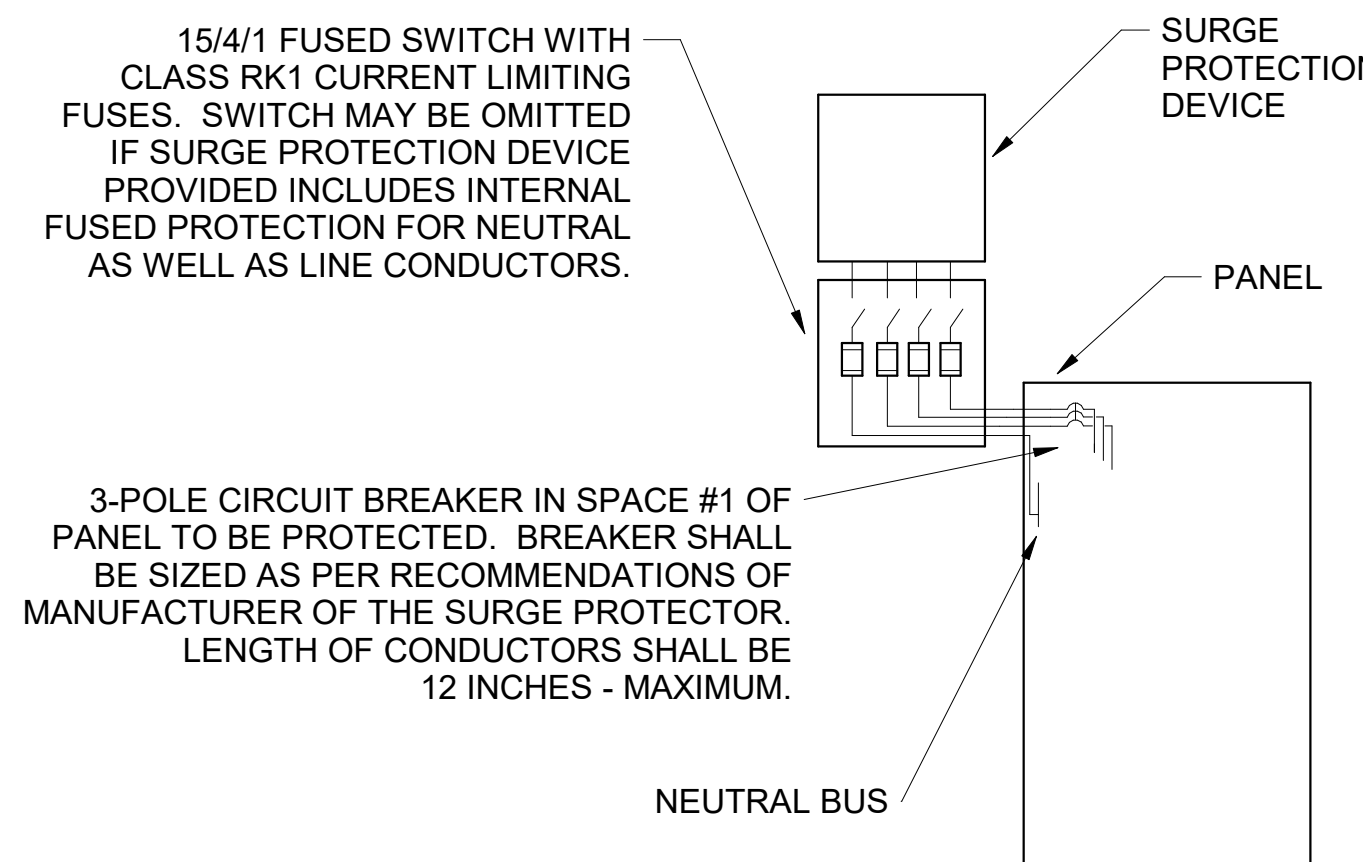
3 **TV WALL ALIGNMENT DETAIL**
E003 SCALE: N.T.S.



NOTES:
DOOR ACCESS EQUIPMENT AND LOW VOLTAGE WIRING BY OTHERS. ACTUAL CONFIGURATION AT DOORS WILL VARY BY LOCATION. REFER TO SIGNAL PLANS AND DOOR HARDWARE SPECIFICATION FOR EQUIPMENT AT EACH DOOR. ELECTRICAL CONTRACTOR TO PROVIDE NECESSARY ROUGH-IN: RACEWAYS, BOXES, CONDUCTORS, POWER, ETC. BASED UPON COORDINATION WITH ACCESS CONTROL HARDWARE PROVIDER AND DOOR HARDWARE PROVIDER TO PROVIDE A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

REFER TO PLAN DRAWINGS FOR WORK APPROPRIATE TO EACH PROJECT AND INTER-RELATIONSHIPS WITH OTHERS. SOME INFORMATION SHOWN HERE IS FOR REFERENCE ONLY.

2 **ACCESS CONTROL DOOR ROUGH IN DETAIL**
E003 NOT TO SCALE



15/41 FUSED SWITCH WITH CLASS RK1 CURRENT LIMITING FUSES. SWITCH MAY BE OMITTED IF SURGE PROTECTION DEVICE PROVIDED INCLUDES INTERNAL FUSED PROTECTION FOR NEUTRAL AS WELL AS LINE CONDUCTORS.

3-POLE CIRCUIT BREAKER IN SPACE #1 OF PANEL TO BE PROTECTED. BREAKER SHALL BE SIZED AS PER RECOMMENDATIONS OF MANUFACTURER OF THE SURGE PROTECTOR. LENGTH OF CONDUCTORS SHALL BE 12 INCHES - MAXIMUM.

6 **SURGE SUPPRESSION INSTALLATION**
E003 NOT TO SCALE

**ELECTRICAL SYSTEMS
SEISMIC REQUIREMENTS
PER IBC-2018/ASCE 7-16**

- 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 7-16.
- 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 7-16.
- 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 = 1.0

Ip = 1.5

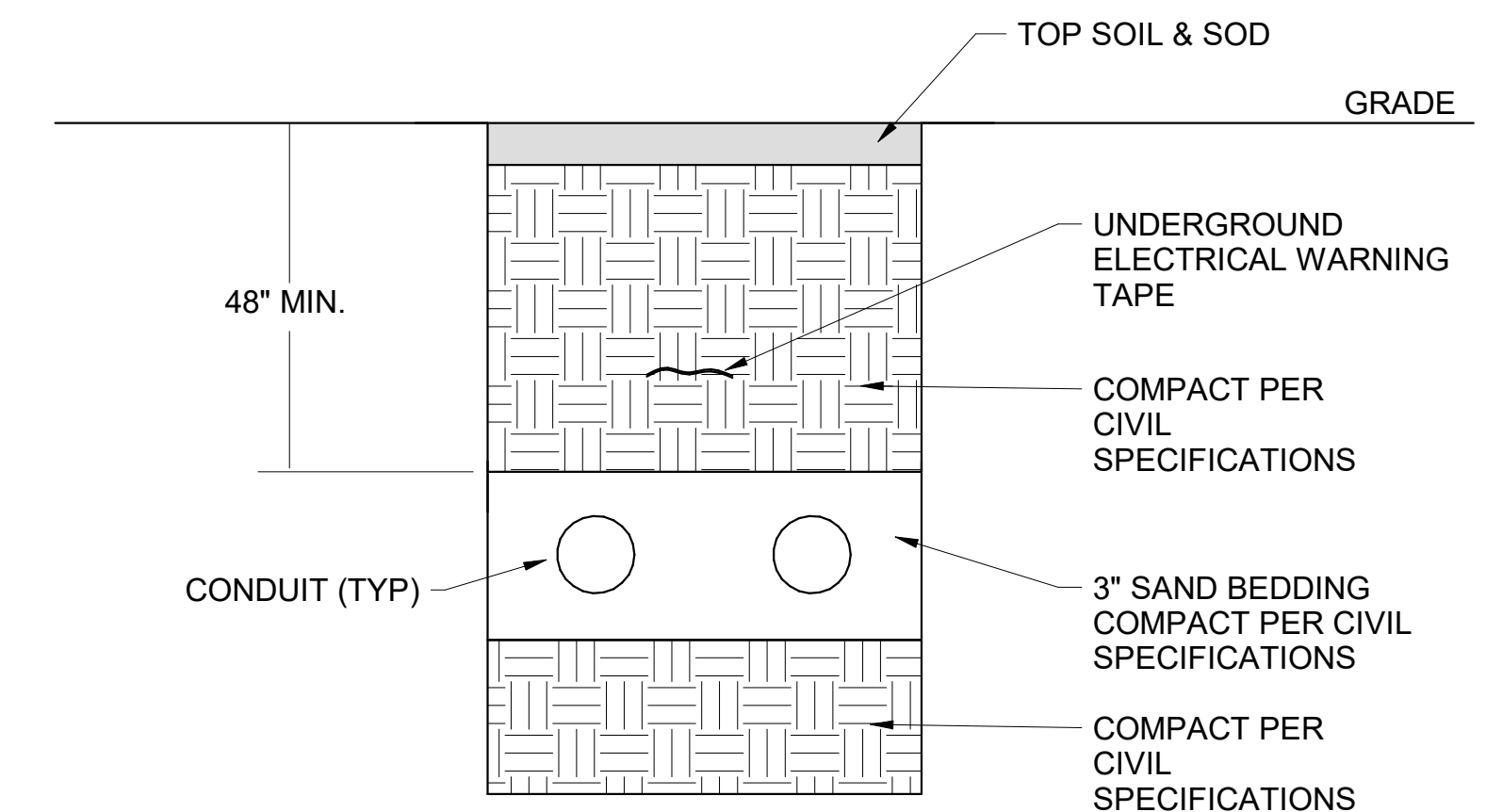
- ALL ASSOCIATED ELECTRICAL WORK UNLESS NOTED OTHERWISE
- EMERGENCY LIGHTS
- EXIT LIGHTS
- FIRE ALARM

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

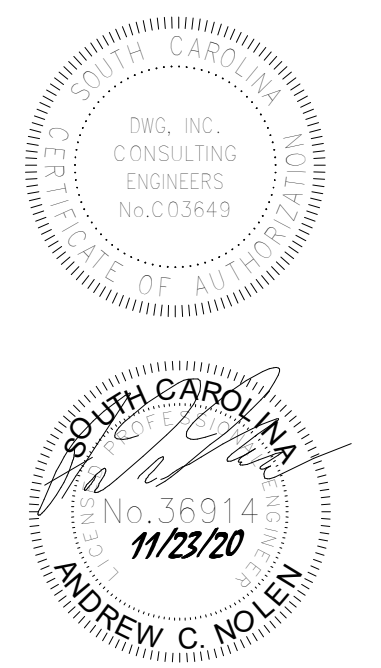
NOTES:

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.



4 **UNDERGROUND CONDUIT DETAIL**
E003 NOT TO SCALE

REV.	DATE	DESCRIPTION

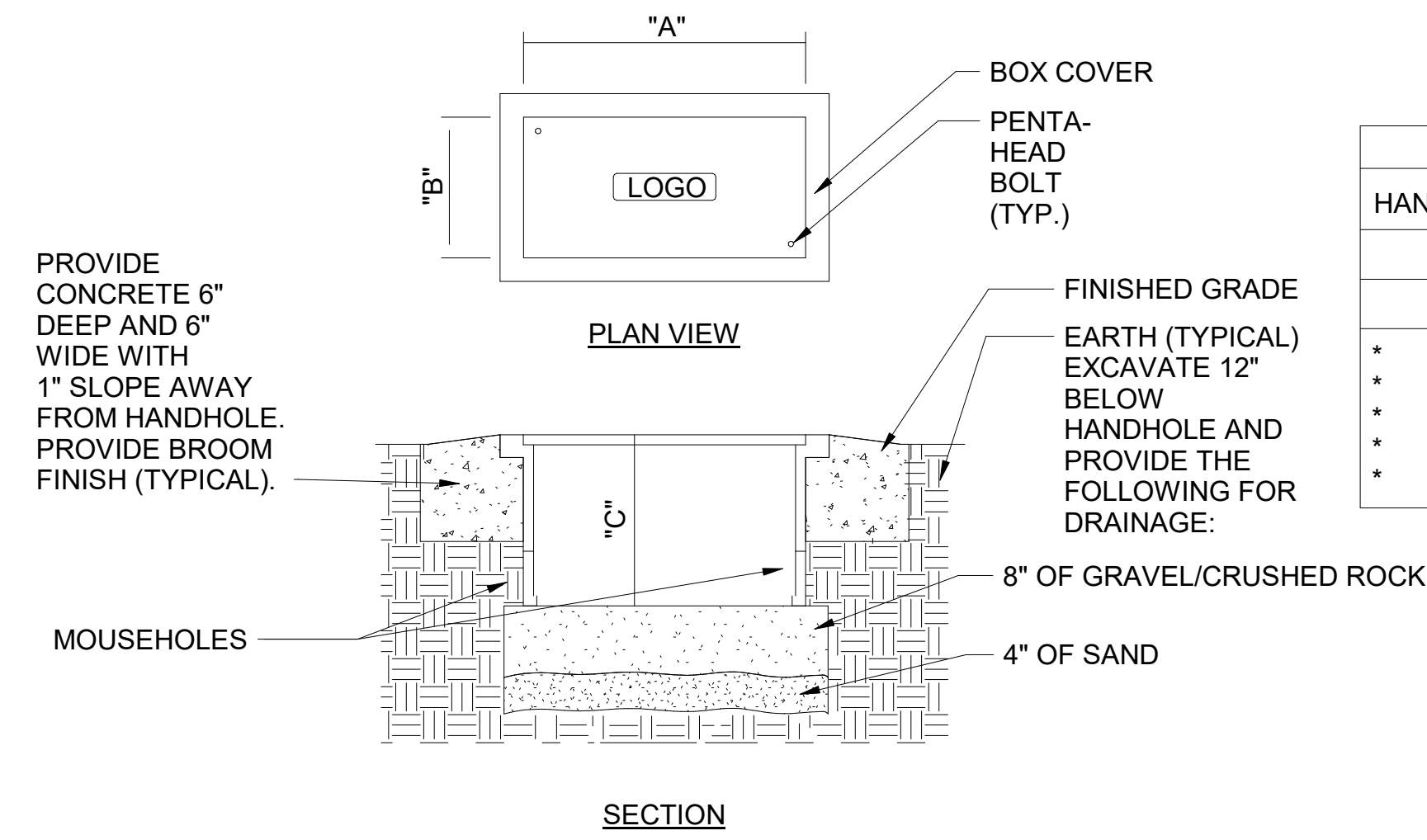


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**ELECTRICAL
DETAILS**

E003



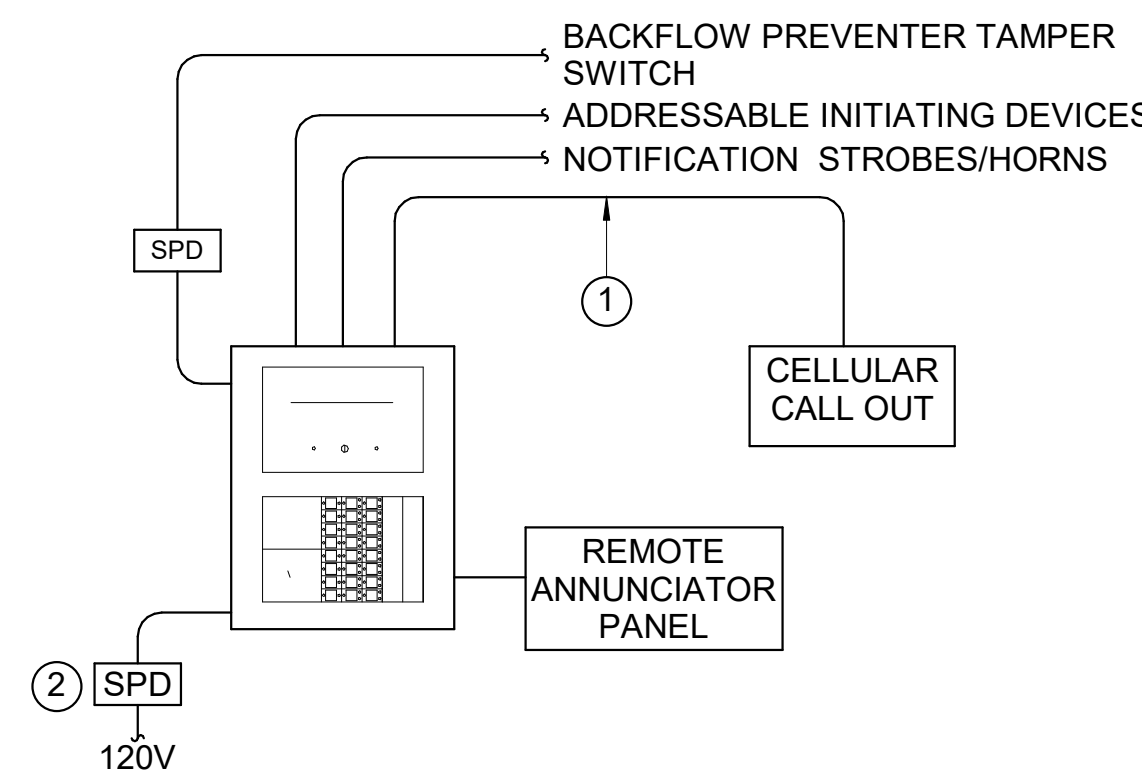
HANDHOLE SCHEDULE					
HANDHOLE NO.	LOAD CAPACITY	COVER LOGO	DIMENSIONS		
			"A"	"B"	"C"
HH1	TIER 22	TELECOM	25.0"	16.0"	26.0"
HH2	TIER 22	ELECTRICAL	33.875"	22.25"	26.0"

* 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.

2 HANDHOLE DETAIL
E004 NOT TO SCALE

FIRE ALARM SINGLE-LINE NOTES

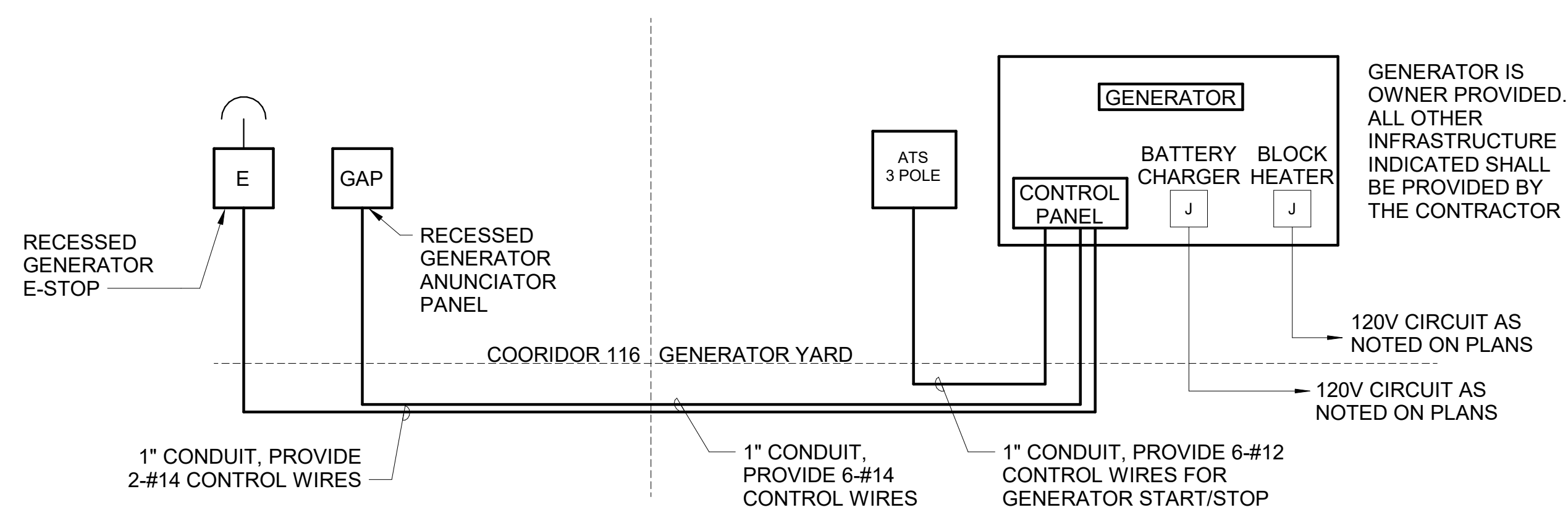
1. PROVIDE TWO LINES OF CELLULAR CALL OUT FOR FACP. PROVIDE A REMOTE BUILDING MOUNTED ANTENNA WITH SURGE PROTECTION IF NEEDED.
2. PROVIDE SURGE PROTECTIVE DEVICES FOR ALL INCOMING POWER CONNECTIONS TO FIRE ALARM CONTROL PANELS, POWER SUPPLIES, AND BATTERY SYSTEMS.



FIRE ALARM SYSTEM GENERAL NOTES

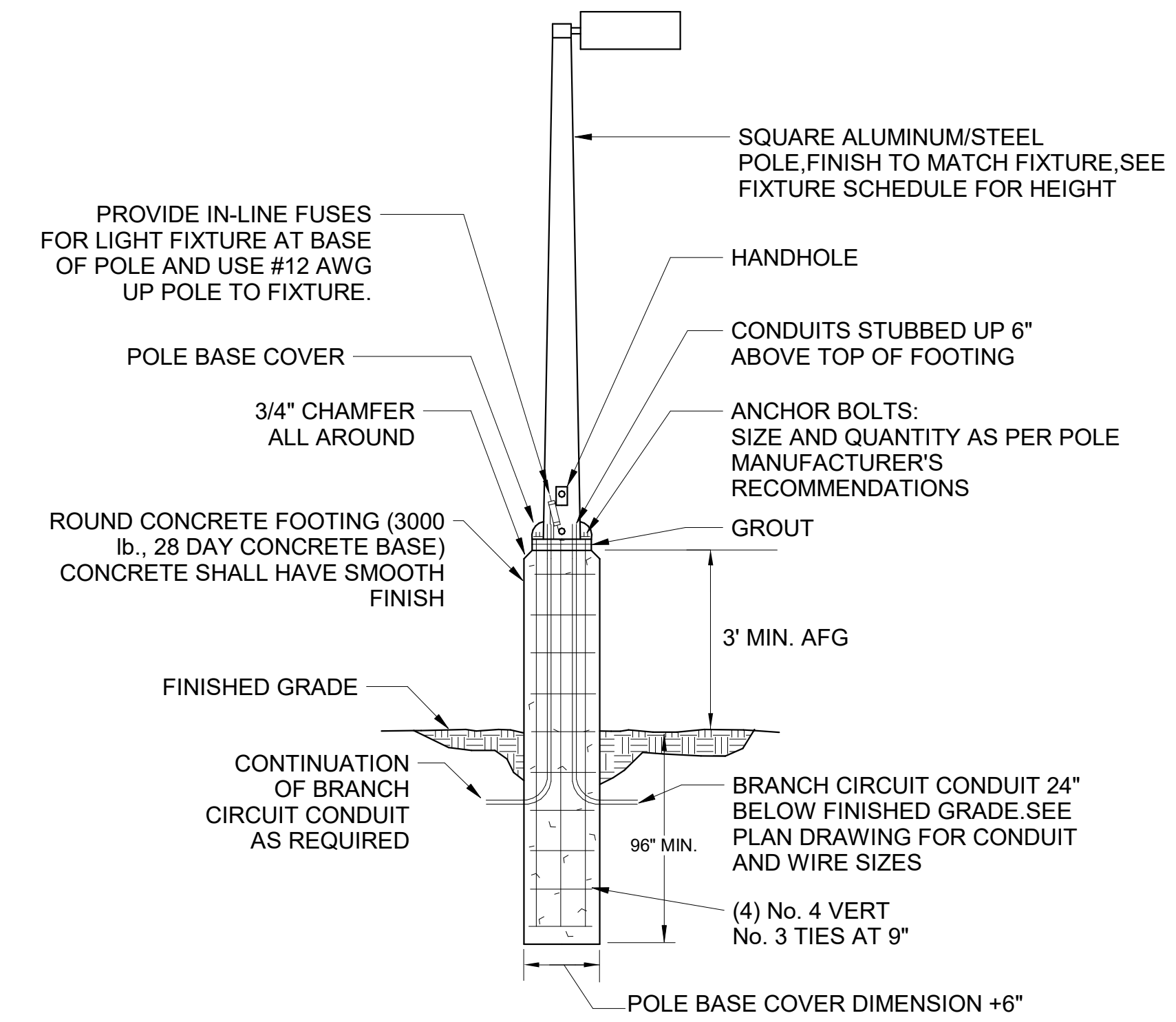
1. SEE FLOOR PLANS FOR INTENDED COVERAGE OF FIRE ALARM SYSTEM.
2. THE FOLLOWING SHALL OCCUR UPON ACTIVATION OF ANY INITIATING DEVICE:
 - A. SOUND ALL AUDIBLE DEVICES (CHIMES, HORNS, BELLS, ETC.) AND FLASH ALL VISUAL DEVICES (LIGHTS OR STROBES) THROUGHOUT THE ENTIRE FACILITY.
 - B. ALERT A CENTRAL STATION ALARM REPORTING SERVICE VIA DIGITAL COMMUNICATOR AND LEASED TELEPHONE LINES.
 - C. STOP OR START AHU'S OR FANS.
 - D. INDICATE BY ZONE WITH AUDIO/VISUAL SIGNAL AT FACP AND ALL REMOTE ANNUNCIATORS.
3. INITIATING DEVICES SHALL BE SMOKE DETECTORS, DUCT-MOUNTED SMOKE DETECTORS, HEAT DETECTORS, MANUAL PULL STATIONS, AND SPRINKLER FLOW SWITCHES.
4. UPON ACTIVATION OF ANY VALVE SUPERVISORY (TAMPER) SWITCH, A DISTINCT SIGNAL ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION SHALL BE SENT TO THE FACP. VISUAL PORTION OF SIGNAL SHALL BE CONTINUOUS. TONE DURATION SHALL BE 3 SECONDS.
5. SYSTEM TROUBLE (OPEN WIRING, SHORTED WIRING, OR GROUND FAULTS) SHALL BE ANNUNCIATED BOTH AUDIBLY AND VISUALLY AT THE FACP AND AT ALL ANNUNCIATORS.
6. ALL SYSTEM WIRING SHALL BE CLASS B. NO T-TAPPING IS PERMITTED.
7. PROVIDE BATTERY AND VOLTAGE DROP CALCULATIONS THAT INCLUDE ALL EXISTING AND NEW DEVICES AND APPLIANCES INSTALLED IN SYSTEM AND SUBMIT TO ENGINEER.
8. FIRE ALARM SYSTEM CONTROL EQUIPMENT, ALARM INITIATING DEVICES, POWER SOURCES, MUNICIPAL OR REMOTE STATION SIGNALING APPARATUS, AND REMOTE ANNUNCIATION/CONTROL PANELS SHALL BE UNDERWRITER'S LABORATORIES LISTED FOR THE INSTALLED APPLICATION.

3 PARTIAL FIRE ALARM RISER DIAGRAM- CELL CALL OUT
E004 SCALE: NOT TO SCALE

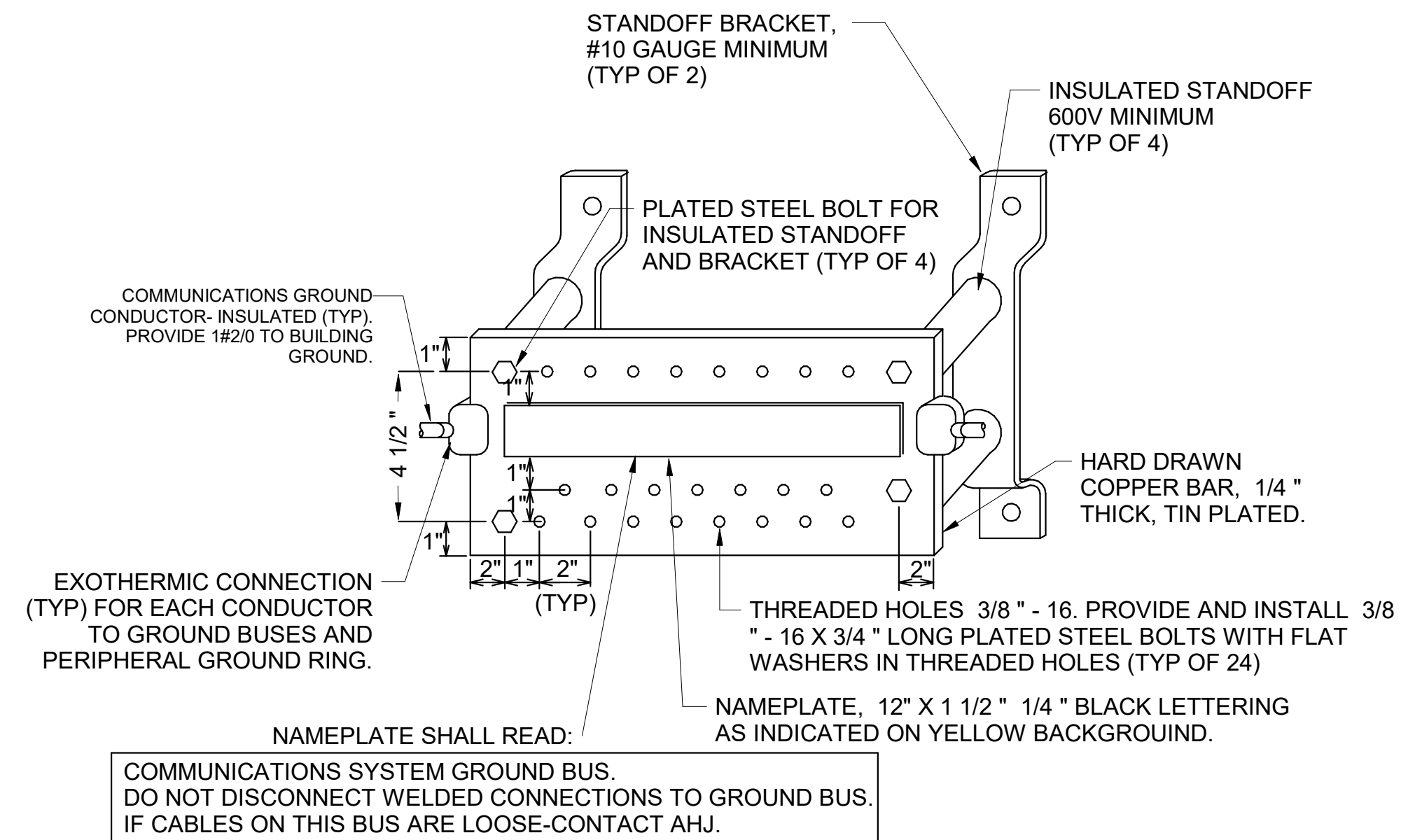


- CONTROL NOTES:**
1. PROVIDE 20% ADDITIONAL SPARE WIRES FOR ALL GENERATOR CONTROLS.

5 GENERATOR CONTROLS DETAIL
E004 NOT TO SCALE

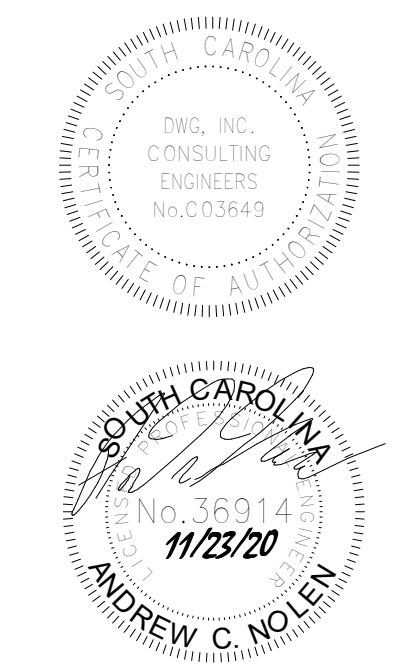


1 POLE MOUNT DETAIL
E004 NOT TO SCALE



4 TELECOMMUNICATIONS GROUND BUS BAR
E004 NOT TO SCALE

REV.	DATE	DESCRIPTION

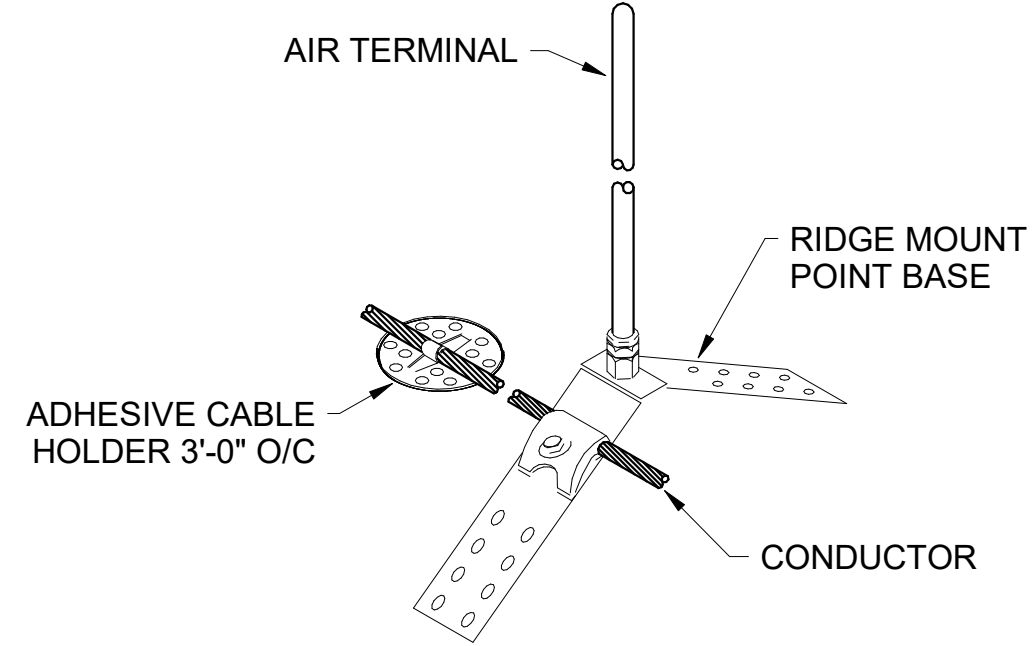


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WALTERBORO, SC 29388

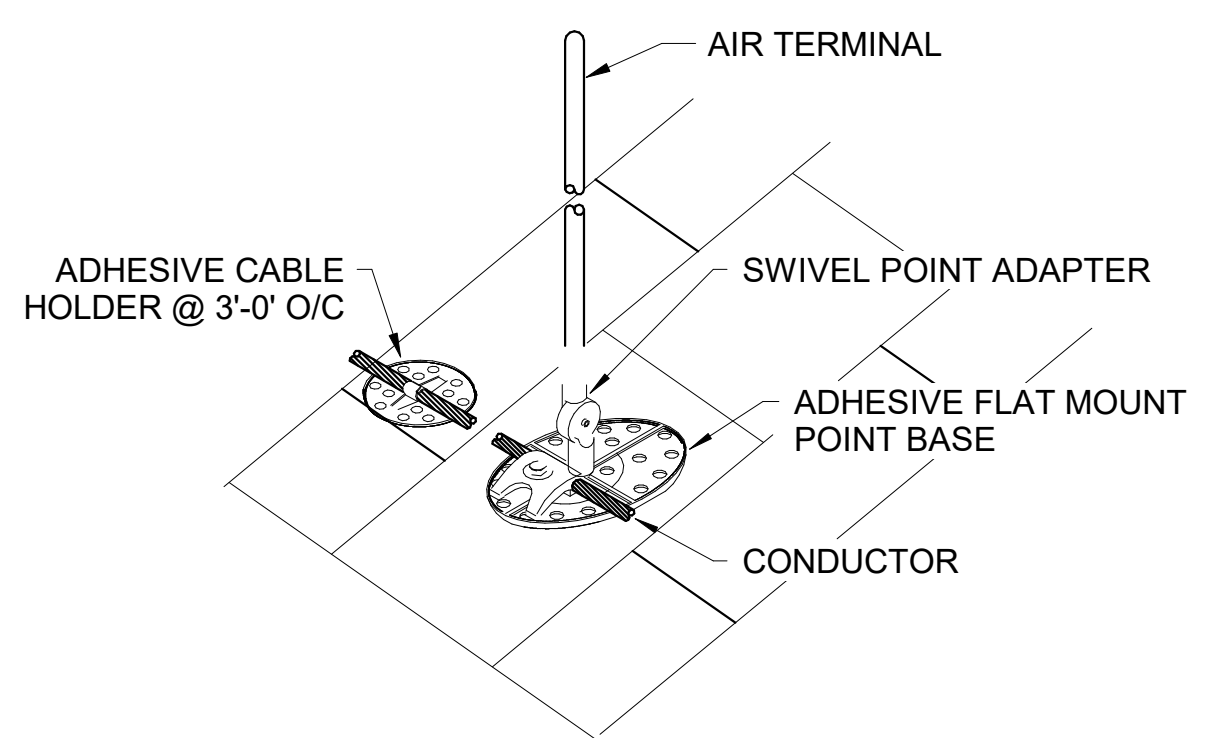
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PROJECT MGR.: WDB
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CHECKED BY: ACN
APPROVED BY: ACN
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ELECTRICAL DETAILS

E004



3 RIDGE MOUNTED BASE & AIR TERMINAL
E005 NOT TO SCALE



2 ADHESIVE SLOPED ROOF MOUNTED BASE & AIR TERMINAL
E005 NOT TO SCALE

****CRITICAL COORDINATION NOTE****
ROOFER/GC MUST ADVISE INFO. REQUESTED BELOW
NO LIGHTNING PROTECTION WORK WITHOUT THIS INFO

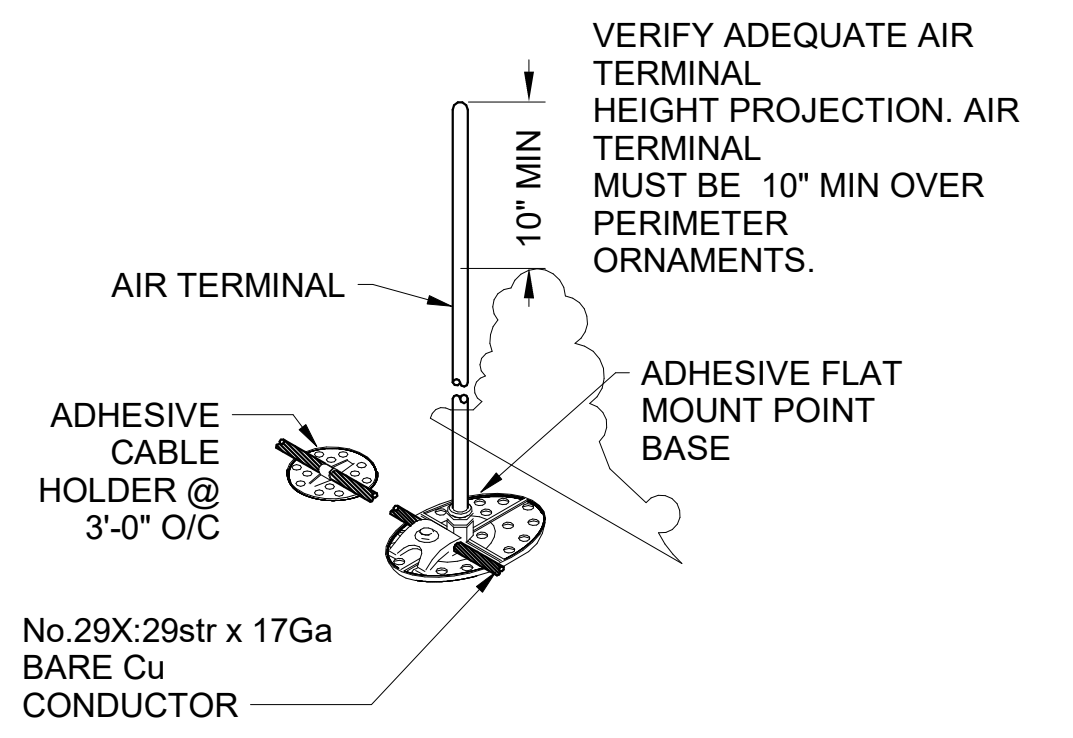
****NOTE****
THIS EQUIPMENT IS TO BE SECURED TO THE ROOF WITH ADHESIVE IF ROOF IS NOT A STANDARD, CONVENTIONAL ASPHALT/TAR & GRAVEL, A/E OR CONTRACTOR MUST VERIFY THE TYPE OF ROOF TO INSURE THE USE OF PROPER ADHESIVE.

PVC TYPE SINGLE MEMBRANE (MANUFACTURER: _____)

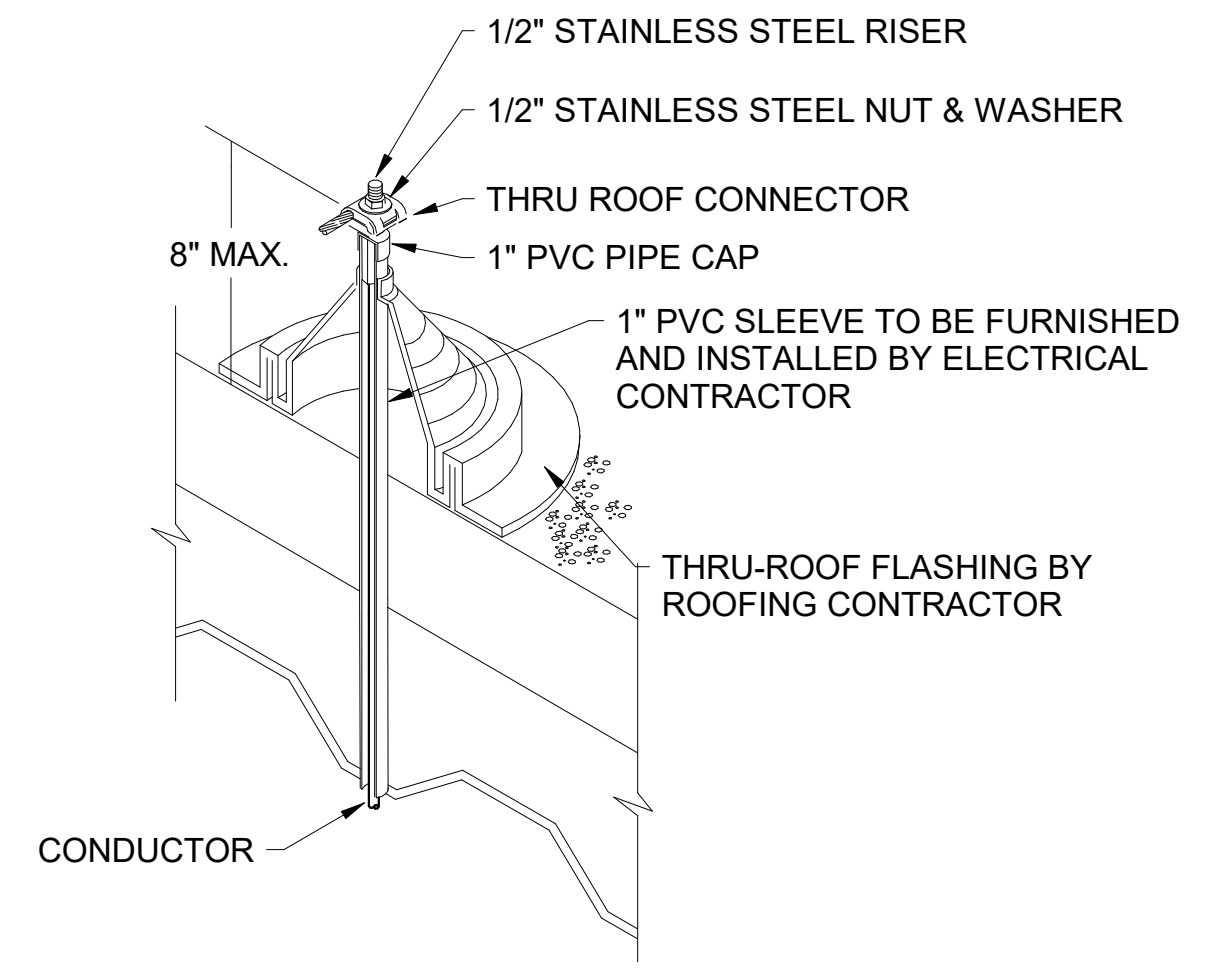
EPDM (RUBBER/NEOPRENE) TYPE SINGLE MEMBRANE (MANUFACTURER: _____)

OTHER-SPECIFY: _____

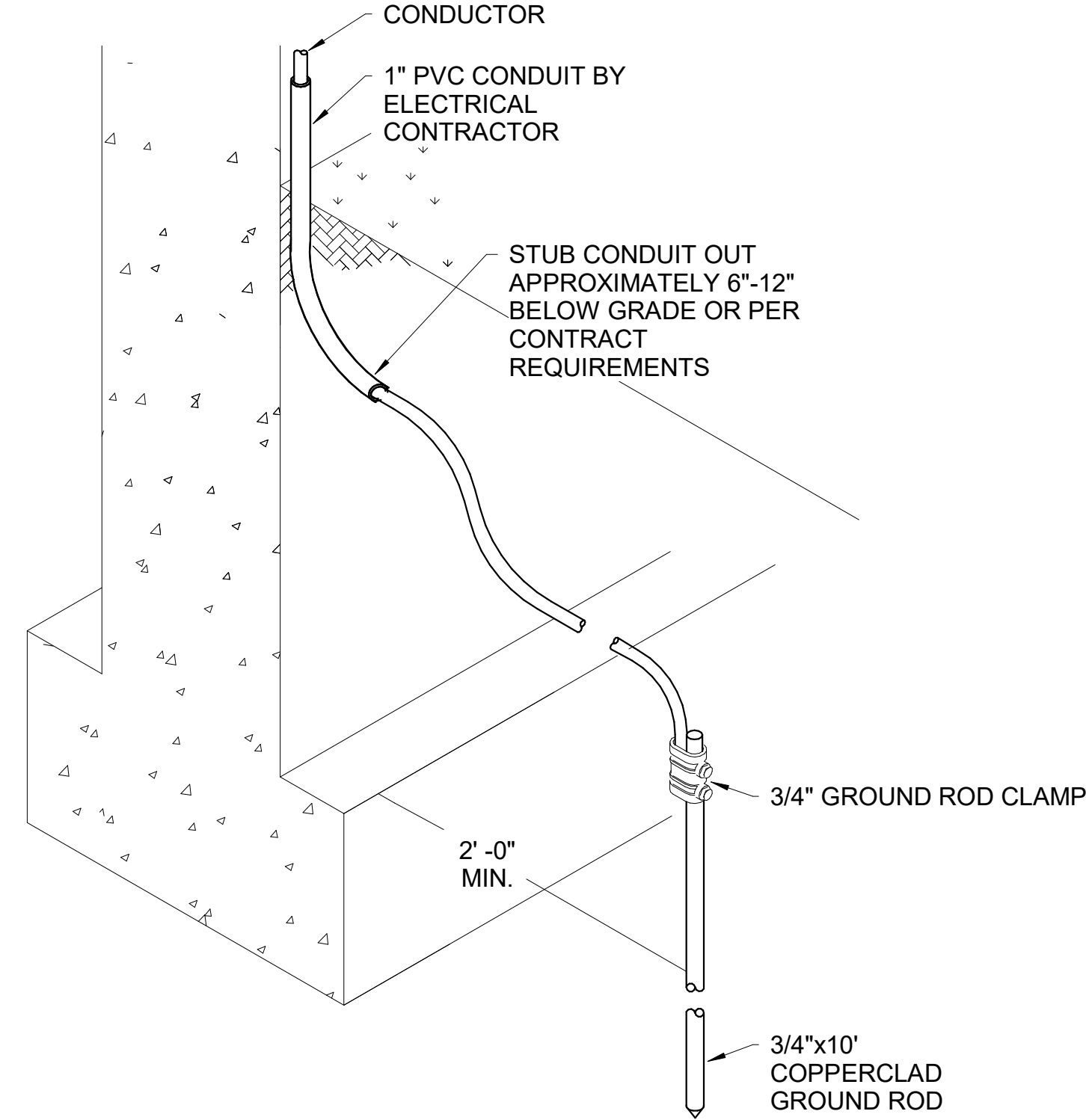
INSTALLATION IS BASED UPON ALL ROOF-MOUNTED LIGHTNING PROTECTION EQUIPMENT BEING ADHERED DIRECTLY TO ROOF SURFACE. ANY VARIANCE OR SPECIAL PROVISIONS BY ROOFING CONTRACTOR.



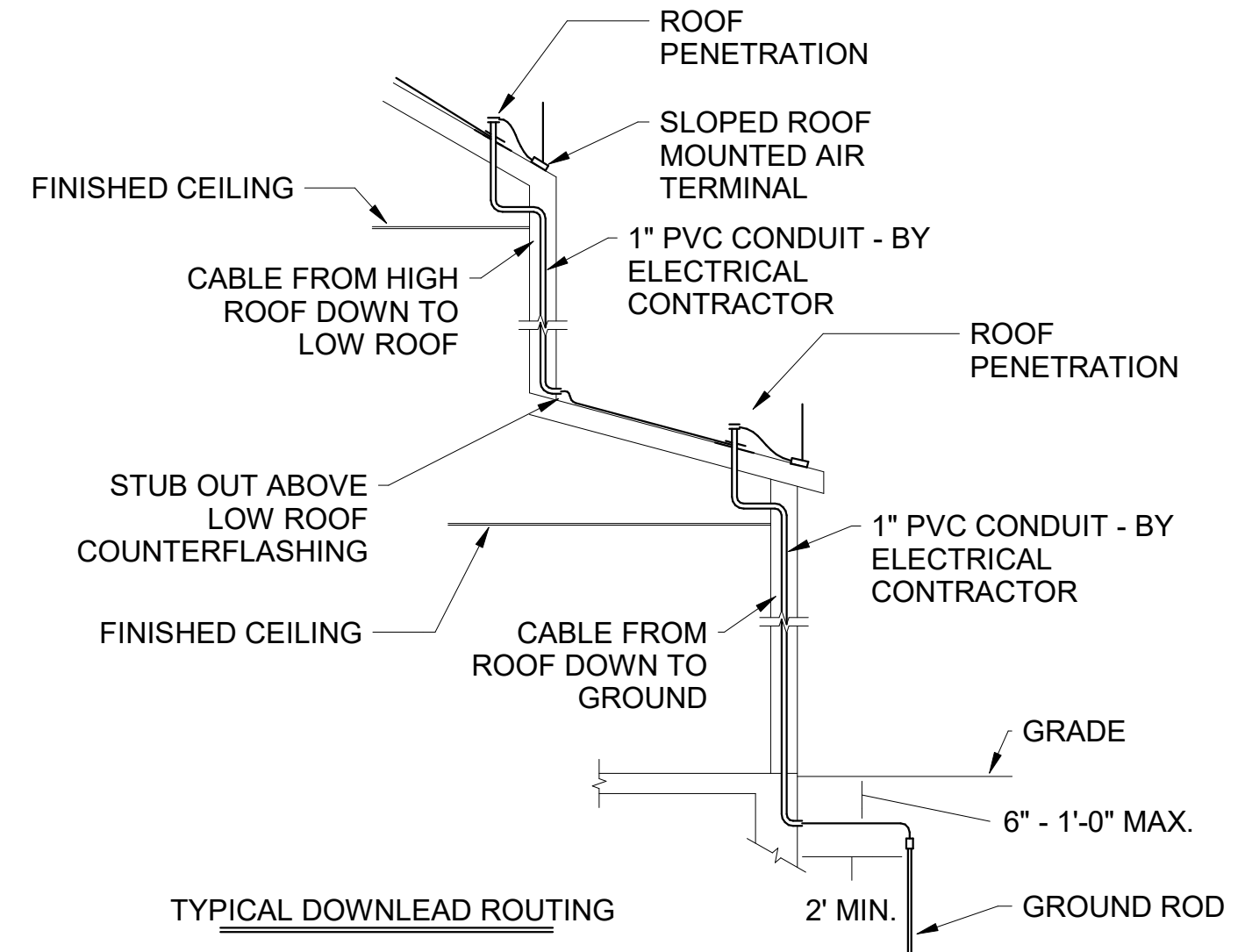
1 ADHESIVE ROOF MOUNTED BASE & AIR TERMINALS
E005 NOT TO SCALE



6 ROOF PENETRATION
E005 NOT TO SCALE

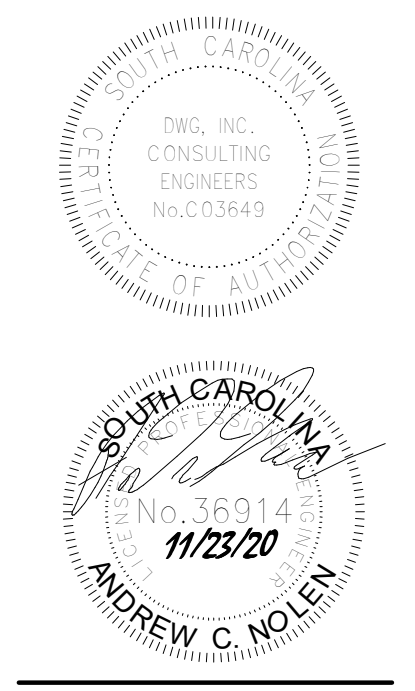


5 CONCEALED DOWN LEAD TO GROUND ROD CONNECTION
E005 NOT TO SCALE



4 DOWNLEAD ROUTING
E005 NOT TO SCALE

REV.	DATE	DESCRIPTION



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LIGHTNING PROTECTION DETAILS
E005

3 SECTION PANELBOARD SCHEDULE

PANEL NAME: MP VOLTS: 120/208 Wye A.I.C. RATING: 22,000
 LOCATION: ELEC 120 PHASES: 3 MAINS RATING: 600 A
 SOURCE: WIRES: 4
 MOUNTING: SURFACE ENCLOSURE: TYPE 1 MAINS TYPE: MAIN CIRCUIT BREAKER

CKT NO.	CIRCUIT DESIGNATION	TRIP	POLES	A	B	C	POLES	TRIP	CIRCUIT DESIGNATION	CKT NO.
1	RCPT: TREASURER	20 A	1	720 / 0			1	20 A	SPARE	2
3	RCPT: TREASURER	20 A	1		900 / 0		1	20 A	SPARE	4
5	RCPT: TREASURER	20 A	1			970 / 820	1	20 A	LTG: TREASURER'S	6
7	RCPT: TREASURER	20 A	1	970 / 1020			1	20 A	LTG: BOH COMMON	8
9	RCPT: TREASURER	20 A	1		970 / 690		1	20 A	LTG: DELIN AUDIT	10
11	RCPT: TREASURER	20 A	1			970 / 550	1	20 A	LTG: PUBLIC AREA	12
13	RCPT: TREASURER	20 A	1	1260 / 800			1	20 A	LTG: PUBLIC AREA	14
15	RCPT: SAFE, STORAGE	20 A	1		1080 / 300		1	20 A	LTG: EXTERIOR	16
17	RCPT: OPEN OFFICES	20 A	1			1440 / 3330	2	40 A	HVAC: HP-1	18
19	RCPT: GROWTH/HISTOR	20 A	1	900 / 3330						20
21	RCPT: CONFERENCE	20 A	1		900 / 5400					22
23	RCPT: CONF PROJECTOR	20 A	1	720 / 5400		720 / 5400	3	45 A	HVAC: AH-1	24
25	RCPT: CONFERENCE	20 A	1							26
27	RCPT: BREAK COUNTER	20 A	1		180 / 2290		2	30 A	HVAC: HP-2	28
29	RCPT: BREAK COUNTER	20 A	1			180 / 2290				30
31	RCPT: BREAK COUNTER	20 A	1	180 / 4990			2	50 A	HVAC: AH-2	32
33	RCPT: BREAK GD	20 A	1		1440 / 4990					34
35	RCPT: BREAK COUNTER	20 A	1			180 / 2290	2	30 A	HVAC: HP-3	36
37	RCPT: BREAK FRIDGE	20 A	1	1440 / 2290						38
39	RCPT: BREAK	20 A	1		360 / 4990		2	50 A	HVAC: AH-3	40
41	RCPT: CORR, ELEC	20 A	1			1080 / 4990				42
43	RCPT: MECH, ELEC	20 A	1	540 / 500			1	20 A	WH-1	44
45	RCPT: MENS, WOMENS	20 A	1		360 / 0		1	20 A	SPARE	46
47	RCPT: MENS	20 A	1			180 / 2700	2	40 A	HVAC: HP-4	48
49	MENS HAND DRYER	20 A	1	1500 / 2700						50
51	WOMENS HAND DRYER	20 A	1		1500 / 4990		2	50 A	HVAC: AH-4	52
53	WOMENS HAND DRYER	20 A	1			1500 / 4990				54
55	RCPT: EDF	20 A	1	1440 / 1780			2	20 A	HVAC: CU-5	56
57	RCPT: UNISEX, JANITOR	20 A	1		360 / 1780					58
59	UNISEX HAND DRYER	20 A	1			1500 / 60	2	15 A	HVAC: AH-5	60
61	FCAP	20 A	1	100 / 60						62
63	LCP	20 A	1		100 / 0		1	20 A	SPARE	64
65	IT UPS	20 A	1			1500 / 0	1	20 A	SPARE	66
67	RCPT: COMM RM	20 A	1	360 / 0			1	20 A	SPARE	68
69	RCPT: COMM RM	20 A	1		360 / 0		1	20 A	SPARE	70
71	RCPT: COMM RM	20 A	1			360 / 0	1	20 A	SPARE	72
73	RCPT: COMM RM	20 A	1	360 / 0			1	20 A	SPARE	74
75	RCPT: DELINQUENT	20 A	1		900 / 0		1	20 A	SPARE	76
77	RCPT: DELINQUENT	20 A	1			970 / 0	1	20 A	SPARE	78
79	RCPT: DELINQUENT	20 A	1	970 / 0			1	20 A	SPARE	80
81	RCPT: DELINQUENT	20 A	1			970 / 0	1	20 A	SPARE	82
83	RCPT: DELINQUENT	20 A	1			720 / 0	1	20 A	SPARE	84
85	RCPT: SAFE, SAFE	20 A	1	1620 / 100			1	20 A	GEN BLOCK HEATER	86
87	RCPT: AUDITOR	20 A	1		1080 / 100		1	20 A	GEN BATTERY CHARGER	88
89	RCPT: AUDITOR	20 A	1			970 / 1090	1	20 A	LTG: POLE LIGHTING	90
91	RCPT: AUDITOR	20 A	1	970 / 250			1	20 A	LTG: SITE TREE LIGHTING	92
93	RCPT: AUDITOR OFFICES	20 A	1		1440 / 0		1	20 A	SPARE	94
95	RCPT: DRIVE THRU COM	20 A	1		180 / 0		1	20 A	SPARE	96
97	RCPT: PUBLIC AREA	20 A	1	1620 / 0			1	20 A	SPARE	98
99	RCPT: PUBLIC AUDITOR	20 A	1		360 / 0		1	20 A	SPARE	100
101	RCPT: PUBLIC AREA TV	20 A	1			1080 / 0	1	20 A	SPARE	102
103	RCPT: PUBLIC DELINQNT	20 A	1	540 / 0			1	20 A	SPARE	104
105	RCPT: PUB TREASURE	20 A	1		720 / 0		1	20 A	SPARE	106
107	RCPT: EXTERIOR	20 A	1			1080 / 0	1	20 A	SPARE	108
109	RCPT: EXTERIOR	20 A	1	1440 / 0			1	20 A	SPARE	110
111	RCPT: IRRIGATION	20 A	1		180 / 0		1	20 A	SPARE	112
113	SPARE	20 A	1			0 / 0	1	20 A	SPARE	114
115	SPARE	20 A	1	0 / 0			1	20 A	SPARE	116
117	SPARE	20 A	1		0 / 0		1	20 A	SPARE	118
119	SPARE	20 A	1			0 / 0	1	20 A	SPARE	120
121	SPARE	20 A	1	0 / 0			--	--	SPACE FOR SPD	122
123	SPARE	20 A	1		0 / 0		--	--	SPACE FOR SPD	124
125	SPARE	20 A	1			0 / 0	--	--	SPACE FOR SPD	126

TOTAL PHASE LOAD: 39530 VA 39259 VA 42439 VA
TOTAL PHASE CURRENT: 330 A 327 A 354 A

PANEL TOTALS
TOTAL CONNECTED LOAD: 121072
TOTAL CONNECTED CURRENT: 336 A

PANEL SCHEDULE KEYED NOTES

- * PROVIDE GFCI STYLE BREAKER
- ** PROVIDE RED BREAKER LOCKED IN THE ON POSITION

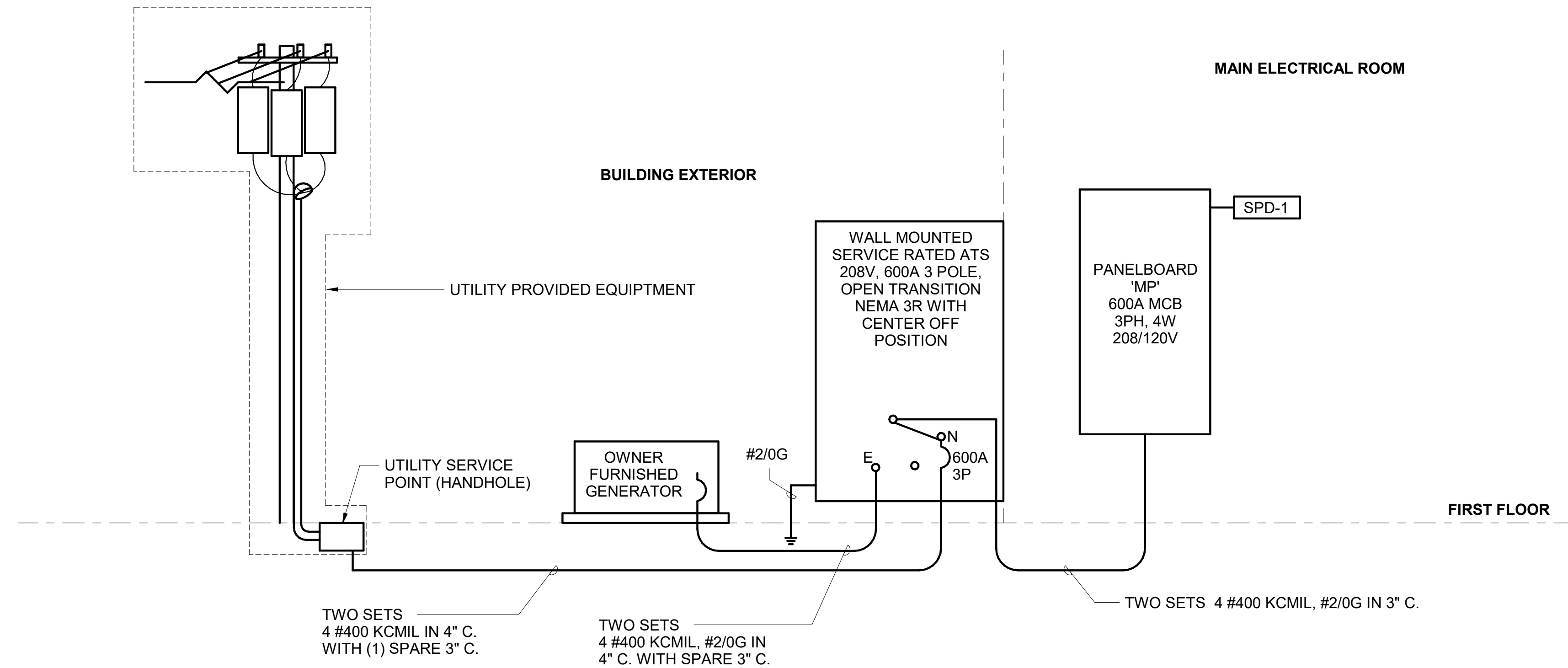
ELECTRICAL SERVICE GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED ELECTRICAL COMPONENTS TO MAKE UTILITY CONNECTION IN ACCORDANCE WITH UTILITY COMPANY'S REQUIREMENTS. UTILITY COMPANY SHALL INSPECT WORK PRIOR TO PROVIDING CONNECTION TO UTILITY SERVICE POLE MOUNTED TRANSFORMER.
2. SERVICE DISCONNECTS SHALL BE PROPERLY LABELED IN ACCORDANCE WITH UTILITY REQUIREMENTS. UTILITY COMPANY SHALL NOT PROVIDE CONNECTION TO SERVICES WITHOUT PROPER IDENTIFICATION.

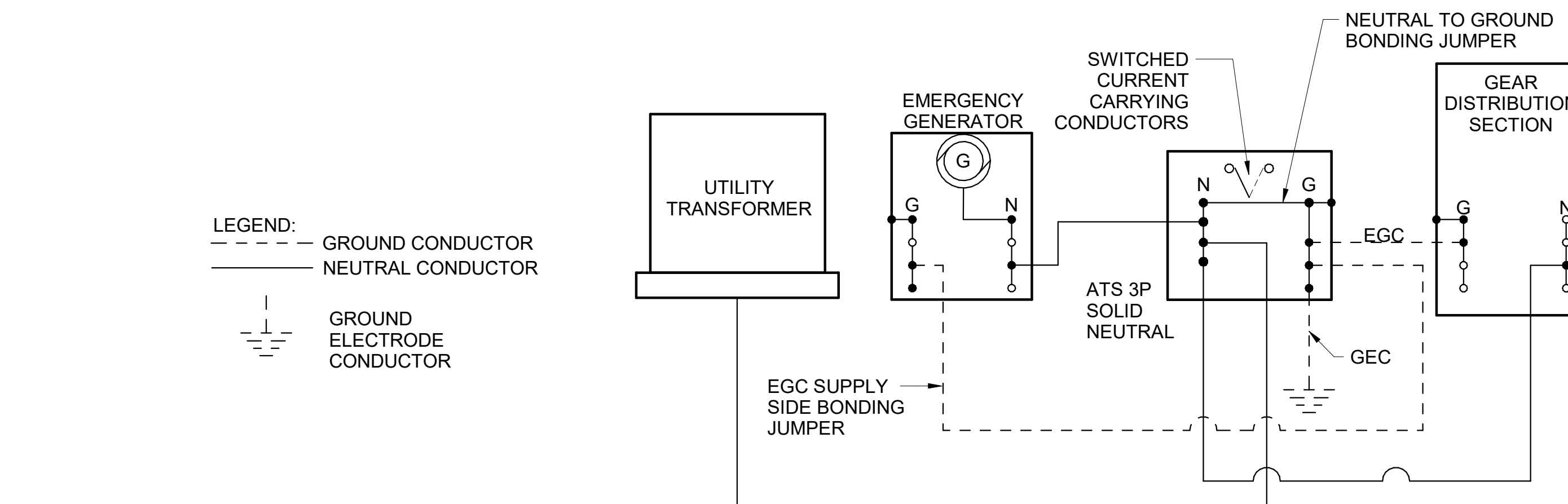
SPD ID	LOCATION TYPE	SURGE CURRENT RATING	SURGE COUNTER	VISUAL & AUDIO ALARM	NETWORK MONITORING	ENCLOSURE
SPD-1	TYPE 1	200kA / MODE	YES	YES	NO	NEMA 1

AVAILABLE FAULT CURRENT

BASED ON A 150 KVA, 1.6 %Z UTILITY TRANSFORMER THE MAXIMUM FAULT CURRENT AVAILABLE AT THE SERVICE ENTRANCE DISCONNECT IS CALCULATED TO BE **26,020** 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.



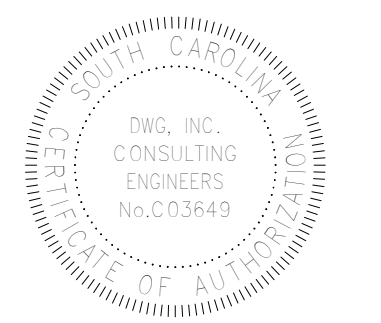
2 RISER DIAGRAM
 NOT TO SCALE
 E010



1 GENERATOR GROUNDING DETAIL 3 POLE
 NOT TO SCALE
 E010

- LEGEND:**
- GROUND CONDUCTOR
 - NEUTRAL CONDUCTOR
 - GROUND ELECTRODE CONDUCTOR

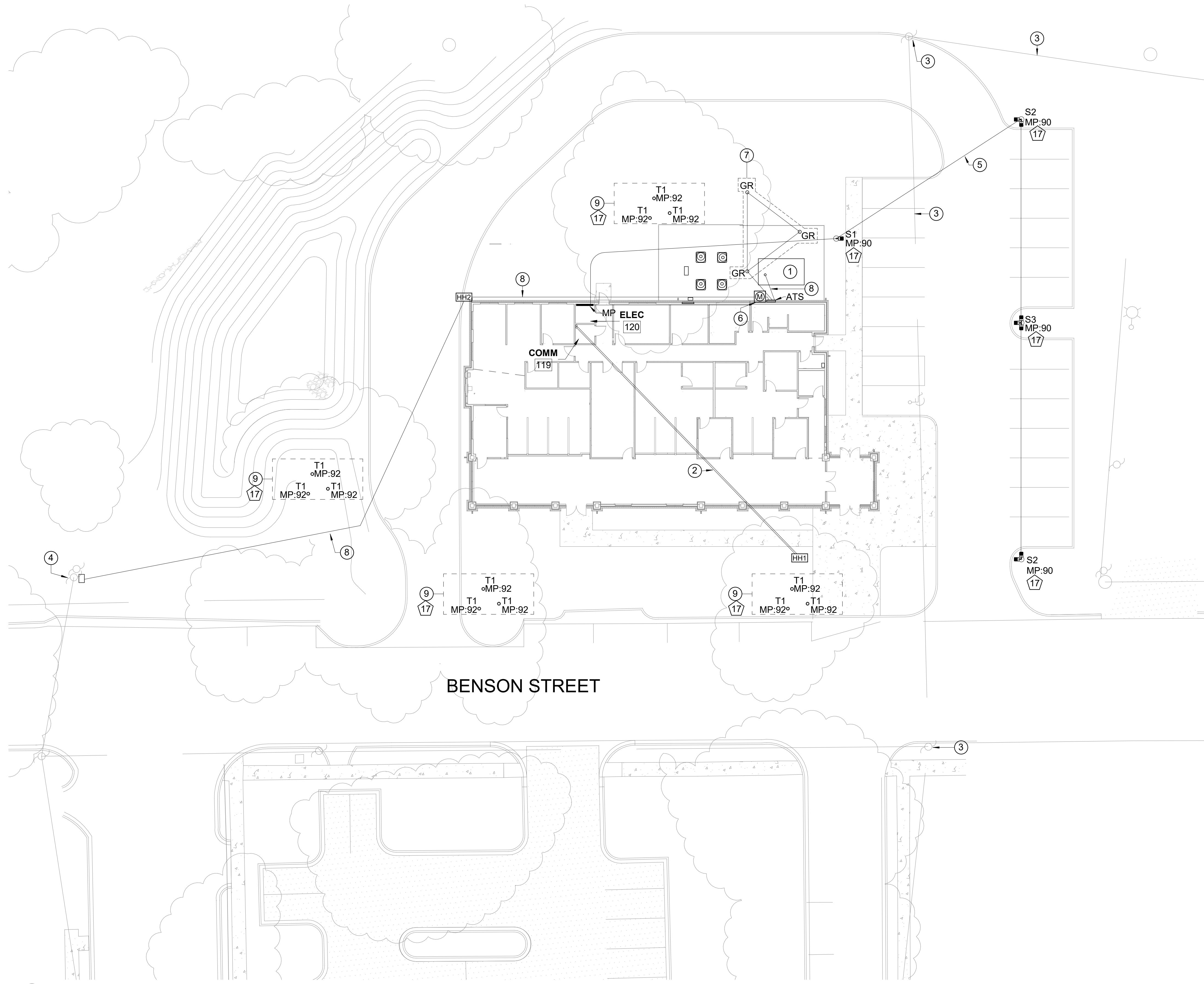
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ELECTRICAL RISER DIAGRAM & SCHEDULES
E010



1 ELECTRICAL PLAN
 E100 SCALE: 1/16" = 1'-0"

KEYNOTES

- ① GENERATOR PAD COORDINATE EXACT SIZE AND PENETRATION LOCATIONS WITH OWNER PRIOR TO FRAMING PAD. REFER TO POWER & TELECOM PLAN FOR ADDITIONAL NOTES ON GENERATOR PAD.
- ② TELECOMMUNICATIONS SERVICE UNDERGROUND ROUTING. COUNTY TELECOMMUNICATION SERVICE POINT.
- ③ EXISTING OVERHEAD UTILITY LINE/POLE TO REMAIN. WORK SHALL BE COMPLETED AROUND EXISTING ELECTRICAL UTILITY INFRASTRUCTURE. COORDINATE WORKING CLEARANCES WITH DOMINION ENERGY PRIOR TO START OF CONSTRUCTION. COORDINATE ANY OUTAGE OR SPECIAL CONDITION WITH DOMINION PRIOR TO CONSTRUCTION.
- ④ EXISTING POWER POLE BY DOMINION ENERGY. ASSOCIATED SERVICE HANDHOLE LOCATED ADJACENT TO POLE AS SHOWN. FIELD COORDINATE EXACT SERVICE POINT LOCATION PRIOR TO TRENCHING/BORING FOR SERVICE CONDUIT. MODIFY ROUTING AS REQUIRED TO TERMINATE SERVICE CONDUIT INTO SERVICE HANDHOLE.
- ⑤ UNDERGROUND BRANCH CIRCUIT ROUTING FOR EXTERIOR POLE LIGHTING. CIRCUIT SHALL BE 2 #6, #10G IN 1" SCHEDULE 80 RNC.
- ⑥ UTILITY METER. CONTRACTOR SHALL PROVIDE METER HOUSING AS NOTED BY DOMINION ENERGY STANDARDS.
- ⑦ LOCATION OF GROUNDING ROD TRIAD AND ASSOCIATED CONNECTIONS. INTERCONNECTION OF GROUND RODS SHALL BE AS NOTED IN GENERAL POWER NOTES. CONNECTION FROM SERVICE SHALL BE SIZED AS NOTED ON ONE LINE.
- ⑧ ELECTRICAL SERVICE UNDERGROUND ROUTING. REFER TO RISER DIAGRAM FOR CONDUIT AND WIRE SIZES. PRIOR TO ROUTING CONFIRM CONNECTION LOCATIONS FOR UTILITY TRANSFORMER AND GENERATOR. IF CONNECTION LOCATIONS DIFFER MORE THAN 5' FROM SHOWN OR WILL NOT BE ABLE TO ACCOMMODATE PROPOSED ROUTING NOTIFY ENGINEER AND PROVIDE SKETCH SHOWING NEW PROPOSED ROUTING.
- ⑨ GRADE MOUNTED LANDSCAPE FIXTURES TO BE MOUNTED EQUALLY SPACED AT 120 DEGREES APART AROUND THE ASSOCIATED TREE 3' AWAY FROM BASE OF TREE TRUNK. FIXTURES SHALL BE AIMED UP AT CANOPY OF TREE. FIELD VERIFY LIGHT LOCATIONS AND AIMING WITH OWNER PRIOR TO INSTALLATION. LIGHTING SHALL BE CONTROLLED BY NOTED CONTROL SCHEME UNDER KEYED NOTED SYMBOL.

DWG CONSULTING ENGINEERS
 118 COLLETON STREET
 WALTERBORO, SC 29154
 Phone: (803) 484-1141 • Fax: (803) 484-8725
 8122 St. Andrews Rd., Suite # Colleton, SC 29210
 Phone: (803) 405-9193 • Fax: (803) 405-1893
 www.dwginc.com

GBA GLICK BOEHM ARCHITECTURE
 ARCHITECTURE PLANNING INTERIOR DESIGN
 199 King Street, Suite 100 Charleston, South Carolina 29403
 Phone: (843) 721-1788 www.gba.com

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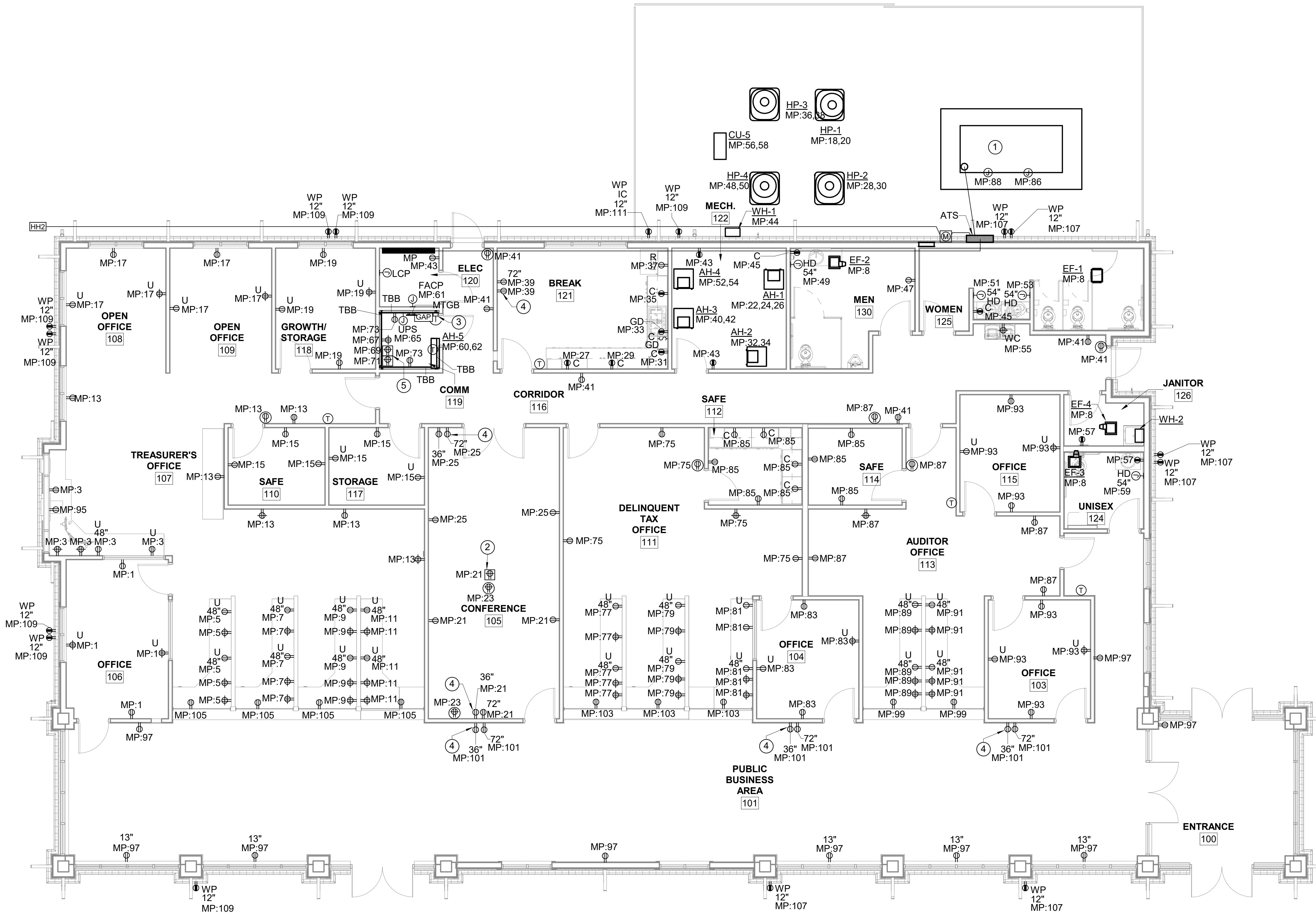
THE SOUTH CAROLINA ENGINEERS ASSOCIATION
 THE ENGINEERING BOARD OF APPROVAL
 DWG, INC. CONSULTING ENGINEERS
 No. C.03649

THE SOUTH CAROLINA ENGINEERS ASSOCIATION
 THE ENGINEERING BOARD OF APPROVAL
 Andrew C. Nolen
 No. 36914
 11/23/20

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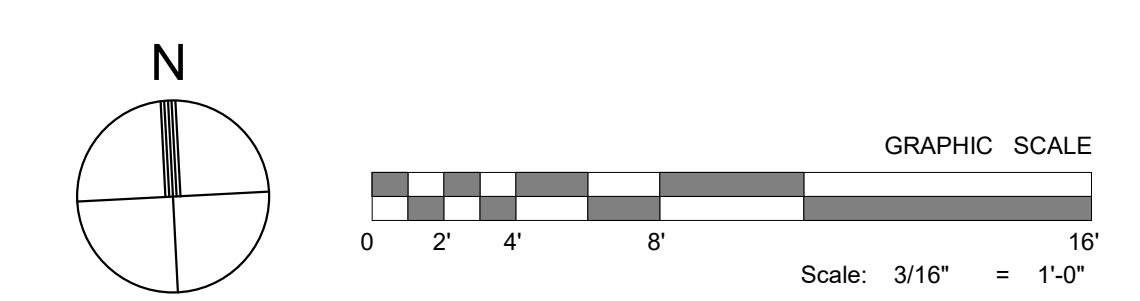
ELECTRICAL SITE PLAN
E100



1 POWER PLAN
 E101 SCALE: 3/16" = 1'-0"

KEYNOTES

- ① PROVIDE CONCRETE PAD AND OTHER INFRASTRUCTURE AS INDICATED IN DETAILS FOR OWNER PROVIDED GENERATOR. PLACE IN THIS APPROXIMATE LOCATION. COORDINATE PAD SIZE WITH OWNER PROVIDED EQUIPMENT. MODIFY GENERATOR PAD SO THAT PAD EXTENDS 1' 6" PAST EXTENTS OF OWNER PROVIDED GENERATOR ENCLOSURE IN ALL DIRECTIONS. TREE THAT IS SHOWN SHALL BE TRIMMED SUCH THAT TREE BRANCHES DON'T OVERHANG GENERATOR.
- ② MINIMUM 6 GANG FLOORBOX WITH RECEPTACLE PLATES AS SHOWN ON PLANS, 3 DATA PLATES AND 1 BLANK. BASIS OF DESIGN IS LEGRAND EFB6S-OG WITH (2) EFB6-MB.
- ③ GENERATOR E-STOP.
- ④ TELEVISION LOCATION REFER TO DETAIL FOR DEVICE ALIGNMENT.
- ⑤ ONE FLOORBOX WITH MINIMUM 8 GANGS WITH RECEPTACLE PLATES AS SHOWN ON PLANS AND 4 BLANKS. BASIS OF DESIGN IS LEGRAND EFB8S-OG WITH (4) EFB6-MB.



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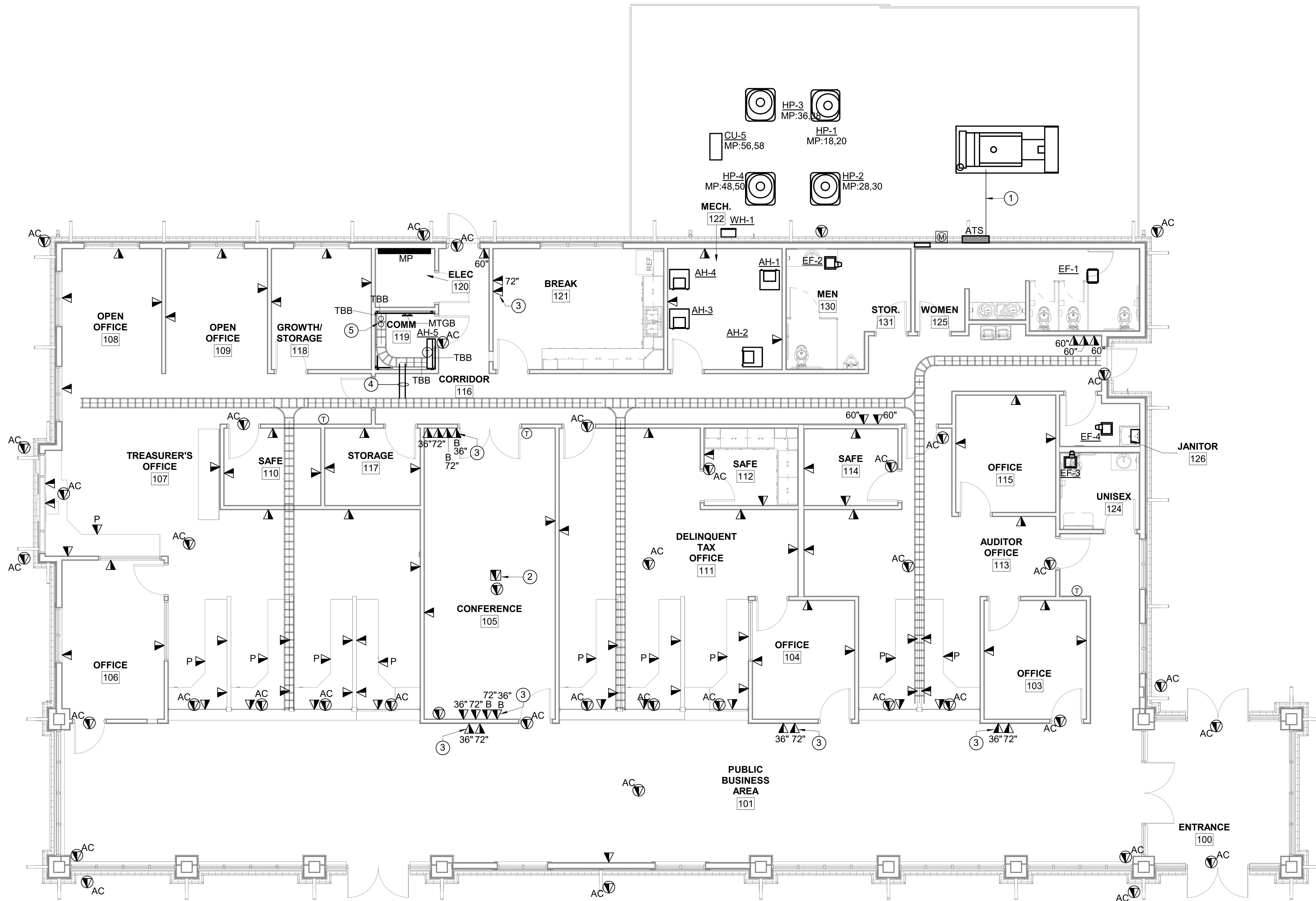
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 ARCHITECTURE
 699 King Street, Suite 100
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Professional Engineer Seal for Andrew C. Nolen, No. C.3649, State of South Carolina, dated 11/23/20.

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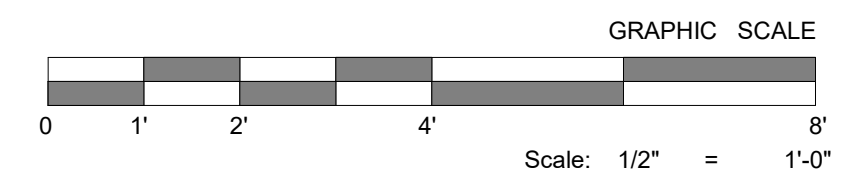
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1 TELECOMMUNICATIONS PLAN
 E201 SCALE: 3/16" = 1'-0"

KEYNOTES

- ① PROVIDE DATA ROUGHIN AND CONDUIT BACK TO ABOVE CEILING FOR GENERATOR COMMUNICATION.
- ② REFER TO POWER PLANS FOR FLOOR BOX SPECIFICATION DETAILS.
- ③ TELEVISION LOCATION REFER TO DETAIL FOR DEVICE ALIGNMENT.
- ④ PROVIDE (2) 6" CONDUIT SLEAVES ABOVE CEILING THROUGH FIRE RATED WALL AT LOCATION NOTED.
- ⑤ TELECOM SERVICE CONDUIT STUB UPS. CONDUIT STUB UP SHALL BE 3' AFF.



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 CONSULTING ENGINEERS
 1125 E. COLLETON STREET
 FLORENCE, SOUTH CAROLINA 29502
 Phone: (843) 666-1141 Fax: (843) 666-8725
 6125 B. ANDREWS RD., SUITE 200, CHARLESTON, SOUTH CAROLINA 29405
 Phone: (803) 405-9913 Fax: (803) 405-9950
 www.dwvg.com

GLBBA
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 ARCHITECTURE PLANNING INTERIOR DESIGN
 999 KING STREET, SUITE 100 CHARLESTON, SOUTH CAROLINA 29403
 Phone: (803) 772-1788 www.glbba.com

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Professional Engineer Seal for Andrew C. Nollen, No. C.03649, State of South Carolina, dated 11/23/20.

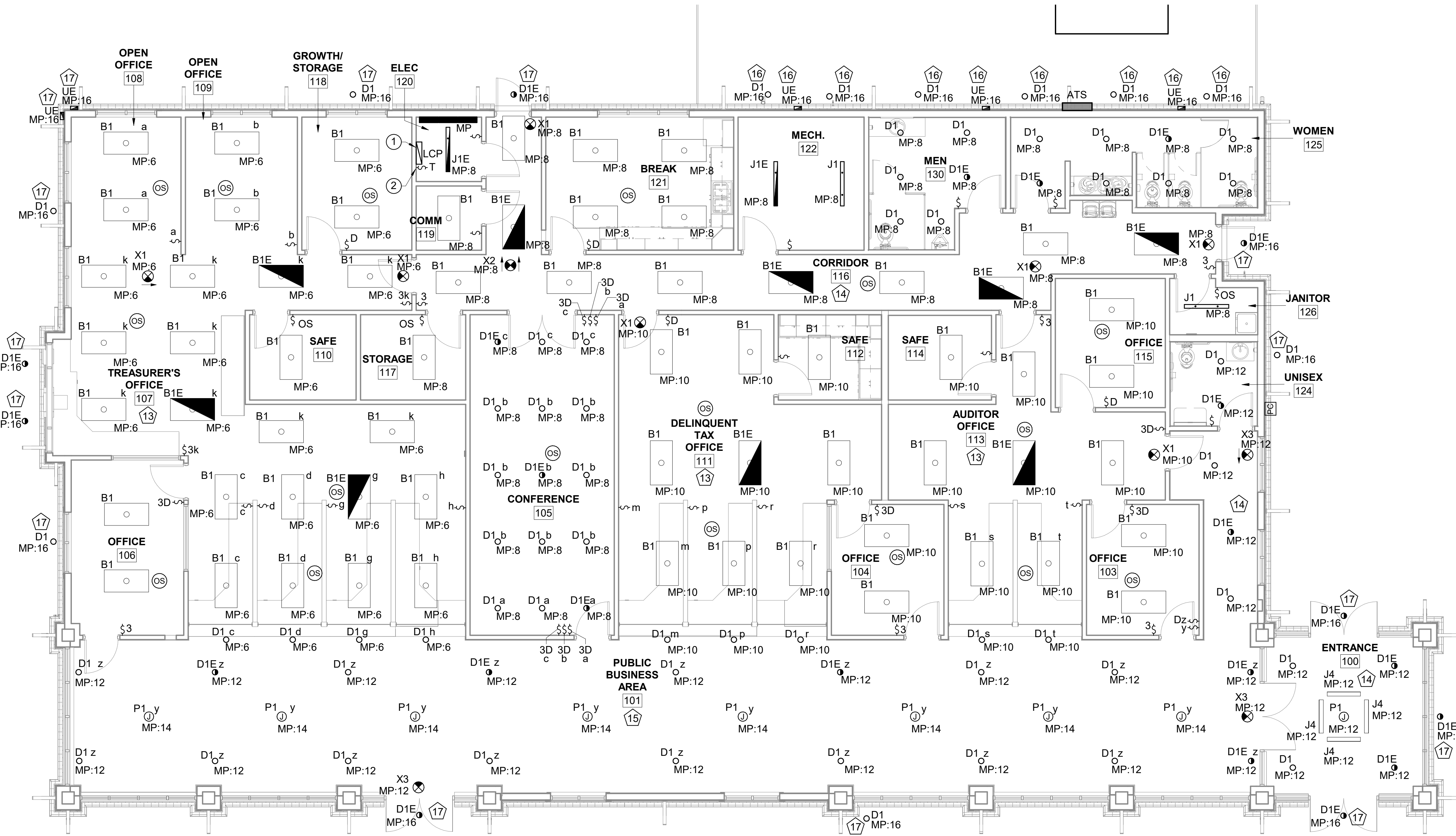
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TELECOM PLAN

KEYNOTES

- ① LIGHTING CONTROL PANEL SHALL BE PROVIDED WITH AT MINIMUM 6 EXTRA RELAY SLOTS/LOCATIONS.
- ② MANUAL OVERRIDE 1 HOUR SWITCH FOR MECHANICAL YARD LIGHTING. SWITCH SHALL BE CLEARLY LABELED AND BE PROVIDED WITH INDICATOR LIGHT THAT WHEN EXTERIOR LIGHTING IS ON, INDICATOR LIGHT IS ON.



1 LIGHTING PLAN
 E301 SCALE: 3/16" = 1'-0"

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GBA
 GLICK BOEHM ARCHITECTURE

115 LITTLETON ROAD, SUITE 100
 CHARLESTON, SOUTH CAROLINA 29405
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 6125 B. ANDREWS RD., SUITE 400, CHARLESTON, SC 29410
 Phone: (803) 405-9913 Fax: (803) 405-9950
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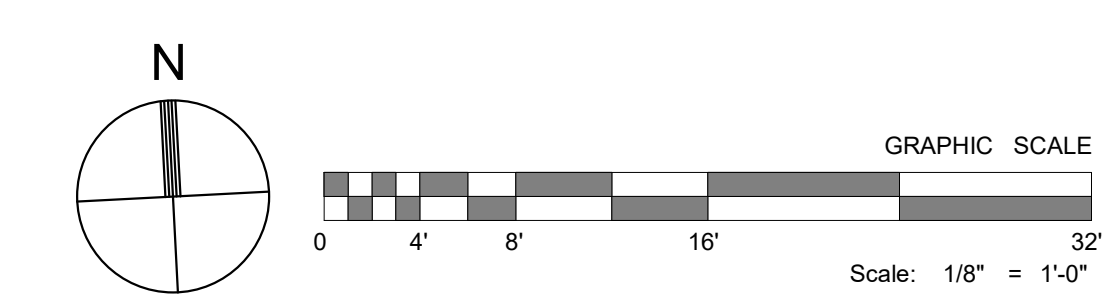
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 STATE OF SOUTH CAROLINA
 No. C-03649

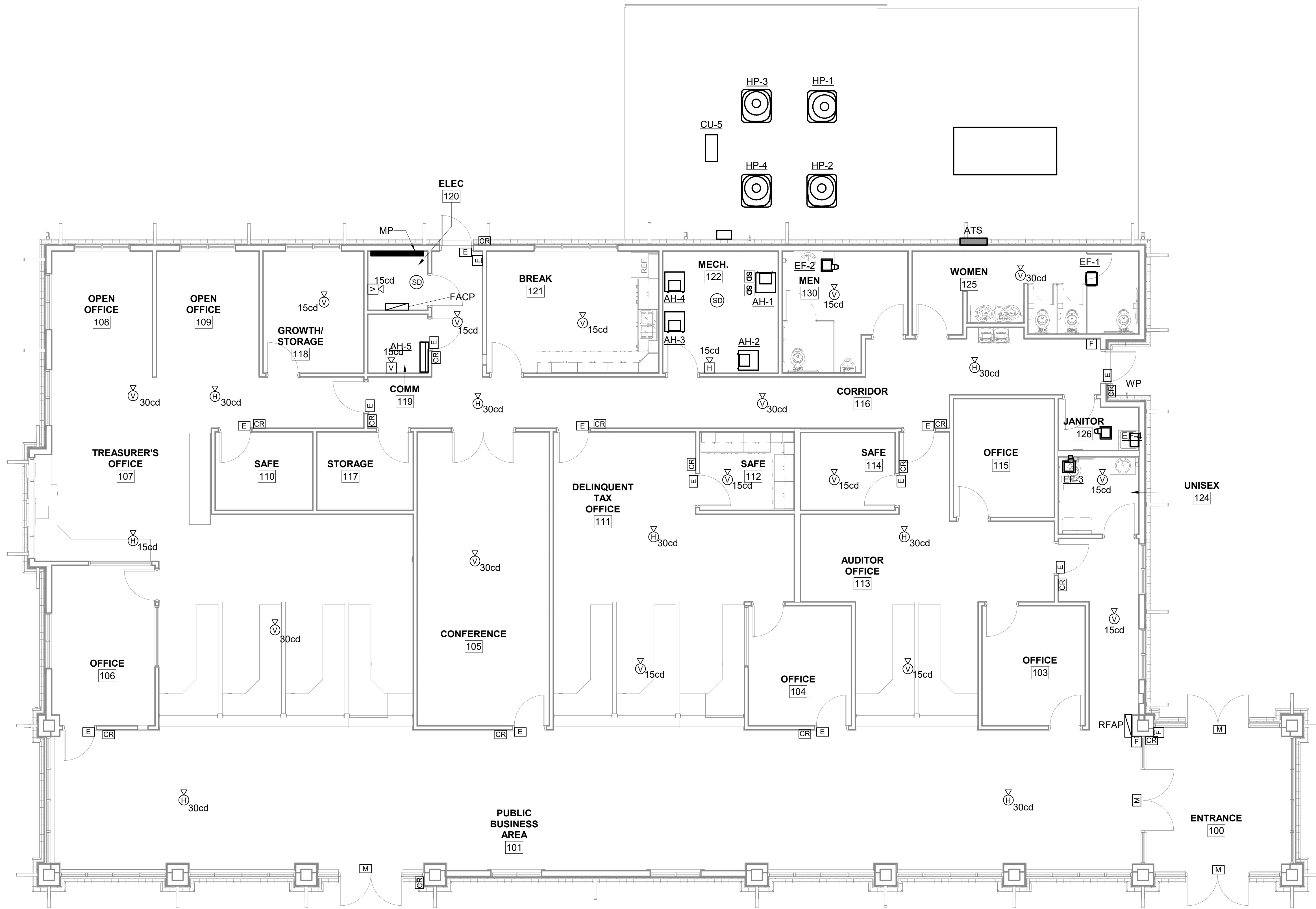
REGISTERED PROFESSIONAL ENGINEER
 STATE OF SOUTH CAROLINA
 No. 36914
 11/23/20
 ANDREW C. NOLEN

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 COLLETON COUNTY
 118 BENSON STREET
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LIGHTING PLAN
 E301

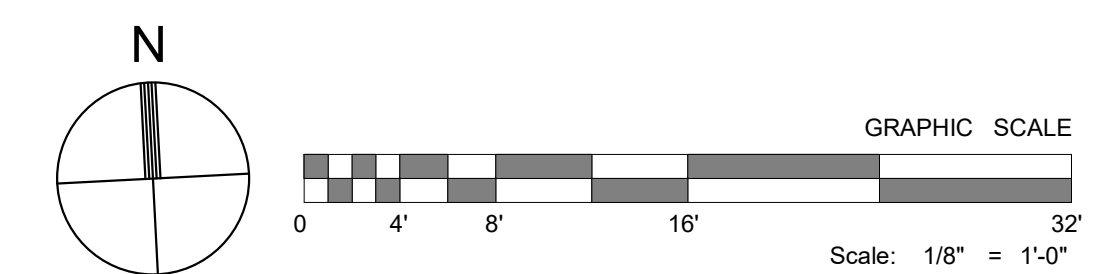




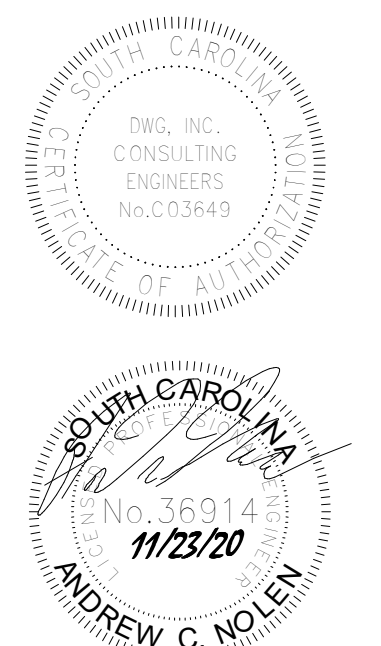
1 SYSTEMS PLAN
 E401 SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. ELECTRICAL CONTRACTOR SHALL REFER TO THE "CAROLINA INNOVATIVE RESEARCH, LTD" SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ACCESS CONTROL ROUGHIN.



REV.	DATE	DESCRIPTION



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SYSTEMS PLAN

SPECIFICATIONS

TAXPAYER SERVICE CENTER

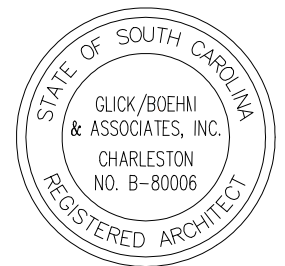
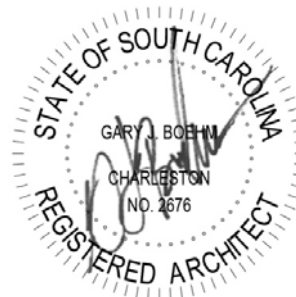
118 Benson Street
Walterboro, SC 29488

For The Owner:

Colleton County

GBA PROJECT N^o.: 1904

DATE: November 23, 2020



ARCHITECTURE / PLANNING / INTERIOR DESIGN

GLICK/BOEHM & ASSOCIATES, INC.

493 King Street, Suite 100

Charleston, South Carolina 29403

Telephone: 843.577.6377

Fax: 722.1768

Internet: www.gbaarchitecture.com

DOCUMENT 00 01 05

PROJECT DIRECTORY

PROJECT: **Taxpayer Service Center**
118 Benson Street
Walterboro, SC 29488

OWNER: **Colleton County**

ARCHITECT: **Glick/Boehm & Associates, Inc.**
493 King Street, Suite 100
Charleston, SC 29403
843-577-6377

STRUCTURAL CONSULTANT: **Atlantic Engineering**
875 Lowcountry Blvd., Suite 210
Mt. Pleasant, SC 29464
843-906-1337

MECHANICAL/ELECTRICAL/
PLUMBING CONSULTANT: **DWG Consulting Engineers, Inc.**
1009 Anna Knapp Blvd., Suite 202
Mount Pleasant, SC 29464
843-849-1141

CIVIL/LANDSCAPE CONSULTANT: **Forsberg Engineering**
1587 Savannah Highway, Suite B
Charleston, SC 29417
843-571-2622

END OF PROJECT DIRECTORY

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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, Taxpayer Service Center, Benson Street, Walterboro, SC, ECS Project Number 34:3774 dated October 25, 2019, prepared by ECS Southeast, LLP.
 - 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.

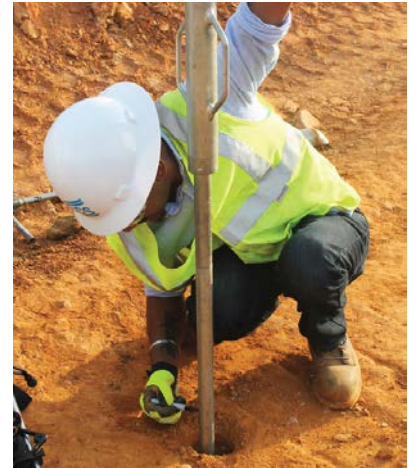
1.02 SITE PERMITS

- A. The Department of Health and Environmental Control (Department of DHEC) NPDES approval letter is attached.
- B. The Coastal Zone Consistency Determination approval letter is attached.
- C. The South Carolina Department of Transportation Encroachment Permit is attached.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION



ECS Southeast, LLP

Report of Subsurface Exploration and Geotechnical Engineering Analysis

Taxpayer Service Center

Benson Street
Walterboro, SC 29488

ECS Project Number 34:3774

October 25, 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 25, 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
Taxpayer Service Center
Benson Street
Walterboro, SC 29488

ECS Project Number 34:3774

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. 34:3852-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

Peter D. Kniesler, E.I.T.
Geotechnical Staff Project Manager
pkniesler@ecslimited.com

Robert L. Goehring, P.E.
Chief Engineer
SC Registration No. 17075
rgoehring@ecslimited.com
No. 17075
REGISTERED PROFESSIONAL ENGINEER
ROBERT L. GOEHRING
SOUTH CAROLINA
ECS
SOUTHEAST, LLP
No. COA3239
CERTIFICATE OF AUTHORIZATION
SOUTH CAROLINA

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EXECUTIVE SUMMARY

ECS Southeast, LLP (ECS) has completed the subsurface exploration for the proposed one-story county municipal building located on Benson Street, Walterboro, 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 : Benson Street, Walterboro, South Carolina
- Building Scope: 1-story building
- Building Type: Shallow foundations, slab-on-grade
- Assumed Loads: Max. Column loads = 40 kips, Max. wall loads = 4 klf
- Assumed Earthwork: Up to two feet of fill (Assumed)
- Sitework: Parking and Drive areas

SUBSURFACE CONDITIONS:

- Field Exploration: 1 cone penetration test and 1 hand auger boring
- Surface Material: Approximately 4 inches of organic laden topsoil
- Coastal Sedimentary Deposits: Observed to the maximum depth explored of approximately 30 feet
- Groundwater: Groundwater observed in CPT sounding at approximately 18 feet below ground surface.

GEOTECHNICAL CONCERNS:

- Presence of organic laden soil to a depth of approximately 4 inches
- Liquefaction Settlement: On the order of 1 inch

DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Seismic Design: Seismic Site Class "D"
- Foundations: 3,000 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, parking and drive areas.

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.

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. 34:3852-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 on the north side of Benson Street approximately 300 feet west of the intersection of Benson Street and Jefferies Boulevard in Walterboro, South Carolina, as shown below and on Figure 1 in [Appendix A](#). The site is bound by undeveloped land to the north and west, Benson Street to the south, and a vacant lot to the east.

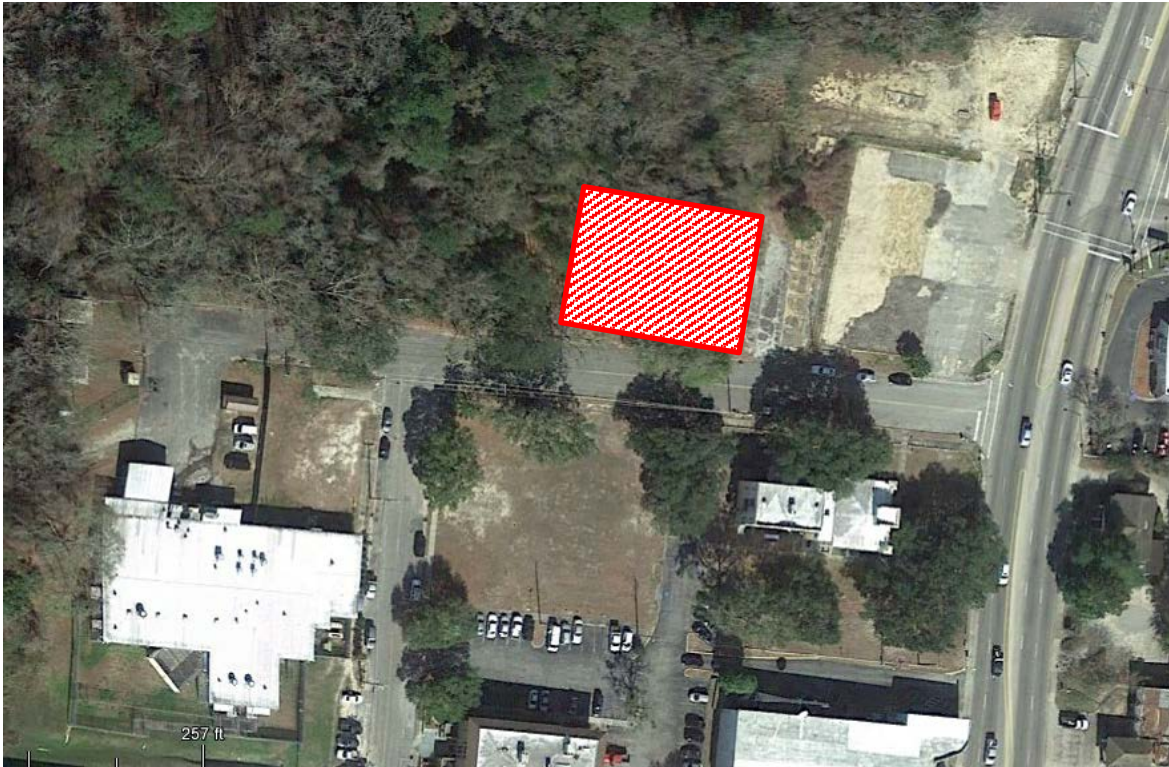


Figure 2-1 Site Location

2.2 CURRENT SITE CONDITIONS

Currently the site is undeveloped and partially wooded. According to available USGS topographic information, current site grades range from approximately +50 feet to +60 feet (NAVD 88).

2.3 PROPOSED CONSTRUCTION

According to the architectural plan dated October 7, 2019, the proposed construction will likely consist of an approximately 6,000 square-foot (SF) structure. The exhibit depicts the location of the proposed structure.

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 6,000 SF (Assumed)
# of Stories	One story above grade
Usage	Offices and Storage
Column Loads	40 kips maximum allowable load (assumed)
Wall Loads	4 kips per linear feet (klf) allowable load (assumed)
Finished Floor Elevation	Approximately 1 to 2 feet above current site grades (Assumed)

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 CPT sounding, designated C-1, was performed within the footprint of the proposed structure to a depth of approximately 30 feet. The cone penetration test sounding 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 cm² and a sleeve area of 225 cm². 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

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 silt (SP-SM, SM) 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 very dense SAND extends to a depth of about 18 feet below the current site grades. The near surface sand is underlain by interbedded layers of stiff to hard CLAY/SILT (CL/ML) and medium dense to dense SAND to a depth of approximately 30 feet.

For subsurface information at a specific location, refer to the CPT and hand auger logs in [Appendix B](#)

3.4 GROUNDWATER OBSERVATIONS

Groundwater was observed at depth of approximately 18 feet below the current site grades during our exploration. 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. For groundwater information at a specific location, refer to the CPT and hand auger logs in [Appendix B](#)

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. Root balls or deeper organic-laden topsoil may be present on-site and remain undetected at locations away from the single boring performed for this study. 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 Groundwater Control

Based upon our limited 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 Size No. 57 Stone or open graded bedding material.

4.1.3 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 earthquake¹. 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 30 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).² 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 1 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_{DS}) 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 0.418 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	0.711	F_a	1.231	$S_{MS}=F_a S_s$	0.875	$S_{DS}=2/3 S_{MS}$	0.584
1.0	S_1	0.226	F_v	1.948	$S_{M1}=F_v S_1$	0.440	$S_{D1}=2/3 S_{M1}$	0.294

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, it is our opinion that the proposed structure can be supported by conventional shallow foundations: individual column footings and continuous wall footings. We recommend the design of the foundation utilize the following parameters:

Table 4-2 Shallow Foundation Design

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure ¹	3,000 psf	3,000 psf
Acceptable Bearing Soil Material	Stratum I or Approved structural fill.	Stratum I or Approved structural fill.
Minimum Width	30 inches	18 inches
Minimum Footing Embedment Depth (below slab or finished grade)	12 inches	12 inches
Estimated Total Settlement ²	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 3.75 ft x 3.75 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 1 foot in thickness.
- Compacted structural fill (with additional compaction testing and soil bearing evaluation).

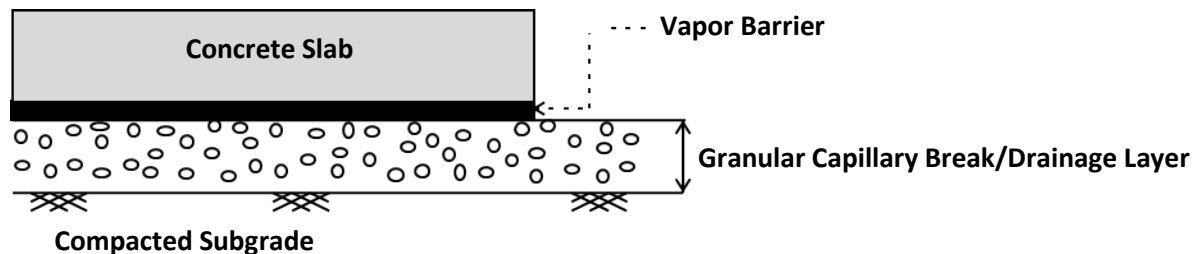
Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened 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, and are considered suitable for support of floor slabs. Moisture control during earthwork operations, including the use of disking 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.

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/our analyses, approximately 25,000 ESAL 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 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 trash dumpster and other heavily trafficked areas (such as drive through lanes) where wheel loads will be concentrated. Provisions for construction traffic have not been included in our analysis.

Please note that large, front-loading trash dumpsters frequently impose concentrated front-wheel loads on pavements during loading. This type of loading typically results in rutting of bituminous pavements and ultimately pavement failures and costly repairs. Consequently, we recommend the use of a 6 inch thick, concrete slab that extends the entire length of the truck. 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.

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 10-foot expanded building pad and to 5 feet beyond the toe of structural fills or pavement areas.

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.

STRUCTURAL FILL RECOMMENDATIONS

5.1.3 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 (GW and GP), which contain void space in their mass should not be used in structural fills unless properly encapsulated with filter fabric.

Suitable structural fill (import) material should have the index properties shown in the table below.

Table 5-1 Imported Structural Fill Index Properties

Location with Respect to Final Grade	Liquid Limit	Plasticity Index (PI)	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 silt (SP-SM, SP) was generally observed to a depth of about 4 feet at the hand auger location. Near surface sands were interpreted from the CPT sounding to extend to a depth of about 18 feet.

In our experience, the on-site upper sandy material (SP-SM, SP) should be generally suitable for use as structural fill as long as it is low plasticity material with a PI less than 20.

5.1.4 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 Tamers, 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.

5.2 GENERAL CONSTRUCTION CONSIDERATIONS

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.

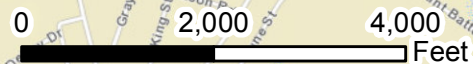
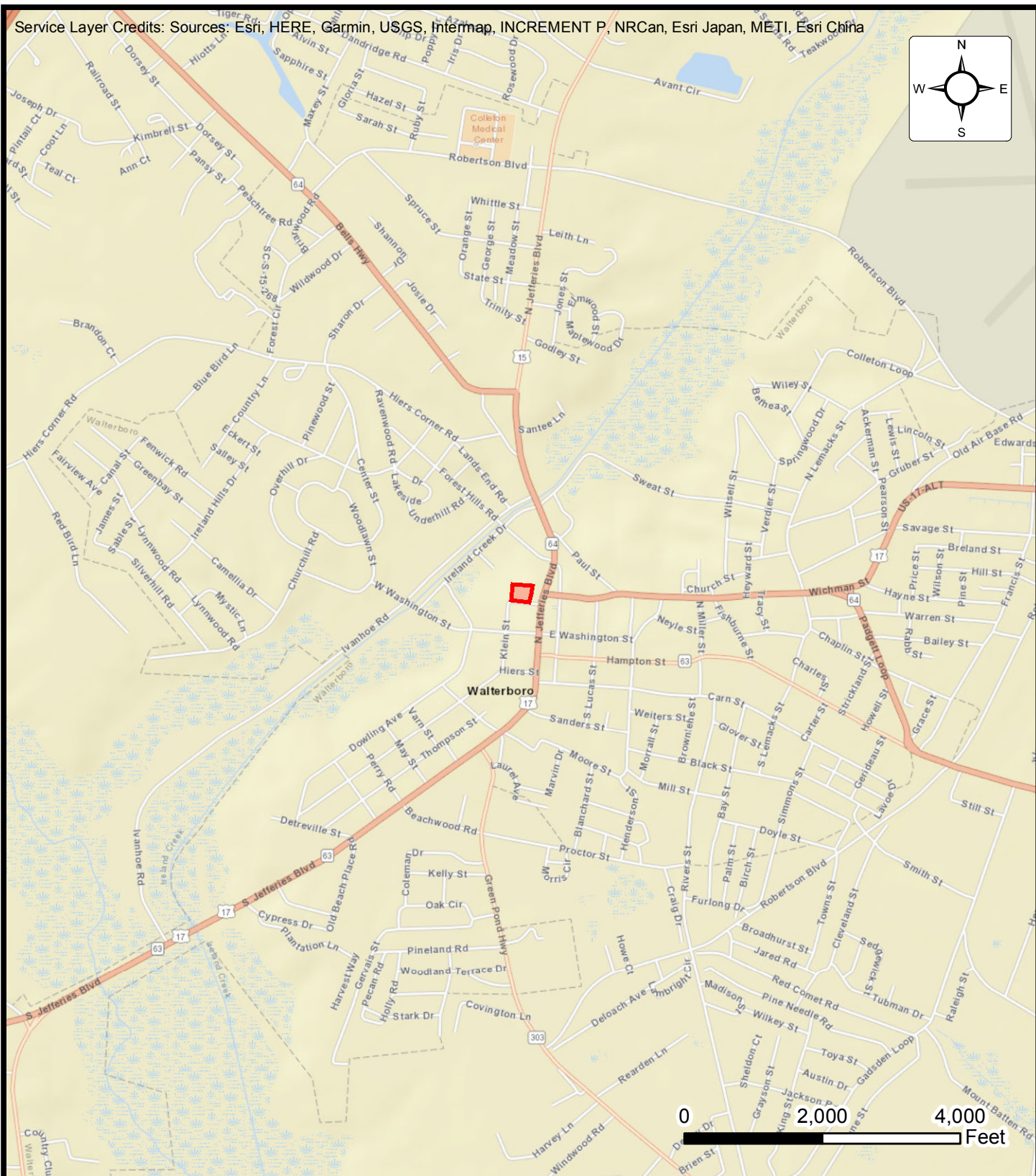
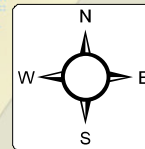
Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the Owner retain these quality assurance services and that ECS be allowed to continue our involvement 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

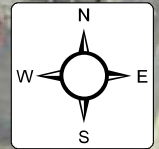
Test Location Diagram

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China



SITE LOCATION DIAGRAM
TAXPAYER SERVICE CENTER
BENSON STREET, WALTERBORO, SOUTH CAROLINA
GLICK BOEHM & ASSOCIATES, INC.

ENGINEER PDK
SCALE 1" = 2000'
PROJECT NO. 34:3774
FIGURE 1
DATE 10/2/2019



Legend

-  C-1, Approximate CPT/Hand Auger Boring Location



**TEST LOCATION DIAGRAM
TAXPAYER SERVICE CENTER**

**BENSON STREET, WALTERBORO, SOUTH CAROLINA
GLICK BOEHM & ASSOCIATES, INC.**

ENGINEER PDK
SCALE NTS
PROJECT NO. 34:3774
FIGURE 2
DATE 10/2/2019

APPENDIX B – Field Operations

Reference Notes for Cone Penetration Test (CPT) Soundings

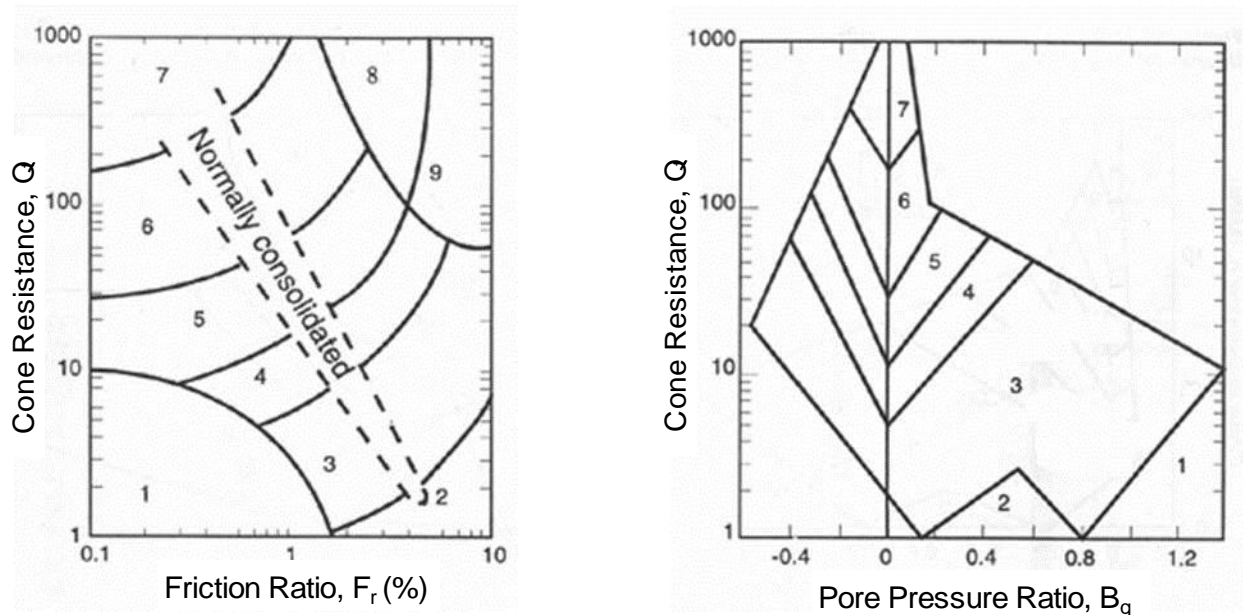
CPT Sounding

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

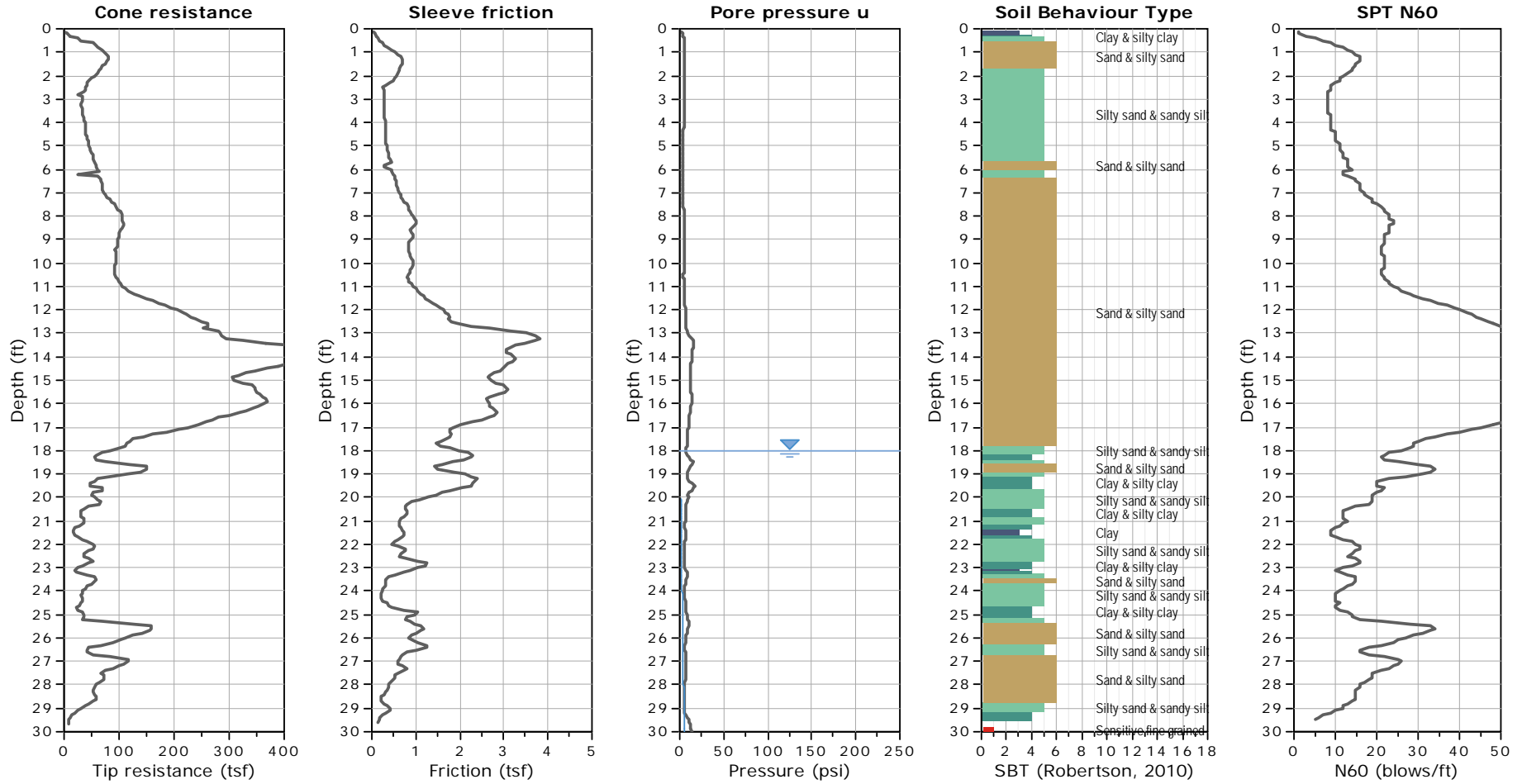
6. Clean Sands to Silty Sands
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff Fine Grained

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: Taxpayer Service Center (ECS Project #34:3774)

Location: Benson Street, Walterboro, South Carolina



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravelly sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |



REFERENCE NOTES FOR BORING LOGS

MATERIAL ^{1,2}	
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	FILL³ MAN-PLACED SOILS
	GW WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM SILTY GRAVEL gravel-sand-silt mixtures
	GC CLAYEY GRAVEL gravel-sand-clay mixtures
	SW WELL-GRADED SAND gravelly sand, little or no fines
	SP POORLY-GRADED SAND gravelly sand, little or no fines
	SM SILTY SAND sand-silt mixtures
	SC CLAYEY SAND sand-clay mixtures
	ML SILT non-plastic to medium plasticity
	MH ELASTIC SILT high plasticity
	CL LEAN CLAY low to medium plasticity
	CH FAT CLAY high plasticity
	OL ORGANIC SILT or CLAY non-plastic to low plasticity
	OH ORGANIC SILT or CLAY high plasticity
	PT PEAT 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 _p ⁴	SPT ⁵ (BPF)	CONSISTENCY ⁷ (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 ⁷	COARSE GRAINED (%) ⁸	FINE GRAINED (%) ⁸
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 ⁵	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS ⁶		
	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

¹Classifications and symbols per ASTM D 2488-09 (Visual-Manual Procedure) unless noted otherwise.

²To 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.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].





⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

⁵Standard 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).

⁶The 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.

⁷Minor deviation from ASTM D 2488-09 Note 16.

⁸Percentages are estimated to the nearest 5% per ASTM D 2488-09.

PROJECT NAME: Taxpayer Service Center					HAND AUGER # C-1			
CLIENT: Glick Boehm & Associates, Inc.			Job #: 34:3774		SURFACE ELEVATION			
DEPTH (FT.)	ELEV. (FT.)	LOCATION:	ARCH./ENG:	EXCAV. EFFORT	DCP	QP (TSF)	SAMPLE NO.	MOIST. CONT. (%)
		Benson Street, Walterboro, Colleton County, SC						
DESCRIPTION OF MATERIAL								
0		Topsoil Thickness [4.0"]		E				
		(SP-SM) SAND WITH SILT, brown and gray, moist					S-1	
1		(SP) SAND, tan, moist					S-2	
2				M			S-3	
3							S-4	
4		END OF BORING @ 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  After Drilling  SHWT 			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				

1.02 SITE PERMITS

- A. The Department of Health and Environmental Control (Department of DHEC) NPDES approval letter is attached.
- B. The Coastal Zone Consistency Determination approval letter is attached.
- C. The South Carolina Department of Transportation Encroachment Permit is attached.



December 8, 2020

John Stieglitz
Colleton County
109 Benson Street
Walterboro, SC 29488

RE: Colleton County Taxpayer Building, Colleton County
NPDES Coverage Number: SCR10Z72K

Dear John Stieglitz:

The Department of Health and Environmental Control (Department or DHEC) has approved the Stormwater Pollution Prevention Plan (SWPPP) for the referenced project on **December 8, 2020 WITHOUT REVIEW**. Based on your submission of the Notice of Intent (NOI) and in accordance with the NPDES General Permit for Stormwater Discharges from Construction Activities (CGP), this project has been granted coverage under the CGP. This project's general permit coverage number is **SCR10Z72K**. The total disturbed area for this site is **1.9 acres**.

See attached DHEC Office of Ocean and Coastal Resource Management (DHEC-OCRM) certification dated November 24, 2020 for additional conditions related to the Coastal Zone Consistency determination.

An as-built survey, signed and sealed by a S.C. Licensed Land Surveyor, should be submitted for the stormwater storage structure(s) on this site. The survey(s) should show grades, contours, and depths for all structures and should include the elevations and dimensions of all outlet structures, including but not limited to pipes, orifices, risers, weirs, and emergency spillways. A statement signed by the project's S.C. Registered Engineer indicating that the structure(s) was installed and is operating as shown on approved plans and in approved calculations is required. If the elevations or dimensions of the structures listed above do not match those used in the approved plans, provide a certification statement signed by the projects S.C. Registered Engineer indicating that the structure, as built, will function as shown in approved calculations. A new analysis of the structure (routing) may be necessary. The as-built survey and/ or analysis must be accepted by the Department before a Notice of Termination (NOT) can be submitted.

The CGP can be downloaded at the following website: <http://www.scdhec.gov/Environment/docs/CGP-permit.pdf> or you may request a copy from us via email (stormwatercgp@dhec.sc.gov). You are responsible for ensuring your contractor(s) complies with the approved SWPPP and the minimum requirements of the CGP. Also, you are responsible for overall compliance with the Storm Water Management and Sediment Reduction Act of 1991 (1991 Act), SC Pollution Control Act, and the Federal Clean Water Act (CWA). Failure to comply with the approved SWPPP or applicable statutes and regulations may result in enforcement actions.

You must notify the local DHEC EA office prior to starting any land-disturbing activity. The address and telephone number are as follows:

Lowcountry EA Beaufort
104 Parker Drive

Beaufort, SC 29906
843-846-1030

Inspections of this site must be performed by qualified personnel as described in Section 4.2.E of the CGP.

You should be aware that this approval is only applicable for the SWPPP that was submitted for this project. Any additional construction or land disturbing activity beyond the scope of the approved plans is not authorized. Any future work for this project not shown on the stamped, approved plans will require that you submit another site plan for review and approval. All major modifications require review and approval by the Department. Minor modifications to the approved SWPPP may be made by the SWPPP preparer and do not require review and approval by the Department; these changes should be signed and dated by the SWPPP preparer. If you have a question about whether a modification is major or minor, contact the Coastal Stormwater Permitting Section at (843) 953-0200.

A copy of the stamped, approved SWPPP (including a copy of the CGP, contractor certifications, inspection records, rainfall data, etc.), NOI, and CGP coverage letter from DHEC must be retained and available at the construction site (or accessible within 30 minutes during normal business hours) from the date of commencement of construction activities to the date of final stabilization. If an on-site location is unavailable to store the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance at the construction site.

All contractors who will conduct land-disturbing activities at the site must complete a Contractor Certification Form. You are also responsible for listing all contractors in the SWPPP and for holding a pre-construction conference with each contractor before they can conduct land-disturbing activity at the site.

The Department may conduct periodic inspections of your site. Any violations found during these inspections may result in enforcement action.

This NPDES coverage should be terminated by the permittee when the conditions listed in Section 5.1 of the CGP have been met. You must submit a Notice of Termination (NOT) to cancel your NPDES coverage under the CGP. Please see section 5.1 of the CGP for additional information required to be submitted with the NOT.

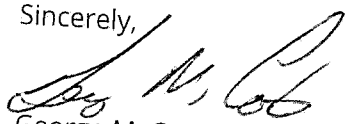
You are responsible for obtaining any other federal, state, or local permit that may be required for this project. In particular, any permits through the U.S. Army Corps of Engineers for the placement of fill material in Waters of the United States. Please note we have not sent a copy of this letter to any county or city building official. You must send a copy of this letter to these agencies, if necessary.

If material excavated during construction activities leaves the site, a mine operating permit may be needed. You are responsible for contacting the Mining and Reclamation Section to determine if a mining permit is required for the site. The Mining and Reclamation Section can be reached at (803)898-1362 or via e-mail at AskMines@dhec.sc.gov.

Please see the enclosed "Guide to Board Review" document for information about the procedures for appealing this NPDES coverage.

If you have any questions or cannot access the referenced websites, please call me at 843-953-0238.

Sincerely,

A handwritten signature in black ink, appearing to read "G. M. Cox". The signature is fluid and cursive, with the first letters of each name being capitalized and prominent.

George M. Cox

Coastal Stormwater Permitting Section

CC: Gadsden Linton III, Forsberg Engineering & Surveying Inc.
Jacob Terry, Lowcountry EA Beaufort



9/14/20
10/8/20

NOTICE OF INTENT (NOI)
For Coverage(s) of Primary Permittees
Under South Carolina NPDES General Permit
For Stormwater Discharges From Construction Activities SCR100000
(Maintain As Part of On-Site SWPPP)

SOUTH CAROLINA

DEPT. OF HEALTH AND ENVIRONMENTAL CONTROL
DAM SAFETY AND STORMWATER PERMITTING DIVISION
CONSTRUCTION STORMWATER PERMITTING
APPROVED - FOR CONSTRUCTION ONLY

DHEC PERMIT #: SCR10272K
DATE ISSUED: 12/8/2020
BY: George M. Cox
Without Review

For Official Use Only

File Number: _____
Permit Number: SCR10
Submittal Package Complete: _____

Submission of this Notice of Intent constitutes notice that the Applicant identified in Section II intends to be authorized as a Primary Permittee in the state of South Carolina under NPDES General Permit SCR1000000. Fees required for review and NPDES coverage of each application type are as listed on page 2 of the Instructions.

Date: 09/04/2029

Project/Site Name: COLLETON COUNTY TAXPAYER BUILDING County: COLLETON

(Modification or Change of Information Only) Prior Approved NPDES Permit or File Number: _____

Do you want this project to be considered for the Expedited Review Program (ERP)? Yes or No (See instructions)

I. Notice of Intent (NOI) Application Type(s)

A. Project (Application/Review) Type(s) (Select ALL that apply):

- New Project (Initial Notification) Ongoing Project: Permitted or Un-Permitted
- Late Notification Low Impact Development (LID) or Project Design Above Regulatory Requirements
- New Owner/Operator or Company Name Change (see instructions, attach Form A (Transfer of Ownership))
- Major Modification: (see instructions, attach Form B (Major Modifications))
- MS4 Project Review
- Ocean and Coastal Resource Management (OCRM) Review
- Change of Information/Other (Specify): _____

B. If Applicable, identify the entity designated as MS4 Reviewer and MS4 Operator (i.e., Lexington County, City of Greer, etc.): MS4 Reviewer _____ MS4 Operator _____

II. Primary Permittee Information

Person or Company If a Company, are you a Lending Institution or Government Entity?
Company EIN (if applicable): EIN: _____ Change of Information

A. Primary Permittee Name: COLLETON COUNTY

Mailing Address: 109 BENSON STREET City: Walterboro State: SC Zip: 29488
Phone: 843-549-5221 Fax: _____ Email Address: jstieglitz@colletoncounty.org

B. Contact /ODSA Name (If different from above OR if owner is a company): JOHN STIEGLITZ, Capital Projects

Mailing Address: SAME AS ABOVE City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

C. Property Owner Name (If different from above): SAME AS ABOVE

Mailing Address: _____ City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

III. Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) Preparer Information Change of Information

A. C-SWPPP Preparer Name: GADSDEN LINTON III

B. Registered Professional Engineer Landscape Architect Tier B Land Surveyor S. C. Registration #: 29925

C. Company/Firm Name: FORSBERG ENGINEERING & SURVEYING, INC. S. C. COA #: 343

Mailing Address: P.O. Box 30575 City: CHARLESTON State: SC Zip: 29417
Phone: 843-571-2622 Fax: 843-571-6780 Email Address: TLINTON@FORSBERG-ENGINEERING.COM

IV. Project/Site Information Change of Information

A. Type of Construction Activity(ies) (Select ALL that apply):

- Commercial Industrial Institutional Mass Grading Linear Utility/Infrastructure
- Residential: Single-family Residential: Multi-family Multi-use (Commercial & Residential)
- Site Preparation (No New Impervious Area) Other (Specify) _____

B. Site Address/Location (street address, nearest intersection, etc.) 118 Benson Street, Walterboro, SC

City/Town (If in limits): Walterboro Zip Code: 29423

Latitude: 32° 54' 15" N Longitude: - 80° 40' 2" W (Source): GPS Web Site: FLASH EARTH

Tax Map Number (s) (List all): 163-11-00-230

RECEIVED

OCT 27 2020

Dam Safety and Stormwater Permitting Division

- C. Is this site located on **Indian Land**? Yes No
- D. **Proposed Start Date:** 01/01/2021 **Proposed Completion Date:** 12/01/2022
- E. **Disturbed Area** (nearest tenth of an acre): 1.9 **Total Area** (acres): 1.9
- F. **Modification Only:** (nearest tenth of an acre): Disturbed Area: Current (Approved) Area: _____
Disturbed Area Change (Increase Only): _____ **Total Disturbed Area (After Change):** _____
- G. Is this project part of a **Larger Common Plan for Development or Sale (LCP)**? Yes No
LCP/ Overall Development Name: _____ Check here if this is the **First Phase.**
Previous State Permit/File Number: _____ **Previous NPDES Coverage Number:** SCR10 _____

- H. Any **Flooding Problems** exist downstream of or adjacent to this site? Yes No (If yes, provide detailed description of flooding problems and applicable floodway/flood zone information in the C-SWPPP).
- I. Active **S.C. DHEC Warning Notice, Notice to Comply or Notice of Violation** for this site or LCP? Yes No
- J. List Relevant **State and Federal Environmental Permits or Approvals** applied for or obtained for this site (e.g., **RCRA, USACOE, Nationwide**, etc.). If None, list None.
NONE

K. **Any Waiver(s)/Variances/Exceptions Requested for this Project?** (If yes, identify below and include **Waiver Request and Justifications** in the C-SWPPP for each proposed request).

1. Small Construction Activity Waiver(s) From NPDES permitting (**Section 1.4 & Appendix B**)? Yes No
If yes, Identify requested waiver: Rainfall Erosivity Waiver TMDL Waiver Equivalent Analysis Waiver

2. Detention Waiver (**72-302(B)**)? Yes No

3. Other (Specify): _____

V. **Waterbody Information** (Attach additional sheet(s) as needed) **Change of Information**

A. **Receiving Waterbody(s) (RWB) Information** (List the nearest and next nearest receiving waterbodies to which the sites stormwater discharges will drain. If stormwater discharges drain to multiple waterbodies, list all such waterbodies).

1. Name of Receiving Waterbodies (RWB)	2. Distance to RWB (feet)	3. Classification of RWB
a. Nearest: <u>Ireland Creek</u>	1200	FW
b. Next Nearest: <u>Ashepool River</u>	23900	FW
c. Coastal Zone ONLY: Coastal Receiving Water (CRW): <u>Ashepool River</u>	23900	Not Applicable
d. Other Waterbodies: _____		

B. **Waters of the U.S. / State Information** (Attach additional sheet(s) as needed)

Waters of the U.S./ State	1. On the site?	2. Delineated/ Identified?	3. Impacts?	4. Amount of impacts
a. Jurisdictional wetlands	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac
b. Non-jurisdictional wetlands	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac
c. Other Water(s): _____	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac ___ Feet
d. Coastal Zone ONLY: <u>Direct Critical Area</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac ___ Feet

5. If yes for impacts in B.3, describe each impact and activity, and list all permits (e.g., USACOE Nationwide Permit, DHEC General Permit) and certifications that have been applied for or obtained for each impact:

C. **S.C. Navigable Waters (SCNW) Information (Section 2.6.5)** The Department will address any issues related to State Navigable Waters' Program under SC Regulation 19-450 during the review of the C-SWPPP for activities that will **NOT** require a 404 permit or a 401 certification. (Attach additional sheet(s) as needed).

- 1. Are **S. C. Navigable Waters (SCNW) on the site**: Yes No
 - a. If no, do not complete this question. Proceed to Section D (Impaired Waterbodies).
 - b. If yes, provide the name of S.C. Navigable Waters (SCNW) on the site: _____
- 2. If yes for C.1, will construction activities cross over or occur in, under, or thru the SCNW? Yes No
If yes, describe SCNW activities (e.g., road crossing, sub-aqueous utility line, temporary or permanent structures, etc.) and proceed to Section C.3:

3. Identify permits providing coverage of SCNW activities proposed for your site. If NONE, list none.

Permits/Certifications	Permit or Certification No.	Corresponding Covered SCNW Activity(ies)
a. DHEC General/ Other DHEC Permit	NONE	
b. USACOE 404 Permit or 401 Certification	NONE	
c. SCNW Permit If applied for or issued, identify Date applied for or issued: _____	NONE	<input type="checkbox"/> All Activities or <input type="checkbox"/> Some Activities (Describe): _____

d. If a SCNW Permit has **NOT** been applied for provide an additional plan sheet that shows plan and profile views (drawn to scale) of the SCNW and associated activities. Include a description of all proposed activities on this plan.

D. Impaired Waterbodies Information (Attach additional sheet(s) as needed)

1. 303(d) Listed Impaired Waterbodies

a. Name of Nearest DHEC Water Quality Monitoring Stations (WQMS)(s) that receives stormwater from your construction site and/or thru an MS4 and the Name of the Corresponding Waterbody?		b. Is this WQMS(s) listed on the most current 303(d) list? # No, proceed to Section 2 of this table. If Yes, complete items c thru f.	c. List the pollutant(s) identified as "CAUSES" of the impairment	d. Will any pollutants causing the impairment be present in your site's construction stormwater discharges?	e. If yes for d, list the "USE SUPPORT" impairment(s) affected by the pollutant(s) identified in c.
Nearest DHEC WQMS(s)	Corresponding Waterbody				
CSTL-125	ASHEPOO RIVER	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Ecol. Beach	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
RS-11047	ASHEPOO RIVER	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	

f. If yes for d above, will use of the BMPs proposed for your project ensure the site's discharges will **NOT** contribute to or cause further WQS violations for the impairment(s) listed in c? Yes No
 (NOTE: If no for f, this site is NOT eligible for coverage under the CGP). See instructions.

2. TMDL Impaired Waterbodies

a. Name of Nearest DHEC Water Quality Monitoring Stations (WQMS)(s) that receives stormwater from your construction site and/or thru an MS4?	b. Has a TMDL(s) been developed for this WQMS(s)? If No, Identify as such below and proceed to Section VI. If Yes, complete items c thru f of this table.	c. If yes for b, what pollutants are listed as "CAUSES" or causing the impairment?	d. If yes for b, has the standard been "ATTAINED" or "Fully Supported" for the impairment(s)?	e. If no for d (Not Attained), will any pollutants causing the impairment be present in your site's construction stormwater discharges?
CSTL-125	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
RS-11047	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
	<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

f. If yes for e above, are your discharges consistent with the assumptions and requirements of the TMDL(s)? Yes No
 (NOTE: If no for f, this site is NOT eligible for coverage under the CGP). See instructions.

VI.

Signatures and Certifications DO NOT SIGN IN BLACK INK! Read the Certifications below (in entirety). Provide date, printed name, and signatures below. If you are a New Owner/Operator, as Primary Permittee you must also sign and date the applicable Comprehensive SWPPP Acceptance & Compliance Agreement below.
C-SWPPP PREPARER: "One copy of the C-SWPPP, all specifications and supporting calculations, forms, and reports are herewith submitted and made a part of this application. I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of Title 48, Chapter 14 of the Code of Laws of SC, 1976 as amended, pursuant to Regulation 72-300 et seq. (if applicable), and in accordance with the terms and conditions of SCR100000." (This should be the person identified in Section III).

GADSDEN LINTON III

Printed Name of C-SWPPP Preparer

Gadسدن Linton III
 Signature of C-SWPPP Preparer

29925

S. C. Registration #

PRIMARY PERMITEE: "I or I (on behalf of my company and its contractors and agents), as the case may be, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I understand that DHEC enforcement actions may be taken if the terms and conditions of the C-SWPPP are not met and I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
 "I or I (on behalf of my company and its contractors and agents), as the case may be, also hereby certify that all land-disturbing construction and associated activity pertaining to this site shall be accomplished pursuant to and in keeping with the terms and conditions of the approved plans and SCR100000. I also certify that a responsible person will be assigned to the project for day-to-day control. I hereby grant authorization to the to S. C. Department of Health and Environmental Control (DHEC) and/or the local implementing agency the right of access to the site at all times for the purpose of on site inspections during the course of construction and to perform maintenance inspections following the completion of the land-disturbing activity." (See Section 122.22 of S.C. Reg. 61-9 for signatory authority information.) Having understood the above information, I am signing this certification as Primary Permittee to the aforementioned NPDES general permit."

JOHN STIEGLITZ

Printed Name of Primary Permittee

John Stieglitz
 Signature of Primary Permittee

PROJECT MANAGER

Title/Position

9-19-2020

Date Signed

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OCT 27 2020



Coastal Zone Consistency Determination

To: Shannon Hicks, BOW Coastal Stormwater Permitting Section
Melanie A Williams, BOW Construction Permitting Section

From: Colleen McDonald, OCRM Coastal Zone Consistency Section *CPMM*

Applicant: John Stieglitz, Colleton County

Project Name: Colleton County Taxpayer Building

Finding: Conditionally Consistent with the SC Coastal Zone Management Program

Site Location: 118 Benson Street, Walterboro, Colleton County, South Carolina 29423
(PIN#: 163-11-00-230 and 163-11-00-227)

Reference #: HP3-BJPJ-WZAC6, WS/WW not assigned

Date: November 24, 2020

The staff of the Office of Ocean and Coastal Resource Management (OCRM) reviewed the above referenced Coastal Zone Consistency project request for land disturbance associated with the demolition of existing structures to clear and grade site for the construction of one (1) commercial building, stormwater pond and associated storm drain infrastructure, parking area, driveway entrance, water and sewer lines, and associated utilities. The nearest receiving waterbody Ireland Creek is located 1,200 feet from the project site. The total area of disturbance will be 1.90 acres of a 1.90 acre project site.

Per US Army Corps of Engineers Permit Number SAC-2019-01912, there are 2.016 acres of freshwater wetlands onsite. No wetland impacts are permitted at this site.

Per SC Department of Archives and History, State Historic Preservation Office (SCDAH, SHPO) this site is within an historic area labeled as Number 536130009. It has been determined that this area is outside of the boundaries of the Colleton Historic District and there are no records to indicate a significant site.

We hereby certify that the above referenced project is **Conditionally Consistent** with the **Guidelines for Evaluation of All Projects** as well as the Transportation Facilities (*Parking Facilities*), Commercial Development, Public Services and Facilities (*Sewage Treatment and Water Supply*), Activities in Areas of Special Resource Significance (*Public*

Open Spaces and Wetlands), and Stormwater Management (*Runoff*) policies contained in the S.C. Coastal Zone Management Program provided the following conditions are included in the permits and adhered to by the applicant.

1. In the event that any historic or cultural resources and/or archaeological materials are found during the course of work, the applicant must notify the State Historic Preservation Office and the South Carolina Institute of Archaeology and Anthropology. Historic or cultural resources consist of those sites listed in the National Register of Historic Places and those sites that are eligible for the National Register. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials.
2. For all projects with a permanent water quality pond having a permanent pool, regardless of size, which are located within one-half (1/2) mile of a receiving water body in the coastal zone, the applicant must demonstrate storage of the first 1/2 inch of runoff from the entire site or storage of the first one (1) inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention or infiltration systems as appropriate for the specific site.
3. The project must be consistent with State Stormwater Permitting requirements during and post construction for protection of water quality.
4. All construction BMPs must be installed, inspected and maintained to hold sediment onsite and to protect any adjacent or downstream critical area, wetlands and waters through the life of the project. Upon completion of construction activities, all disturbed (includes undeveloped) areas, including those impacted for access, must be immediately stabilized.
5. The project must be fully consistent with local zoning and comprehensive plans prior to work being conducted.
6. The applicant is not authorized to impact any wetlands. In the event any impacts to wetlands occur, the US Army Corps of Engineers and DHEC-OCRM must be notified and all work must cease to minimize additional impacts until the applicant receives authorization.

This determination shall serve as the SCDHEC OCRM Coastal Zone Consistency Determination for the work described above. However, this determination **does not** serve as a Department permitting decision and **does not** alleviate the applicant's responsibility to obtain any applicable State or Federal permit(s) for the work. Local government authorizations **may also** be required.

South Carolina Board of Health and Environmental Control
Guide to Board Review
Pursuant to S.C. Code Ann. § 44-1-60

The decision of the South Carolina Department of Health and Environmental Control (Department) becomes the final agency decision fifteen (15) calendar days after notice of the decision has been mailed to the applicant, permittee, licensee and affected persons who have requested in writing to be notified, unless a written request for final review accompanied by a filing fee in the amount of \$100 is filed with Department by the applicant, permittee, licensee or affected person.

Applicants, permittees, licensees, and affected parties are encouraged to engage in mediation or settlement discussions during the final review process.

If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within thirty (30) calendar days after notice is mailed that the Board declined to hold a final review conference. In matters pertaining to decisions under the South Carolina Mining Act, appeals should be made to the South Carolina Mining Council.

I. Filing of Request for Final Review

1. A written Request for Final Review (RFR) and the required filing fee of one hundred dollars (\$100) must be received by Clerk of the Board within fifteen (15) calendar days after notice of the staff decision has been mailed to the applicant, permittee, licensee, or affected persons. If the 15th day occurs on a weekend or State holiday, the RFR must be received by the Clerk on the next working day. RFRs will not be accepted after 5:00 p.m.
 2. RFRs shall be in writing and should include, at a minimum, the following information:
 - The grounds for amending, modifying, or rescinding the staff decision;
 - a statement of any significant issues or factors the Board should consider in deciding how to handle the matter;
 - the relief requested;
 - a copy of the decision for which review is requested; and
 - mailing address, email address, if applicable, and phone number(s) at which the requestor can be contacted.
 3. RFRs should be filed in person or by mail at the following address:
South Carolina Board of Health and Environmental Control
Attention: Clerk of the Board
2600 Bull Street
Columbia, South Carolina 29201
- Alternatively, RFR's may be filed with the Clerk by facsimile (803-898-3393) or by electronic mail (boardclerk@dhec.sc.gov).
4. The filing fee may be paid by cash, check or credit card and must be received by the 15th day.
 5. If there is any perceived discrepancy in compliance with this RFR filing procedure, the Clerk should consult with the Chairman or, if the Chairman is unavailable, the Vice-Chairman. The Chairman or the Vice-Chairman will determine whether the RFR is timely and properly filed and direct the Clerk to (1) process the RFR for consideration by the Board or (2) return the RFR and filing fee to the requestor with a cover letter explaining why the RFR was not timely or properly filed. Processing an RFR for consideration by the Board shall not be interpreted as a waiver of any claim or defense by the agency in subsequent proceedings concerning the RFR.
 6. If the RFR will be processed for Board consideration, the Clerk will send an Acknowledgement of RFR to the Requestor and the applicant, permittee, or licensee, if other than the Requestor. All personal and financial identifying information will be redacted from the RFR and accompanying documentation before the RFR is released to the Board, Department staff or the public.
 7. If an RFR pertains to an emergency order, the Clerk will, upon receipt, immediately provide a copy of the RFR to all Board members. The Chairman, or in his or her absence, the Vice-Chairman shall based on the circumstances, decide whether to refer the RFR to the RFR Committee for expedited review or to decline in writing to schedule a Final Review Conference. If the Chairman or Vice-Chairman determines review by the RFR Committee is appropriate, the Clerk will forward a copy of the RFR to Department staff and Office of General Counsel. A Department response and RFR Committee review will be provided on an expedited schedule defined by the Chairman or Vice-Chairman.
 8. The Clerk will email the RFR to staff and Office of General Counsel and request a Department Response within eight (8) working days. Upon receipt of the Department Response, the Clerk will forward the RFR and Department Response to all Board members for review, and all Board members will confirm receipt of the RFR to the Clerk by email. If a Board member does not confirm receipt of the RFR within a twenty-four (24) hour period, the Clerk will contact the Board member and confirm receipt. If a Board member believes the RFR should be considered by the RFR Committee, he or she will respond to the Clerk's email within forty-eight (48) hours and will request further review. If no Board member requests further review of the RFR within the forty-eight (48) hour period, the Clerk will send a letter by certified mail to the Requestor, with copy by

regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Final Review Conference. Contested case guidance will be included within the letter.

NOTE: If the time periods described above end on a weekend or State holiday, the time is automatically extended to 5:00 p.m. on the next business day.

9. If the RFR is to be considered by the RFR Committee, the Clerk will notify the Presiding Member of the RFR Committee and the Chairman that further review is requested by the Board. RFR Committee meetings are open to the public and will be public noticed at least 24 hours in advance.
10. Following RFR Committee or Board consideration of the RFR, if it is determined no Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Conference. Contested case guidance will be included within the letter.

II. Final Review Conference Scheduling

1. If a Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, informing the Requestor of the determination.
2. The Clerk will request Department staff provide the Administrative Record.
3. The Clerk will send Notice of Final Review Conference to the parties at least ten (10) days before the Conference. The Conference will be publicly noticed and should:
 - include the place, date and time of the Conference;
 - state the presentation times allowed in the Conference;
 - state evidence may be presented at the Conference;
 - if the conference will be held by committee, include a copy of the Chairman's order appointing the committee; and
 - inform the Requestor of his or her right to request a transcript of the proceedings of the Conference prepared at Requestor's expense.
4. If a party requests a transcript of the proceedings of the Conference and agrees to pay all related costs in writing, including costs for the transcript, the Clerk will schedule a court reporter for the Conference.

III. Final Review Conference and Decision

1. The order of presentation in the Conference will, subject to the presiding officer's discretion, be as follows:
 - Department staff will provide an overview of the staff decision and the applicable law to include [10 minutes]:
 - Type of decision (permit, enforcement, etc.) and description of the program.
 - Parties
 - Description of facility/site
 - Applicable statutes and regulations
 - Decision and materials relied upon in the administrative record to support the staff decision.
 - Requestor(s) will state the reasons for protesting the staff decision and may provide evidence to support amending, modifying, or rescinding the staff decision. [15 minutes] *NOTE: The burden of proof is on the Requestor(s)*
 - Rebuttal by Department staff [15 minutes]
 - Rebuttal by Requestor(s) [10 minutes]

Note: Times noted in brackets are for information only and are superseded by times stated in the Notice of Final Review Conference or by the presiding officer.
2. Parties may present evidence during the conference; however, the rules of evidence do not apply.
3. At any time during the conference, the officers conducting the Conference may request additional information and may question the Requestor, the staff, and anyone else providing information at the Conference.
4. The presiding officer, in his or her sole discretion, may allow additional time for presentations and may impose time limits on the Conference.
5. All Conferences are open to the public.
6. The officers may deliberate in closed session.
7. The officers may announce the decision at the conclusion of the Conference or it may be reserved for consideration.
8. The Clerk will mail the written final agency decision (FAD) to parties within 30 days after the Conference. The written decision must explain the basis for the decision and inform the parties of their right to request a contested case hearing before the Administrative Law Court or in matters pertaining to decisions under the South Carolina Mining Act, to request a hearing before the South Carolina Mining Council. The FAD will be sent by certified mail, return receipt requested.
9. Communications may also be sent by electronic mail, in addition to the forms stated herein, when electronic mail addresses are provided to the Clerk.

The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.



Coastal Zone Consistency Determination

To: Shannon Hicks, BOW Coastal Stormwater Permitting Section
Melanie A Williams, BOW Construction Permitting Section

From: Colleen McDonald, OCRM Coastal Zone Consistency Section *cpmm*

Applicant: John Stieglitz, Colleton County

Project Name: Colleton County Taxpayer Building

Finding: Conditionally Consistent with the SC Coastal Zone Management Program

Site Location: 118 Benson Street, Walterboro, Colleton County, South Carolina 29423
(PIN#: 163-11-00-230 and 163-11-00-227)

Reference #: HP3-BJPJ-WZAC6, WS/WW not assigned

Date: November 24, 2020

The staff of the Office of Ocean and Coastal Resource Management (OCRM) reviewed the above referenced Coastal Zone Consistency project request for land disturbance associated with the demolition of existing structures to clear and grade site for the construction of one (1) commercial building, stormwater pond and associated storm drain infrastructure, parking area, driveway entrance, water and sewer lines, and associated utilities. The nearest receiving waterbody Ireland Creek is located 1,200 feet from the project site. The total area of disturbance will be 1.90 acres of a 1.90 acre project site.

Per US Army Corps of Engineers Permit Number SAC-2019-01912, there are 2.016 acres of freshwater wetlands onsite. No wetland impacts are permitted at this site.

Per SC Department of Archives and History, State Historic Preservation Office (SCDAH, SHPO) this site is within an historic area labeled as Number 536130009. It has been determined that this area is outside of the boundaries of the Colleton Historic District and there are no records to indicate a significant site.

We hereby certify that the above referenced project is **Conditionally Consistent** with the ***Guidelines for Evaluation of All Projects*** as well as the Transportation Facilities (*Parking Facilities*), Commercial Development, Public Services and Facilities (*Sewage Treatment and Water Supply*), Activities in Areas of Special Resource Significance (*Public*

Open Spaces and Wetlands), and Stormwater Management (*Runoff*) policies contained in the S.C. Coastal Zone Management Program provided the following conditions are included in the permits and adhered to by the applicant.

1. In the event that any historic or cultural resources and/or archaeological materials are found during the course of work, the applicant must notify the State Historic Preservation Office and the South Carolina Institute of Archaeology and Anthropology. Historic or cultural resources consist of those sites listed in the National Register of Historic Places and those sites that are eligible for the National Register. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials.
2. For all projects with a permanent water quality pond having a permanent pool, regardless of size, which are located within one-half (1/2) mile of a receiving water body in the coastal zone, the applicant must demonstrate storage of the first 1/2 inch of runoff from the entire site or storage of the first one (1) inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention or infiltration systems as appropriate for the specific site.
3. The project must be consistent with State Stormwater Permitting requirements during and post construction for protection of water quality.
4. All construction BMPs must be installed, inspected and maintained to hold sediment onsite and to protect any adjacent or downstream critical area, wetlands and waters through the life of the project. Upon completion of construction activities, all disturbed (includes undeveloped) areas, including those impacted for access, must be immediately stabilized.
5. The project must be fully consistent with local zoning and comprehensive plans prior to work being conducted.
6. The applicant is not authorized to impact any wetlands. In the event any impacts to wetlands occur, the US Army Corps of Engineers and DHEC-OCRM must be notified and all work must cease to minimize additional impacts until the applicant receives authorization.

This determination shall serve as the SCDHEC OCRM Coastal Zone Consistency Determination for the work described above. However, this determination **does not** serve as a Department permitting decision and **does not** alleviate the applicant's responsibility to obtain any applicable State or Federal permit(s) for the work. Local government authorizations **may also** be required.

**SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
Encroachment Permit**

Permit No : 240082

Permit Decision Date :
12/11/2020

Expiration Date : 12/11/2021

Type

Permit : DRIVEWAY -
COMMERCIAL

Location:

<u>District</u>	<u>Work County</u>	<u>Type</u>	<u>Route</u>	<u>Aux</u>	<u>Begin MP</u>	<u>End MP</u>
6	Colleton, SC	S-	293	None	0.086	0.000

Contact

Information

Applicant: ColletonCountyCapitalProject

Phone:

Contact: John Stieglitz

Address: 113 Mable T. Willis Blvd. ,

City: Walterboro

State: SC

Zip: 29488

Comments

118 Benson Street, Walterboro, SC in Colleton County. North side of Benson Street between Klein Street and Jeffries Boulevard.

Special

Provisions:

0003 - WHEN ROADS ARE RESURFACED, SHOULDERS SHALL BE REGRADED TO THE EDGE OF PAVEMENT TO CONFORM TO THE DEPARTMENT SPECIFICATIONS.

0004 - SCDOT SHALL BE NOTIFIED WHEN WORK DEFINED IN THE PERMIT STARTS AS WELL AS WHEN THE WORK IS COMPLETED. REFERENCE SHALL BE MADE BY PERMIT NUMBER.

0005 - APPLICANT SHALL PROVIDE TO THE DEPARTMENT THE OPPORTUNITY OF ATTENDING ANY PRE-CONSTRUCTION MEETING PRIOR TO THE BEGINNING OF WORK.

0202 - PAVEMENT DESIGN SHALL BE AS SHOWN ON ATTACHED DOCUMENTATION

0204 - SIDEWALK OR CURB AND GUTTER REMOVAL SHALL BE REPLACED FROM JOINT TO JOINT.

0207 - PIPE USED IN THIS INSTALLATION SHALL BE IN ACCORDANCE WITH SCDOT SPECIFICATION SC-M-714 AND COMPLY WITH CURRENT SCDOT POLICY.

0209 - DISTURBED VEGETATION SHALL BE RESEDED ACCORDING TO THE

SPECIFICAION FOR HIGHWAY CONSTRUCTION.

0210 - ALL SIDEWALKS TO INCLUDE AT DRIVEWAY RADIUS SHALL MEET (ADAAG) AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES.

0304 - PAVEMENT MARKINGS ALTERED DURING THIS INSTALLATION SHALL BE RESTORED BY THE APPLICANT.

0306 - TRAFFIC CONTROL, LIGHTS, SIGNS AND FLAG-MEN WILL BE FURNISHED BY APPLICANT AND WILL CONFORM TO PART VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

0310 - FIELD CHANGES, IF NECESSARY, MUST BE APPROVED IN WRITING BEFORE ACTUAL CONSTRUCTION OF PROPOSED CHANGES.

0311 - SEDIMENT AND EROSION CONTROL DEVICES SHALL BE USED TO MINIMIZE THE MOVEMENT OF SEDIMENT.

0312 - THE PERMITTEE SHALL HOLD THE DEPARTMENT HARMLESS FOR DAMAGES TO BOTH UPSTREAM AND DOWNSTREAM PROPERTIES.

0318 - THE APPLICANT SHALL BE RESPONSIBLE FOR IMMEDIATE REMOVAL OF SUCH TRAFFIC HAZARDS AS MUD, DEBRIS, LOOSE STONE, AND TRASH AS MAY BE WASHED OR SPILLED ON THE TRAVELED ROADWAY AS A RESULT OF THE PROPOSED WORK.

9999 - See Attached for Additional Special Provisions

Application for Encroachment Permit

S.C. Department of Transportation
Form 637 (Rev 09/2015)

Contact Information

Applicant: ColletonCountyCapitalProject
 Street: 113 Mable T. Willis Blvd.
 City: Walterboro
 State: SC ▼ Zip Code: 29488
 Phone: (843)539-1968 Fax: _____
 Email: tlinton@forsberg-engineering.com
 Contact: John Stieglitz

Project Location

Primary County: Colleton ▼

County	Road Name
<u>Colleton</u>	<u>Benson St (S-293)</u>

1. Type of Encroachment: DRIVEWAY - COMMERCIAL

New Driveways - New Colleton County Taxpayer building will be constructed at 118 Benson Drive in Walterboro, SC. The taxpayer building will required new drives off of Benson Street for access to parking lot and drive thru teller at this location.

2. Description of Location:

118 Benson Street, Walterboro, SC in Colleton County. North side of Benson Street between Klein Street and Jeffries Boulevard.

(Attach sketch indicating roadway features such as: pavement width, shoulder width, sidewalk and curb and gutter location, significant drainage structure, north arrow, right of way width, and location of the proposed encroachment with respect to the roadway centerline and the nearest intersecting road on the State system.)

Encroachment Application

3. The undersigned applicant hereby requests the SCDOT to permit encroachment on the SCDOT right of way as described herein. It is expressly understood that the encroachment, if and when constructed, shall be installed in accordance with the sketch attached hereto and made a part hereof. The applicant agrees to comply with and be bound by the SCDOT's "A Policy for Accommodating Utilities on Highways Rights of way", "Standard Specifications for Highway Construction", the "General Provisions" and "Special Provisions", attached hereto or made a part hereof by reference, during the installation, operation and maintenance of said encroachment within the SCDOT's Right of Way. **DISCHARGES OF STORM WATER AND NON-STORM WATER:** Work within State Highway right-of-way shall be conducted in compliance with all applicable requirements of the National Pollutant Discharge Elimination System (NPDES) permit(s) issued to the Department of Transportation (Department), to govern the discharge of storm water and non-storm water from its properties. Work shall also be in compliance with all other applicable Federal, State and Local laws and regulations, and with the Department's Encroachment Permits Manual and encroachment permit. The encroachment permit will not be issued until the applicant has received an NPDES construction permit from SC Department of Health and Environmental Control.

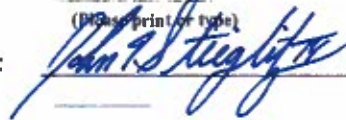
The applicant agrees to comply with all current SCDOT Standards Specifications for Highway Construction including all Supplemental Technical Specifications. The applicant hereby further agrees, and binds his/her/its heirs, personal representatives, successors, assigns, to assume any and all liability for accidents or injuries to persons, or damage to property, including the highway, that may be caused by the construction, maintenance, use, moving or removing of the physical appurtenances contemplated herein.

Applicant's Name: John Stieglitz

Date: 08/03/2020

(Please print or type)

Applicant's Sig:



Title: Capital Projects Director

For Office Use Only

For Office Use Only

In accordance with your request and subject to all the provisions, terms, conditions, and restrictions stated in the application and the general and special provisions attached hereto, the SCDOT hereby approves your application for an encroachment permit. This permit shall become null and void unless the work contemplated herein shall have been completed prior to: December 11, 2021

See Attached Special Provision and/or Permit Requirements

NPDES Permit

Nbr:

SCR10Z72K

Jackie B. Fleming

December 11, 2020

(Date received by res. Maint. Engr.)

(SCDOT Approval)

(Date)

Application for Encroachment Permit
General Provisions

1. **DEFINITIONS:** The word "Permittee" used herein shall mean the name of the person, firm, or corporation to whom this permit is addressed, his, her, its, heirs, personal representatives, successors and assigns. The word "DEPARTMENT" shall mean the South Carolina Department of Transportation.
2. **NOTICE PRIOR TO STARTING WORK:** Before starting the work contemplated herein within the limits of the highway right of way, the Department's Resident Maintenance Engineer in the county in which the proposed work is located shall be notified 24 hours in advance so that he may be present while the work is under way.
3. **PERMIT SUBJECT TO INSPECTION:** This permit shall be kept at the site of the work at all times while said work is under way and must be shown to any representative of the Department or law enforcement officer on demand.
4. **PROTECTION OF HIGHWAY TRAFFIC:** The applicant shall be responsible for the protection of the highway traffic at all times during the construction, maintenance, removing or moving of the encroachment permitted herein. Detours, barricades, warning signs and flagmen, as necessary, shall be provided by and at the expense of the Permittee and shall be in accordance with the "Manual on Uniform Traffic Control Devices" (MUTCD). The work shall be planned and carried out so that there will be the least possible inconvenience to the motoring public. The Permittee agrees to observe all rules and regulations of the Department while carrying on the work contemplated herein and take all other precautions that circumstances warrant.
5. **STANDARDS OF CONSTRUCTION:** All work shall conform to the Department's standards of construction and shall be performed in a workman-like manner. The applicant shall make adequate provisions for maintaining the proper drainage of the highway as it may be affected by the encroachment permitted herein. All work shall be subject to the supervision and satisfaction of the Department.
6. **FUTURE MOVING OF PHYSICAL APPURTENANCES:** If, in the opinion of the State Highway Engineer, it should ever become necessary to move or remove the physical appurtenances, or any part thereof contemplated herein, on account of change in location of the highway, widening of the highway, or for any other sufficient reason, such moving shall be done on demand of the Department at the expense of the Permittee.
7. **RESTORATION OF HIGHWAY FACILITIES UPON MOVING OR REMOVING OF PHYSICAL APPURTENANCES:** If, and when, the physical appurtenances contemplated herein shall be moved or removed, either on the demand of the Department or at the option of the Permittee, the highway and facilities shall immediately be restored to their original condition at the expense of the Permittee.
8. **COSTS:** All work in connection with the construction, maintenance, moving or removing of the physical appurtenances contemplated herein shall be done by and at the expense of the Permittee.
9. **ADDITIONAL PERMISSIONS:**
 - (a) It is distinctly understood that this permit does not in any way grant or release any rights lawfully possessed by the abutting property owners. The Permittee shall secure any such rights, as necessary, from said abutting property owners.
 - (b) The Permittee shall be responsible for obtaining all other approvals or permits necessary for installation of the encroachment from other government entities.

(c) There shall be no excavation of soil nearer than two feet to any public utility line or appurtenant facility except with the consent of the owner thereof, or except upon special permission of this Department after an opportunity to be heard is given the owner of such line or appurtenant facility.

10. ADDITIONAL WORK PERFORMANCE:

(a) All crossings over the highway shall be constructed in accordance with "Specifications for Overhead Crossings of Light and Power Transmission Lines and Telegraph Lines over each other and over Highway Rights of Way in South Carolina," as approved by the Public Service Commission of South Carolina and effective as of date of this permit.

(b) All tunneling, boring, or jacking shall be done in such a way as not to disturb the highway surfacing.

(c) No pavement shall be cut unless specifically authorized herein.

(d) No excavation shall be nearer than three feet to the edge of pavement unless specifically authorized herein.

(e) Underground facilities will be located at minimum depths as defined in the "Utility Accommodations Manual" for the transmittant, generally as follows: 4 feet minimum for hazardous or dangerous transmittant, 3 feet minimum for other lines. The Department may approve shallower depths if adequate protection is provided. Such approval must be obtained in writing.

(f) Service and other small diameter pipes shall be jacked, driven, or otherwise forced underneath the pavements on any surfaced road without disturbing the pavement. The section under the highway pavement and within a distance of three (3) feet on either side shall be continuous without joints.

11. ACCESS:

(a) Permittee is responsible for maintaining reasonable access to private driveways during construction.

(b) It is expressly provided that, with respect to any limited access highway, the Permittee shall not have or gain access from the main traveled way of the highway, or the on or off ramps to such facility, except upon approval by the Department.

12. DRIVEWAYS:

(a) The existing crown of the highway shall be continued to the outside shoulder line of the highway.

(b) If the driveway or approach is concrete pavement, the pavement shall be constructed at least 6 inches thick and with a minimum of class 2500 concrete. There shall be a bituminous expansion joint, not less than 3/4 inches in thickness, placed between the highway paving and the paving of the approach for the full width of the approach.

13. BEAUTIFICATION:

(a) All trees, plants, flowers, etc. shall be placed in accordance with the provisions specifically stipulated herein.

(b) All trees, plants, flowers, etc. shall be maintained by, and at the expense of, the Permittee and the provisions of this permit shall become null and void, if and when said Permittee ceases to maintain aid trees, plants, flowers, etc.

14. AS-BUILT PLANS:

(a) The applicant shall provide the Department with survey-quality as-built plans in accordance with the requirements set forth in the Department's "A Policy for Accommodating Utilities on Highway Rights of Way".

9999 SPECIAL PROVISIONS – App 84464

- 1.) The permittee and/or contractor is to be fully aware of these provisions. Also see attached drawings, details, and location maps of proposed work to be done under this permit.
- 2.) Prior to the start of any work shown on this permit the permittee, the contractor, and SCDOT will meet on site to discuss proposed work, these provisions, and all required safety requirements and signage pertaining to this permit.
- 3.) This office is to be notified a minimum of 2 weeks prior to any work inside SCDOT rights-of-way being started by calling **(843) 538-8031, Colleton County Permit Office**. Contact this office immediately if an accident should occur during this construction.
- 4.) Approval of this permit is for the installation of two commercial driveways for the Colleton County Taxpayer Office on S-293 (Benson Street) – one full access driveway and one exit only driveway to include removal of existing driveways/curb/gutter, modification/installation of storm drain structures, signing and pavement markings all more fully shown on plans stamped/signed 11/23/2020.
- 5.) Any work requiring a traffic disruption or lane closure will be performed between the hours of 9:00 AM and 3:00 PM with all traffic control removed from the roadway at that time. Any closure will require notifying all required media outlets, SCDOT, SCDOT Colleton Permit Office, and all emergency agencies a minimum of one week prior to the implementation of the closure. Use SCDOT Standard Drawing 610-005-20 for flagging operations through stop controlled side roads.
- 6.) Any work requiring a shoulder closure is to be done using SCDOT Standard Drawing 610-205-00. All shoulder work is to be done during daylight hours between the hours of 9:00 AM and 3:00 PM.
- 7.) All traffic control will be the responsibility of the permittee and/or the contractor doing the work.
- 8.) The permittee and/or contractor will maintain positive drainage at all times during construction, until final inspection and approval is obtained.
- 9.) All construction signage is to be placed and maintained during the construction of this project until SCDOT final approval of work is given for all work shown on this permit. All signage is the responsibility of the permittee.

- 10.) Traffic control, lights, signs, and flagmen will be furnished by the permittee and/or contractor and will conform to “Manual on Uniform Traffic Control Devices”, latest edition. All devices and signs will be maintained during all phases of construction. Signs not in use will be removed or covered as required.
- 11.) **The South Carolina Department of Transportation reserves the right to impose additional conditions, provisions, and/or requirements on this permit to respond to any unforeseen, specific problems that might arise during the life of this permit, and to take any enforcement action necessary to ensure compliance with SCDOT specifications, standards, or policies.**
- 12.) No excavated material is to be placed or let accumulate on roadway surface during the construction of this project. All material is to be removed from roadway as soon as possible.
- 13.) This permit has been issued with an expiration date of one year from the approval and all work shown or detailed on this permit must be completely finished and approved by that date.

INSPECTION PROVISIONS

- 14.) This project requires an onsite inspector certified in all required disciplines necessary to insure all construction meets SCDOT specifications and standards at all times work is performed inside SCDOT rights-of-way. Disciplines will include but not be limited to concrete, asphalt paving, earthwork and grading, and drainage. All material sampling shall follow the SCDOT Construction Manual latest edition.
- 15.) This project requires a person of authority on site at all times with the ability to direct all construction operations when SCDOT representatives address any issues pertaining to requirements associated with this permit or any SCDOT specifications.
- 16.) The permittee is responsible to have an independent testing firm test all material used in the construction of these facilities, and all construction as per current SCDOT standards and specifications require, or as directed by the SCDOT representative on site.
- 17.) **Information regarding inspection/inspector and testing firm shall be provided to SCDOT personnel prior to any construction beginning with SCDOT right of way.**
- 18.) SCDOT will be notified of all times work is being performed on this installation so that if needed, an inspector will be available to be on site.

- a. Prior to the start of any work inside SCDOT rights-of-way, the following items must be done:
 - i. All utility lines must be located and visibly marked on the ground; marking must be maintained for the duration of construction.
 - ii. Existing rights-of-way must be defined and marked along with any sight areas or special conditions in work zone area.
 - iii. All traffic control must be placed prior to the planned start of construction.
 - iv. All required materials, equipment, and traffic control devices will be on site and inspected prior to starting operation by SCDOT representative.

PAVEMENT PROVISIONS

- 19.) Any pavement to be used in the construction shown on this permit is to be placed as specified and in accordance with the South Carolina Department of Transportation standard specifications for highway construction (latest edition), whichever is greater. The pavement structure listed or shown will be used in all areas where asphalt is to be placed inside SCDOT right-of-way unless indicated differently on the permit.
- 20.) Any existing roadway pavement damaged or removed in connection with this work will be replaced, using the same thickness and type of material destroyed, or according to specifications called for in the South Carolina Department of Transportation construction manual (latest edition), whichever is greater. **Damaged pavement to be milled/resurfaced for entire lane width for 10' on both sides of damage.**
- 21.) Where pavement is cut and replaced, the contractor shall cut the edges to a straight and even line before removing the pavement. No ragged edges will be allowed or accepted. All patches and repairs will have squared corners. Prior to placing new asphalt all existing edges are to be tacked as per current SCDOT specifications. In some cases an asphalt surface overlay may be required to smooth riding surface of roadway at patch, see permit for details.
- 22.) If the roadway pavement is cut and base material other than asphalt is replaced, the entire area is to be primed with asphalt prime coat, acceptable to the South Carolina Department of Transportation specifications, prior to the placement of asphalt surface course. All new construction having rock type base is to be primed as required.

STORM DRAIN PROVISIONS

- 23.) All existing storm drainage pipes disturbed during construction are to be inspected by a SCDOT representative for any signs of cracking or breakage prior

to being re-laid. After the relaying of the drainage pipe it will then again be inspected for grade, alignment, and joint sealing prior to be backfilled and compaction. If a pipe is determined to have been damaged in construction to a condition where it cannot be reused, it will then be replaced with an equivalent or better grade pipe as required meeting all current SCDOT specifications. If the contractor finds an existing pipe is damaged prior to any construction in that area, he is to notify the SCDOT inspector prior to any construction.

- 24.) Upon placement or replacement of any storm drainage pipe or structure indicated on this permit, and prior to beginning the backfilling operation, this office is to be notified and the pipe and/or structure inspected for grade, alignment, and the sealing of all joints, or construction and placement. When approval of the pipe and/or structure is given the backfilling will be allowed. Any pipe placed and covered without being inspected may result in the pipe having to be uncovered and inspected at the cost of the permittee.**
- 25.) Any existing storm drainage pipe removed or damaged during construction of this project will be replaced with the same size and type pipe as was present. Any change in pipe size or type will require approval from SCDOT prior to the change being made.
- 26.) All cross line pipes and/or sideline pipes disturbed or damaged during construction will be replaced immediately. New pipe will be placed on proper grade, sealed properly, and cleaned to provide positive drainage. Pipes are to remain uncovered until a South Carolina Department of Transportation inspector, inspect the pipe, the condition, and the placement in the trench. Then at that time the pipe is to be covered and compacted as required. Reinforced concrete pipe used within state rights-of-way shall be stamped for conformance with South Carolina Department of Transportation specifications, and be free of any cracks, chips, or breaks.

EXCAVATION PROVISIONS

- 27.) Any required excavation or mucking in connection with this work, will be backfilled in six inch layers, and thoroughly compacted in a manner satisfactory to the South Carolina Department of Transportation specifications. Density tests may be required with the results to be furnished to the departments utility inspector on a weekly basis during construction, see permit for details.
- 28.) Compaction requirements in these provisions apply to crosscuts and longitudinal trench cuts from shoulder break to shoulder break. If compaction tests are required the maximum distance between tests shall be 500 feet. In some cases additional tests may be required, see permit for details.

- 29.) If unsuitable material is excavated, it will not be put back in the excavation, and will be removed from the right-of-way as soon as possible. The material will be replaced with suitable approved backfill, and be in compliance with the South Carolina Department of Transportation specifications for backfill.
- 30.) There shall be no excavation of soil nearer than two feet from any public utility pole or appurtenant facility without the written consent of the owner thereof. Special permission of the South Carolina Department of Transportation after an opportunity to be heard is given the owner of such pole or appurtenant facility may be given.
- 31.) If the side of the trench, pit, or any excavation is less than 3'-0" from the existing edge of pavement, the excavated area will be backfilled entirely with flowable fill to an elevation 6 inches from the existing ground elevation. Then brought to grade with suitable topsoil, compacted, graded, and grassed as required to eliminate any erosion.
- 32.) Existing ditch slopes, if excavated, shall be backfilled in six inch layers and well tamped with a mechanical tamp to 95% density (standard proctor). These lifts will be benched into the existing embankment as required. The new slopes will then be graded to match existing typical roadway cross section.
- 33.) No excavated material or spoil is to be placed on the pavement without the permission of the South Carolina Department of Transportation, and if permission is granted, this material must be removed daily, as soon as possible. The roadway is to be cleaned of all material in a manner as to protect the existing pavement. Any pavement destroyed, or marked by this operation will be removed and replaced as required.
- 34.) When shoulders and ditch slopes are reshaped and graded to a typical section, the section will match existing road section. Where the existing section is less than state standards (6' wide shoulder @ 12:1, front slope of ditch @ 4:1, ditch bottom as required to accommodate existing runoff, and back slope of ditch min. 3:1 or to right-of-way line) the section will be upgraded to the standard. In either case positive drainage must be established and approved by SCDOT.
- 35.) Contractor will maintain positive drainage at all times during construction and until final inspection and approval from South Carolina Department of Transportation is obtained.
- 36.) No excavation located between the edge of roadway pavement and the center of sideline ditch or 15'0" where no ditch is present is to be left open overnight. The excavation is to be either temporarily backfilled or a steel plate is to be secured of hole. In either case reflective traffic cones are to be placed around the area of the excavation until the excavation has been permanently backfilled as required and graded.

CONSTRUCTION CLEANUP PROVISIONS

- 37.) All areas in SCDOT right-of-way disturbed during construction are to be restored to original condition as soon as possible and maintained during entire length of project, see “SCDOT POLICY FOR SEEDING AND EROSION CONTROL MEASURES INSIDE ROADWAY RIGHTS-OF-WAY”.
- 38.) All disturbed areas inside SCDOT rights-of-way will be seeded with a mixture of grass seed as specified in the South Carolina Department of Transportation standard specifications for highway construction, section 109b2, or latest edition. No rye grass will be allowed inside SCDOT rights-of-way. A satisfactory stand of grass will be required, prior to any acceptance or final approval is granted on this permit.
- 39.) All rocks, pebbles, boards, other debris along with any spoil material will be kept clear of roadway at all times as the work progresses.



December 8, 2020

John Stieglitz
Colleton County
109 Benson Street
Walterboro, SC 29488

RE: Colleton County Taxpayer Building, Colleton County
NPDES Coverage Number: SCR10Z72K

Dear John Stieglitz:

The Department of Health and Environmental Control (Department or DHEC) has approved the Stormwater Pollution Prevention Plan (SWPPP) for the referenced project on **December 8, 2020 WITHOUT REVIEW**. Based on your submission of the Notice of Intent (NOI) and in accordance with the NPDES General Permit for Stormwater Discharges from Construction Activities (CGP), this project has been granted coverage under the CGP. This project's general permit coverage number is **SCR10Z72K**. The total disturbed area for this site is **1.9 acres**.

See attached DHEC Office of Ocean and Coastal Resource Management (DHEC-OCRM) certification dated November 24, 2020 for additional conditions related to the Coastal Zone Consistency determination.

An as-built survey, signed and sealed by a S.C. Licensed Land Surveyor, should be submitted for the stormwater storage structure(s) on this site. The survey(s) should show grades, contours, and depths for all structures and should include the elevations and dimensions of all outlet structures, including but not limited to pipes, orifices, risers, weirs, and emergency spillways. A statement signed by the project's S.C. Registered Engineer indicating that the structure(s) was installed and is operating as shown on approved plans and in approved calculations is required. If the elevations or dimensions of the structures listed above do not match those used in the approved plans, provide a certification statement signed by the projects S.C. Registered Engineer indicating that the structure, as built, will function as shown in approved calculations. A new analysis of the structure (routing) may be necessary. The as-built survey and/ or analysis must be accepted by the Department before a Notice of Termination (NOT) can be submitted.

The CGP can be downloaded at the following website: <http://www.scdhec.gov/Environment/docs/CGP-permit.pdf> or you may request a copy from us via email (stormwatercgp@dhec.sc.gov). You are responsible for ensuring your contractor(s) complies with the approved SWPPP and the minimum requirements of the CGP. Also, you are responsible for overall compliance with the Storm Water Management and Sediment Reduction Act of 1991 (1991 Act), SC Pollution Control Act, and the Federal Clean Water Act (CWA). Failure to comply with the approved SWPPP or applicable statutes and regulations may result in enforcement actions.

You must notify the local DHEC EA office prior to starting any land-disturbing activity. The address and telephone number are as follows:

Lowcountry EA Beaufort
104 Parker Drive

Beaufort, SC 29906
843-846-1030

Inspections of this site must be performed by qualified personnel as described in Section 4.2.E of the CGP.

You should be aware that this approval is only applicable for the SWPPP that was submitted for this project. Any additional construction or land disturbing activity beyond the scope of the approved plans is not authorized. Any future work for this project not shown on the stamped, approved plans will require that you submit another site plan for review and approval. All major modifications require review and approval by the Department. Minor modifications to the approved SWPPP may be made by the SWPPP preparer and do not require review and approval by the Department; these changes should be signed and dated by the SWPPP preparer. If you have a question about whether a modification is major or minor, contact the Coastal Stormwater Permitting Section at (843) 953-0200.

A copy of the stamped, approved SWPPP (including a copy of the CGP, contractor certifications, inspection records, rainfall data, etc.), NOI, and CGP coverage letter from DHEC must be retained and available at the construction site (or accessible within 30 minutes during normal business hours) from the date of commencement of construction activities to the date of final stabilization. If an on-site location is unavailable to store the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance at the construction site.

All contractors who will conduct land-disturbing activities at the site must complete a Contractor Certification Form. You are also responsible for listing all contractors in the SWPPP and for holding a pre-construction conference with each contractor before they can conduct land-disturbing activity at the site.

The Department may conduct periodic inspections of your site. Any violations found during these inspections may result in enforcement action.

This NPDES coverage should be terminated by the permittee when the conditions listed in Section 5.1 of the CGP have been met. You must submit a Notice of Termination (NOT) to cancel your NPDES coverage under the CGP. Please see section 5.1 of the CGP for additional information required to be submitted with the NOT.

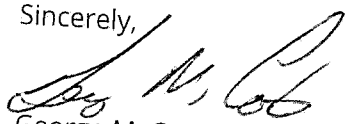
You are responsible for obtaining any other federal, state, or local permit that may be required for this project. In particular, any permits through the U.S. Army Corps of Engineers for the placement of fill material in Waters of the United States. Please note we have not sent a copy of this letter to any county or city building official. You must send a copy of this letter to these agencies, if necessary.

If material excavated during construction activities leaves the site, a mine operating permit may be needed. You are responsible for contacting the Mining and Reclamation Section to determine if a mining permit is required for the site. The Mining and Reclamation Section can be reached at (803)898-1362 or via e-mail at AskMines@dhec.sc.gov.

Please see the enclosed "Guide to Board Review" document for information about the procedures for appealing this NPDES coverage.

If you have any questions or cannot access the referenced websites, please call me at 843-953-0238.

Sincerely,



George M. Cox

Coastal Stormwater Permitting Section

CC: Gadsden Linton III, Forsberg Engineering & Surveying Inc.
Jacob Terry, Lowcountry EA Beaufort



9/14/20
10/8/20

NOTICE OF INTENT (NOI)
For Coverage(s) of Primary Permittees
Under South Carolina NPDES General Permit
For Stormwater Discharges From Construction Activities SCR100000
(Maintain As Part of On-Site SWPPP)

SOUTH CAROLINA

For Official Use Only

File Number: _____
Permit Number: **SCR10**
Submittal Package Complete: _____

Submission of this Notice of Intent constitutes notice that the Applicant identified in Section II intends to be authorized as a Primary Permittee in the state of South Carolina under NPDES General Permit SCR1000000. Fees required for review and NPDES coverage of each application type are as listed on page 2 of the Instructions.

DEPT. OF HEALTH AND ENVIRONMENTAL CONTROL
DAM SAFETY AND STORMWATER PERMITTING DIVISION
CONSTRUCTION STORMWATER PERMITTING
APPROVED - FOR CONSTRUCTION ONLY

DHEC PERMIT #: SCR10272K
DATE ISSUED: 12/8/2020
BY: George M. Cox
Without Review

Date: 09/04/2029

Project/Site Name: COLLETON COUNTY TAXPAYER BUILDING County: COLLETON

(Modification or Change of Information Only) Prior Approved NPDES Permit or File Number: _____

Do you want this project to be considered for the Expedited Review Program (ERP)? Yes or No (See instructions)

I. Notice of Intent (NOI) Application Type(s)

A. Project (Application/Review) Type(s) (Select ALL that apply):

- New Project (Initial Notification) Ongoing Project: Permitted or Un-Permitted
- Late Notification Low Impact Development (LID) or Project Design Above Regulatory Requirements
- New Owner/Operator or Company Name Change (see instructions, attach Form A (Transfer of Ownership))
- Major Modification: (see instructions, attach Form B (Major Modifications))
- MS4 Project Review
- Ocean and Coastal Resource Management (OCRM) Review
- Change of Information/Other (Specify): _____

B. If Applicable, identify the entity designated as MS4 Reviewer and MS4 Operator (i.e., Lexington County, City of Greer, etc.): MS4 Reviewer _____ MS4 Operator _____

II. Primary Permittee Information

Person or Company If a Company, are you a Lending Institution or Government Entity?
Company EIN (if applicable): EIN: _____ Change of Information

A. Primary Permittee Name: COLLETON COUNTY

Mailing Address: 109 BENSON STREET City: Walterboro State: SC Zip: 29488
Phone: 843-549-5221 Fax: _____ Email Address: jstieglitz@colletoncounty.org

B. Contact /ODSA Name (If different from above OR if owner is a company): JOHN STIEGLITZ, Capital Projects

Mailing Address: SAME AS ABOVE City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

C. Property Owner Name (If different from above): SAME AS ABOVE

Mailing Address: _____ City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

III. Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) Preparer Information Change of Information

A. C-SWPPP Preparer Name: GADSDEN LINTON III

B. Registered Professional Engineer Landscape Architect Tier B Land Surveyor S. C. Registration #: 29925

C. Company/Firm Name: FORSBERG ENGINEERING & SURVEYING, INC. S. C. COA #: 343

Mailing Address: P.O. Box 30575 City: CHARLESTON State: SC Zip: 29417
Phone: 843-571-2622 Fax: 843-571-6780 Email Address: TLINTON@FORSBERG-ENGINEERING.COM

IV. Project/Site Information Change of Information

A. Type of Construction Activity(ies) (Select ALL that apply):

- Commercial Industrial Institutional Mass Grading Linear Utility/Infrastructure
- Residential: Single-family Residential: Multi-family Multi-use (Commercial & Residential)
- Site Preparation (No New Impervious Area) Other (Specify) _____

B. Site Address/Location (street address, nearest intersection, etc.) 118 Benson Street, Walterboro, SC

City/Town (If in limits): Walterboro Zip Code: 29423

Latitude: 32° 54' 15" N Longitude: - 80° 40' 2" W (Source): GPS Web Site: FLASH EARTH

Tax Map Number (s) (List all): 163-11-00-230

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Dam Safety and Stormwater Permitting Division

- C. Is this site located on **Indian Land**? Yes No
- D. **Proposed Start Date:** 01/01/2021 **Proposed Completion Date:** 12/01/2022
- E. **Disturbed Area** (nearest tenth of an acre): 1.9 **Total Area** (acres): 1.9
- F. **Modification Only:** (nearest tenth of an acre): Disturbed Area: Current (Approved) Area: _____
Disturbed Area Change (Increase Only): _____ **Total Disturbed Area (After Change):** _____
- G. Is this project part of a **Larger Common Plan for Development or Sale (LCP)**? Yes No
LCP/ Overall Development Name: _____ Check here if this is the **First Phase.**
Previous State Permit/File Number: _____ **Previous NPDES Coverage Number:** SCR10 _____

- H. Any **Flooding Problems** exist downstream of or adjacent to this site? Yes No (If yes, provide detailed description of flooding problems and applicable floodway/flood zone information in the C-SWPPP).
- I. Active **S.C. DHEC Warning Notice, Notice to Comply or Notice of Violation** for this site or LCP? Yes No
- J. List Relevant **State and Federal Environmental Permits or Approvals** applied for or obtained for this site (e.g., **RCRA, USACOE, Nationwide**, etc.). If None, list None.
NONE

K. **Any Waiver(s)/Variances/Exceptions Requested for this Project?** (If yes, identify below and include **Waiver Request and Justifications** in the C-SWPPP for each proposed request).

1. Small Construction Activity Waiver(s) From NPDES permitting (**Section 1.4 & Appendix B**)? Yes No
If yes, Identify requested waiver: Rainfall Erosivity Waiver TMDL Waiver Equivalent Analysis Waiver

2. Detention Waiver (**72-302(B)**)? Yes No

3. Other (Specify): _____

V. Waterbody Information (Attach additional sheet(s) as needed) **Change of Information**

A. **Receiving Waterbody(s) (RWB) Information** (List the nearest and next nearest receiving waterbodies to which the sites stormwater discharges will drain. If stormwater discharges drain to multiple waterbodies, list all such waterbodies).

1. Name of Receiving Waterbodies (RWB)	2. Distance to RWB (feet)	3. Classification of RWB
a. Nearest: <u>Ireland Creek</u>	1200	FW
b. Next Nearest: <u>Ashepool River</u>	23900	FW
c. Coastal Zone ONLY: Coastal Receiving Water (CRW): <u>Ashepool River</u>	23900	Not Applicable
d. Other Waterbodies: _____		

B. **Waters of the U.S. / State Information** (Attach additional sheet(s) as needed)

Waters of the U.S./ State	1. On the site?	2. Delineated/ Identified?	3. Impacts?	4. Amount of impacts
a. Jurisdictional wetlands	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac
b. Non-jurisdictional wetlands	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac
c. Other Water(s): _____	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac ___ Feet
d. Coastal Zone ONLY: <u>Direct Critical Area</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	___ Ac ___ Feet

5. If yes for impacts in B.3, describe each impact and activity, and list all permits (e.g., USACOE Nationwide Permit, DHEC General Permit) and certifications that have been applied for or obtained for each impact:

C. **S.C. Navigable Waters (SCNW) Information (Section 2.6.5)** The Department will address any issues related to State Navigable Waters' Program under SC Regulation 19-450 during the review of the C-SWPPP for activities that will **NOT** require a 404 permit or a 401 certification. (Attach additional sheet(s) as needed).

- 1. Are **S. C. Navigable Waters (SCNW) on the site**: Yes No
 - a. If no, do not complete this question. Proceed to Section D (Impaired Waterbodies).
 - b. If yes, provide the name of S.C. Navigable Waters (SCNW) on the site: _____
- 2. If yes for C.1, will construction activities cross over or occur in, under, or thru the SCNW? Yes No
If yes, describe SCNW activities (e.g., road crossing, sub-aqueous utility line, temporary or permanent structures, etc.) and proceed to Section C.3:

3. Identify permits providing coverage of SCNW activities proposed for your site. If NONE, list none.

Permits/Certifications	Permit or Certification No.	Corresponding Covered SCNW Activity(ies)
a. DHEC General/ Other DHEC Permit	NONE	
b. USACOE 404 Permit or 401 Certification	NONE	
c. SCNW Permit If applied for or issued, identify Date applied for or issued: _____	NONE	<input type="checkbox"/> All Activities or <input type="checkbox"/> Some Activities (Describe): _____

d. If a SCNW Permit has **NOT** been applied for provide an additional plan sheet that shows plan and profile views (drawn to scale) of the SCNW and associated activities. Include a description of all proposed activities on this plan.

D. Impaired Waterbodies Information (Attach additional sheet(s) as needed)

1. 303(d) Listed Impaired Waterbodies

a. Name of Nearest DHEC Water Quality Monitoring Stations (WQMS)(s) that receives stormwater from your construction site and/or thru an MS4 and the Name of the Corresponding Waterbody?		b. Is this WQMS(s) listed on the most current 303(d) list? # No, proceed to Section 2 of this table. If Yes, complete items c thru f.	c. List the pollutant(s) identified as "CAUSES" of the impairment	d. Will any pollutants causing the impairment be present in your site's construction stormwater discharges?	e. If yes for d, list the "USE SUPPORT" impairment(s) affected by the pollutant(s) identified in c.
Nearest DHEC WQMS(s)	Corresponding Waterbody				
CSTL-125	ASHEPOO RIVER	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Ecol. Beach	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
RS-11047	ASHEPOO RIVER	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	

f. If yes for d above, will use of the BMPs proposed for your project ensure the site's discharges will **NOT** contribute to or cause further WQS violations for the impairment(s) listed in c? Yes No
 (NOTE: If no for f, this site is NOT eligible for coverage under the CGP). See instructions.

2. TMDL Impaired Waterbodies

a. Name of Nearest DHEC Water Quality Monitoring Stations (WQMS)(s) that receives stormwater from your construction site and/or thru an MS4?	b. Has a TMDL(s) been developed for this WQMS(s)? If No, Identify as such below and proceed to Section VI. If Yes, complete items c thru f of this table.	c. If yes for b, what pollutants are listed as "CAUSES" or causing the impairment?	d. If yes for b, has the standard been "ATTAINED" or "Fully Supported" for the impairment(s)?	e. If no for d (Not Attained), will any pollutants causing the impairment be present in your site's construction stormwater discharges?
CSTL-125	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
RS-11047	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
	<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

f. If yes for e above, are your discharges consistent with the assumptions and requirements of the TMDL(s)? Yes No
 (NOTE: If no for f, this site is NOT eligible for coverage under the CGP). See instructions.

VI.

Signatures and Certifications DO NOT SIGN IN BLACK INK! Read the Certifications below (in entirety). Provide date, printed name, and signatures below. If you are a New Owner/Operator, as Primary Permittee you must also sign and date the applicable Comprehensive SWPPP Acceptance & Compliance Agreement below.
C-SWPPP PREPARER: "One copy of the C-SWPPP, all specifications and supporting calculations, forms, and reports are herewith submitted and made a part of this application. I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of Title 48, Chapter 14 of the Code of Laws of SC, 1976 as amended, pursuant to Regulation 72-300 et seq. (if applicable), and in accordance with the terms and conditions of SCR100000." (This should be the person identified in Section III).

GADSDEN LINTON III

Printed Name of C-SWPPP Preparer

Gadسدن Linton III
 Signature of C-SWPPP Preparer

29925

S. C. Registration #

PRIMARY PERMITEE: "I or I (on behalf of my company and its contractors and agents), as the case may be, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I understand that DHEC enforcement actions may be taken if the terms and conditions of the C-SWPPP are not met and I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
 "I or I (on behalf of my company and its contractors and agents), as the case may be, also hereby certify that all land-disturbing construction and associated activity pertaining to this site shall be accomplished pursuant to and in keeping with the terms and conditions of the approved plans and SCR100000. I also certify that a responsible person will be assigned to the project for day-to-day control. I hereby grant authorization to the to S. C. Department of Health and Environmental Control (DHEC) and/or the local implementing agency the right of access to the site at all times for the purpose of on site inspections during the course of construction and to perform maintenance inspections following the completion of the land-disturbing activity." (See Section 122.22 of S.C. Reg. 61-9 for signatory authority information.) Having understood the above information, I am signing this certification as Primary Permittee to the aforementioned NPDES general permit."

JOHN STIEGLITZ

Printed Name of Primary Permittee

John Stieglitz
 Signature of Primary Permittee

PROJECT MANAGER

Title/Position

9-19-2020

Date Signed

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OCT 27 2020



Coastal Zone Consistency Determination

To: Shannon Hicks, BOW Coastal Stormwater Permitting Section
Melanie A Williams, BOW Construction Permitting Section

From: Colleen McDonald, OCRM Coastal Zone Consistency Section *CPMM*

Applicant: John Stieglitz, Colleton County

Project Name: Colleton County Taxpayer Building

Finding: Conditionally Consistent with the SC Coastal Zone Management Program

Site Location: 118 Benson Street, Walterboro, Colleton County, South Carolina 29423
(PIN#: 163-11-00-230 and 163-11-00-227)

Reference #: HP3-BJPJ-WZAC6, WS/WW not assigned

Date: November 24, 2020

The staff of the Office of Ocean and Coastal Resource Management (OCRM) reviewed the above referenced Coastal Zone Consistency project request for land disturbance associated with the demolition of existing structures to clear and grade site for the construction of one (1) commercial building, stormwater pond and associated storm drain infrastructure, parking area, driveway entrance, water and sewer lines, and associated utilities. The nearest receiving waterbody Ireland Creek is located 1,200 feet from the project site. The total area of disturbance will be 1.90 acres of a 1.90 acre project site.

Per US Army Corps of Engineers Permit Number SAC-2019-01912, there are 2.016 acres of freshwater wetlands onsite. No wetland impacts are permitted at this site.

Per SC Department of Archives and History, State Historic Preservation Office (SCDAH, SHPO) this site is within an historic area labeled as Number 536130009. It has been determined that this area is outside of the boundaries of the Colleton Historic District and there are no records to indicate a significant site.

We hereby certify that the above referenced project is **Conditionally Consistent** with the **Guidelines for Evaluation of All Projects** as well as the Transportation Facilities (*Parking Facilities*), Commercial Development, Public Services and Facilities (*Sewage Treatment and Water Supply*), Activities in Areas of Special Resource Significance (*Public*

Open Spaces and Wetlands), and Stormwater Management (*Runoff*) policies contained in the S.C. Coastal Zone Management Program provided the following conditions are included in the permits and adhered to by the applicant.

1. In the event that any historic or cultural resources and/or archaeological materials are found during the course of work, the applicant must notify the State Historic Preservation Office and the South Carolina Institute of Archaeology and Anthropology. Historic or cultural resources consist of those sites listed in the National Register of Historic Places and those sites that are eligible for the National Register. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials.
2. For all projects with a permanent water quality pond having a permanent pool, regardless of size, which are located within one-half (1/2) mile of a receiving water body in the coastal zone, the applicant must demonstrate storage of the first 1/2 inch of runoff from the entire site or storage of the first one (1) inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention or infiltration systems as appropriate for the specific site.
3. The project must be consistent with State Stormwater Permitting requirements during and post construction for protection of water quality.
4. All construction BMPs must be installed, inspected and maintained to hold sediment onsite and to protect any adjacent or downstream critical area, wetlands and waters through the life of the project. Upon completion of construction activities, all disturbed (includes undeveloped) areas, including those impacted for access, must be immediately stabilized.
5. The project must be fully consistent with local zoning and comprehensive plans prior to work being conducted.
6. The applicant is not authorized to impact any wetlands. In the event any impacts to wetlands occur, the US Army Corps of Engineers and DHEC-OCRM must be notified and all work must cease to minimize additional impacts until the applicant receives authorization.

This determination shall serve as the SCDHEC OCRM Coastal Zone Consistency Determination for the work described above. However, this determination **does not** serve as a Department permitting decision and **does not** alleviate the applicant's responsibility to obtain any applicable State or Federal permit(s) for the work. Local government authorizations **may also** be required.

South Carolina Board of Health and Environmental Control
Guide to Board Review
Pursuant to S.C. Code Ann. § 44-1-60

The decision of the South Carolina Department of Health and Environmental Control (Department) becomes the final agency decision fifteen (15) calendar days after notice of the decision has been mailed to the applicant, permittee, licensee and affected persons who have requested in writing to be notified, unless a written request for final review accompanied by a filing fee in the amount of \$100 is filed with Department by the applicant, permittee, licensee or affected person.

Applicants, permittees, licensees, and affected parties are encouraged to engage in mediation or settlement discussions during the final review process.

If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within thirty (30) calendar days after notice is mailed that the Board declined to hold a final review conference. In matters pertaining to decisions under the South Carolina Mining Act, appeals should be made to the South Carolina Mining Council.

I. Filing of Request for Final Review

1. A written Request for Final Review (RFR) and the required filing fee of one hundred dollars (\$100) must be received by Clerk of the Board within fifteen (15) calendar days after notice of the staff decision has been mailed to the applicant, permittee, licensee, or affected persons. If the 15th day occurs on a weekend or State holiday, the RFR must be received by the Clerk on the next working day. RFRs will not be accepted after 5:00 p.m.
 2. RFRs shall be in writing and should include, at a minimum, the following information:
 - The grounds for amending, modifying, or rescinding the staff decision;
 - a statement of any significant issues or factors the Board should consider in deciding how to handle the matter;
 - the relief requested;
 - a copy of the decision for which review is requested; and
 - mailing address, email address, if applicable, and phone number(s) at which the requestor can be contacted.
 3. RFRs should be filed in person or by mail at the following address:
South Carolina Board of Health and Environmental Control
Attention: Clerk of the Board
2600 Bull Street
Columbia, South Carolina 29201
- Alternatively, RFR's may be filed with the Clerk by facsimile (803-898-3393) or by electronic mail (boardclerk@dhec.sc.gov).
4. The filing fee may be paid by cash, check or credit card and must be received by the 15th day.
 5. If there is any perceived discrepancy in compliance with this RFR filing procedure, the Clerk should consult with the Chairman or, if the Chairman is unavailable, the Vice-Chairman. The Chairman or the Vice-Chairman will determine whether the RFR is timely and properly filed and direct the Clerk to (1) process the RFR for consideration by the Board or (2) return the RFR and filing fee to the requestor with a cover letter explaining why the RFR was not timely or properly filed. Processing an RFR for consideration by the Board shall not be interpreted as a waiver of any claim or defense by the agency in subsequent proceedings concerning the RFR.
 6. If the RFR will be processed for Board consideration, the Clerk will send an Acknowledgement of RFR to the Requestor and the applicant, permittee, or licensee, if other than the Requestor. All personal and financial identifying information will be redacted from the RFR and accompanying documentation before the RFR is released to the Board, Department staff or the public.
 7. If an RFR pertains to an emergency order, the Clerk will, upon receipt, immediately provide a copy of the RFR to all Board members. The Chairman, or in his or her absence, the Vice-Chairman shall based on the circumstances, decide whether to refer the RFR to the RFR Committee for expedited review or to decline in writing to schedule a Final Review Conference. If the Chairman or Vice-Chairman determines review by the RFR Committee is appropriate, the Clerk will forward a copy of the RFR to Department staff and Office of General Counsel. A Department response and RFR Committee review will be provided on an expedited schedule defined by the Chairman or Vice-Chairman.
 8. The Clerk will email the RFR to staff and Office of General Counsel and request a Department Response within eight (8) working days. Upon receipt of the Department Response, the Clerk will forward the RFR and Department Response to all Board members for review, and all Board members will confirm receipt of the RFR to the Clerk by email. If a Board member does not confirm receipt of the RFR within a twenty-four (24) hour period, the Clerk will contact the Board member and confirm receipt. If a Board member believes the RFR should be considered by the RFR Committee, he or she will respond to the Clerk's email within forty-eight (48) hours and will request further review. If no Board member requests further review of the RFR within the forty-eight (48) hour period, the Clerk will send a letter by certified mail to the Requestor, with copy by

regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Final Review Conference. Contested case guidance will be included within the letter.

NOTE: If the time periods described above end on a weekend or State holiday, the time is automatically extended to 5:00 p.m. on the next business day.

9. If the RFR is to be considered by the RFR Committee, the Clerk will notify the Presiding Member of the RFR Committee and the Chairman that further review is requested by the Board. RFR Committee meetings are open to the public and will be public noticed at least 24 hours in advance.
10. Following RFR Committee or Board consideration of the RFR, if it is determined no Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Conference. Contested case guidance will be included within the letter.

II. Final Review Conference Scheduling

1. If a Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, informing the Requestor of the determination.
2. The Clerk will request Department staff provide the Administrative Record.
3. The Clerk will send Notice of Final Review Conference to the parties at least ten (10) days before the Conference. The Conference will be publicly noticed and should:
 - include the place, date and time of the Conference;
 - state the presentation times allowed in the Conference;
 - state evidence may be presented at the Conference;
 - if the conference will be held by committee, include a copy of the Chairman's order appointing the committee; and
 - inform the Requestor of his or her right to request a transcript of the proceedings of the Conference prepared at Requestor's expense.
4. If a party requests a transcript of the proceedings of the Conference and agrees to pay all related costs in writing, including costs for the transcript, the Clerk will schedule a court reporter for the Conference.

III. Final Review Conference and Decision

1. The order of presentation in the Conference will, subject to the presiding officer's discretion, be as follows:
 - Department staff will provide an overview of the staff decision and the applicable law to include [10 minutes]:
 - Type of decision (permit, enforcement, etc.) and description of the program.
 - Parties
 - Description of facility/site
 - Applicable statutes and regulations
 - Decision and materials relied upon in the administrative record to support the staff decision.
 - Requestor(s) will state the reasons for protesting the staff decision and may provide evidence to support amending, modifying, or rescinding the staff decision. [15 minutes] *NOTE: The burden of proof is on the Requestor(s)*
 - Rebuttal by Department staff [15 minutes]
 - Rebuttal by Requestor(s) [10 minutes]

Note: Times noted in brackets are for information only and are superseded by times stated in the Notice of Final Review Conference or by the presiding officer.
2. Parties may present evidence during the conference; however, the rules of evidence do not apply.
3. At any time during the conference, the officers conducting the Conference may request additional information and may question the Requestor, the staff, and anyone else providing information at the Conference.
4. The presiding officer, in his or her sole discretion, may allow additional time for presentations and may impose time limits on the Conference.
5. All Conferences are open to the public.
6. The officers may deliberate in closed session.
7. The officers may announce the decision at the conclusion of the Conference or it may be reserved for consideration.
8. The Clerk will mail the written final agency decision (FAD) to parties within 30 days after the Conference. The written decision must explain the basis for the decision and inform the parties of their right to request a contested case hearing before the Administrative Law Court or in matters pertaining to decisions under the South Carolina Mining Act, to request a hearing before the South Carolina Mining Council. The FAD will be sent by certified mail, return receipt requested.
9. Communications may also be sent by electronic mail, in addition to the forms stated herein, when electronic mail addresses are provided to the Clerk.

The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.

SECTION 01 45 33**CODE-REQUIRED SPECIAL INSPECTIONS****PART 1 GENERAL - NOT USED****1.01 SECTION INCLUDES**

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.02 DEFINITIONS

- A. Code or Building Code: 2015 Edition of the International Building Code and, more specifically, Chapter 17 - Structural Tests and Inspections, of same.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.03 REFERENCE STANDARDS

- A. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

1.04 SUBMITTALS

- A. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:
 - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- B. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Conformance with Contract Documents.

1.05 SPECIAL INSPECTION AGENCY

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling required by the building code.

- B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.06 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 3 EXECUTION

2.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. See Statement of Special Inspections on the structural drawings.
- B. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
 - 1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
 - 2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

2.02 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

- A. Mechanical and Electrical Components:
 - 1. Anchorage of electric equipment required for emergency or standby power systems; periodic.
 - 2. Installation and anchorage of other electrical equipment; periodic.

2.03 SPECIAL INSPECTIONS FOR WIND RESISTANCE

- A. Structural Observations for Wind Resistance: Visually observe structural system for general conformance with the approved contract documents; periodic.

2.04 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified reference standards.
 - 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests or inspections specified.
- B. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- C. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

2.05 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.

4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of work or products.
 5. Perform additional tests and inspections required by Architect.
 6. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the work.
- C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

2.06 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION CONTROL**PART 1 - GENERAL****1.1 SUMMARY**

- A. This section includes the following:
1. Temporary erosion and sediment control measures during construction.
 2. Cleaning, repair, and restoration of adjoining properties and roads necessitated by erosion and sedimentation from the project site during the course of the project.

1.2 DEFINITIONS

- A. Soil stabilization refers to measures, which protect soil from erosive forces of raindrop impact and flowing water
- B. Erosion control structures refer to silt fences, sediment traps, outlet traps, diversion berms, stabilized construction entrances, and similar devices constructed for the purpose of retaining and controlling sediment.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: Meet the following requirements:
1. Implement sediment and erosion control measures in an orderly manner as work progresses. Coordinate with the approved Storm Water Pollution Prevention Plan (SWPPP) and the approved NPDES Storm Water Discharge permit.
 2. Protect existing undisturbed areas from effects of erosion.
 3. Retain sediment within the boundaries of the site.
 4. Prevent damage to properties outside the construction limits from silting due to construction of the project.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Comply with the requirements of the approved SWPPP and the approved NPDES Storm Water Discharge permit.
 2. Pay all fees, fines, and assessments related to work of this section charged or levied by authorities having jurisdiction.

1.5 SEQUENCING AND SCHEDULING

- A. Scheduling of Work:
1. Conduct site inspection and document existing conditions of site and portions indicated to remain.
 2. Identify all trees indicated to be protected and install tree barricades in coordination with requirements indicated on the construction drawings.
 3. Remove vegetation and surfaces only as required to allow installation of perimeter silt barrier.

4. Install construction entrance and remaining erosion control devices as indicated on the project drawings, and as needed to comply with the approved SWPPP.
5. Contact the appropriate jurisdictional authority office to schedule site inspection of erosion control devices prior to starting site work.
6. Comply with the requirements indicated on the construction drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stone Materials

1. Washed filter stone, ASTM D 448, size as indicated.
2. Rip-rap stone, hard quarry stone or fieldstone, split or crushed natural stone, per SCDOT Standard Specification, Edition of 2007, Section 804, Class and size as indicated.

B. Geotextiles

1. Sediment /Silt fence Fabric: Polypropylene, woven monofilament geotextile, UV and soil chemical resistant:
 - a. Puncture strength, ASTM D 4833, 60-pound.
 - b. Apparent opening Size (AOS), ASTM D 4751, 40 US Std. Sieve (0.425 mm).
 - c. Water Flow Rate, ASTM D 4491, 75 gpm/sq.ft.
 - d. Manufacturer: Fence fabric must be on the SCDOT list #34 of approved materials.
2. Synthetic Filter fabric and Sediment Trap Fabric: Polypropylene, staple fiber, needle punched non-woven geotextile, UV and soil chemical resistant:
 - a. Puncture strength, ASTM D 4833, 55-pound.
 - b. Apparent opening Size (AOS), ASTM D 4751, 70 US Std. Sieve (0.212 mm).
 - c. Water Flow Rate, ASTM D 4491, 110 gpm/sq.ft.
 - d. Manufacturers: Fence fabric must be on the SCDOT list #44 of approved materials.

C. Erosion Control Blanket: Erosion control blanket to be light weight degradable polypropylene (1.64 lbs/1000sf photodegradable) with 100% agricultural wheat-straw fiber blanket (0.5 lbs./sq.yd.).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditions of the project site correspond with information given in the construction drawings.
- B. Inspect project site, areas of property outside of project site, and surrounding properties.
 1. Note and bring to the immediate attention of the Architect any existing disturbed soil conditions, erosion, or sedimentation requiring abatement or documentation.
 2. Provide project site border documentation in the form of a complete series of photographs clearly showing existing conditions at the construction limits of the project site prior to beginning any disturbing activities or starting any work. Submit copy to the Architect for record purposes.

3.2 SEDIMENT AND EROSION CONTROL

- A. Erosion Control Responsibilities: The Contractor will be responsible for all sediment and erosion control on the project site. He shall comply with the State regulations regarding the sediment and erosion control for land disturbing activities and the approved Storm Water Pollution Prevention Plan (SWPPP) and the approved SC DHEC NPDES General Permit for Stormwater Discharge from Large and Small Construction Activities SCR 100000. The Contractor shall ensure construction operations and management are constantly in compliance with the terms and conditions of the General Permit. If it is determined during construction that any of the installed Best Management Practices (BMP's) erosion control structures are not functioning as required, the BMP shall be repaired, modified or replaced as needed to prevent sediment from leaving the project site.
- B. Erosion Control SWPPP Inspections: The Contractor shall provide for all weekly SWPPP inspections. Inspections must be performed by a third-party SCDHEC Certified Inspector (i.e. not a direct employee of the Contractor or the Owner). If the inspections discover portions of the erosion control BMP's that must be repaired, replaced, or modified, the Contractor shall comply immediately with the repairs. A copy of the approved SWPPP will be provided to the Contractor for his use. The Contractor shall maintain an approved copy of the SWPPP at the construction on-site trailer office, and continually update as regulations require, reflecting current conditions.
- C. SWPPP Compliance Logbook: The Contractor shall create and maintain a three-ring binder of documents that demonstrate compliance with the Stormwater Pollution Prevention Plan (SWPPP) Construction Activity Permit. The binder shall include a copy of the permit registration statement, SWPPP and SWPPP update amendments, all inspection reports, copies of correspondence with the list agency that issued the permit (i.e. SCDHEC Stormwater Division of Bureau of Water and the local stormwater MS4 Office as applicable). At the completion of the project, the folder shall become the property of the Owner.
- D. SCDHEC Standard Erosion Control Notes:

Implement sediment and erosion control measures as shown on plans. Where specific sediment and erosion control measures are not shown on the plans, the following minimum requirements apply:

1. 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 daily until the slope is brought to grade.
2. 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 (14) days after work has ceased, except as stated below.
 - a. Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions stabilization measures must be initiated as soon as practicable.
 - b. 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.
3. All sediment and erosion control devices shall be inspected once every calendar week. If periodic inspections or other information indicates that a BMP has been inappropriately installed, or incorrectly maintained, the Permittee must address the necessary replacement or modification required to correct the BMP within 48 hours of identification.
4. Provide silt fences 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 shall be filtered to remove any sediments before being pumped back into any waters of the state.

5. 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.
6. 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.
7. 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.
8. 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.
9. 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 can't 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.
10. 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 stormwater discharges.
11. A copy of the SWPPP, inspection 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.
12. 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.
13. Minimize soil compaction and, unless infeasible, preserve topsoil.
14. 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.
15. Minimize the discharge of pollutants from dewatering of trenches and excavated areas. These discharges are to be routed through appropriate BMP's (sediment basins, filter bag, etc.).
16. 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.
17. 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.

18. If existing BMP's need to be modified or if additional BMP's are necessary to comply with the requirements of this permit and/or SC's 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 BMP's must be implemented as soon as reasonably possible.
19. 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 (SCDHEC-OCRM) has approved otherwise.

E. Additional Erosion Control Notes:

1. The contractor shall maintain barriers and silt fences around all drainage inlets, open pipe inlets, unfinished junction boxes, or any openings that allow storm water borne sediments to enter the drainage system or be discharged from the site. Erosion control shall be maintained and/or replaced as needed until all permanent surfaces (i.e. pavement, grass, planting, etc.) are in place.
2. Silt fence dams on 100' intervals along all temporary ditches and swales,
3. A concrete truck wash down location will be located on the site for concrete trucks delivering concrete to the site to perform wash down after discharging concrete. Wash down shall allow excess water to drain off through a filter system, while retaining fines and paste. See also Standard SCDHEC SWPPP Notes No.14 & No.16. Once the excess water has drained away, and the paste cured to a dried condition, the subsequent hardened concrete debris material shall be collected and removed from the Owner's property in accordance with the requirements specified for construction debris and waste. The concrete waste material will not be allowed to accumulate in piles on-site. If, at any time, the Program Manager determines the wash-down area is not being operated or maintained in an appropriate manner, he may direct the Contractor to cease wash-down operations on the site and to clean the area.
4. The contractor shall be responsible for establishing final surface stabilization of all areas of land disturbance disturbed by construction operations. This includes pavements, mulches, landscaping, and grassing. Any unpaved area disturbed not specifically identified on the drawings for the type of vegetative stabilization shall be stabilized to match the adjacent surface or to match the original type of surface; i.e. grass, mulch, landscape bed, etc. No disturbed area shall be left un-stabilized.

3.3 PROTECTION AND CLEANING

- A. Maintain all devices for sediment control in proper working order for the duration of the project. When control devices become filled halfway to capacity, remove sediment and deposit onsite in such a manner as to preclude further erosion of deposited sediment. Clean and reset device in proper working order.
- B. Restore protection to protected stockpiles and slopes immediately following disturbance.

3.4 REMOVAL OF TEMPORARY DEVICES

- A. Remove erosion and sedimentation controls only after a final inspection and after permanent pavements and vegetative stabilization has been achieved and approved.
- B. Final stabilization of grassed areas is determined when 100% of sodded areas are complete without any gaps or spots larger than 12" by 12" square; and seeded areas are complete with a stable stand of grass that covers a minimum of 75% of the designated area with no bare spots

larger than 12" by 12" square. These minimum requirements are for determination of "stabilization" only, and do not determine the level required for Final Acceptance by the Owner or the Landscape Architect, as specified in the appropriate landscape specification.

END OF SECTION

SECTION 01 71 23**CONSTRUCTION STAKEOUT AND FIELD ENGINEERING****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This item shall consist of furnishing, placing, replacing when required, marking and maintaining all Construction Layout stakes necessary for proper guidance and control of construction operations. It shall also include the preparation of all construction staking, field books, such as alignment books, slope and grade books, blue-top books etc. It shall also include any additional Surveyor's, Civil, Structural or other professional engineering services specified or required to execute Contractor's construction methods.

1.2 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. When it is specified or required for the Contractor to retain the services of an engineer or surveyor, then each shall meet the following requirements:
1. Surveyor shall be a Registered Professional Land Surveyor in the State the project site is located.
 2. Engineer shall be a Registered Professional Engineer in the State the project site is located.

PART 2 - PRODUCTS**2.1 EQUIPMENT AND MATERIALS**

- A. All surveying equipment, stakes and any other material necessary to perform the work shall be furnished by the Contractor, either directly or by a sub-contracted Registered Land Surveyor.

PART 3 - EXECUTION**3.1 SURVEY REFERENCE POINTS**

- A. Existing basic horizontal and vertical control points for the Project are those designated on drawing.
- B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
- C. The Contractor shall provide a Registered Land Surveyor, subject to the Owner's approval, to establish and/or re-establish all benchmarks, reference points, line and grade points necessary to complete the work at no additional expense to the Owner.
- D. The Contractor shall notify the Project Engineer in the event any original reference point or benchmark as defined in subparagraph A and B, is destroyed or lost, and if required by the Project Engineer, shall replace said reference point or benchmark as per the requirements of subparagraph C.

3.2 CONSTRUCTION STAKEOUT

- A. Establish lines and levels, locate and layout by instrumentation and similar appropriate means all site improvements
 - 1. Stakes for grading, fill and topsoil placement.
 - 2. Stakes for alignment and grades for roadways, parking facilities, and other pavements or structures.
 - 3. Storm drainage and sanitary sewers alignment and invert elevations.
 - 4. Water distribution systems, and other non-gravity utility system fixtures, fittings, bends and other appurtenances needed for proper location and alignment.
- B. A complete and accurate log of all control and survey work, as it progresses, shall be maintained.
- C. Contractor shall verify layouts, and line and grade of work, as work progresses, at random times to verify proper installation and shall notify Project Engineer of status.
- D. At the Project Engineer's request, surveying stakeout data shall be submitted for review to verify accuracy of field engineering work.

3.3 RECORD DRAWINGS AND CERTIFICATION

- A. AS-BUILT RECORD DRAWINGS: Upon completion of the work, the Contractor shall provide a certified final as-built survey by a Registered Land Surveyor showing all dimensions, locations, angles, and elevations of all portions of work performed under his contract, including new building additions and pavement. Coordinate with the requirements of this section and as specified Division One. The Contractor will be provided a copy of the original Site electronic CAD files to use as a base for the creation of these as-built record drawings. Survey shall show all improvements and their relations to any and all existing conditions that are relative to their use.
- B. UTILITY AS-BUILTS: Contractor shall, as part of his work, survey the as-constructed location of all new buried utilities. These locations shall document the horizontal location, size, material, and elevation, or depth of cover over the buried utility pipe, cable or duct.
 - 1. Provide storm drainage as-built drawings of the storm drainage system and the storm water management control structures as required by the approved SCDHEC NPDES storm water permit and as required in Section 33 41 00 STORM DRAINAGE PIPING.
 - 2. Provide water as-built drawings, and close-out documents in accordance with the requirements of the water system utility company having authority and the requirements of Section 33 11 00 WATER DISTRIBUTION PIPING.
 - 3. Provide sanitary sewer as-built drawings, and close-out documents in accordance with the requirements of the sewer utility company having authority and the requirements of Section 33 30 00 SANITARY SEWERS.
 - 4. Other utilities as-built drawings shall be as required by that discipline or utility authority requirements.
- C. UTILITY EASEMENT PLATS: Contractor shall provide new easement plats for all new potable/fire water line, and sanitary sewer lines. Plats shall be prepared by a professional surveyor and shall meet all requirements of the utility company having jurisdiction, as applicable.
- D. CERTIFICATE OF CONFORMANCE: Submit a certificate signed by Professional Engineer or

CONSTRUCTION STAKEOUT AND FIELD ENGINEERING

Registered Land Surveyor, as each portion of work requires, certifying that elevations and locations of improvements are in conformance or non-conformance with Contract Documents.

END OF SECTION

**SECTION 02 41 13
SELECTIVE SITE DEMOLITION****PART 1 GENERAL****1.1 SUMMARY**

- A. The scope of work of this specification covers demolition of exterior infrastructure (i.e. pavements and utilities) and other site improvements. It does not cover demolition of buildings or selective demolition to interiors of structures or buildings. Coordinate work in this section with Section 31 10 00, SITE CLEARING.

1.2 GENERAL REQUIREMENTS

- A. Do not begin demolition until authorization is received from the Architect. Remove rubbish and debris from the project site daily, unless otherwise directed; do not allow accumulations on the project site. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Materials that cannot be removed daily shall be stored in approved storage containers in areas specified by the Architect.

1.3 REGULATORY AND SAFETY REQUIREMENTS

- A. Comply with federal, state, and local regulations for demolition, hauling and disposal. Obtain all necessary permits as required by the above Governmental agencies.

1.4 DUST AND DEBRIS CONTROL

- A. Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.5 SEDIMENT AND EROSION CONTROL

- A. The Contractor will be responsible for all sediment and erosion control on the project site. He shall comply with the State regulations regarding the sediment and erosion control for land disturbing activities and an approved Storm Water Pollution Prevention Plan (SWPPP). Coordinate all sediment and erosion control work with the requirements of Section 01 57 13 TEMPORARY EROSION CONTROL.

1.6 PROTECTION

- A. Traffic Control Signs: Where pedestrian and driver safety are endangered in the area of removal work use traffic barricades with flashing lights. Notify the Architect prior to beginning such work.
- B. Existing Work: Before beginning any demolition work, the Contractor shall conduct a site inspection with the Architect to document all existing conditions and examine the drawings and specifications to determine the extent of the work. Record existing work in the presence of the Architect, showing the condition of structures, pavements, and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions.
- C. Items to Remain in Place: Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged items as approved by the Architect. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Do not

overload pavements to remain. Repairs, reinforcement, or replacement require approval by the Architect prior to performing such work.

- D. Existing Construction: Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction.
- E. Trees: Protect trees within the project site which are indicated to be left in place, and which might be damaged during demolition by a minimum 4-foot high fence. Erect and secure a temporary tree barricade or fence barrier a minimum of 5 feet from the trunk for trees 10-inch DBH (diameter breast height-as measured 4.5 feet above existing ground) and smaller. For trees greater than 10-inch DBH, protective barricades shall provide a diameter of protection around the tree, measured in feet, equal to the DBH diameter of the tree measured in inches (i.e. an 18-inch diameter tree would require an 18-foot diameter protective barricade). For cluster trees or large clumps of trees, follow the outer perimeter of branches, unless specifically indicated otherwise. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Architect.
- F. Utility Service: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
- G. Facilities: Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.
- H. Protection of Personnel: Before, during and after the demolition work the Contractor shall continuously evaluate the site conditions and take immediate action to protect all personnel working in and around the demolition site.

1.7 BURNING

- A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the Architect.

1.9 USE OF EXPLOSIVES

- A. Use of explosives will not be permitted.

PART 2 PRODUCTS

2.1 FILL MATERIAL

- A. Comply with Section 31 20 00 EARTH MOVING for excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition of pavements or site infrastructure.

PART 3 EXECUTION**3.1 EXISTING FACILITIES TO BE REMOVED**

- A. Utilities and Related Equipment:
1. General Requirements: Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Architect. Do not interrupt existing utilities serving facilities occupied and used by the Owner except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.
 2. Disconnecting Existing Utilities: Remove existing utilities, as indicated, and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Architect. When utility lines are encountered that are not indicated on the drawings, the Architect shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location on the station in accordance with instructions of the Architect.
- B. Paving and Slabs: Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat sawcuts at limits of pavement removal as indicated. Sawcuts shall be at full depth of the pavement. Assume for bidding purposes that concrete sidewalks are 4 inches thick; asphalt pavements are 3 inches thick (not including aggregate base), and exterior structural or utility slabs are 6" thick, unless otherwise indicated.
- C. Concrete: Saw concrete along straight lines. Make sawcuts full depth of pavement. At locations where the thickness exceeds the capabilities of a saw blade, grind smooth the rough broken area where new concrete pavement will be installed abutting the saw cut pavement so as to allow the proper installation of pre-formed expansion joint material between the existing concrete pavements and the new concrete pavements.
- D. Miscellaneous Metal: Salvage shop-fabricated items such as trash dumpster enclosure access doors and frames, steel gratings, metal ladders, and similar items as whole units. Scrap metal shall become the Contractor's property. Recycle scrap metal to the greatest extent possible as part of demolition operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycle facility.
- E. Patching: Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated.
- F. Electrical Equipment and Fixtures: Remove and salvage outdoor/exterior electrical fixtures for re-use, as indicated. Fixtures indicated for re-use shall be boxed and tagged for identification and protected from breakage.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

- A. Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work until all demolition in the area has been completed and debris removed. Holes, excavation depressions and other hazardous openings shall be filled in accordance with Section 31 20 00, EARTH MOVING.

3.3 DISPOSITION OF MATERIAL

- A. Title to Materials: Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Owner property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Architect of the Contractor's demolition and removal procedures, and authorization by the Architect to begin demolition. The Owner will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.
- B. Reuse of Materials and Equipment: Remove and store materials and equipment listed or indicated to be reused or relocated to prevent damage and reinstall as the work progresses.
- C. Salvaged Materials and Equipment: Remove materials and equipment that are indicated and/or specified to be removed by the Contractor and that are to remain the property of the Owner, and deliver to a storage site, as directed within 10 miles of the work site.
 - 1. Salvage items and material to the maximum extent possible.
 - 2. Material salvaged for the Contractor shall be stored as approved by the Architect and shall be removed from Owner property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.
 - 3. Salvaged items to remain the property of the Owner shall be removed in a manner to prevent damage and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents.
- D. Unsalvageable Material: Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of off the site.

3.4 CLEANUP

- A. Debris and rubbish shall be removed from disturbed site areas, trenches, and similar excavations prior to any backfilling. Under no circumstances will rubbish or demolition debris be allowed to be buried on site. Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations with all applicable federal, state and local regulations. Debris shall be transported in a manner that prevents spillage on streets or adjacent areas.

3.5 REUSE OF SALVAGED ITEMS

- A. Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Qualification Data: For Installer, manufacturer, and testing agency.
- E. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Curing compounds.
 - 5. Floor and slab treatments.
 - 6. Bonding agents.
 - 7. Adhesives.

8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates

G. Minutes of pre-installation conference.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement

installation, slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82/A 82M.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets. Do not use rolls.

2.2 REINFORCEMENT ACCESSORIES

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

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size 3/4 inch, nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- D. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder (except for Polished Concrete Floors): ASTM E 1745, Class A, Include manufacturer's recommended adhesive or pressure-sensitive tape. Sheet Vapor Retarder shall have a permeance of not more than 0.1 perms (grains/sq ft/hr/in-Hg).
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Grace Construction Products, W. R. Grace & Co.; Florprufe 120 (15 mil).
 - b. Insulation Solutions, Inc.; Viper VaporCheck, 15mil.
 - c. Meadows, W. R., Inc.; Perminator, 15 mil.
- B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
 - b. BASF Construction Chemicals - Building Systems; Confilm.

- c. ChemMasters; SprayFilm.
 - d. Conspec by Dayton Superior; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film (J-74).
 - f. Edoco by Dayton Superior; BurkeFilm.
 - g. Euclid Chemical Company (The), an RPM company; Eucobar.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Construction Chemicals - Building Systems; Kure-N-Seal W.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec by Dayton Superior; High Seal.
 - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - e. Edoco by Dayton Superior; Spartan Cote WB II 20 Percent.
 - f. Euclid Chemical Company (The), an RPM company; Diamond Clear VOX; Clearseal WB STD.
 - g. Kaufman Products, Inc.; SureCure Emulsion.
 - h. Lambert Corporation; Glazecote Sealer-20.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
- 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

- E. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Slabs-on-Grade (except Polished Concrete Floor Slabs): Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Minimum Cementitious Materials Content: 470lb/cu. yd.
 - 3. Slump Limit: 4 inches
 - 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

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

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Granular Course: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
 - 1. Place and compact a 1/2-inch- thick layer of fine-graded granular material over granular fill.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 1. Apply scratch finish to surfaces [indicated] [and] [to receive concrete floor toppings] [to receive mortar setting beds for bonded cementitious floor finishes].
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces [indicated] [to receive trowel finish] [and] [to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo].
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces as indicated and where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including building walls and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- F. Slabs to receive Liquid Densifier and Sealer: Finish Slabs with "Euco Diamond Hard". Follow manufacturer's written specifications, recommendations.

3.10 JOINT FILLING

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

3.11 CONCRETE SURFACE REPAIRS

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

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

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports according to the "Statement of Special Inspections".
- B. Inspections:
1. Steel reinforcement placement.
 2. Headed bolts and embedded bolts/threaded rods.
 3. Verification of use of required design mixture.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days. Hold one cylinder for 56 day test (if required).
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of

concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SECTION 04 20 01
MASONRY VENEER**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Clay Facing Brick.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.
- D. Flashings.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.
- B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- D. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- F. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- H. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- I. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.
- C. Samples: Submit three samples of facing brick units to illustrate color, texture, and extremes of color range. Submit grout color samples
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

107 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS**201 BRICK UNITS**

- A. Facing Brick:
 - 1. Manufacturer and color selection as noted on the drawings.
 - 2. Modular Size: 3 5/8" x 7 5/8" x 2 1/4".
 - 3. Special Shapes: Provide special shapes as indicated on the drawings.

202 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
- F. Water: Clean and potable.

203 REINFORCEMENT AND ANCHORAGE

- A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Anchor Plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
 - 2. Wire Ties: Manufacturer's standard shape, 0.1875 inch thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches.
 - 4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

204 FLASHINGS

- A. Provide one of the following systems:
 - 1. Multiple component system consisting of the following:
 - a. Flashing Termination Drip Plates: Stainless steel drip plate by Hohmann & Barnard, Inc. or equal.
 - b. EPDM Flashing: ASTM D4637, Type II, 0.040 inch thick.
 - 2. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick.

205 ACCESSORIES

- A. Cavity Vents: Molded PVC grilles, insect resistant.
- B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

206 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
- B. Colored Mortar: Proportion selected pigments and other ingredients to provide white colored mortar, without exceeding manufacturer's recommended pigment-to-cement ratio.

PART 3 EXECUTION**301 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

302 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

303 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

304 WEEPS/CAVITY VENTS

- A. Install cavity vents in veneer walls at 32 inches on center horizontally at base of wall above flashing.

305 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. Install cavity mortar control panels continuously at all thru wall flashings including at the base of the wall, above window openings, door openings and louver openings. Comply with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.

306 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
- B. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

307 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

308 CONTROL AND EXPANSION JOINTS

- A. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.

309 TOLERANCES

- A. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

310 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

311 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

312 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking, cants, and nailers.
 - 3. Wood furring and grounds.
- B. Related Requirements:
 - 1. Division 06 Section "Sheathing".
 - 2. Division 06 Section "Shop Fabricated Wood Trusses".

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. SPIB: The Southern Pine Inspection Bureau.

1.4 ACTION SUBMITTALS

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

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

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency. Coordinate with Architect's preference.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

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

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground.

2.3 DIMENSION LUMBER FRAMING

- A. Roof Truss Modification Blocking: No. 1 grade.
 1. Species: Southern pine; SPIB.
- B. Other Framing Not Listed Above: No. 1.
 1. Species: Southern pine; SPIB.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Furring.
- B. For items of dimension lumber size, provide No. 1 grade lumber of the following species:
 1. Southern pine; SPIB.
- C. For utility shelving, provide lumber with 15 percent maximum moisture content of the following species and grades:
 1. Mixed southern pine; No. 1 grade; SPIB.

2. Spruce-pine-fir (south) or spruce-pine-fir; Select Merchantable or No. 1 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 FASTENERS

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

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails: ASTM F 1667.

C. Wood Screws: ASME B18.6.1.

D. Bolts: ASTM A-307, $F_y=36\text{ksi}$

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

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

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board as indicated.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports according to the "Statement of Special Inspections".
- B. Testing agency will report test results promptly and in writing to Contractor and Architect.

- C. Repair or Remove and replace work where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 PROTECTION

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

END OF SECTION 061000

SECTION 061600

SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Plywood for Roof Truss Modification.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for plywood backing panels.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- 1. Plywood.
- B. Plywood: Exterior, Structural I.
- C. Factory mark panels to indicate compliance with applicable standard.

2.2 SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than 5/8 inch.

- B. Plywood Exterior Wall Sheathing: Exterior, Structural I
 - 1. Span Rating: Not less than 24/16.
 - 2. Nominal Thickness: Not less than 7/16 inch.
- C. Plywood for Roof Truss Modification: Exterior, Structural I
 - 1. Span Rating: Not less than 32/24.
 - 2. Nominal Thickness: 3/4 inch.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below and as indicated by drawings.
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to Light Gage Metal Framing.
 - c. Space panels 1/8 inch apart at edges and ends.
- C. Comply with manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports according to the "Statement of Special Inspections".
- B. Testing agency will report test results promptly and in writing to Contractor and Architect.
- C. Repair or Remove and replace work where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 061600

SECTION 061753

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Wood roof trusses.
- 2. Wood girder trusses.
- 3. Wood truss bracing.
- 4. Metal truss accessories.

- B. Related Requirements:

- 1. Division 06 Section "Sheathing" for roof sheathing and subflooring.
- 2. Division 31 Section "Termite Control" for site application of borate treatment to wood trusses.

- C. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Division 01 Section "Allowances."

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For wood-preserved-treated lumber, fire-retardant-treated lumber, metal-plate connectors, metal truss accessories, and fasteners.
 - 1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated lumber.
2. Fire-retardant-treated wood.
3. Metal-plate connectors.
4. Metal truss accessories.

1.6 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that [participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 1. Design Loads: As indicated.
 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/480 of span.
- C. Comply with applicable requirements and recommendations of the following publications:

1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Certified Wood: For metal-plate-connected wood trusses and permanent bracing, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Provide dressed lumber, S4S.
 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- C. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for both top and bottom chords.
- D. Minimum Specific Gravity for Top Chords: 0.50.
- E. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry."

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
 - C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 1. For exposed trusses indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - D. Application: trusses where indicated on Drawings.

2.4 FIRE-RETARDANT-TREATED WOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.[For enclosed roof framing, framing in attic spaces, and where high-temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed trusses and bracing indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:

2.5 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 1. Alpine Engineered Products, Inc.; an ITW company.
 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 3. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 4. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 5. Robbins Engineering, Inc.
 6. Truswal Systems Corporation; an ITW company.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with TPI 1.
- D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
 1. Use for interior locations unless otherwise indicated.
- E. Stainless-Steel Sheet: ASTM A 666, Type 316, and not less than 0.035 inch thick.
 1. Use for exterior locations, wood-preserved-treated lumber, fire-retardant treated lumber, and where indicated.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 2. Where trusses are exposed to weather, in ground contact, made from pressure-preserved-treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.7 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
1. Use for wood-preservative-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304.
1. Use for exterior locations and where indicated.
- G. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick.[Tie fastens to one side of truss, top plates, and side of stud below.]
- H. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.
- I. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/2 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.
- J. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

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

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.
- B. Protective Coatings: SSPC-Paint 22, epoxy-polyamide primer or SSPC-Paint 16, coal-tar epoxy-polyamide paint.

2.9 FABRICATION

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

2.10 SOURCE QUALITY CONTROL

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses 24 inch o.c.; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Division 06 Section "Rough Carpentry."
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered

borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

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

END OF SECTION 061753

SECTION 06 20 00
FINISH CARPENTRY**PART 1 GENERAL****101 SECTION INCLUDES**

- A. Finish carpentry items.
- B. Wood casings and moldings.

102 RELATED REQUIREMENTS

- A. Section 09 90 00 - Painting and Coatings: Painting and finishing of finish carpentry items.

103 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.

104 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for 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).

105 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

106 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS**201 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. Moldings, Bases, Casings, Sills and Miscellaneous Trim: Poplar; prepare for paint finish.
 - 2. Base Trim: White Oak; prepare for stain finish.
 - 3. Ship Lap: Poplar; prepare for paint finish.

202 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

203 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application.

204 ACCESSORIES

- A. Primer: Alkyd primer sealer.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

205 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**301 EXAMINATION**

- A. Verify adequacy of backing and support framing.

302 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.

303 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.

304 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 41 00
ARCHITECTURAL WOOD CASEWORK**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 12 36 00 - Countertops.

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.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for 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).
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Wood finish samples.
- E. Mockup: Mockup one work station as identified in the drawings.

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 units from moisture damage.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS**2.01 CABINETS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Cabinets: Wood, Custom grade, Painted finish.
- C. Cabinets:
 - 1. Plastic Laminate Cabinet Style: Flush overlay.

202 COUNTERTOPS

- A. Solid Surfacing: Specified in Section 12 36 00.

203 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

204 HARDWARE

- A. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- B. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- C. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
- D. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Commercial grade Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
- E. Hinges: European style concealed self-closing type, steel with polished finish.

205 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Seal cut edges.

PART 3 EXECUTION**301 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

302 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements of custom grade installation.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.

303 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.

304 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Batt insulation in exterior wall construction.
- B. Continuous rigid insulation at roof.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wall framing.
- B. Section 07 41 13 – Metal Roof Panels: Underlayment and roofing.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on installation techniques.

PART 2 PRODUCTS**2.01 APPLICATIONS**

- A. Insulation in Wood Framed Walls: Unfaced batt insulation with no vapor retarder.
- B. Rigid Insulation at roof deck.

2.02 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: R19 flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

2.03 RIGID INSULATION

- A. Type X extruded polystyrene (XPS) rigid foam plastic insulation board, R5 per inch minimum or equal.
- B. R20 minimum to be installed above roof deck.

PART 3 EXECUTION**3.01 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.02 RIGID INSULATION INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.

3.02 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate.

1.02 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- E. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc; 2011.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics and performance criteria.
- C. Shop Drawings: Provide manufacturer's details.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.04 MOCK-UP

- A. Install materials on mock-up in place.

PART 2 PRODUCTS**2.01 WEATHER BARRIER ASSEMBLIES**

- A. Water-Resistive Barrier: Provide on exterior walls on exterior plywood sheathing under cladding.

2.02 WEATHER-AIR BARRIER MATERIALS - WATER VAPOR PERMEABLE AND WATER-RESISTIVE

- A. Weather-Air Barrier Coating: Cold-fluid-applied, vapor permeable, elastomeric waterproofing membrane.
 - 1. Dry Film Thickness (DFT): Per manufacturer's requirements.
 - 2. Air Permeance: 0.001 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
 - 3. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
 - 4. Nail Sealability: No water penetration at galvanized roofing nail penetration under 127 mm (5") head of water after 3 days at 4 C (40 °F), when tested in accordance with ASTM D 1970.
 - 5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 6. Products:
 - a. BASF Corporation; ENERSHIELD-HP: www.enershield.basf.com.
 - a. W.R. Meadows, Inc.; Air-Shield LMP: www.wrmeadows.com/sle.
 - b. Sto Corp; Sto Gold Coat: www.stocorp.com/sle..
 - c. Substitutions: Equal product.

2.03 SEALANTS

- A. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

204 ACCESSORIES

- A. Flexible Flashing: Sheathing fabric saturated with air barrier coating and complying with the applicable requirements of ICC-ES AC148. Provide flexible flashings as recommended by manufacturer.
- B. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION**301 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

302 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

303 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions and follow manufacturer's details.
- B. Coatings:
 - 1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
 - 2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
 - 3. Use flashing to seal to adjacent construction and to bridge joints.
 - 4. **Install mesh and coating to overlap all base metal flashing, window metal flashing and door metal flashing.**
- C. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Mesh and coat all sheathing seams.
 - 2. Coat all fasteners in sheathing.
 - 3. Mesh and coat over all flashings to provide seamless overlap.
 - 4. Coat all openings, sill, jambs and head. Mesh all opening corners.
 - 5. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - 6. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide mesh and coating; do not seal sill flange.
 - 7. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 - 8. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

304 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Architectural roofing system of preformed steel panels.
- B. Fastening system.
- C. Factory finishing.
- D. Accessories and miscellaneous components.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 – Thermal Insulation: Rigid insulation.

1.02 REFERENCE STANDARDS

- A. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- D. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
 - 2. Include structural analysis signed and sealed by qualified structural engineer, indicating conformance of roofing system to IBC 2015 wind loads.
 - 3. Show clip spacing requirements for each roof zone area.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors.
- E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project.
 - 1. Not less than 5 years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 30 year period from date of Substantial Completion.

- C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements, meeting requirements of IBC for wind loads and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Steel Panels:
 - a. Aluminum-zinc alloy-coated steel conforming to ASTM A792/A792M; minimum AZ50 coating.
 - b. Steel Thickness: Minimum 24 gage (0.024 inch).
 - 2. Profile: Standing seam, with minimum 1.5 inch seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: Smooth.
 - 4. Width: Maximum panel coverage of 18 inches.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 PANEL FINISH

- A. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; provide samples of colors noted on the drawings.

2.05 ACCESSORIES AND MISCELLANEOUS ITEMS

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
 - 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.
- D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 - 2. Sheet Thickness: 22 mil (0.022 inch) minimum total thickness.
 - 3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 4. Water Vapor Permeance: 0.067 perm, maximum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).

2.06 FABRICATION

- A. Panels: Fabricate panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

- B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 - 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, trim, moldings, closure strips, and caps.
- C. Install roofing underlayment on roof deck before installing metal roof panels. Install underlayment in accordance with manufacturer's instructions.
- D. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

3.04 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 46 46
FIBER CEMENT SIDING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fiber cement siding.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Siding substrate.
- B. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- C. Section 07 90 05 - Joint Sealers.
- D. Section 09 90 00 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

- A. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Installation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Provide fasteners and fastener pattern to meet code wind requirements.
- C. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- D. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

PART 2 PRODUCTS**2.01 SIDING**

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Smooth.
 - 3. Length: 12 ft, nominal.
 - 4. Width (Height): 8-1/4 inches.
 - 5. Thickness: 5/16 inch, nominal.
 - 6. Finish: Factory applied primer.
 - 7. Warranty: 30 year limited; transferable.
 - 8. Lap Siding Manufacturers:
 - a. James Hardie Building Products, Inc: www.jameshardie.com.
 - b. Substitutions: Product meeting the specifications.
- B. Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
 - 1. Texture: Smooth.

2. Vented: Perforated at soffits.
 3. Length: 96 inches, nominal.
 4. Width: 30 inches.
 5. Thickness: 5/16 inch, nominal.
 6. Finish: Factory applied primer.
 7. Manufacturer: Same as siding.
- C. Trim: 5/4 inch and 3/4 inch thick with smooth face and edges. Sizes as indicated on the drawings. Trim shall have factory applied primer.

201 ACCESSORIES

- A. Trim: Smooth face and edges.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch. Provide fasteners required to meet code wind requirements.
- C. Joint Sealer: As specified in Section 07 90 05.

PART 3 EXECUTION

301 PREPARATION

- A. Examine substrate and clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

302 PREPARATION

- A. Install sheet metal flashing:
 1. Above door and window trim and casings. Provide end dams at all door and window head flashings.
 2. Above horizontal trim in field of siding.
 3. At base of wall.

303 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 2. Use trim details indicated on drawings.
 3. Touch up all field cut edges before installing.
 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-plywood Sheathing: Fasten siding through sheathing into studs.
- C. Allow space for thermal movement between both ends of siding panels that butt against trim, 1/8 inch; seal joint between panel and trim with specified sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- F. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area shown on drawings.
- G. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- H. Prime all siding and trim cut ends with manufacturer approved primer.
- I. Finish Painting: Specified in Section 09 90 00.

304 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 25 00 - Weather Barriers: Coordinate with weather barrier installation.
- C. Section 07 46 46 - Fiber Cement Siding: Flashings associated with fiber cement siding.
- D. Section 07 41 13 – Metal Roof Panels: Flashings associated with metal roofing.
- E. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS**2.01 SHEET MATERIALS**

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage (0.032 inch) thick; plain finish shop pre-coated with modified silicone coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: To match adjacent surfaces.

2.02 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.

- B. Primer: Zinc chromate type.
- C. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.
- D. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.
- E. Sealant: Type specified in Section 07 90 05.
- F. Plastic Cement: ASTM D4586, Type I.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.04 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM), Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Accessories: Profiled to suit gutters and downspouts.
 - 1. Gutter Supports: Brackets.
 - 2. Downspout Supports: Brackets.
- D. Downspout Extenders: Same material and finish as downspouts.
- E. Seal metal joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify window openings door openings, roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

- A. Install pan flashings, head flashings and base flashings in coordination with fluid-applied waterproofing and weather barriers. Provide back dam and end dams at window pan flashing.
- B. Secure flashings in place using concealed fasteners.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.
- F. Secure gutters and downspouts in place using concealed fasteners.
- G. Slope gutters 1/8 inch per 10 feet, minimum.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING**PART 1 GENERAL****SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies.

RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- B. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- C. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2010.
- D. ASTM E2837 - Standard Test Method for Determining Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2011.
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- F. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; 2004.
- G. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

PART 2 PRODUCTS**FIRESTOPPING - GENERAL REQUIREMENTS**

- A. Firestopping: Any material meeting requirements.
- B. Firestopping Materials with Volatile Content: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
- D. Fire Ratings: See Drawings for required wall, floor and roof ratings.

FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

- B. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
- C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

PART 3 EXECUTION**EXAMINATION**

- A. Verify openings are ready to receive the work of this section.

PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

CLEANING

- A. Clean adjacent surfaces of firestopping materials.

PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

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. See Section 01 30 00 - Administrative Requirements, for 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. See Section 01 78 00 - 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. Fiber Cement Exterior Sealant: Elastomeric Joint sealant complying with ASTM C920 Grade NS, Class 25 or Higher or Latex Joint sealant complying with ASTM C834.
 - 1. Color: Match adjacent finished surfaces.
- C. 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.
- D. 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 and fire rated hollow metal frames.
- B. Hollow metal doors.
- C. Thermally insulated hollow metal doors with 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. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- F. 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.
- G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for 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.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

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. Finish: Factory primed, for field finishing.
 - 3. Fire-Rated Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.02 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
 - 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. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Weatherstripping: Separate, see Section 08 71 00.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.04 ACCESSORIES

- A. 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.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

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 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. Coordinate installation of hardware.

3.03 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.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 12 13 - Hollow Metal Frames.
- B. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- B. AWI/AWMACWI (AWS) - Architectural Woodwork Standards; 2014.
- C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Division 01 Specifications for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Specimen warranty.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS**2.01 DOORS**

- A. All Doors:
 - 1. Quality Level: Premium Grade with A grade veneer, in accordance with AWI/AWMACWI Architectural Woodwork Standards.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations .
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252, UL 10B, or UBC Standard 7-2-94 ("neutral pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
 - 3. Wood veneer facing with factory transparent finish .

2.02 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type staved lumber core (SLC), plies and faces as indicated.
- B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.03 DOOR FACINGS

- A. Wood Veneer Facing for Transparent Finish: Natural birch, veneer grade as specified by quality standard, plain sliced, book veneer match, running assembly match; unless otherwise indicated.
 - 1. Vertical Edges: Any option allowed by quality standard for grade.
 - 2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.
- B. Facing Adhesive: Type I - waterproof.

2.04 ACCESSORIES

- A. Glazed Openings:

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
 - 2. Provide solid blocking for other throughbolted hardware.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
 - 1. Exception: Doors to be field finished.
- G. Provide edge clearances in accordance with the quality standard specified.
- H. Doors shall be urea formaldehyde free.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
 - 1. Transparent:

- a. System - 12, Polyurethane, Water-based.
 - b. Stain: Match existing doors.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.08 ACCESSORIES

- A. Hollow Metal Door Frames: As specified in Section 08 12 13.
- B. Glazed Openings:
- 1. Heat-Strengthened and Fully Tempered Glass: ASTM
 - 2. Glazing: Single vision units, 1/4 inch thick glass.
 - 3. Tint: Clear.
- C. Hardware: As specified in Section 08 71 00.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Install door louvers plumb and level.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- H. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, attachment requirements to meet IBC wind load requirements, expansion and contraction joint location and details, and field welding required.
- D. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least 5 years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Aluminum-Framed Storefront and Doors:
 - 1. Kawneer North America: www.kawneer.com.
 - 2. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 - 3. YKK AP America Inc: www.ykkap.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Vertical Mullion Dimensions: Size required to meet wind load required by IBC 2018.
 - 3. Finish: Class I color anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 4. Finish Color: Color noted on the drawings.
 - 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements:
 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of 2015 IBC. See design wind load pressures on the structural drawings.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
 3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
 1. Thickness: 1-3/4 inches.
 2. Top Rail: 5 inches minimum wide.
 3. Vertical Stiles: 5 inches minimum wide.
 4. Bottom Rail: 10 inches minimum wide.
 5. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings and Column Covers: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

2.06 HARDWARE

- A. For each door, include weather stripping, sill sweep strip, and threshold.
- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 1. Finish on Hand-Contacted Items: Stainless Steel.
 2. For each door, include butt hinges, push handle, pull handle, exit device, and closer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware for:
 - a. Swinging doors.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Stile and Rail Wood Doors"
 - d. "Interior Aluminum Doors and Frames"
 - e. "Aluminum-Framed Entrances and Storefronts"
 - f. "Stainless Steel Doors and Frames"
 - g. "Special Function Doors"
 - h. "Entrances"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies

2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 3. UL 1784 - Air Leakage Tests of Door Assemblies
 4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
1. Sequence and Format for the Hardware Schedule
 2. Recommended Locations for Builders Hardware
 3. Key Systems and Nomenclature
- C. NFPA – National Fire Protection Association
1. NFPA 70 – National Electric Code
 2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
 3. NFPA 101 – Life Safety Code
 4. NFPA 105 – Smoke and Draft Control Door Assemblies
 5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
 2. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems

1.03 SUBMITTALS

- A. General:
1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
 2. Prior to forwarding submittal:
 - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
 - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
- B. Action Submittals:
1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Factory order acknowledgement numbers (for warranty and service)
 - d. Name, address, and phone number of local representative for each manufacturer.
 - e. Parts list for each product.
 - f. Final approved hardware schedule edited to reflect conditions as-installed.
 - g. Final keying schedule
 - h. Copies of floor plans with keying nomenclature
 - i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - j. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 - a. Warehousing Facilities: In Project's vicinity.
 - b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - d. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
 - 1) Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:

- a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Certifications:
1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
 2. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
 3. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article, herein for door hardware on doors in an accessible route.
- C. Pre-Installation Meetings
1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Address for delivery of keys.
 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:

- a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Falcon

- 1) SC Series: 10 year mechanical
- 2) Lock: 10 year mechanical

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fasteners
 1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series.
2. Acceptable Manufacturers and Products: Bommer BB series, McKinney TA/T4A series.

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
4. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
5. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.

2.04 ELECTRIC POWER TRANSFER

A. Manufacturers:

- a. Scheduled Manufacturer: Von Duprin EPT-10.
- b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10.

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.05 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.06 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Falcon MA series.
2. Acceptable Manufacturers and Products: Schlage L series, Dorma ML9000 series.

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3 hour fire doors.
2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
3. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

- a. Lever Design: Falcon Dane

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Falcon 24/25 series.
2. Acceptable Manufacturers and Products: Sargent 19-43-GL-80 series, Precision Apex series.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Provide electrified options as scheduled.
12. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.09 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 6000 Series.
2. Acceptable Manufacturers and Products: Folger Adam 300 Series, HES 1006 Series.

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary-resistant.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series.
2. Acceptable Manufacturers and Products: Precision ELR series, Sargent 3500 series.

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: As required by Falcon

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide the following keyway: To be Determined by Owner

C. Construction Keying:

1. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.

2.12 KEYING

- A. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Falcon SC80A series.
2. Acceptable Manufacturers and Products: LCN 1450 series, Norton 8000 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
3. Closer Body: 1-1/4 inch (32 mm) diameter, with 5/8 inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.

8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.14 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide push plates, push bars, pull plates, and pulls with diameter and length as scheduled.

2.15 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.

2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.
2. Acceptable Manufacturers: National Guard, Reese.

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.19 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.20 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage.
2. Acceptable Manufacturers: GE-Interlogix, Sargent.

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.

2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.21 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 2. Continuous Hinges: BHMA 630 (US32D)
 3. Continuous Hinges: BHMA 628 (US28)
 4. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 5. Protection Plates: BHMA 630 (US32D)
 6. Overhead Stops and Holders: BHMA 630 (US32D)
 7. Door Closers: Powder Coat to Match
 8. Wall Stops: BHMA 630 (US32D)
 9. Latch Protectors: BHMA 630 (US32D)
 10. Weatherstripping: Clear Anodized Aluminum
 11. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- H. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
- I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Testing and labeling wires with Architect's opening number.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- L. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- M. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- N. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- O. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- P. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 FIELD QUALITY CONTROL

- A. Engage qualified, independent, Door Hardware Institute (DHI) Certified, Fire Door Assembly Inspector (CFDAI) or Architectural Hardware Consultant (AHC) to perform inspections, prepare inspection reports, and issue inspection reports.
 - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.
 - 2. Representative will inspect fire rated doors and state in report whether installed work complies with NFPA 80.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in

a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

43346 OPT0177235 Version 2

Hardware Group No. HW-01

For use on Door #(s):

101

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	PANIC HARDWARE	CD-25-C-EO	626	FAL
2	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
2	EA	90 DEG OFFSET PULL	8190EZHD 12" STD	630-316	IVE
2	EA	SURFACE CLOSER	SC81A SS	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	MEETING STILE	328AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-226	A	ZER

Hardware Group No. HW-02

For use on Door #(s):

100A 100B

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-MEL-25-C-C-718 24 VDC	626	FAL
1	EA	ELEC PANIC HARDWARE	RX-MEL-25-C-EO 24 VDC	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
2	EA	90 DEG OFFSET PULL	8190EZHD 12" STD	630- 316	IVE
2	EA	SURFACE CLOSER	SC81A SS	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	MEETING STILE	328AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-226	A	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
2	EA	DOOR CONTACT	679-05	WHT	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC	LGR	SCE
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

2. DOOR FUNCTION: DOORS NORMALLY CLOSED AND LOCKED. DOORS MAY BE ELECTRICALLY DOGGED DURING BUSINESS HOURS TO ALLOW FREE ENTRY. AFTER HOURS, PRESENTING VALID CREDENTIAL AT READER WILL RETRACT LATCHBOLT AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS.

3. CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-03

For use on Door #(s):

100C

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	PUSH/PULL BAR	9190EZHD-12"-NO	630- 316	IVE
2	EA	SURFACE CLOSER	SC81A SS	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. HW-04

For use on Door #(s):
102

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	MA301 DG	626	FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. HW-05

For use on Door #(s):
103B 104B 106B

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.
2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.
3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-06

For use on Door #(s):

110 112 114

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.

3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-07

For use on Door #(s):

103A 104A 105A 115

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	MA571L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. HW-08

For use on Door #(s):

107 111 113B

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.
2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.
3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-09

For use on Door #(s):
113A

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.
2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.
3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-010

For use on Door #(s):
106A

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	MA571L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	OH STOP	90S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. HW-011

For use on Door #(s):
125

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	MA101 DG	626	FAL
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. HW-012

For use on Door #(s):
130

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	MA301 DG	626	FAL
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. HW-013

For use on Door #(s):
118

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. HW-014

For use on Door #(s):
121

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	MA561L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. HW-015

For use on Door #(s):
105B

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
5	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	SC81A SS	689	FAL
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.
2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.
3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-016

For use on Door #(s):

119

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	ELECTRIC STRIKE	(PROVIDED AND INSTALLED BY SECURITY PROVIDER)	626	VON
1	EA	SURFACE CLOSER	SC81A SS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

2. DOOR FUNCTION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RELEASE ELECTRIC STRIKE AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.

3. ELECTRIC STRIKE, POWER SUPPLY, CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

Hardware Group No. HW-017

For use on Door #(s):

120 131

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	SURFACE CLOSER	SC81A SS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. HW-018

For use on Door #(s):

117 122 126

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581L DG	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	SURFACE CLOSER	SC81A REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. HW-019

For use on Door #(s):

116A 116B

Provide each door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-MEL-25-R-NL 24 VDC	626	FAL
1	EA	CYLINDER	AS REQUIRED TO MATCH EXISTING		FAL
1	EA	SURFACE CLOSER	SC81A SS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-226	A	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC	LGR	SCE
1	EA	WIRING DIAGRAM	AS REQUIRED		DLR

1. THE HARDWARE SUPPLIER SHALL COORDINATE THE ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.
2. DOOR FUNCTION: DOORS NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL AT READER WILL RETRACT LATCHBOLT AND ALLOW FOR ENTRY. DOOR ALWAYS AVAILABLE FOR FREE EGRESS. KEY OVERRIDE AVAILABLE.
3. CREDENTIALS, READER, AND CONNECTIONS TO THE OWNER'S NETWORK PROVIDED BY ACCESS CONTROL PROVIDER. ALL OTHER WORK PROVIDED BY ELECTRICAL CONTRACTOR.

END OF SECTION

SECTION 08 80 00**GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Sealant and back-up material.
- B. Section 08 14 16 - FLUSH WOOD DOORS: Glazed lites in doors.
- C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- J. GANA (GM) - GANA Glazing Manual; 2009.
- K. GANA (SM) - GANA Sealant Manual; 2008.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples 5 by 5 inch in size of glass units.
- E. Certificates: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Certificate: Certify that the glass meets or exceeds specified requirements.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

- A. Type GL-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
 - 1. Total Thickness: 1-5/16 inch.
 - 2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Bronze.
 - b. Coating: Low-E type, on #2 surface.
 - 3. 1/2 inch air space.
 - 4. Inboard Lite: Laminated float glass, 9/16 inch thick, minimum.
 - a. Outboard Lite: Class 1 (clear) float glass, 1/4" thick, minimum.
 - b. Interlayer: 0.060 Salflex HP by Solutia or equal.
 - c. Inboard Lite: Class 1 (clear) float glass, 1/4" thick, minimum.
 - d. Tint: Clear.
 - 5. Total Thickness: 1-5/16 inch.
 - 6. Total Solar Heat Gain Coefficient:.34 percent, nominal.
 - 7. Glazing Method: standard with manufacturer to meet impact/wind requirements.
- B. Type GL-2 - Sealed Insulating Glass Units: Vision glass, double glazed.
 - 1. Total Thickness: 1-5/16 inch.
 - 2. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Bronze.
 - b. Coating: Low-E type, on #2 surface.
 - 3. 1/2 inch air space.
 - 4. Inboard Lite: Laminated float glass, 9/16 inch thick, minimum.
 - a. Outboard Lite: Class 1 (clear) float glass, 1/4" thick, minimum.
 - b. Interlayer: 0.060 Salflex HP by Solutia or equal.
 - c. Inboard Lite: Class 1 (clear) float glass, 1/4" thick, minimum.
 - d. Tint: Clear.
 - 5. Total Thickness: 1-5/16 inch.
 - 6. Total Solar Heat Gain Coefficient:.34 percent, nominal.
 - 7. Glazing Method: standard with manufacturer to meet impact/wind requirements.

2.02 GLAZING UNITS

- A. Type GL-3 - Single Exterior Vision Glazing:
 - 1. Type: Laminated fully tempered float glass.
 - 2. Tint: Clear.
 - 3. Thickness: 9/16 inch.
 - 4. Glazing Method: standard with manufacturer to meet wind requirements.

2.03 EXTERIOR GLAZING ASSEMBLIES

- A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: In accordance with applicable codes. See structural drawings for design pressures.
 - 2. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
 - 3. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
 - 4. Glass thicknesses listed are minimum.
- B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
 - 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.04 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
 - 3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
 - 4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - 1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
 - 2. Plastic Interlayer:
 - a. Polyvinyl Butyral (PVB) Interlayer: 0.060 inch thick, minimum.
 - b. Ionoplast Interlayer: 0.060 inch thick, minimum.

2.05 SEALED INSULATING GLASS UNITS

- A. Sealed Insulating Glass Units: Types as indicated.
 - 1. Application: Exterior, except as otherwise indicated.
 - 2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 3. Edge Spacers: Aluminum, bent and soldered corners.
 - 4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 5. Edge Seal Color: Black.
 - 6. Purge interpane space with dry hermetic air.

2.06 GLAZING COMPOUNDS

- A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.07 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; Black color.
- E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- E. Trim protruding tape edge.

3.05 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
 - 1. Place glazing tape on glazing pane of unit with tape flush with sight line.
- F. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
- G. Fill gap between glazing and stop with manufacturer's recommended type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
- H. Apply cap bead of manufacturer's recommended type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INSTALLATION - EXTERIOR WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- C. Fill gaps between glazing and stops with manufacturer's recommended type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.07 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.08 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.09 SCHEDULE

- A. See Drawings

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Acoustic insulation.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- 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.
- F. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- H. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum years of experience, with minimum 3 years of documented experience.

PART 2 PRODUCTS**2.01 BOARD MATERIALS**

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. At Assemblies with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
- B. Backing Board for Wall Tile: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 - 1. Application: Walls at bathrooms.
 - 2. Thickness: 5/8 inch.
 - 3. Edges: Tapered.

2.02 ACCESSORIES

- A. Acoustic Insulation: 1; preformed glass fiber, friction fit type, unfaced. Thickness: 3 1/2 inch.
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for

project conditions.

1. Tape: 2 inch wide, coated glass fiber tape for joints and corners.
 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 3. Ready-mixed vinyl-based joint compound.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

PART 3 EXECUTION

301 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

302 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install as follows:
1. Place continuous bead at base and top of wall on both sides of wall.
 2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

303 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Installation on Wood Framing: For non-rated assemblies, install as follows:
1. Single-Layer Applications: Screw attachment.

304 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

305 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.

306 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 30 00
TILING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic trim.
- D. Non-ceramic trim.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
- D. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- E. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- F. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
- G. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
- H. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- I. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Revised)
- J. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- K. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Samples: Provide sample of each type of tile.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS**2.01 TILE**

- A. Floor tile, tile base, wall tile and grout color as scheduled on the drawings.

2.02 TRIM AND ACCESSORIES

- A. Trim: Matching trim ceramic shapes in sizes coordinated with field tile.
 - 1. Manufacturers: Same as for tile.
- B. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Transition between floor finishes.
 - d. Thresholds at door openings.
 - e. Floor/wall intersection
 - f. Outsides corners, Inside corners
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com.

2.03 SETTING MATERIALS

- A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
 - 1. Products:
 - a. ARDEX Engineered Cements; ARDEX N 23 MICROTEC: www.ardexamericas.com.
 - b. AVM Industries, Inc; Thin-Set 780: www.avmindustries.com.
 - c. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com/#sle.
 - d. Substitutions: Equal or better products are acceptable.

2.04 GROUTS

- A. Standard Grout: ANSI A118.6 standard cement grout.
 - 1. Applications: Use this type of grout where indicated .
 - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 - 3. Color(s): As selected by Architect from manufacturer's full line.

2.05 THIN-SET ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
 - 1. Thickness: 20 mils, maximum.
 - 2. Crack Resistance: No failure at 1/16 inch gap, minimum.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of

setting materials to sub-floor surfaces.

- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile off center line of room in both directions. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles square.
- F. Install Schuler profiles in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout.

3.05 INSTALLATION - WALL TILE

- A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Samples: Submit two samples 6" by 6" inch in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 6" inches long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS**2.01 ACOUSTICAL UNITS**

- A. Manufacturers:
 - 1. USG: www.usg.com.
 - 2. Armstrong: www.armstrongceilings.com
 - 3. Substitutions: Permitted if products meet the requirements of this specification.
- B. ACT-1 Acoustical Units – Mars High-NRC SLT 87200 by USG.
 - 1. Size: 24 by 24 inches.
 - 2. Thickness: 1 inches.
 - 3. Edge: Beveled.
 - 4. Surface Color: White.

2.02 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with clips, splices, and perimeter moldings as required.
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Install suspension system in accordance with ASTM E 580 for Areas Subject to Severe Severe Seismic Disturbance.
- C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- D. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
 - 2. Double cut and field paint exposed reveal edges.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

**SECTION 09 65 00
RESILIENT FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Concrete Testing Standard: Submit a copy of ASTM F710.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

PART 2 PRODUCTS**2.01 TILE FLOORING**

- A. High Performance Luxury Vinyl Tile.
 - 1. Manufacturer: Mohawk Group
 - a. Hot & Heavy Collection.
 - b. See drawings for color selections
 - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 3. Plank Size: 9 inches x 59 inches
 - 4. Wear Layer Thickness: 20 mil
 - 5. Total Thickness: 5mm

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and as follows:
 - 1. Height: 4 inch.
 - 2. Thickness: 0.125 inch thick.
 - 3. Finish: Satin.
 - 4. Color: Color as selected from manufacturer's standards.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Adhesives: Type recommended by flooring manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Luxury vinyl flooring shall be installed with adhesive. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

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.
- C. Scope: Finish all exterior and interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- 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. Glass.
 - 6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 07 46 46 - Fiber Cement Siding: Factory applied primer for siding, trim and soffit panels.

1.03 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 D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- 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.

1.07 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. 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.
- C. Substitutions: See Section 01 60 00 - Product Requirements.

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. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. 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.
 - 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.
- C. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint WE-OP-3L - Fiber Cement siding, trim, soffits and ceilings, Opaque, Latex, 3 Coat:
 - 1. One coat of factory applied primer sealer.
 - 2. Semi-gloss: Two coats of latex enamel.
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Semi-gloss: Two coats of latex enamel.

2.04 PAINT SYSTEMS - INTERIOR

- A. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
 - 1. One coat of latex primer sealer.
 - 2. Semi-gloss: Two coats of latex enamel.
- B. Paint WI-TR-VS - Wood, Transparent, Varnish, Stain:
 - 1. One coat of stain.
 - 2. One coat of sealer.
 - 3. Satin: One coat of varnish
- C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:

1. One coat of latex primer.
 2. Semi-gloss: Two coats of latex enamel.
- D. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with latex primer.
 2. Semi-gloss: Two coats of latex enamel.
- E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of alkyd primer sealer.
 2. Satin: Two coats of latex enamel; Walls.
 3. Flat: Two coats of latex enamel; Ceilings.

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. Test shop-applied primer for compatibility with subsequent cover materials.
- E. 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. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 3. Exterior 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. 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.
- H. 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.
- I. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- J. Exterior Wood/Fiber Cement Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before

installation.

3.03 APPLICATION

- A. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- B. Apply products in accordance with manufacturer's instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface
- I. 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.

END OF SECTION

SECTION 10 21 13
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 10 28 00 - Toilet Accessories.

1.03 REFERENCE STANDARDS

- A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- D. Samples: Submit two samples of partition panels, 6 by 6 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Scranton Products: Hiny Hiders Bathroom Partitions.
 - 2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted unbraced.
 - 1. Color: As noted on the drawings.
- B. Doors:
 - 1. Thickness: 1 inch.
 - 2. Width: 24 inch.
 - 3. Width for Handicapped Use: 36 inch, out-swinging.
 - 4. Height: 55 inch.
- C. Panels:
 - 1. Thickness: 1 inch.
 - 2. Height: 55 inch.
- D. Pilasters:
 - 1. Thickness: 1 inch.
 - 2. Width: As required to fit space; minimum 3 inch.

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with satin finish, 3 inch high, concealing floor fastenings.
- B. Pilaster Brackets: Satin stainless steel.

- C. Wall Brackets: Continuous type, satin stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
- E. Hardware: Satin stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

**SECTION 10 28 00
TOILET ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Utility room accessories.
- C. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed blocking support.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- C. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.02 FINISHES

- A. Stainless Steel: No. 4 Brushed finish.

2.03 COMMERCIAL TOILET ACCESSORIES

- A. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
- B. See drawings for other toilet accessories.

2.04 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
 - 1. Holders: 3 spring-loaded rubber cam holders.
 - 2. Length: 24 inches.

Taxpayer Service Center

3. Products:
 - a. Bobrick; B-233.
 - b. Substitutions: Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

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. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Product Data: Provide extinguisher operational features.
- E. 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.
 - 5. Temperature range: Minus 40 degrees F to 120 degrees F.

2.02 FIRE EXTINGUISHER CABINETS

- A. Cabinet Configuration: Recessed type.
 - 1. Size to accommodate accessories.
 - 2. Trim: Flat square edge, with 1 1/2 inch max. wide face.
 - 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- B. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.
- C. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- D. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- E. Weld, fill, and grind components smooth.
- F. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.

- G. Finish of Cabinet Interior: White colored enamel.

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

SECTION 12 36 00
COUNTERTOPS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.
- B. Section 22 40 00 – Plumbing Fixtures: Under mount sinks.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. IAPMO Z124 - Plastic Plumbing Fixtures; 2012.
- C. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS**2.01 COUNTERTOPS**

- A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting self-supporting over structural members.
 - 1. Flat Sheet Thickness: 1/2 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - c. Color and Pattern: As indicated on drawings.
 - 3. Other Components Thickness: 1/2 inch, minimum.

4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; radiused edge.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

2.02 MATERIALS

- A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- B. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
 1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

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

- designation 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 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 and hot water return 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.

2.07 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.

3.09 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 Supply and Return:
1. Above grade: Indoor Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 2. Underslab: Indoor Insulation shall be the following:
 - a. Flexible Elastomeric: 1 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 devices.
 - 6. Outlet Boxes

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. 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.

2.08 SPECIALTY VALVES

- A. Comply with requirements for general-duty metal valves in Section 220523 "General-Duty Valves for Plumbing Piping."

2.09 OUTLET BOXES

- A. Icemaker Outlet Boxes:
 - 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. IPS Corporation.
 - b. LSP Products Group, Inc.
 - c. Oatey.
 - 2. Mounting: Recessed.
 - 3. Material and Finish: Enameled-steel, epoxy-painted-steel, or PVC box and faceplate.
 - 4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
 - 5. Supply Shutoff Fitting: NPS 1/2 ball valve and NPS 1/2 copper, water tubing.

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. Reduced-pressure-principle backflow preventers.
 3. Dual-check-valve backflow preventers.
 4. 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."

3.04 FIELD QUALITY CONTROL

- B. Perform the following tests and inspections:
 1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- C. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.05 ADJUSTING

- E. Set field-adjustable pressure set points of water pressure-reducing valves.
- F. Set field-adjustable flow set points of balancing valves.
- G. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

**SECTION 22 13 16
SANITARY WASTE AND VENT PIPING****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 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 223300
ELECTRIC, DOMESTIC-WATER HEATERS**PART 1 - GENERAL****RELATED DOCUMENTS**

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

1.01 SUMMARY

- A. Section Includes:
 - 1. Commercial, electric, storage, domestic-water heaters.
 - 2. Domestic-water heater accessories.

1.02 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 3. 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."

1.03 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.04 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For commercial domestic-water heaters, 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. 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. Product Certificates: For each type of electric, domestic-water heater, from manufacturer.
- C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Warranty: Sample of special warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components – Health Effects."

1.07 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Electric, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Three years.
 - 2) Controls and Other Components: Three years.
 - b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.01 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

- A. Commercial, Electric, Storage, Domestic-Water Heaters:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Lochinvar Corporation.
 - b. PVI Industries, LLC.
 - c. Rheem Manufacturing Company.
 - d. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 - e. State Industries.
 - 2. Standard: UL 1453.
 - 3. Storage-Tank Construction: ASME-code, steel vertical arrangement.
 - a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - b. Pressure Rating: 150 psig.
 - c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - 4. Factory-Installed Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - c. Insulation: Comply with ASHRAE/IESNA 90.1.
 - d. Jacket: Steel with enameled finish.

- e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - f. Temperature Control: Adjustable thermostat.
 - g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
5. Special Requirements: NSF 5 construction.
- B. Capacity and Characteristics: See drawings.

2.02 DOMESTIC-WATER HEATER ACCESSORIES

- A. Domestic-Water Compression Tanks:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL Inc.
 - b. Honeywell International Inc.
 - c. Pentair Pump Group (The); Myers.
 - d. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 - e. State Industries.
 - f. Taco, Inc.
 - 2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 - 3. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
 - 4. Capacity and Characteristics:
 - a. Working-Pressure Rating: 150 psig.
 - b. Air Precharge Pressure: same as piping static pressure.
- B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
- D. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- F. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- G. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.03 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION**3.01 DOMESTIC-WATER HEATER INSTALLATION**

- A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base.
 - 1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 - 2. Maintain manufacturer's recommended clearances.
 - 3. Arrange units so controls and devices that require servicing are accessible.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 8. Anchor domestic-water heaters to substrate.
- B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- D. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- F. Install water-heater drain piping as indirect waste to spill by positive air gap into service sink. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."
- G. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.
- H. Fill electric, domestic-water heaters with water.
- I. Charge domestic-water compression tanks with air.

3.02 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.03 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.04 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.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain electric, domestic-water heaters.

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 23 05 10
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.

END OF SECTION

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

**SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC 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 general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.03 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 PRODUCTS**2.01 GENERAL MOTOR REQUIREMENTS**

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. Comply with IEEE 841 for severe-duty motors.

2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.04 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.05 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 EXECUTION (Not Applicable)**END OF SECTION**

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

**SECTION 23 05 29
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.

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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.

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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.

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

- 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.

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- 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.

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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:

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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:

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- 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.

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- 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 23 05 53
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

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

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.

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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 23 05 93
TESTING, ADJUSTING, AND BALANCING 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. Balancing Air Systems:
 - a. Constant-volume air systems.

1.03 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.05 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB, or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB, or TABB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.
- B. TAB Conference: Meet with Architect, Owner, Construction Manager, or Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

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1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect, Owner, Construction Manager, or Commissioning Authority.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.06 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.07 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, as specified in

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Section 233113 "Metal Ducts" Section 233116 "Nonmetal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

- F. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine operating safety interlocks and controls on HVAC equipment.
- M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Isolating and balancing valves are open and control valves are operational.
 - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near

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- the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
- d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 6. Obtain approval from Architect, Owner, Construction Manager, or Commissioning Authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.06 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.

7. Starter thermal-protection-element rating.

3.07 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.08 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each electric heating coil:
 1. Nameplate data.
 2. Airflow.
 3. Entering- and leaving-air temperature at full load.
 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 5. Calculated kilowatt at full load.
 6. Fuse or circuit-breaker rating for overload protection.
- B. Measure, adjust, and record the following data for each refrigerant coil:
 1. Dry-bulb temperature of entering and leaving air.
 2. Wet-bulb temperature of entering and leaving air.
 3. Airflow.
 4. Air pressure drop.
 5. Refrigerant suction pressure and temperature.

3.09 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.

3.10 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop

Drawings and product data.

- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fan performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Settings for supply-air, static-pressure controller.
 - g. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Terminal units.
 4. Balancing stations.
 5. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.

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- d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
- a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outdoor-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.
- F. Apparatus-Coil Test Reports:
1. Coil Data:
- a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
2. Test Data (Indicated and Actual Values):
- a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Refrigerant expansion valve and refrigerant types.
 - i. Refrigerant suction pressure in psig.
 - j. Refrigerant suction temperature in deg F.
 - k. Inlet steam pressure in psig.
- G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
1. Unit Data:
- a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Air flow rate in cfm.
 - i. Face area in sq. ft..
 - j. Minimum face velocity in fpm.
2. Test Data (Indicated and Actual Values):

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- a. Heat output in Btu/h.
 - b. Air flow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
- 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- I. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
- 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- J. System-Coil Reports: For reheat coils include the following:
- 1. Unit Data:
 - a. System and air-handling-unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
 - 2. Test Data (Indicated and Actual Values):

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- a. Air flow rate in cfm.
 - b. Entering-air temperature in deg F.
 - c. Leaving-air temperature in deg F.
- K. Instrument Calibration Reports:
- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.12 INSPECTIONS

- A. Initial Inspection:
- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect, Owner, Construction Manager, or Commissioning Authority.
 - 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Architect, Owner, Construction Manager, or Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 - 3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 - 4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
- 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

**SECTION 23 07 13
DUCT 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 duct services:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, concealed return located in unconditioned space.
 - 3. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
- B. Related Sections:
 - 1. Section 230719 "HVAC Piping Insulation."
 - 2. Section 233113 "Metal Ducts" for duct liners.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.06 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.

1.07 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.08 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS**2.01 INSULATION MATERIALS**

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket or Type III with factory-applied FSP jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; SoftTouch Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Friendly Feel Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; SOFTR All-Service Duct Wrap.
- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. CertainTeed Corp.; Commercial Board.
- b. Fibrex Insulations Inc.; FBX.
- c. Johns Manville; 800 Series Spin-Glas.
- d. Knauf Insulation; Insulation Board.
- e. Manson Insulation Inc.; AK Board.
- f. Owens Corning; Fiberglas 700 Series.

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. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H.B. Fuller Company; 85-60/85-70.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).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.Mon-Eco Industries, Inc.; 22-25.
 - 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).
 - 3. Adhesive 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."

2.03 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, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.
 - 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, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-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. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. Eagle Bridges - Marathon Industries; 570.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 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 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
 - b. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.05 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges - Marathon Industries; 405.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
 - c. 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).
 7. Sealants 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."

2.06 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. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.07 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas No. 5.
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
 - b. Vimasco Corporation; Elastafab 894.

2.08 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.09 TAPES

- A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

- A. Bands:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.
 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:
1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- or 0.135-inch- diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- or 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CHP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
 3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low-carbon steel, Aluminum, Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) GEMCO; Nylon Hangers.
 - 2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
 - b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
 - c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
 - 2) GEMCO; Peel & Press.
 - 3) Midwest Fasteners, Inc.; Self Stick.
 - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low-carbon steel, Aluminum, Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive-backed base with a peel-off protective cover.
6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel, aluminum, stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - 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) GEMCO.
 - 2) Midwest Fasteners, Inc.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy, 0.062-inch soft-annealed, stainless steel, or 0.062-inch soft-annealed, galvanized steel.
 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. C & F Wire.

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.

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 ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on

- anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.04 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
1. Comply with requirements in Section 078413 "Penetration Firestopping" firestopping and fire-resistive joint sealers.

3.05 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

- b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a

continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
- b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.06 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "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. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

3.07 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. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.08 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. All supply, return, and outdoor air.
 - 2. Where energy recovery wheel is present, environmental air exhaust to the wheel.
 - 3. Exhaust between isolation damper and penetration of building exterior.

- B. Items Not Insulated:
 - 1. Fibrous-glass ducts.
 - 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums and casings.
 - 5. Flexible connectors.
 - 6. Vibration-control devices.
 - 7. Factory-insulated access panels and doors.
 - 8. Environmental air exhaust where energy recovery wheel is not present
 - 9. Where energy recovery wheel is present, environmental air exhaust after the wheel.

3.09 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed supply, return, and outdoor-air duct and plenum insulation shall be the following:
 - 1. Mineral-Fiber Blanket: 2.2 inches thick and 0.75-lb/cu. ft. nominal density.

- B. Exposed supply, return, and outdoor-air duct in Utility and/or Spaces Below 8' Above Finished Floor, insulation shall be the following:
 - 1. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.

END OF SECTION

**SECTION 23 07 19
HVAC 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 HVAC piping systems:
 - 1. Condensate drain piping, indoors and outdoors.
 - 2. Refrigerant suction and hot-gas piping, indoors and outdoors.
- B. Related Sections:
 - 1. Section 230713 "Duct Insulation."

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail attachment and covering of heat tracing inside insulation.
 - 3. Detail insulation application at pipe expansion joints for each type of insulation.
 - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 5. Detail removable insulation at piping specialties.
 - 6. Detail application of field-applied jackets.
 - 7. Detail application at linkages of control devices.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.06 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.

1.07 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.08 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS**2.01 INSULATION MATERIALS**

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. 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, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

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 Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; 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).
3. Adhesive 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."

2.03 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, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.
 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, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-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. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. Eagle Bridges - Marathon Industries; 570.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 5. Color: White.

2.04 SEALANTS

- A. Joint Sealants:

- B. FSK and Metal Jacket Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. 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).
 - 7. Sealants 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 SECUREMENTS

- A. Bands:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
 - 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
 - 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
 - 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

- C. Wire: 0.080-inch nickel-copper alloy, 0.062-inch soft-annealed, stainless steel, or 0.062-inch soft-annealed, galvanized steel].
 - 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. C & F Wire.

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.
 - 3. 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. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. 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. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - 6. Cleanouts.

3.04 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 Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. 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.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. 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 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC

- covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

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 FINISHES

- A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "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.

3.08 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. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.09 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

- A. Condensate and Equipment Drain Water below 60 Deg F:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
- B. Refrigerant Suction and Hot-Gas Piping/tubing:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.

3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping/tubing:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 2 inches thick.

3.12 OUTDOOR, EXPOSED, 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. Aluminum, with Z-Shaped Locking Seam: 0.040 inch thick.

END OF SECTION

**SECTION 23 23 00
REFRIGERANT 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. This Section includes refrigerant piping used for air-conditioning applications.

1.03 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
1. Suction Lines for Air-Conditioning Applications: 300 psig.
 2. Suction Lines for Heat-Pump Applications: 535 psig.
 3. Hot-Gas and Liquid Lines: 535 psig.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:
1. Thermostatic expansion valves.
 2. Solenoid valves.
 3. Hot-gas bypass valves.
 4. Filter dryers.
 5. Strainers.
 6. Pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
1. Shop Drawing Scale: 1/4 inch equals 1 foot.
 2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.05 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.08 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.09 COORDINATION

- A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

PART 2 PRODUCTS**2.01 COPPER TUBE AND FITTINGS**

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

2.02 VALVES AND SPECIALTIES

- A. Diaphragm Packless Valves:
 - 1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 - 2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 - 3. Operator: Rising stem and hand wheel.
 - 4. Seat: Nylon.
 - 5. End Connections: Socket, union, or flanged.
 - 6. Working Pressure Rating: 500 psig.
 - 7. Maximum Operating Temperature: 275 deg F.
- B. Packed-Angle Valves:
 - 1. Body and Bonnet: Forged brass or cast bronze.
 - 2. Packing: Molded stem, back seating, and replaceable under pressure.
 - 3. Operator: Rising stem.
 - 4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
 - 5. Seal Cap: Forged-brass or valox hex cap.
 - 6. End Connections: solder
 - 7. Working Pressure Rating: 500 psig.
 - 8. Maximum Operating Temperature: 275 deg F.
- C. Check Valves:
 - 1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
 - 2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
 - 3. Piston: Removable polytetrafluoroethylene seat.
 - 4. Closing Spring: Stainless steel.
 - 5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
 - 6. End Connections: solder
 - 7. Maximum Opening Pressure: 0.50 psig.
 - 8. Working Pressure Rating: 500 psig.
 - 9. Maximum Operating Temperature: 275 deg F.

- D. Service Valves:
1. Body: Forged brass with brass cap including key end to remove core.
 2. Core: Removable ball-type check valve with stainless-steel spring.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: Copper spring.
 5. Working Pressure Rating: 500 psig.
- E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
1. Body and Bonnet: Plated steel.
 2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: solder
 5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 115 or 208-V ac coil.
 6. Working Pressure Rating: 400 psig.
 7. Maximum Operating Temperature: 240 deg F.
 8. Manual operator.
- F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 2. Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Seat Disc: Polytetrafluoroethylene.
 4. End Connections: solder
 5. Working Pressure Rating: 400 psig.
 6. Maximum Operating Temperature: 240 deg F.
- G. Thermostatic Expansion Valves: Comply with ARI 750.
1. Body, Bonnet, and Seal Cap: Forged brass or steel.
 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Packing and Gaskets: Non-asbestos.
 4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 5. Suction Temperature: 40 deg F.
 6. Superheat: Adjustable.
 7. Reverse-flow option (for heat-pump applications).
 8. End Connections: solder
 9. Working Pressure Rating: 700 psig, 450 psig.
- H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Packing and Gaskets: Non-asbestos.
 4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 5. Seat: Polytetrafluoroethylene.
 6. Equalizer: External.
 7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 115 or 208-V ac coil.
 8. End Connections: Socket.
 9. Set Pressure
 10. Throttling Range: Maximum 5 psig.
 11. Working Pressure Rating: 500 psig.
 12. Maximum Operating Temperature: 240 deg F.
- I. Straight-Type Strainers:
1. Body: Welded steel with corrosion-resistant coating.
 2. Screen: 100-mesh stainless steel.

3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 deg F.
- J. Angle-Type Strainers:
 1. Body: Forged brass or cast bronze.
 2. Drain Plug: Brass hex plug.
 3. Screen: 100-mesh monel.
 4. End Connections: Socket or flare.
 5. Working Pressure Rating: 500 psig.
 6. Maximum Operating Temperature: 275 deg F.
- K. Moisture/Liquid Indicators:
 1. Body: Forged brass.
 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 3. Indicator: Color coded to show moisture content in ppm.
 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 5. End Connections: Socket or flare.
 6. Working Pressure Rating: 500 psig.
 7. Maximum Operating Temperature: 240 deg F.
- L. Replaceable-Core Filter Dryers: Comply with ARI 730.
 1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated alumina or charcoal.
 4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: 2 psig.
 8. Rated Flow:
 9. Working Pressure Rating: 500 psig.
 10. Maximum Operating Temperature: 240 deg F.
- M. Permanent Filter Dryers: Comply with ARI 730.
 1. Body and Cover: Painted-steel shell.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated alumina or charcoal.
 4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: 2 psig.
 8. Rated Flow:
 9. Working Pressure Rating: 500 psig.
 10. Maximum Operating Temperature: 240 deg F.
- N. Mufflers:
 1. Body: Welded steel with corrosion-resistant coating.
 2. End Connections: Socket or flare.
 3. Working Pressure Rating: 500 psig.
 4. Maximum Operating Temperature: 275 deg F.
- O. Receivers: Comply with ARI 495.
 1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

2. Comply with UL 207; listed and labeled by an NRTL.
 3. Body: Welded steel with corrosion-resistant coating.
 4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
 5. End Connections: solder
 6. Working Pressure Rating: 500 psig.
 7. Maximum Operating Temperature: 275 deg F.
- P. Liquid Accumulators: Comply with ARI 495.
1. Body: Welded steel with corrosion-resistant coating.
 2. End Connections: solder
 3. Working Pressure Rating: 500 psig.
 4. Maximum Operating Temperature: 275 deg F.

2.03 REFRIGERANTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Atofina Chemicals, Inc.
 2. DuPont Company; Fluorochemicals Div.
 3. Honeywell, Inc.; Genetron Refrigerants.
 4. INEOS Fluor Americas LLC.
- C. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 EXECUTION

3.01 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines for Conventional Air-Conditioning Applications: Copper, Type K, drawn-temper tubing and wrought-copper fittings with soldered joints.
- B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type K, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- C. Safety-Relief-Valve Discharge Piping: Copper, Type K, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.02 VALVE AND SPECIALTY APPLICATIONS

- A. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor.
- B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Except as otherwise indicated, install diaphragm packless or packed-angle valves on inlet and outlet side of filter dryers.
- E. Install a full-sized, three-valve bypass around filter dryers.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
1. Install valve so diaphragm case is warmer than bulb.
 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb

- straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
 - I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
 - J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 1. Solenoid valves.
 2. Thermostatic expansion valves.
 3. Hot-gas bypass valves.
 4. Compressor.
 - K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
 - L. Install receivers sized to accommodate pump-down charge.
 - M. Install flexible connectors at compressors.

3.03 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 Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Refer to Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.
- K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access

doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

- M. Install refrigerant piping in protective conduit where installed belowground.
- N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- O. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:
 - 1. Shot blast the interior of piping.
 - 2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
 - 3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
 - 4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
 - 5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
 - 6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.
- R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- S. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."
- T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.04 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

- D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
- F. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.05 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feetlong.
 - 2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 - 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.
- D. Support multifloor vertical runs at least at each floor.

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Comply with ASME B31.5, Chapter VI.
 - 2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 - 3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.

- c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
- d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.07 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 - 4. Charge system with a new filter-dryer core in charging line.

3.08 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

**SECTION 233113
METAL DUCTS****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. Single-wall rectangular ducts and fittings.
 2. Single-wall round ducts and fittings.
 3. Sheet metal materials.
 4. Duct liner.
 5. Sealants and gaskets.
 6. Hangers and supports.
 7. Seismic-restraint devices.
- B. Related Sections:
1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7. And SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
 2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
 3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
1. Liners and adhesives.
 2. Sealants and gaskets.
 3. Seismic-restraint devices.
- B. Shop Drawings:
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Factory- and shop-fabricated ducts and fittings.
 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
 4. Elevation of top of ducts.
 5. Dimensions of main duct runs from building grid lines.
 6. Fittings.
 7. Reinforcement and spacing.

8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.
 5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- B. Welding certificates.
- C. Field quality-control reports.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS**2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS**

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 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. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in

SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- E. Snap lock type duct can be used for low pressure applications.

2.03 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 or G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 or G90.
 - 2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil thick on opposite surface.
 - 3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.
- D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- F. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- G. Factory- or Shop-Applied Antimicrobial Coating:
 - 1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
 - 2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - 3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
 - 4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 5. Shop-Applied Coating Color: Black or White.
 - 6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.
- H. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- I. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.04 DUCT LINER

- A. Fibrous-Glass Duct Liner is not allowed.
- B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 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. Aeroflex USA Inc.
 - b. Armacell LLC.
 - c. Rubatex International, LLC
 - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. 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).
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel, aluminum, or stainless steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- D. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
 - 1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - 3. Butt transverse joints without gaps, and coat joint with adhesive.
 - 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 - 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 - 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
 - 7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 - 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.

- c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
- 9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
- 10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.05 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 4 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Solvent-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Base: Synthetic rubber resin.
 - 3. Solvent: Toluene and heptane.
 - 4. Solids Content: Minimum 60 percent.
 - 5. Shore A Hardness: Minimum 60.
 - 6. Water resistant.
 - 7. Mold and mildew resistant.
 - 8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

9. VOC: Maximum 395 g/L.
 10. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 11. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
 12. Service: Indoor or outdoor.
 13. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- E. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.
 3. Grade: NS.
 4. Class: 25.
 5. Use: O.
 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- G. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.06 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.07 SEISMIC-RESTRAINT DEVICES

- 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.; a division of Cooper Industries.
 2. Ductmate Industries, Inc.
 3. Hilti Corp.
 4. Kinetics Noise Control.
 5. Loos & Co.; Cableware Division.
 6. Mason Industries.
 7. TOLCO; a brand of NIBCO INC.
 8. Unistrut Corporation; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service, the Office of Statewide Health Planning and Development for the State of California, or an agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- D. Restraint Cables: ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 EXECUTION

3.01 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 - 3. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 - 4. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 5. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 6. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 7. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 - 8. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 9. Conditioned Space, Return-Air Ducts: Seal Class C.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.05 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems." ASCE/SEI 7.
 - 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service, the Office of Statewide Health Planning and Development for the State of California, an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

- G. Drilling for and Setting Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect 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. Set anchors to manufacturer's recommended torque, using a torque wrench.
 5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.06 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.07 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.08 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Supply Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - c. Return Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - d. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - e. Outdoor Air Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

4. Test for leaks before applying external insulation.
 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 6. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
1. Visually inspect duct system to ensure that no visible contaminants are present.
 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.09 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.
 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces

- without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 6. Provide drainage and cleanup for wash-down procedures.
 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.
- B. Supply Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 2. Ducts Connected to Constant-Volume Air-Handling Units:
 - a. Pressure Class: Positive 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- C. Return Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 3.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- D. Exhaust Ducts:
 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.

- d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - 2. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
 - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
 - 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 3.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- F. Intermediate Reinforcement:
 - 1. Galvanized-Steel Ducts: Galvanized steel.
 - 2. PVC-Coated Ducts:
 - a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: Match duct material.
 - 3. Stainless-Steel Ducts:
 - a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: Match duct material.
 - 4. Aluminum Ducts: Aluminum.
- G. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

- c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or Welded.
- H. Branch Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 - 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION

**SECTION 23 33 00
AIR DUCT ACCESSORIES****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. Backdraft and pressure relief dampers.
 2. Barometric relief dampers.
 3. Manual volume dampers.
 4. Control dampers.
 5. Flange connectors.
 6. Remote damper operators.
 7. Duct-mounted access doors.
 8. Flexible connectors.
 9. Flexible ducts.
 10. Duct accessory hardware.
- B. Related Requirements:
1. Section 283111 "Digital, Addressable Fire-Alarm System" for duct-mounted fire and smoke detectors.
 2. Section 283112 "Zoned (DC-Loop) Fire-Alarm System" for duct-mounted fire and smoke detectors.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Wiring Diagrams: For power, signal, and control wiring.

1.04 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS**2.01 ASSEMBLY DESCRIPTION**

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated.

Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and exposed ducts.
- C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 MANUAL VOLUME DAMPERS

- A. Standard, Aluminum, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. McGill AirFlow LLC.
 - d. Nailor Industries Inc.
 - e. Pottorff.
 - f. Ruskin Company.
 - g. Trox USA Inc.
 - h. Vent Products Company, Inc.
 - 2. Standard leakage rating, with linkage outside airstream.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 - e. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 - 6. Blade Axles: Galvanized steel.
 - 7. Bearings:
 - a. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 8. Tie Bars and Brackets: Aluminum.
- B. Low-Leakage, Aluminum, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.

- b. American Warming and Ventilating; a division of Mestek, Inc.
- c. McGill AirFlow LLC.
- d. Nailor Industries Inc.
- e. Pottorff.
- f. Ruskin Company.
- g. Trox USA Inc.
- h. Vent Products Company, Inc.
- 2. Comply with AMCA 500-D testing for damper rating.
- 3. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- 4. Suitable for horizontal or vertical applications.
- 5. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
- 6. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 - d. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
- 7. Blade Axles: Galvanized steel.
- 8. Bearings:
 - a. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 9. Blade Seals: Vinyl.
- 10. Jamb Seals: Cambered stainless steel or aluminum.
- 11. Tie Bars and Brackets: Galvanized steel or Aluminum.
- 12. Accessories:
 - a. Include locking device to hold single-blade dampers in a fixed position without vibration.
- C. Jackshaft:
 - 1. Size: 0.5-inch diameter.
 - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.

2.04 CONTROL DAMPERS

- 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. American Warming and Ventilating; a division of Mestek, Inc.
 - 2. Arrow United Industries; a division of Mestek, Inc.
 - 3. Cesco Products; a division of Mestek, Inc.
 - 4. Greenheck Fan Corporation.
 - 5. Lloyd Industries, Inc.
 - 6. McGill AirFlow LLC.
 - 7. Metal Form Manufacturing, Inc.
 - 8. Nailor Industries Inc.
 - 9. NCA Manufacturing, Inc.
 - 10. Pottorff.
 - 11. Ruskin Company.
 - 12. Vent Products Company, Inc.
 - 13. Young Regulator Company.

- B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- C. Frames:
 - 1. Hat shaped.
 - 2. 0.094-inch- thick, galvanized sheet steel.
 - 3. Interlocking, gusseted corners.
- D. Blades:
 - 1. Multiple blade with maximum blade width of 6 inches.
 - 2. Parallel and/or Opposed-blade design.
 - 3. Galvanized-steel.
 - 4. 0.064 inch thick single skin or 0.0747-inch- thick dual skin.
 - 5. Blade Edging: Closed-cell neoprene.
 - 6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- E. Blade Axles: 1/2-inch- diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- F. Bearings:
 - 1. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 2. Thrust bearings at each end of every blade.

2.05 FLANGE CONNECTORS

- 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. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.06 FLEXIBLE CONNECTORS

- 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. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Elgen Manufacturing.
 - 4. Ventfabrics, Inc.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.07 FLEXIBLE DUCTS

- 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. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
- C. Flexible Duct Connectors:
 - 1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action or Nylon strap in sizes 3 through 18 inches, to suit duct size.
 - 2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.08 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Connect ducts to duct silencers with flexible duct connectors.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream and downstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. At each change in direction and at maximum 50-foot spacing.
 - 7. Control devices requiring inspection.
 - 8. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- O. Connect diffusers to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- P. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- Q. Install duct test holes where required for testing and balancing purposes.

- R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.02 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

**SECTION 23 34 23
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. Ceiling-mounted ventilators.

1.03 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on actual Project site elevations.
- 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.
 - 6. Roof curbs.
 - 7. Fan speed controllers.
- 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. Roof framing and support members relative to duct penetrations.
 - 2. Ceiling suspension assembly members.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. 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 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set(s) for each belt-driven unit.

1.08 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.

1.09 COORDINATION

- A. Coordinate size and location of structural-steel support members.

PART 2 PRODUCTS**2.01 CEILING-MOUNTED VENTILATORS**

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. American Coolair Corporation.
 - 2. Breidert Air Products.
 - 3. Broan-NuTone LLC; NuTone Inc.
 - 4. Carnes Company.
 - 5. Greenheck Fan Corporation.
 - 6. JencoFan.
 - 7. Loren Cook Company.
 - 8. PennBarry.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Painted aluminum, louvered grille with flange on intake and thumbscrew attachment to fan housing.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
 - 3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
 - 4. Motion Sensor: Motion detector with adjustable shutoff timer.
 - 5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.
 - 6. Isolation: Rubber-in-shear vibration isolators.

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:
 1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- C. Support suspended units from structure using threaded steel rods and elastomeric hangers, spring hangers, or spring hangers with vertical-limit stops having a static deflection of 1 inch. Vibration-control devices are specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- D. Install units with clearances for service and maintenance.
- E. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

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 23 37 13
DIFFUSERS, REGISTERS, AND GRILLES**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. Rectangular sidewall grilles
 2. Rectangular and square ceiling diffusers.
 3. Perforated diffusers.
 4. Louver face diffusers.
 5. Louvers.
- B. Related Sections:
1. Section 089116 "Operable Wall Louvers" and Section 089119 "Fixed Louvers" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
 2. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.04 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, 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. Method of attaching hangers to building structure.
 3. Size and location of initial access modules for acoustical tile.
 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 5. Duct access panels.
- B. Source quality-control reports.

PART 2 - PRODUCTS

- 2.01 Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on drawings or equal.

2.02 Refer to drawings.**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- D. Install louvers per manufacturer recommendations.

3.03 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

**SECTION 23 81 26
SPLIT-SYSTEM AIR-CONDITIONERS****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 split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set(s) for each air-handling unit.
 - 2. Gaskets: One set(s) for each access door.
 - 3. Fan Belts: One set(s) for each air-handling unit fan.

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. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.08 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. For Compressor: Five year(s) from date of Substantial Completion.
 - b. For Parts: Five year(s) from date of Substantial Completion.
 - c. For Labor: Five year(s) from date of Substantial Completion.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Trane; a business of American Standard companies.
 - 2. YORK; a Johnson Controls company.
 - 3. Daikin
 - 4. Carrier

2.02 INDOOR UNITS (5 TONS OR LESS)

- A. Vertical Evaporator-Fan Components:
 - 1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - 2. Insulation: Faced, glass-fiber duct liner.
 - 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
 - 4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
 - 5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
 - 6. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
 - 7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - 8. Filters: Permanent, cleanable.
 - 9. Condensate Drain Pans:
 - a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of 2 inches deep.
 - b. Single-wall, stainless-steel sheet.

- c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - 1) Minimum Connection Size: NPS 1.
- d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
- e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

2.03 OUTDOOR UNITS (5 TONS OR LESS)

- A. Air-Cooled, Compressor-Condenser Components:
 - 1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
 - 3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
 - 4. Fan: Aluminum-propeller type, directly connected to motor.
 - 5. Factory applied epoxy coated condenser coil
 - 6. Motor: Permanently lubricated, with integral thermal-overload protection.
 - 7. Low Ambient Kit: Permits operation down to 45 deg F.
 - 8. Mounting Base: Concrete pad

2.04 ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- D. Drain Hose: For condensate.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Equipment Mounting:
 - 1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s).
 - 2. Install ground-mounted, compressor-condenser components on concrete mounting base.
 - 3. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.
- C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

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.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.04 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL**1.1 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.

1.2 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.

1.3 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 Section of this Division, individually and collectively.

1.4 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.

1.5 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.

1.6 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.

1.7 SYSTEMS REQUIRING ROUGH-IN

COMMON WORK RESULTS FOR ELECTRICAL

- 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.

1.8 SUBMITTALS

- A. Refer to section 260510

PART 2 - PRODUCTS

2.1 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."

PART 3 - EXECUTION

3.1 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.

COMMON WORK RESULTS FOR ELECTRICAL

- 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.)

3.2 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.

3.3 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.

3.4 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 260500

**SECTION 26 05 02
ELECTRICAL ACCEPTANCE TESTS**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 References

- A. ANSI/NETA ATS, "Standard for Acceptance Testing Specifications, current edition.

1.3 SCOPE OF WORK

- A. Acceptance tests shall be performed in accordance with the current version of ANSI/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.
- H. 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.

1.4 TESTING CRITERIA

- A. High potential tests shall be performed at the AC or DC voltage listed in ANSI/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 ensure the accuracy of tests. These calibration reports shall be made available to the Owner when requested. Depending upon frequency of use, the instruments shall be calibrated at least every 12 months.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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

3.2 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.

3.3 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. Panelboards
1. A continuity check and a 1,000-volt DC megger test shall be performed on distribution and isolation transformers, and online reactors.
 2. A 1,000-volt DC megger test shall be performed on buses, motor starters, 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. A continuity check shall be performed on motor control circuits and control panel internal wiring.
 4. An operational test shall be performed on the motor controls.
 5. Motor heater sizes shall be checked for proper size.
 6. Test all shunt trip and under voltage circuit breakers.
 7. Measure the resistance of each winding at each tap connection.
 8. Overpotential test on all high- and low-voltage windings-to-ground.
- C. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panels, DSTS, 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.

D. 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 260502

**SECTION 26 05 10
ELECTRICAL SUBMITTALS**

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Comply with the applicable requirements of the Division 1 specifications (013300) and the requirements of this Division of the specifications.

1.2 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
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 bus bars
7. Section 260529 – Hangers and Supports for Electrical Systems
 - a. Product Data
8. Section 260533 – Raceway and Boxes for Electrical Systems
 - a. Raceway
 - b. Boxes
 - c. Enclosure ratings
 - d. Dimension data
 - e. Floor Boxes
 - f. Corrosion Protection
 - g. Hazardous Location Conduit Bodies, Fittings, Outlet Boxes, and Covers
 - h. Surface Metallic/Nonmetallic Raceway
 - i. Cast Outlet/Device Boxes
9. Section 260543 – Underground Ducts and Raceways for Electrical Systems
 - a. Handholes
 - b. Warning Tape
10. 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 (S_x) and Moment of Inertia (I_x).
 - e. Field reports
11. Section 260553 – Identification for Electrical Systems
- a. Product data for all labeling products
12. Section 260923 – Lighting Control Devices
- a. Device Layout drawings
 - b. Lighting Contactors
 - c. Lighting Control Panels
 - d. Photocells.
 - e. Enclosures
 - f. Dimensional Data
 - g. Wiring Diagrams
 - h. Time Clock
 - i. Zone Control Diagram
 - j. Short Circuit Current Rating
13. Section 262400 -Panelboards
- a. Product data
 - b. Enclosures
 - c. Dimensional Data
 - d. Circuit Directory
 - e. Shunt-Trip Breakers
 - f. Bussing Diagrams
 - g. Ground-Fault Protection
 - h. Schematic Wiring Diagram
 - i. Layout Drawings and elevations
 - j. Short Circuit Current Rating
 - k. 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. Occupancy Sensors
 - g. Occupancy Sensor Wiring Diagrams
 - h. Occupancy Sensor Layout Drawings showing location and orientation of each sensor.
 - i. 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 264100 – Facility Lightning Protection
- a. Lightning Protection System Components
 - b. Layout drawing including all bonding of metal bodies
 - c. Installation Details
 - d. Coordination Letter from Roofing Contractor / Roof Supports and Penetrations
 - e. Installer Qualifications
 - f. U.L. Masterlabel Certification
 - g. Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Include layout indicating all system components and interconnection with each component identified for this project. Typical layouts are not acceptable. Prepare drawing at a minimum scale of 1/16"=1'-0".
 - h. Review shop drawings submitted under this and other sections, as well as other divisions, to ensure coordination between work required among different trades. Coordinate the installation sequence with other Contractors to avoid conflicts and to provide the fastest overall installation schedule. Coordinate installation with architectural and structural features, equipment installed under other sections of the specifications and electrical equipment to insure access.
 - i. Provide a separate letter to the Roofing manufacturer requesting method of attaching materials to and penetrating roof, for each type roof. Engage the services of the roof installer to provide attaching materials and to make and seal all roof penetrations.
 - j. Comply with UL 96A, "Master Labeled Lightning Protection Systems."
17. 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
18. Section 265100 – Lighting
- a. Lighting Fixtures
 - b. Emergency Battery Packs
19. Section 283100 – Fire Detection and Alarm
- a. Surge Protection
 - b. HVAC/Kitchen Hood/Egress Door/Elevator Recall Control Wiring Diagrams
 - c. Battery calculations.
 - d. Voltage drop calculations
 - e. Installer's qualifications.
 - f. Conduit fill calculations.
 - g. Manufacturer's detailed data sheet for each control unit, initiating device, and

- notification appliance.
- h. Device layout drawings with proposed conduit routing. Drawings must be prepared using AutoCAD Release 2017 or newer.
 - i. System riser diagram.
 - j. List of all devices on each signaling line circuit, with spare capacity indicated.
 - k. Clear and concise description of operation, with input/output matrix like that shown in NFPA 72
 - l. Warranty
 - m. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 - n. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - o. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications or revisions to obtain approval.
 - p. Inspection and Test Reports:
 - 1) Submit inspection and test plan prior to closeout demonstration
 - 2) Submit documentation of satisfactory inspections and tests.
 - 3) Submit NFPA 72 "Inspection and Test Form," filled out.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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 260510

**SECTION 26 05 11
ELECTRICAL WORK CLOSEOUT**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 RELATED SECTIONS

- A. Refer to section 017839 for additional requirements.

PART 2 - PRODUCTS

2.1 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.

2.2 RECORD MANUALS

- A. Record manuals shall include the following:
1. Manufacturer's operation and maintenance manuals for:
 - a. Light Fixtures
 - b. Panelboards and Circuit Breakers
 - c. Surge Protection Devices
 - d. Fire Alarm System
 - e. Transfer switches
 - f. Lightning Protection System
 - g. Lighting Control Systems

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
 6. Fire alarm set of floor plans showing actual installed locations of components, conduit, and zones.
 7. Fire Alarm "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- B. Submit record manuals in quantities and in the format prescribed in the Division 1 specifications.
- C. Submit copies of all Maintenance contracts including:
1. Generator Systems.
 2. Fire Alarm Systems.

2.3 CLOSEOUT SUBMITTALS

- A. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
 2. Program Software Backup: On USB drive, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.

PART 3 - EXECUTION

3.1 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.

3.2 TRAINING

- A. Train Owner's personnel on the operation and maintenance of the following systems:
1. Fire Alarm System - 1 hours
 2. Lighting Control Systems – 2 hours
 3. Emergency power system - 4 hours
- B. Training shall not be conducted until system has been tested by the Contractor and is 100% operational. Refer to the individual specification sections for additional requirements.

END OF SECTION 260511

**SECTION 26 05 12
ELECTRICAL COORDINATION**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

PART 2 - PRODUCTS

2.1 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.

2.2 ELECTRICAL COORDINATION DRAWINGS

- A. Electrical Rooms: Provide layouts of all electrical rooms using the dimensions of equipment furnished. Locate all ducts and piping entering or crossing these spaces.
- B. 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.
- C. 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.

2.3 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
 - 2. Fire Protection Equipment
 - 3. Telephone/Computer Systems
 - 4. Fire Alarm System
 - 5. Motorized Projection Screens and Ceiling Projectors
 - 6. Site Lighting
 - 7. A/V systems
 - 8. Control Systems

- 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

3.1 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 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 260512

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

PART 1 - GENERAL**1.1 SUMMARY**

- A. This section includes the requirements for the following:
 - 1. Wire and cable for 600 volts and less.
 - 2. Wiring connectors and connections.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 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.

1.4 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**2.1 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.

2.2 BUILDING WIRE

- A. Conductor: Copper.

LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

- B. Insulation Voltage Rating: 600 volts.
- C. Temperature Rating: 90° C.

PART 3 - EXECUTION

3.1 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.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- D. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- E. Clean conductor surfaces before installing lugs and connectors.
- F. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- G. 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.
- H. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- I. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- J. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values or UL 486A and UL 486B.
- K. 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.
- L. 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.
- M. Motor connections shall be made with compression connectors forming a bolted in-line or stub-type connection.
- N. 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.
- O. All splices made underground or in the pipe basements shall be rated suitable for water immersion.

LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

- P. 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.
- Q. All MC cable shall be installed perpendicular or parallel to building structure and supports at intervals of 5 feet or less.
- R. Cable ties shall not be used to support MC cables.

3.2 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:

120/208 volt, 3-phase	Phase A - Black
	Phase B -Red
	Phase C - Blue
	Neutral - White

3.3 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 7.3.2.

END OF SECTION 260519

**SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 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.
 - 3. Concrete-encased electrode.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.4 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. IEEE Standard 142 "Green Book" – Recommended Practices for Grounding of industrial and Commercial Power Systems; current edition.

1.5 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

2.1 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.

2.2 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.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

2.3 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.

2.4 GROUND TERMINAL BLOCKS

- A. 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

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that final backfill, and compaction has been completed before driving rod electrodes.

3.2 ELECTRICAL AND COMMUNICATION ROOM GROUNDING

- A. Building Earth Ground Busbars: Provide ground busbar hardware at each electrical and communication room and connect to pigtail extensions of the building grounding ring.

3.3 LIGHTNING PROTECTION SYSTEM

- A. Bond the lightning protection system to the electrical grounding electrode system.

3.4 CONDUCTIVE PIPING

- A. 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.
- B. 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.

3.5 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.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- 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.

3.6 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 pull box, 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.

3.7 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. Make rebar in concrete footing around the perimeter of the building electrically continuous such that the resulting installation consists of a concrete encased electrode per Article 250 of the NEC. Extend No. 1/0 THWN grounding electrode conductors from convenient points along the "ground ring" to the equipment ground system.
- D. If it is determined that the rebar cannot be made electrically continuous, install a No 1/0 bare copper conductor in the footing around the perimeter of the building.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- E. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing.
- F. Bond together metal siding not attached to grounded structure; bond to ground.
- G. Bond together reinforcing steel and metal accessories in pool and fountain structures.

3.8 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.

END OF SECTION 260526

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL**1.1 SUMMARY**

- A. This section includes the requirements for the following:
1. Conduit and equipment supports.
 2. Anchors and fasteners.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. 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.

PART 2 - PRODUCTS.**2.1 MATERIALS**

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized, *or* PVC.
- C. Anchors and Fasteners:
1. Do not use powder-actuated anchors.
 2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
 3. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
 4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
 5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
 6. Solid Masonry Walls: Use expansion anchors or preset inserts.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood Elements: Use wood screws.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- B. Cutting or Holes:
1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Architect prior to drilling through structural sections.
 2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Architect as required by limited working space.
- C. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- D. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- E. In wet and damp locations use steel channel supports to stand cabinets, disconnects and panelboards 1 inch (25 mm) off wall.
- F. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- H. Use adjustable steel channel fasteners for hung ceiling outlet box.
- I. Do not fasten boxes to ceiling support wires.
- J. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- K. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- L. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits
- M. Do not support conduit with wire, wire ties, or perforated pipe straps. Remove wire used for temporary supports.
- N. Do not attach conduit to ceiling support wires.

END OF SECTION 260529

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL**1.1 SUBMITTALS**

- A. Refer to section 260510

1.2 QUALITY ASSURANCE

- A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.3 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

1.4 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**2.1 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 LFMC (LFMC shall be only used with restrictions, see conduit installation)
 - 2. Exterior below ground: RNC schedule 40
 - 3. Interior: RMC, IMC, or LFMC (LFMC shall be only used with restrictions, see conduit installation)
 - 4. Interior below grade: RNC schedule 40
 - 5. Where RNC Schedule 40 is installed below grade or under floor slabs, the elbows

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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 LFMC (LFMC 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).

2.2 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.

2.3 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.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) 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.

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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.

2.5 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.

2.6 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.

2.7 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.

2.8 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.

2.9 FLOOR BOXES:

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

- A. For slab on grade locations (non-furniture feed applications): Evolution Series floor box by Legrand or comparable product by one of the following, contingent upon compliance with the Contract Documents:
 - 1. Hubbell Wiring Systems
 - 2. FSR Inc.
- B. All floor boxes to be recessed service. Flush service boxes are not acceptable.
- C. Provide floor boxes with all necessary appurtenances to make a fully functioning system and incorporate wiring devices, low-voltage, and A/V connections indicated on plans.
- D. Cover to be UL listed for scrub water. Cover to have in-use hinged cable access doors. Finish of cover shall be selected by Architect and shall be compatible with specified floor finish or covering.

PART 3 - EXECUTION

3.1 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.

3.2 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 pipe cutter; 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

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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 LFMC in lengths over 6'.
- U. Use LFMC 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.

3.3 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.

3.4 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 260533

UNDERGROUND RACEWAYS FOR ELECTRICAL SYSTEMS

**SECTION 26 05 43
UNDERGROUND RACEWAYS FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 SUBMITTALS:

- A. Refer to section 260510.

PART 2 - PRODUCTS

2.1 HANDHOLES

- A. 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.
- B. 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.
- C. 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.
- D. Hardware shall be of gray cast iron or hot-dip galvanized steel.
- E. Water, mud, and trash shall be periodically pumped or otherwise removed from handholes by the Contractor until final acceptance of the work.
- F. 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.

2.2 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

3.1 GENERAL

- A. 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.
- B. Clearance from Other Utilities: Do not install lines installed under this contract in the same

UNDERGROUND RACEWAYS FOR ELECTRICAL SYSTEMS

trenches with other utilities. Maintain horizontal and vertical separation as required by ANSI C2.

3.2 INSTALLATION

- A. 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.

3.3 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.

3.4 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 260543

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

**SECTION 26 05 48
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 QUALITY ASSURANCE

- A. 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.
- B. 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.
- C. 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

2.1 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

3.1 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

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- 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.

3.2 FIELD QUALITY CONTROL

- A. 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 260548

**SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

PART 2 - PRODUCTS

2.1 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

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 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 and panelboards.
- E. Provide labels on all receptacles, light switches, and wall mounted occupancy sensors.

END OF SECTION 260553

**SECTION 26 09 23
LIGHTING CONTROL DEVICES**

PART 1 - PART 1 GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 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
- D. UL Approvals: UL listed under UL 916 Energy Management Equipment.
- E. FCC Emissions: Compliance with FCC emissions Standards specified in Part 15 Subpart J for Class A application.

1.3 REFERENCE STANDARDS

- A. NEMA ICS 4 – Industrial Control and Systems: Terminal Blocks; National Electrical Manufacturers Association; current edition.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association, current edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Leviton Manufacturing, Inc: www.leviton.com.
- B. Lutron Electronics Inc: www.lutron.com
- C. Wattstopper Inc: www.wattstopper.com

2.2 RELAY PANELS

- A. Cover: Surface or Flush as required, hinged, lockable and shall restrict access to line voltage section.
- B. Clock display and keypad shall be mounted on interior cabinet door for easy user access and programming
- C. Interior: Barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. It shall include intelligence boards, power supply and control relays. Clock display and keypad shall be mounted on interior cabinet door for easy user access and programming.
- D. Panel shall accept a minimum of eight single pole relays. Provide 25% minimum spare relays. Relays shall be individual latching relays with 30 Amp load contacts for ballast (including HID, magnetic or electronic type ballasts), tungsten and general-purpose loads.

Provide isolated auxiliary contacts for pilot light switching. Relays shall use quick connectors and be individually replaceable to facilitate ease of use.

- E. The lighting control panel shall provide a stagger up delay, override push buttons, pilot light outputs, and LED status light indicators for each relay or contactor control channel.
- F. The clock shall have a backlight display, user keypad and shall provide a minimum of 8 channels of time or astronomical control. Preprogrammed lighting control scenarios shall include the following: scheduled on/off, manual on/scheduled off, manual on/automatic switch sweep off, astronomic or photocell on/off and astronomic or photocell control with scheduled on/off. Time clock shall provide up to 42 holidays, automatic daylight savings adjustment, astronomic coordinates by major cities, and help screens. Program memory shall be non-volatile, and clock shall retain time keeping during power outages for at least 48 hours.
- G. The panel shall have minimum of 8 universal switch inputs that are low voltage, self-configuring and shall not require programming to accept momentary on/ momentary off switch, push button switch (cycling), maintained switch or 24VDC signals from occupancy sensors, photocells or other interfacing devices.
- H. After-hour interior lighting shut off control shall provide a full duration override time of 1 to 240 minutes with a warning blink five to 15 minutes prior to shutting the lighting off. An impending shut off will be cancelled and the override period re-initialized through the operation of any assigned switch input.
- I. After-hour interior lighting shut off control may be by line voltage power interrupt control to automatic control switches. The lighting control relay panel shall provide a warning blink signal to automatic control switches, thus allowing a five-minute delay prior to shutting off lighting. The lighting shut off event may be cancelled by pressing the automatic control switch push button. The lighting control panel time clock shall provide periodic lighting sweep signals to shut off automatic control switches.

2.3 CONTACTORS

- A. Contactors shall be rated 30A/600V and shall be installed in a NEMA 1 enclosure. Coil voltage shall be 120V, unless noted otherwise. Contactors shall be electrically operated, mechanically held type with coil clearing contacts. Contactors shall be field-convertible for use with maintained-contact (two-wire) or momentary-contact (three-wire) control devices. Provide three-wire control unless noted otherwise.
- B. Contactors shall be of the number of poles required to control the circuits indicated, plus a minimum of two spare poles. Where number of circuits controlled exceeds the maximum number of poles available, provide multiple contactors connected in parallel.
- C. Provide H-O-A switch in cover of enclosure for contactors serving exterior lighting. Connect switch to operate as indicated on the drawings.
- D. Contactors shall have silver alloy double-break contacts and coil clearing contacts for mechanically held contactor and shall require no arcing contacts.

2.4 PHOTOCELLS

- A. Photocells shall have the following features:
 - 1. Quick-response, cadmium-sulfide type.
 - 2. A 15 to 30 second, built-in time delay to prevent response to momentary lightning flashes, car headlights or cloud movements.

3. Energizes the system when the north sky light decreases to approximately 1.5 foot-candles, and maintains the system energized until the north sky light increases to approximately 3 to 5 foot-candles.

2.5 OCCUPANCY SENSORS

- A. Wall switch sensors: Passive Infrared type.
 1. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet with 180-degree coverage capability.
 2. Rating: Sensor rating shall be at least 125% of the connected load.
 3. Sensor shall utilize Zero Crossing Circuitry.
 4. Sensor shall have no leakage current to load, and voltage drop protection.
 5. Sensor shall provide high immunity to false triggering from RFI and EMI.
 6. Sensor shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
 7. Sensor shall utilize automatically adjustable time delay and sensitivity settings.
 8. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 9. A bypass manual override shall be provided on each sensor.
 10. All sensors shall have UL rated, 94V-0 plastic enclosures.
- B. Ceiling Sensors: Dual Technology type.
 1. Rating: Sensor rating shall be at least 125% of the connected load.
 2. Sensor shall be ceiling mounted in such a way as to minimize coverage in unwanted areas.
 3. Sensor shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.
 4. Passive Infrared Sensor shall provide high immunity to false triggering from RFI and EMI.
 5. Ultrasonic Sensor shall adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout the controlled space.
 6. Sensor shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
 7. Sensor shall utilize automatically adjustable time delay and sensitivity settings.
 8. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 9. A bypass manual override shall be provided on each sensor.
 10. All sensors shall have UL rated, 94V-0 plastic enclosures.
- C. Circuit Control Hardware – Where required.
 1. Control Unit: Self-contained unit consisting internally of isolated load switching relay(s) and transformer to provide low-voltage power.
 2. Control Unit shall provide power to a minimum of two sensors.
 3. Relay Contacts shall have ratings as required for connected load.

2.6 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.
 2. Locator Light: Lighted handle type switch.
 3. Ratings: Match branch circuit and load characteristics.
- B. Switch Types: Single pole, double pole, 3-way, and 4-way.

2.7 WALL DIMMERS

- A. Electronic Wall Dimmers: Coordinate with electronic dimming ballast requirements.
 - 1. Body and Handle: plastic with slide adjuster three button function (on/off, up, down).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Photocell Switch Aiming: Aim switch according to manufacturer's recommendations. Set adjustable window slide for proper foot-candles photocell turn-on.
- B. Locate contactors controlling lighting circuits above panels in which circuits originate; locate contactors controlling receptacles above accessible ceiling of room near location of door to room.
- C. Neutral and grounding conductors shall be routed through contactor enclosure with associated phase conductor(s) being switched. Group each branch circuit within enclosure using nylon tie straps.
- D. Do not splice conductors within contactor enclosure.
- E. Provide wiring troughs with terminal strips adjacent to contactors, so that unswitched portions of circuits (i.e. exit lights, etc.) can bypass the contactors. The use of wirenuts within enclosures is not acceptable. Connect contactor enclosure to panelboard and troughs with conduit nipples sized for the total number of branch circuits conductors encountered.
- F. Install switches with OFF position down.
- G. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- H. Do not share neutral conductor on load side of dimmers.

3.2 LABELING

- A. All wiring shall be labeled clearly indicating which lighting control panel or device it connects to.
- B. Use only properly color-coded, stranded wire as indicated on the drawings.

3.3 DEMONSTRATION

- A. Demonstrate proper operation of system.

3.4 FIELD QUALITY CONTROL

- A. Perform field inspection, testing, and adjusting in accordance with Section 01 40 00.
- B. Inspect each device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Test each occupancy sensor and verify settings are appropriate for associated space.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. It shall be the contractor's responsibility to locate and aim occupancy sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.
- C. 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.

END OF SECTION 260923

**SECTION 26 24 00
PANELBOARDS**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. See section 260510.

1.2 QUALITY ASSURANCE

- A. 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.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- B. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; current edition.
- C. 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.
- D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Electrical/Cutler-Hammer
- B. GE Industrial
- C. Square D
- D. Siemens

2.2 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.

2.3 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. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator. (where indicated)
 - 3. Shunt Trip: 120V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage. (where indicated)
 - 4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage [with field-adjustable 0.1- to 0.6-second time delay. (where indicated)
 - 5. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts. (where indicated)
 - 6. 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)
- C. Circuit breakers serving elevators shall have adjustable long-time setting and shall be provided with a shunt trip coil rated for 120V operation. Breaker shall also have a set of Form C contacts. Connect shunt trip coil to operate as indicated on the drawings.
- D. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.

- E. Circuit breakers serving fire alarm devices shall be provided with a red fire alarm circuit breaker lockout kit that permanently identifies circuit as "FIRE ALARM".
- F. Circuit breakers serving emergency communication devices (e.g. mass notification, area of refuge, two-way communication) shall be provided with a circuit breaker locking device and be permanently identified as "EMERGENCY COMMUNICATIONS".

2.4 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.

2.5 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. 208 Volt Panelboards: Minimum 10,000 amperes rms symmetrical unless noted otherwise on plans.
 2. Match existing equipment short circuit current ratings.

PART 3 - EXECUTION

3.1 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 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 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.

3.2 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.

3.3 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.

3.4 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.
- E. Provide ARC flash identification per NFPA 70E.

3.5 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 262400

**SECTION 26 27 26
WIRING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section includes the requirements for the following:
 - 1. Receptacles.
 - 2. Device plates.

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 OCCUPANCY SENSOR DRAWING

- A. Drawing Format: Drawings shall be prepared at a scale of no less than 1/16"=1'-0". Drawing shall be titled to define Project Name, Drawing subject and date prepared. Drawings are to be prepared in AutoCAD 2017 or compatible software.

1.5 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. Special Purpose Receptacles: Provide heavy-duty type as indicated on the drawings.
- D. 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.

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. Any other receptacles specifically indicated on the drawings.
- H. Install decorative plates in finished areas.
- I. Connect wiring devices by wrapping conductor around screw terminal.
- J. Provide screen-printed nylon wall plates that indicate the branch circuit to which the associated device is connected. Use 1/8" high black letters.

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.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

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 262726

**SECTION 26 36 00
TRANSFER SWITCHES**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. See section 260510.

1.2 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.

1.3 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
C37.90.1-02IEEE 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 4Industrial 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

2.1 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. Each transfer switch shall be equipped with bypass/ isolation switch. The switch shall be part of the transfer switch.
5. 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)

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.

2.2 FEATURES

- A. Transfer switches shall include the following features:
1. Operating Mechanism:
 - a. Shall be three-pole, open transition.
 - b. Actuated by an electrical operator.
 - c. Electrically and mechanically interlocked so that the main contact cannot be closed simultaneously in both normal and emergency position.
 - d. 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.
 - e. Shall not include a neutral position.
 - f. Contact transfer time shall not exceed six cycles.
 - g. 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.

2.3 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. Auxiliary Contacts:
 - 1. Provide contacts for connection to elevator controllers, one closed when transfer switch is connected to normal, and one closed when transfer switch is connected to emergency.
 - 2. Provide additional contacts as necessary to accomplish the functions shown on the drawings, specified, and designated in other sections of these specifications and one spare normally open and normally closed contact.
 - 3. Contacts shall have a minimum rating of ten amperes and be positive acting on pickup and dropout.
- F. Remote Indicators:
 - 1. Provide remote pilot lamps to show transfer switch position.
 - 2. Provide remote manual test switch to simulate normal source failure.
 - 3. Provide remote contact to bypass retransfer time delay to normal source //.
- G. 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 //.
- H. Auxiliary Relay: Provide an auxiliary pre-signal relay on all automatic transfer switches, which will feed elevator loads for use as elevator control.

2.4 TRANSFER SWITCH OPERATION

- A. 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.
- B. 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.
- C. 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 shutting down. Time delay shall be adjustable from zero to fifteen minutes. //
- D. 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.
- E. Transfer to Emergency (Emergency System Loads): Transfer switches for emergency system loads shall transfer their loads from normal to emergency source when frequency and voltage of the engine-generator unit have attained 90 percent of rated value. Only those switches with deficient normal source voltage shall transfer.

- F. Transfer to Emergency (Equipment System Loads): Transfer switches for equipment system loads shall transfer their loads to the generator on a time delayed staggered basis, after the emergency system switches have transferred. Total delayed transfer time of an equipment system switches shall not exceed two minutes. Time-delay relays shall be field adjustable zero to two minutes.
- G. Retransfer to Normal (All Loads): 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.
- H. Exercise Mode: Transfer to emergency power source shall be accomplished by remote manual test switches on a selective basis.

PART 3 - EXECUTION

3.1 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.

3.2 START UP AND TESTING

- A. 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
- B. 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.
- C. 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 263600

**SECTION 264100
FACILITY LIGHTNING PROTECTION****PART 1 - GENERAL****1.1 SCOPE OF WORK:**

- A. The work required under this section of the specifications consists of the layout and installation of a functional and unobtrusive lightning protection system for the entire facility. Other requirements are shown on the drawings. All materials and devices which are an integral part of the lightning protection system shall be provided under this section of the Specifications.
- B. Definitions: Terms as defined in NFPA 780 shall apply to this section.

1.2 QUALITY ASSURANCE:

- A. The following standards are incorporated into and become a part of this specification by reference.
 - 1. National Electric Code (NFPA 70)
 - a. Lightning Protection Code (NFPA 780)
 - b. IEEE Std 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. Underwriters Laboratories, Inc.
 - a. 96 Lightning Protection Components
 - b. 96A Installation Requirements for Lightning Protection Systems
 - 3. Lightning Protection Institute
 - a. LPI-175 Lightning Protection Installation Standard
 - b. LPI-176 Lightning Protection System Material and Component Standard
 - c. LPI-177 Inspection Guide for LPI Certified Systems
- B. 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 "Instructions to Bidders" (AIA A701) and approved by the A/E. Bidders shall carefully review the front end documents (AIA A701) and submit all information required to allow the A/E the ability to make a fully informed decision.
 - 1. Acceptable Manufacturers: Firms regularly engaged in manufacture of lightning protection system components, of types, sizes, and ratings required.
- C. Installer's Qualifications - Firm with at least five years of successful installation experience with projects utilizing lightning protection system similar to that required for this project.

1.3 SUBMITALS:

- A. Refer to section 260510.

PART 2 - PRODUCTS**2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS**

- A. General: Provide lightning protection system material and components, of types, sizes, ratings, for Class 1 service, which comply with manufacturer's standard materials, design, and

construction in accordance with published product information, and as required for complete installation. Materials and all components shall comply with NFPA 780.

- B. All materials shall be copper or bronze of the size, weight and construction required to suit this application.
- C. Copper equipment shall not be connected to aluminum surfaces except by means of on LPI approved bi-metal transition fitting. Lead-coated fittings are not acceptable.
- D. Ground rods shall be the type specified in Section 26 GROUNDING AND BONDING. All rods shall be accessible, and shall be provided with a waterproof tag labelled "LIGHTNING PROTECTION SYSTEM".

PART 3 - EXECUTION

3.1 INSTALLATION OF LIGHTNING PROTECTION SYSTEMS

- A. Install lightning protection systems as indicated, in accordance with equipment manufacturer's written instructions, and in compliance with applicable requirements of NEC, NFPA 780 to ensure that lightning protection systems comply with requirements.
- B. Coordinate with all trades as necessary, to interface installation of lightning protection system with other work.
- C. Install conductors with direct paths from air terminals to ground connections avoiding sharp bends and narrow loops.
- D. All roof conductors shall be concealed. Provide all necessary components for a concealed system installation.
- E. Where the drawings show the new lightning protection system connected to an existing lightning protection system without a UL master label, the new portion of the lightning system still requires inspection and labels as specified above for new work.
- F. Install the vertical conductors within the concealed cavity of exterior walls. Run the conductors to the exterior at elevations below the finished grade and make the ground connections to the earth outside of the building or stack perimeter.
- G. Make connections of dissimilar metal with bimetallic type fittings to prevent electrolytic action.
- H. Use the exothermic welding type connections that form solid metal joints in the main vertical and horizontal conductors, and for connections that are not exposed in the finish work.
- I. Sheath copper conductors, which pass over cast stone, cut stone, architectural concrete and masonry surfaces, with not less than a 2 mm (1/16 inch) thickness of lead to prevent staining of the exterior finish surfaces.
- J. When the structural steel framework or reinforcing steel is used as the main conductor:
 - 1. Weld or bond the non-electrically-continuous sections together and make them electrically continuous.
 - 2. Verify the electrical continuity by measuring the ground resistances to earth at the ground level, at the top of the building or stack, and at intermediate points with a sensitive ohmmeter. Compare the resistance readings.
 - 3. Connect the air terminals together with an exterior conductor connected to the structural steel framework at not more than 18000 mm (60 foot) intervals.

4. Install ground connections to earth at not more than 18000 mm (60 foot) intervals around the perimeter of the building.
5. Weld or braze bonding plates, not less than 200 mm (eight inches) square, to cleaned sections of the steel and connect the conductors to the plates.
6. Do not pierce the structural steel in any manner. Connections to the structural steel shall conform to UL Publication No. 96A.

3.2 DOWN CONDUCTORS

- A. Down conductors shall be installed in 1" schedule 40 PVC conduit. All down conductors shall be installed concealed.

3.3 INTERCONNECTION OF METALS

- A. Provide potential equalization and bonding of metal bodies as required by NFPA 780.
- B. Bonding of all metallic objects and systems at roof levels and within the structures shall be complete. Bonds for metal bodies shall consist of, but not be limited to the following: Roof exhaust fans, HVAC units with related piping ductwork, exhaust vents and any other piping systems, antenna mast for TV, radio or microwave, flag poles, roof handrails and/or decorative screens, roof ladders, skylights, metal plumbing stacks, etc. Exterior architectural metal fascia and/or curtain walls or mullions, which extend the full height of the structure shall also be bonded, if not inherently bonded thru the building frame.
- C. Other metal bodies shall be bonded as required by NFPA 780. Typical of these are: roof flashings, parapet coping caps, gravel guards, isolated metal building panels or siding, roof drains, down spouts, roof insulation vents and any other sizable miscellaneous metals, etc.

3.4 GROUNDING

- A. Grounding terminals (rods) shall be provided for each down conductor.

3.5 BONDING

- A. Where conductors are installed in metallic raceways, bond conductor to raceway at both ends.

3.6 TESTING

- A. Upon completion of installation of lightning protection system, test resistance-to-ground as specified in Section 26 GROUNDING AND BONDING.
- B. Update shop drawings to reflect all field changes.
- C. Test and certify the system per UL, and NFPA. Provide UL Master Label certification. Permanently affix label in a location approved by the Architect.

END OF SECTION 264100

**SECTION 26 43 00
SURGE PROTECTIVE DEVICES****PART 1 - GENERAL****1.1 SUBMITTALS**

- A. Refer to section 260510.

1.2 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 3rd 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).

1.3 WARRANTY

- A. Provide a 5-year product warranty

PART 2 - PRODUCTS**2.1 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.

2.2 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 3rd 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 3rd 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 3rd 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 3rd 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

- 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

3.1 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 3rd Edition.

END OF SECTION 264300

**SECTION 26 51 00
LIGHTING****PART 1 - GENERAL****1.1 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.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 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.

1.4 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

2.1 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.

2.2 LUMINAIRES

- A. Furnish products as indicated in Schedule on plans.

2.3 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 75% of fixture lumens for a minimum of 90 minutes. Drivers/batteries shall have full 5-year warranty.
 - 2. Fixture Using Remote Emergency Driver/Battery Pack: Provide Iota or Bodine emergency driver/battery pack installed remotely above accessible ceiling. Driver/Battery must be capable of operating fixture at 75% of fixture 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.

2.4 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

3.1 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.

3.2 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.

3.3 ADJUSTING

- A. Aim and adjust luminaires as indicated.
- B. Position exit sign directional arrows as indicated.

3.4 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.

3.5 CLOSEOUT ACTIVITIES

- A. Demonstrate luminaire operation for minimum of two hours.

3.6 PROTECTION

- A. Replace/Repair luminaires that have failed at Substantial Completion.

END OF SECTION 265100

**SECTION 28 05 00
COMMON WORK RESULTS FOR SAFETY AND SECURITY**

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. All division 28 work shall, in addition to all division 1 specification sections, comply with all of the requirements in the following specification sections:

260500 Common Work Results for Electrical
260510 Electrical Submittals
260511 Electrical Work Closeout
260512 Electrical Coordination
260519 Low-Voltage Electrical Power Conductors and Cables.doc
260526 Grounding and Bonding for Electrical Systems
260529 Hangers and Supports for Electrical Systems
260533 Raceway and Boxes for Electrical Systems
260548 Vibration and Seismic Controls for Electrical Systems
260553 Identification for Electrical Systems
262726 Wiring Devices

END OF SECTION 280500

SECTION 28 10 00
ACCESS CONTROL REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Access Control Specifications.
- B. The General Contractor shall contract with Carolina Innovative Research, Ltd. Co. to provide all materials and installation for the access control system.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 – Door Hardware.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS**201 PRODUCTS**

- A. Provide products as specified in Access Control Specifications – Taxpayer Service Center Submitted by the Infrastructure Services Team of Carolina Innovative Research, Ltd. Co. dated November 6, 2020 attached.

PART 3 EXECUTION**301 INSTALLATION**

- A. The complete installation shall be done in a neat, workmanlike manner in accordance with Division 26 of these documents and manufacturer's recommendations.
- B. Coordinate with the Division 08 contractor regarding the doorframes and hardware equipment which is associated with the Access Control System. Verify rough-in and installation requirements for all door frame mounted and/or door mounted control and monitoring equipment.
- C. Prior to start of construction, confirm installation requirements with the Agency. The coordination shall include, but not be limited to, hardware, cabling and wiring requirements including types, sizes, color-coding schemes, labeling, wire way requirements, termination responsibilities, and cable identification requirements.
- D. Coordinate with Division 26 installer to confirm required cabling pathways, device rough-ins, and line-voltage power requirements.
- E. Receive, store and install Access Control System equipment and cabling as specified. Comply with the manufacturer's instructions and recommendations for installation of all products. Provide all system wiring between all components in accordance with manufacturer's guidelines. Each cable for each device shall be home run. No splices are allowed unless otherwise noted

END OF SECTION



Access Control Specifications – Taxpayer Service Center

Colleton County Government

Submitted by the
Infrastructure Services Team of
Carolina Innovative Research, Ltd. Co.

Prepared By:

Carolina innovative Research, Ltd. Co.
301 Greystone Blvd. Suite 125
Columbia, SC 29210

Chavous P. Camp
(803) 470-2000
ccamp@carolinainnovative.com

Prepared For:

Colleton County
Technology Department
31 Klein St.
Harrelson Bldg
Walterboro, SC 29488

Eric Avant



Situation

There are 16 doors that, as part of Colleton County Government’s new Taxpayer Service Center, require access control. This document lays out options and specifications for the access control on those doors as well as approximate costs for securing each.

Wiring

As usual, all readers require CAT-6-rated cabling from a POE-capable network switch to the reader. “Remote unlock” PBX Web relays require an additional POE-capable CAT-6 rated network cable. See note (5) for locations. Previously, Colleton county has provided all network wiring. This action plan assumes Colleton County will continue this practice. **NOTE: CABLES MUST BE INSTALLED PRIOR TO INSTALLATION AT EACH DOOR AND MUST BE FULLY TESTED. HOURLY CHARGES WILL APPLY IF ADDITIONAL WORK IS REQUIRED DUE TO A LACK OF SITE PREPARATION.**

Door Function Warning

For access control to function properly, *all doors must be in working condition, aligned with their strikes properly, and with closers that function properly. Additionally, each cylindrical lock should use a “storeroom” lockset, to ensure all doors remain locked and can’t be left in an unlocked state without the access control system’s assistance.*

THESE RECOMMENDATIONS ASSUME THAT ALL DOORS ARE IN NEW WORKING CONDITION. SEE REQUIRED SITE CONDITIONS BELOW.

Budgetary Pricing

Doors

Description	ASM	RU	K	Strike/EL	Price	Note
Front Entrance South (100b)				MELR See (1)	\$2,646.05	(1) (5)
Front Entrance North (100a)				<ELR See (1)	\$2,646.05	(1) (5)
Auditor's Office Public Door (103b)		Y		Trine 4100-32D	\$3,741.49	(2) (5)
Auditor's Office Side Door (113b)				Trine 4100-32D	\$3,404.80	(2)
Auditor's Office Safe Door (114)	Y		Y	Trine 4100-32D	\$3,707.30	(2) (4) (7)
Auditor's Office Employee Entrance (113a)				Trine 4100-32D	\$3,404.80	(2)
Del Tax Office Public Door (104b)		Y		Trine 4100-32D	\$3,741.49	(2) (5)
Del Tax Office Safe Door (112)	Y		Y	Trine 4100-32D	\$3,707.30	(2) (4) (7)
Del Tax Office Employee Entrance (111)				Trine 4100-32D	\$3,404.80	(2)
Conference Room Public Door (105b)		Y		Trine 4100-32D	\$3,741.49	(2) (5)
Treasurer's Office Public Door (106b)		Y		Trine 4100-32D	\$3,741.49	(2) (5)
Treasurer's Office Emp Entrance (107)				Trine 4100-32D	\$3,404.80	(2)
Treasurer's Office Safe Door (110)	Y		Y	Trine 4100-32D	\$3,707.30	(2) (4) (7)
Employee Entrance North (116a)	Y	Y	Y	Trine 4850POE-32D	\$4,043.99	(3) (6) (5) (7)
Comm Room Door (119)			Y	Trine 4100-32D	\$3,624.80	(2) (7)
Employee Entrance East (116b)	Y	Y	Y	Trine 4850POE-32D	\$4,043.99	(3) (6) (5) (7)

Legend: ASM = Advanced Security Module RU = Remote Unlock K = Includes Keypad Reader

Notes

- (1) Front entrances – without keypads. NO ISONAS RC-04 OR RC-01 will be provided. CI will provide and install a 3-door Isonas IP Bridge module. ALL FOUR DOORS must have panic hardware equipped with a 24V MOTORIZED (*NOT* solenoid) Electronic Latch Retraction (MELR) device. **SEE “FRONT ENTRANCE DOORS” under “Other Specifications/Conduit & Junction Boxes” for further requirements
- (2) Install county-standard cylindrical lockset with STOREROOM cylinder & trim. CI Team will cut doorframe to install strike
- (3) Install county-standard RIM-style panic bar with keyed lockset. Keyed lockset must be configured for STOREROOM operation.
- (4) Safe/money room door. Isonas Advanced Security Module and in-swinging latch guard will be installed by CI team.
- (5) PBX “Web” remote unlock module will be provided. Additional CAT-6 network drop needed to this location. Change 4x4 surface mounted box to 6x6 for this location.
- (6) External employee entrance. Isonas Advanced Security Module will be installed by CI team.
- (7) Keypad reader will be provided

Other Specifications

Ethernet Specifications

- One CAT-6 network drop must be provided to the below-listed junction box for each door, except where noted (see note 5 and note 1). Sufficient length (25') service loop must be provided to reach through conduit and to reader if necessary.
- Each network cable must be terminated into a Power-Over-Ethernet+ (POE+)-capable switch, rated for 802.3at (30W/port).

Locksets/Trim/Electrified Locks

- All locksets/trim should be ordered in “Storeroom” configuration
- Our locksmiths will install electric strikes themselves.
- This proposal assumes the strikes listed under Strike/EL will be provided AND INSTALLED BY the CI install team, with the exception of the MELR per note (1).

Conduit & Junction Boxes

All doors except front entrances

- Except where noted (5), above door: 4x4 (2-gang) surface mount communication box mounted on wall. For those doors noted with (5), provide a 6x6 box.
- At Reader location, on “insecure” / “exterior” side of door: single-gang in-wall electrical box
- Conduit with jetline or other pull string must be provided from above-door box to the reader in-wall electrical box.
- Conduit with jetline or other pull string must be provided from above-door box to the door strike

Front entrance doors

IN furtherance of note (1):

- 120VAC outlet must be provided on secure side, above the ceiling line, in the “public” Area
- 6x6 communications box must be provided within proximity (24in”) of this outlet
- A cable pathway with jetline must be provided from that box to the hinge side of each door.
 - Conduit from that box as far as practical
 - Suitable cable pathway through the metal storefront frame to the hinge side of each door
 - Jetline from the hinge side of each door to the box
 - Suitable cable pathway through the metal storefront frame to above each door, where we will mount a REX motion device.
 - Jetline from the above-door location to the box
- ALL FOUR DOORS must have panic hardware equipped with a 24V *MOTORIZED* Electronic Latch Retraction (*NOT* solenoid) device.

Other Hardware

- All doors should have appropriate door closer hardware installed by contractor.

Scope

- Physical Installation will be performed by certified Isonas installers and licensed, certified locksmiths. Integration will be performed by Isonas-certified installers/integrators.
- Provide new access control strikes, reader/controller devices, PIR REX motion sensors, door open/close sensors and web-relay hardware where noted
- Install above hardware on fully-working doors, per notes above
- Provide basic door / closer adjustment as necessary.
- Integrate all doors with the existing PureAccess Cloud setup
- Work with CC Technology Department to establish door access rules and provide basic staff training as necessary
- Work with CC Technology Department to integrate web-based door relay releases into their video/IP phone product

Pricing

Total hardware + Integration: \$56,711.89

Note: price is EXCLUSIVE of South Carolina Sales Tax

Terms and Payment

Pricing/availability is valid for 60 days. Changes to hardware pricing may be required upon PO issuance if PO is issued after 60 days, due to changes in product availability/discontinuation of product by manufacturers/etc. Such changes will be communicated to contractor prior to CI's acceptance of purchase order.

Payment terms:

50% will be invoiced and due upon CI's acceptance of purchase order. 50% will be invoiced upon completion and acceptance by contractor/client and due net-15.

Purchase orders containing wording contrary to these terms are not valid unless agreed upon in writing by CI.

SECTION 28 3111
DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Notification appliances.
 - 5. Device guards.
 - 6. Remote annunciator.
 - 7. Addressable interface device.
 - 8. Digital alarm communicator transmitter.

1.2 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

1.3 ACTION SUBMITTALS

- A. Refer to Specification 260510 Electrical Submittals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. 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.
- F. Provide TVSS for any exterior mounted or remote from building annunciation or alarm devices.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
 - 1. Manual stations.
 - 2. Smoke detectors.
 - 3. Duct smoke detectors.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Activate alarm communication system.
 - 5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - 6. Record events in the system memory.
 - 7. Indicate device in alarm on the remote annunciator.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. User disabling of zones or individual devices.
 - 2. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
 - 4. Loss of primary power at fire-alarm control unit.
 - 5. Ground or a single break in internal circuits of fire-alarm control unit.
 - 6. Abnormal ac voltage at fire-alarm control unit.
 - 7. Break in standby battery circuitry.
 - 8. Failure of battery charging.
 - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.
6. Display system status on graphic annunciator.

2.3 FIRE-ALARM CONTROL UNIT

- 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. GAMEWELL.
 2. Notifier.
 3. Siemens Industry, Inc.; Fire Safety Division.
 4. SimplexGrinnell LP.
 5. Edwards
 6. Honeywell Fire Lite
 7. Eaton/ Cooper
- B. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
 2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

- D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
 - 1. Pathway Class Designations: NFPA 72, Class B.
- E. Notification-Appliance Circuit:
 - 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 - 2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
 - 3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- G. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- H. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

2.4 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.
 - 3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - 4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.5 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 4. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
- B. Photoelectric Smoke Detectors:
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
 4. Each sensor shall have multiple levels of detection sensitivity.
 5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
 1. Basis of design color shall be white, coordinate with architect.
- C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 2. Mounting: Wall mounted unless otherwise indicated.
 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 4. Flashing shall be in a temporal pattern, synchronized with other units.
 5. Strobe Leads: Factory connected to screw terminals.
 6. Mounting Faceplate: Factory finished. Basis of design color shall be white, coordinate with architect.

2.7 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.8 ADDRESSABLE INTERFACE DEVICE

- A. General:
1. Include address-setting means on the module.
 2. Store an internal identifying code for control panel use to identify the module type.
 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- C. Control Module:
1. Operate notification devices.
 2. Operate solenoids for use in sprinkler service.

2.9 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
1. Verification that both telephone lines are available.
 2. Programming device.
 3. LED display.
 4. Manual test report function and manual transmission clear indication.
 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
1. Address of the alarm-initiating device.
 2. Address of the supervisory signal.
 3. Address of the trouble-initiating device.
 4. Loss of ac supply.
 5. Loss of power.
 6. Low battery.
 7. Abnormal test signal.

8. Communication bus failure.

E. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
 - 1. Comply with requirements for seismic-restraint devices specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- C. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- D. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet (9 m)
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
 - 5. HVAC: Locate detectors not closer than 60 inches (1520 mm) from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- G. Air-Sampling Smoke Detectors: If using multiple pipe runs, the runs shall be pneumatically balanced.
- H. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- I. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- K. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- A. Pathways shall be installed in red EMT.
- B. Exposed EMT in public areas shall be painted to match the background color of the ceiling area.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.

3.5 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.6 CIRCUIT BREAKERS

- A. Circuit breakers serving fire alarm devices shall be provided with a red fire alarm circuit breaker lockout kit that permanently identifies circuit as "FIRE ALARM".

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- B. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- C. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include **12** months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version.
 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111

SECTION 31 10 00
SITE CLEARING**PART 1 - GENERAL****1.1 SUMMARY OF WORK:**

- A. The specification section covers the extent of site clearing as indicated on the contract drawings. Site clearing work includes, but is not limited to, protection of existing trees, removal of trees, stumps, shrub and other vegetation; grubbing out of roots and root systems; stripping and stockpiling topsoil from the project site.

1.2 RELATED DOCUMENTS

- A. General: Drawings and general provisions of Contract, including General Conditions apply to work of this section.
- B. Site Demolition: Coordinate work with the requirements of Section 02 41 13, SELECTIVE SITE DEMOLITION.

1.3 JOB CONDITIONS:

- A. Traffic: Conduct site clearing operations to ensure minimum interference with streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Sediment & Erosion Control Measures: Comply with the erosion control measures indicated on the drawings, as specified in Section 01 57 13, TEMPORARY EROSION CONTROL, and as required in the approved SWPPP/SCDHEC Permit. Perform inspections and certifications on erosion control system as required in the approved SWPPP and as specified.
- C. Protection of Existing Improvements:
 - 1. Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 2. Protect improvements on adjoining properties and on Owner's property.
 - 3. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.
- D. Protection of Existing Trees and Vegetation:
 - 1. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising or bark, smothering of trees by stockpiling construction materials or excavated materials within drip line. Prohibit vehicular traffic, or parking of vehicles within drip line.
 - 2. Erect and secure a temporary tree barricade or fence barrier as indicated on the construction drawings.
 - 3. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
 - 4. Provide protection for roots over 1-1/2" diameter cut during construction operations. Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

5. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Architect. Employ licensed arborist to repair damage to trees and shrubs.

PART 2 - PRODUCTS

(Not used).

PART 3 - EXECUTION

3.1 SITE CLEARING:

- A. General: Remove trees, shrubs, grass and other vegetation, interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated in accordance with Section 02 41 13, SELECTIVE SITE DEMOLITION. Removal includes digging out stumps and roots. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.
- B. Topsoil:
 1. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.
 2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
 3. Remove heavy growths of grass from areas before stripping.
 4. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.
 5. Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.
 6. Dispose of unsuitable or excess topsoil same as waste material, herein specified.
- C. Clearing and Grubbing:
 1. Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing. Completely remove stumps, roots, and other debris protruding through ground surface.
 2. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.
 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 8" loose depth, and thoroughly compact to a density equal to adjacent original ground. Comply with Section 31 20 00, EARTH MOVING for backfilling and compaction operations.

3.2 REMOVAL OF IMPROVEMENTS:

- A. Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated, and in conformance with Section 02 41 13, SELECTIVE SITE DEMOLITION.

3.3 DISPOSAL OF WASTE MATERIALS:

- A. Burning will not be allowed.
- B. Removal of Waste Materials: Transport and dispose of non-combustible waste materials and unsuitable or surplus topsoil materials offsite, at the Contractors expense.

END OF SECTION

SECTION 31 20 00
EARTH MOVING**PART 1 - GENERAL****1.1 SUMMARY OF WORK**

- A. Work included: Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed for the installation of underground utilities, storm drainage, systems, roadway subgrades, building pads, foundation structures, and general site grading, and also to meet the requirements of the construction shown in the Contract Documents.
- B. Related Work: Documents affecting work of this section include, but are not necessarily limited to, General Provisions and Modifications of these Specifications.
- C. Refer to Section 01 40 00, SPECIAL INSPECTIONS for a list of special Inspections required in association with earthwork performed relative to the building foundation.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the Engineer. Where the term "Engineer" is used herein, it is inferred to include the Project Civil Engineer Designer of Record, the Geotechnical (Soil) Engineer, or Project Architect, as assigned by the Owner as his representative.
- D. Testing required for this part of the work will be furnished by the Contractor.

PART 2 - PRODUCTS**2.1 SOIL MATERIALS**

- A. Fill and backfill materials:
 - 1. General Requirements: Utilize existing on-site soils from on-site excavations for general site fill and backfill where feasible and suitable. Soils used for site fill and backfill should generally consist of sands classified as SP, SP-SC, SC, SP-SM, or SM soils according to the Unified Soil Classification System. In addition, soil used for fill and backfill should be free of roots, organics, debris and other deleterious matter. Provide soil materials in lawns and landscape beds that have a maximum of 25% fines (material passing the No.200 sieve).
 - 2. Off-site Fill (Borrow) Material: Borrow material is that material removed from excavations and imported from off-site borrow areas and may vary in composition depending on its intended use in the work. Provide off-site borrow where insufficient soil exists on site to accomplish the backfilling and filling required to achieve the indicated grades or elevations, or if unsuitable soils are found on site for the work. Off-site borrow material is subject to the approval of the Engineer. In this specification it refers to predominantly granular, non-expansive soils free from roots and other deleterious matter, normally referred to as

“Select Fill”, “Structural Fill” or “Controlled Fill”. For the purposes of this specification it shall be referred to as “Controlled Fill.”

- a. Controlled fill borrow material shall be free from roots, debris, organic matter, and deleterious substances, containing no rocks or lumps larger than 2" in their greatest dimension, and containing no more than 12% fines (material passing No. 200 sieve) and having a maximum Dry Density as defined by ASTM D-1557 of 105 pcf. Submit samples of materials to soils laboratory for testing and approval prior to execution of filling.
3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
4. Cohesionless materials used for trench backfill: Utilize existing material excavated from the trench provided it meets the General Requirements specified above. Borrow material utilized for trench backfill shall meet the requirements specified for Select borrow material, and approved by the Engineer, unless specifically required otherwise in other sections or indicated on the drawings.

2.2 GRAVEL BEDDING

- A. Aggregate Gradation: Provide coarse aggregate, Number 57 stone, with gradation as shown on Table A-4 of the SCDOT 2007 Edition of the Standard Specification for Highway Construction. Aggregate shall be composed of crushed angular granite.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examination: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.
- B. Erosion and Sediment Control: Coordinate and comply with the erosion control measures indicated on the drawings, and as specified in Section 01 57 13, TEMPORARY EROSION CONTROL.
- C. Topsoiling: Remove all topsoil and surface deleterious matter in accordance with Section 31 10 00, SITE CLEARING.
- D. Densification and Proof-rolling:
 1. Proof roll testing will be required in vehicular pavement areas and building foundation areas, except it is not required over pile supported building foundations. After removal of topsoil, and other surface overburden (cut soils) to design subgrade elevation, but prior to installation of any required fill material, densify existing soils to a uniform consistency by making six to eight passes with a large (10-ton or larger) vibratory roller. If water is drawn to the surface, the vibrator should be disengaged, and the densification continued.
 2. After completion of the densification process, proof roll the densified subgrade with a dump truck or pneumatic tire roller with a minimum weight of 15 tons.
 3. Proof-roll over all areas at speeds of 2.5 to 3.5 miles per hour. Proof-rolling shall be done in the presence of the Engineer. Rutting or pumping may indicate unsatisfactory material or satisfactory material with a high moisture content.
 4. Undercut areas as directed and replace with approved controlled fill material.
 5. Proof-roll only when weather conditions permit. Do not proof-roll wet or saturated subgrades. Materials degraded by proof-rolling of wet subgrades shall be replaced by the Contractor at no cost to the Owner.

E. Mucking:

1. When unsatisfactory or unsuitable soils (muck) are encountered and are required to be removed by the Engineer, the cost of the removal and replacement shall be determined according to the contract provisions, when payment is to be based upon a unit price, such price shall be determined as noted below.
 2. Mucking Unit Price: Contractor shall provide a unit price for mucking (removable of unsuitable soils). The unit price shall include the removal of unsuitable soils below the area of stripping (assume 6" stripping and indicated subgrade cut) and shall include the disposal of muck offsite. The unit price shall also include backfilling and compacting with approved controlled fill. The unit cost submitted shall be based upon in-place measurement. No truck measures will be allowed. The approved or negotiated unit price will be used to modify the contract price.
- E. Undercutting and Gravel Bedding: Where specified or indicated, provide gravel bedding (#57 stone) below all footings, grade beams and other foundation elements. Depth of bedding will be as indicated. Assume groundwater will be encountered at the depth of excavation required to install the gravel bedding, and provide a dewatering system, as specified in Section 31 23 19, DEWATERING to control groundwater levels during construction.

3.2 PROCEDURES:

A. Protection of Utilities:

1. Contractor shall contact Palmetto Utilities Protection Services (PUPS) at 1-888-721-7877 or "811", a minimum of three (3) business days prior to beginning construction.
2. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
3. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
4. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
5. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the Engineer and secure his instructions.
6. Do not proceed with permanent relocations of utilities until written instructions are received from the Engineer.

B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

- C. Dewatering: The Contractor is responsible for managing all surface rainfall runoff water in a manner to protect the stability of the exposed soils in excavations and subgrades in paved areas on the site. This includes both surface water and subsurface water. Surface water control may include temporary ditches, temporary swales, temporary drain holes and or inlet openings

in storm boxes to prevent ponding around inlets located in paved areas. Coordinate all temporary drainage devices with the approved SWPPP plan and Section 01 57 13, TEMPORARY EROSION CONTROL. Provide dewatering for excavations and subsurface water in accordance with Section 31 23 19, DEWATERING.

- D. Dust Control: Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site. Airborne dust control is also a part of the environmental protection requirements, just as rainwater erosion. The use of watering trucks, or other such techniques shall be employed as needed to control wind-borne dust.
- E. Maintain access to adjacent areas at all times.

3.3 GENERAL EXCAVATION

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades, and elevations indicated and specified herein.
- B. Unsatisfactory excavated materials:
 - 1. Excavate to a distance below grade as directed by the Engineer and replace with materials in accordance with the paragraph entitled "Mucking."
 - 2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials, as parts of the work of this Section.
- C. Surplus materials: All site surface strippings and surplus satisfactory excavated material shall be stockpiled on-site, in the designated stockpile storage area, unless specifically directed otherwise in writing by the Owner and Engineer.
- D. Excavation of rock: Based on geotechnical subsurface report, no rock, or boulders will be encountered during excavation or earthwork.
- E. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- F. Borrow: Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the Engineer.
- G. Ditches and gutters:
 - 1. Cut accurately to the cross sections, grades, and elevations shown.
 - 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.
 - 3. Dispose of excavated materials as shown on the Drawings or directed by the Engineer; except do not, in any case, deposit materials less than 3'- 0" from the edge of a ditch.
- H. Unauthorized excavation:
 - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Engineer.
 - 2. Under footings, foundations, or retaining walls:
 - a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the Engineer, gravel bedding may be used to bring the bottom elevation to proper position.

3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Engineer.
- I. Stability of excavations:
 1. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
 2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
 - J. Shoring and bracing:
 1. Provide materials for shoring and bracing as may be necessary for safety personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
 2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
 3. Carry shoring and bracing down as excavation progresses.
 - K. Excavating for structures: Conform the elevations and dimensions shown within a tolerance of 0.10 ft. and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required, and for inspection.
 - L. When excavating for pavements, cut surface to comply with cross sections, elevations, and grades.
 - M. Cold weather protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.4 TRENCHING FOR UTILITIES

- A. Provide sheeting and shoring necessary for protection of the work and for the safety of personnel.
 1. Prior to backfilling, remove all sheeting.
 2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Engineer, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Engineer may permit portions of sheeting to be cut off and remain in the trench.
- B. Open cut:
 1. Excavate for utilities by open cut.
 2. If conditions at the site prevent such open cut, and if approved by the Engineer trenching may be used.
 3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
 4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the Engineer.
 5. When the void is below the subgrade for the utility bedding, use suitable earth material and compact as approved by the Engineer, but in no case to the relative density directed less than 90%.
 6. When the void is in the side of the utility trench or open cut, use suitable earth or sand

compacted or consolidated as approved by the Engineer, but in no case to a relative density less than 80%.

7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
8. Excavating for appurtenances:
 - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation beyond such appurtenances that has not been directed, will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the Owner.
- C. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for utility.
- D. Depressions:
 1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
 2. Do not excavate below the depth indicated or specified.
- E. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract.

3.5 BEDDING FOR UTILITIES

- A. Provide bedding as indicated on the Drawings for each utility.

3.6 BACKFILLING OF UTILITY TRENCHES

- A. General:
 1. Do not completely backfill trenches until required tests have been performed, and until the utilities systems as installed conform to the requirements specified in their pertinent Sections of these Specifications.
 2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the Engineer.
 3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the Engineer.
 4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests, and approvals.
 5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.
- B. Lower portion of trench:
 1. Deposit approved backfill and bedding material in layers of 6" maximum thickness and compact with suitable tampers to the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 24" over sewer and 12" over other utility lines.

2. Take special care in backfilling and bedding operations as not to damage pipe and pipe coatings.
- C. Remainder of trench:
1. Except for special materials for pavements, such as "flowable fill", backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
 2. Deposit backfill material in layers not exceeding the thickness specified and compact each layer to the minimum density indicated.
- D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.

3.7 GENERAL SITE FILLING AND BACKFILLING

- A. General: For each classification listed below, place acceptable soil material layers to required subgrade elevations.
1. In excavations, use satisfactory excavated or borrow material.
 2. Under asphalt pavements, use approved on-site fill or controlled fill borrow materials as approved by Engineer.
 3. Under building slabs, use approved on-site fill or controlled fill borrow materials as approved by Engineer.
- B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
1. Acceptance of construction below finish grade including, where applicable, damp-proofing and water-proofing.
 2. Inspecting, testing, approving, and recording locations of underground utilities.
 3. Removing concrete formwork.
 4. Removing shoring and bracing and backfilling of voids with satisfactory materials.
 5. Removing trash and debris.
 6. Placement of horizontal bracing on horizontally supported walls.
- C. Ground surface preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious matter from ground surface prior to placement of fills. Coordinate and comply with the requirements of Section 31 10 00, SITE CLEARING.
 2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill materials will bond with existing surfaces.
 3. When existing ground surface has a density less than specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- D. Placing and Compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth. Conform with paragraph entitled "COMPACTING."
 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 3. Compact each layer to required percentage of maximum density for area.

4. Do not place backfill or fill material on surface that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

3.8 GRADING

A. General:

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading outside building lines:

1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft. above or below the required subgrade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade and cross section, with finished surface not more than 0.05 ft. above or below the required subgrade elevation.

3.9 COMPACTING

- A. Control soil compaction for other than clay soils during construction to provide the minimum percentage of density specified for each area as determining according to ASTM D 1557.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the Engineer.
 1. Lawn, playing field and other non-paved areas: Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 2. Walks: Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum density.
 3. Vehicular Pavements: Compact the top 12" of subgrade and each layer of fill material or backfill material at 95% of maximum density.
 4. Utility Trenches: Compact initial backfill and top 12" above the utility at 95% of maximum density. Where utilities cross under paved areas compact the remainder of trench at 95% of maximum density; and at 90% of maximum density for unpaved areas.
 5. Slabs and foundations:
 - a. Where existing unstable soils have been removed, backfill shall be placed in thin successive layers 8 inches to 10 inches loose measurement. Each layer shall be

compacted to at least 95% of its maximum laboratory dry density. All soil beneath building floor slabs and footings shall be compacted to at least 95% of its maximum density.

b. The gravel bedding layer shall be lightly tamped to seat the stone into the underlying insitu soil and to dispel large voids. Vibratory compactors shall not be used.

C. Moisture Control:

1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

3.10 QUALITY CONTROL

- A. Secure the Engineer's inspection and approval of subgrades, and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the Engineer:
 1. At paved areas, each lift of fill or backfill shall be tested for density and moisture content at a frequency of one test for every 5000 square feet (sf), but not less than three tests.
 2. Slabs and Footings:
 - a. Fill and Controlled Fill Beneath Slabs and Footings: Each lift of fill or backfill shall be tested for density and moisture content at a frequency of one test for every 2500 square feet (sf), but not less than three tests. Each test location shall be tested twice. The average of two tests at one location shall equal or exceed the specified density. The location of the tests shall be as selected by the Engineer.
 - b. Compacted Existing Soil Beneath Slabs and Footings: In addition to the tests in subparagraph a. above, perform density tests in not less than two randomly selected locations.
 3. In utility trenches, each lift of fill or backfill shall be tested for density and moisture content at a frequency of one test for every 50 linear feet of compacted trench

3.11 TEST FOR DISPLACEMENT OF SEWERS AND STORMDRAINS

- A. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified. Comply with the specific requirements as specified in Section 33 30 00, SANITARY SEWERS and Section 33 41 00, STORM DRAINAGE PIPING.
- B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.
- C. If the illuminated interior of the pipeline shows poor alignment, displaced pipes, or any other defects, correct the defects to the specified conditions and at no additional cost to the Owner.

3.12 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion and keep free from trash and weeds.
 - 2. Protect newly graded and excavated subgrade soils from standing water in low points or in open excavations. The contractor will be responsible for subgrades soils or excavation areas where the stability of the soils is damaged, or the soils made unstable due to failure to provide proper drainage during construction.
 - 3. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.

- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

END OF SECTION

SECTION 31 23 19
DEWATERING**PART 1 - GENERAL****1.1 SUMMARY OF WORK**

- A. Section includes construction dewatering; which includes the extraction or pumping of subsurface ground water to allow for proper utility and foundation trench work; also, the management and disposal of surface runoff from rainfall events within the construction area that could damage excavated or unfinished pavement subgrades.
- B. Related Sections:
 - 1. Section 31 20 00, EARTH MOVING for excavating, backfilling, site grading, and for site utilities.

1.2 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Remove all water, including rainwater, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods. The potential for groundwater intrusion into excavations will be higher during periods of rainfall. Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 5. Remove dewatering system when no longer required for construction.

1.3 SUBMITTALS

- A. Shop Drawings: For dewatering well-point system: Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 - 1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 - 2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Qualification Data: For qualified professional engineer.

- D. Field quality-control reports.
- E. Other Informational Submittals: Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to dewatering including, but not limited to, the following:
 - 2. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
 - 3. Geotechnical report.
 - 4. Proposed site clearing and excavations.
 - 5. Existing utilities and subsurface conditions.
 - 6. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 7. Testing and monitoring of dewatering system.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
 - 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
 - 2. The geotechnical report is included elsewhere in the Project Manual.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 – PRODUCTS

(Not Used)

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - 1. Provide temporary grading to facilitate dewatering and control of surface water. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls. Space well points or wells at intervals required to provide sufficient dewatering. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- E. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 01 57 13, TEMPORARY EROSION CONTROL during dewatering operations.
- F. Dispose of all subsurface water in accordance with the SCDHEC-OCRM erosion control regulations. Utilize sumps, sedimentation tanks, filter bags and other devices to separate sediments from water prior to discharge. At no time shall such water be discharged into a sanitary sewer without the expressed written permission of the jurisdictional authority (owner/operator) of the sewer system.

- G. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand.
- H. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 FIELD QUALITY CONTROL

- A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated on Contractor's approved shop drawing; additional observation wells may be required by authorities having jurisdiction.
 - 1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
 - 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 - 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION

SECTION 31 31 16
TERMITE CONTROL**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Chemical soil treatment.

1.02 REFERENCE STANDARDS

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Manufacturer's Application Instructions: Indicate caution requirements .
- D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three (3) years of documented experience.
- E. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
 - 1. Licensed in the State in which the Project is located.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year installer's warranty against damage to building caused by termites.
 - 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.

2.02 MIXES

- A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

3.02 APPLICATION

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
 - 1. Under Slabs-on-Grade.
 - 2. At Exterior Side of Foundation Surface.
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.

- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 PROTECTION

- A. Do not permit soil grading over treated work.

END OF SECTION

SECTION 32 05 30
LANDSCAPE MAINTENANCE**PART 1 - GENERAL****1.1 SUMMARY**

The scope of this section includes the requirements for the maintenance and care of exterior planting beds, landscaping plants, trees, mulches, grasses and lawns installed by the Contractor, or contained within his project limits until final acceptance by the owner, or the end of the warranty period, as specified herein.

1.2 DEFINITIONS

- A. Pesticide: Fumigant, herbicide, insecticide, fungicide and rodenticide.
- B. Stand of Turf: 95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

- A. Section 32 92 19, SEEDING applies to this section for installation of new permanent hydro-seeded turfgrass requirements, with additions and modifications herein.
- B. Section 32 92 23, SODDING applies to this section for installation of new permanent sod turfgrass requirements, with additions and modifications herein.
- C. Section 32 93 00 , LANDSCAPE PLANTS applies to this section for installation of trees, shrubs, ground cover, vines, mulch topdressing, and staking and guying, with additions and modifications herein.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.

- A. Product Data
 - 1. Fertilizer
 - 2. PesticidesInclude physical characteristics, application instructions and recommendations.
- B. Test Reports
 - 1. Topsoil composition tests
- C. Manufacturer's Instructions
 - 1. Pesticides

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery
 - 1. Fertilizer Delivery: Deliver to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer may be furnished in bulk with a certificate indicating the above information.

2. Pesticide Delivery: Deliver to the site in original containers with legible label indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.

B. Storage

1. Fertilizer and Mulch Storage: Store in dry locations away from contaminants.
2. Pesticides and Plant Growth Regulators Storage: Do not store with other maintenance material. Store herbicides "downwind," relative to the airflow in the storage building, from other pesticides.

- C. Handling: Do not drop or dump materials from vehicles.

1.6 QUALITY ASSURANCE

- A. Topsoil composition Tests: Perform tests as specified in DOA SSIR.

PART 2 - PRODUCTS

2.1 PH ADJUSTERS

- A. Iron: 100 percent elemental

2.2 SOIL CONDITIONERS

- A. Sand: Clean and free of materials harmful to plants.
- B. Composted Derivatives: Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:
1. Particle Size: Minimum percent by weight passing:
 - No. 4 mesh screen 95
 - No. 8 mesh screen 80
 2. Nitrogen Content: Minimum percent based on dry weight:
 - Fir Sawdust 0.7
 - Fir or Pine Bark 1.0
- C. Gypsum: Coarsely ground gypsum comprised of calcium sulfate dihydrate 91 percent, calcium 22 percent, sulfur 17 percent; minimum 96 percent passing through a 20-mesh screen, 100 percent passing thru a 16-mesh screen.

2.3 FERTILIZER

- A. Post-Plant Fertilizer Mixture: Fertilizer mixtures not to exceed one percent granular dust, as specified below.
1. Turf Fertilizer "A": For Fall, Winter, Spring, and Summer seasons use an organic, granular fertilizer containing the following minimum percentages, by weight, or plant food nutrients:
 - 20 percent available nitrogen
 - 10 percent available phosphorus
 - 10 percent available potassium
 - 3 percent sulfur
 - 3 percent iron

2. Planter Bed/Slope Fertilizer "C": For Fall, Winter, Spring, and Summer seasons use an organic, granular fertilizer containing the following minimum percentages, by weight, or plant food nutrients:

- 20 percent available nitrogen
- 10 percent available phosphorus
- 10 percent available potassium
- 3 percent sulfur
- 3 percent iron

2.4 WATER

Source of water to be approved by Architect, suitable quality for irrigation.

2.5 ORGANIC MULCH MATERIALS

Pine straw mulch: needle length ranging in size from 2 to 8 inches.

2.6 PESTICIDES

Fumigant, herbicide, insecticide, fungicide, and rodenticide: EPA registered and approved. Furnish for post-emergence application for crabgrass control and broadleaf weed control. Comply with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on contractor's licensing, certification, and record keeping. Contractor to keep records of all pesticide applications and forward data monthly to Architect. Submit record keeping format to Architect for approval. Contact the Installation Pest Control Coordinator prior to starting work.

PART 3 - EXECUTION

3.1 EXTENT OF WORK

Provide landscape construction maintenance to include mowing, edging, rolling, aeration, fertilizing, watering, weeding, pruning, stake and guy adjusting, and pesticide application for all newly installed landscape areas, unless indicated otherwise, and at all areas inside or outside the limits of the construction that are disturbed by the Contractor's operations.

3.2 IRRIGATION ESTABLISHMENT PERIOD

There is a new permanent irrigation system included in this project. Temporary irrigation will be required if the permanent system is not fully functional at the time of planting, and commencement of the plant establishment period. Temporary irrigation system may be terminated once the permanent irrigation system is approved for use.

The irrigation establishment period will include the proper implementation and operation of a watering and irrigation system that will be utilized during the maintenance period. Irrigation establishment period will commence on the same date as the Turf Establishment Period and the Plant Establishment Period and shall continue until such time as the system is turned over to the Owner for final acceptance.

- A. Maintenance During the Irrigation Establishment Period: Begin maintenance immediately after irrigation equipment has been installed and is functional. Inspect irrigation equipment at least once a week during the installation and establishment period and perform needed maintenance promptly.
- B. The Contractor shall provide all necessary maintenance and repair to ensure proper operation of the irrigation system and its components. This includes all drip lines, rotary heads, pop-ups and piping, valves and controllers.

- C. Water Restrictions: The Contractor shall abide by state, local or other water conservation regulations in force during the establishment period.
- D. Fire Hydrants: To use a fire hydrant for irrigation is not allowed, without the expressed written approval of the water distribution system utility company having jurisdiction.
- E. Remedial Work: Remedial measures directed by the Architect to ensure all irrigation system and equipment repairs and adjustments for plant material survival and healthy growth have been completed.

3.3 TURF ESTABLISHMENT PERIOD

Turf establishment period will commence on the date that inspection by the Architect shows that the new turf furnished under this contract has been satisfactorily installed and shall continue until such time as it is turned over to the Owner for final acceptance.

- A. Maintenance During the Turf Establishment Period: Begin maintenance immediately after turf has been installed. Inspect turf areas at least once a week during the installation and establishment period and perform needed maintenance promptly.
- B. Promotion of Turf Growth: Turf shall be maintained in a manner that promotes proper health, growth, rich natural green color, and neat uniform manicured appearance, free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, roll, aerate, topdress and perform other operations necessary to promote turf growth.
- C. Mowing: Turf shall be mowed at a uniform finished height. Mow turfed areas to an average height of 2 inches when average height of grass becomes 4 inches for spring/summer maintenance and to an average height of 2 inches when the average height of grass reaches 4 inches for fall/winter maintenance. The height of turf is measured from the soil. Mowing of turf shall be performed in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Each successive mowing shall be at approximate 45-degree angles to the previous mowing where practical. Prior to mowing, all rubbish, debris, trash, leaves, rocks, paper, and limbs or branches on a turf area shall be picked up and disposed. Adjacent paved areas shall be swept/vacuumed clean. Reel-type mowers shall be used on warm season grasses and rotary-type mowers shall be used on cool season type grasses. Mulcher mowers may be used on only cool season type grasses.
- D. Turf Edging: Perimeter of planter bed edges, sidewalks, driveways, curbs, and other paved surfaces shall be edged. Uniformly edge these areas to prevent encroachment and to provide a clear-cut division line between planter beds, turf, and ground cover. Edging is to be accomplished in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Edging shall be performed on the same day that turf is mowed. Use of string line trimmers is permitted in "soft" areas such as an edge between turfgrass and a planter bed. Care shall be exercised to avoid damaged to any plant materials.
- E. Turf Trimming: Trimming around trees, fences, poles, walls, irrigation valve boxes and other similar objects is to be accomplished to match the height and appearance of surrounding mowed turf growth. Trimming shall be performed on the same day the turf's mowed. Care shall be exercised to avoid "Girdling" trees located in turf areas. The use of protective tree collars on trees in turf areas may be utilized as a temporary means to avoid injury to tree trunks. At the end of the plant establishment period Contractor will be responsible for removing all protective tree collars.
- F. Post-Fertilizer Application: Apply fertilizer in a manner that promotes health, growth, color and appearance of cultivated turf areas. The method of application, fertilizer type and frequencies

shall be determined by the laboratory soil analysis result and recommendations of the soils at the site. Organic fertilizer shall be used. In the event that organic fertilizer is not producing the desired effect, the Contractor shall contact the Architect for approval prior to the use of a non-organic type of fertilizer. Fertilizer shall be applied by approved methods in accordance with the manufacturer's recommendations. For bidding purposes only apply at rates for the following:

Organic Fertilizer "A" 10 pounds per 1000 square feet at intervals of every 10 weeks.

- G. Turf Watering: The Contractor shall perform irrigation in a manner that promotes the health, growth, color and appearance of cultivated vegetation and that complies with all Federal, State, and local water agencies and authorities' directives. The Contractor shall be responsible to prevent over watering, water run-off, erosion, and ponding due to excessive quantities or rate of application. The Contractor shall abide by state, local or other water conservation regulations or restrictions in force during the establishment period. Irrigation rates shall be adjusted to comply with the water conservation regulations schedule.
- H. Turf Aeration: Upon completion of weed eradication operations and Architect's approval to proceed, aerate turf areas by approved device. Core, by pulling soil plugs, to a minimum depth of 1.5 inches. Leave all soil plugs, that are produced, in the turf area. After aeration operations are complete, top-dress entire area 1/4-inch depth with the following mixture:
 - 72 percent sand
 - 25 percent humusBlend all parts of topdressing mixture to a uniform consistency throughout. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean all soil plugs off of other paving when work is complete. This work shall commence 90 days prior final acceptance of the maintenance establishment period.
- I. Turf Clearance Area: Trees located in turf areas shall be maintained with a growth free clearance of 18 inches from the tree trunk base. The use of mechanical weed whips to accomplish the turf growth free bed area is prohibited.
- J. Policing: The Contractor shall police all landscaped areas. Policing includes removal of leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks or other debris. Policing shall extend to both sides of fencing or walls. Collected debris shall be promptly removed and disposed of at an approved disposal site.
- K. Final Inspection and Acceptance: Final inspection will be scheduled upon written request from the Contractor at least 10 days prior to the last day of the turf establishment period. Final acceptance will be based upon a satisfactory stand of turf.
- L. Replanting: Replant seeded areas in accordance with Section 32 92 19 SEEDING; sodded areas in accordance with Section 32 92 23 SODDING, and within specified planting dates, areas which do not have a satisfactory stand of turf.

3.4 EXTERIOR PLANT (PLANTER BED) ESTABLISHMENT PERIOD

Planter Bed establishment period will commence on the date that inspection by the Architect shows that the new plants furnished under this contract has been satisfactorily installed and shall continue until such time as it is turned over to the Owner for final acceptance.

- A. Maintenance During the Planter Bed Establishment Period: Begin maintenance immediately after plants have been installed. Inspect planter bed areas at least once a week during the installation and establishment period and perform needed maintenance promptly.

- B. Promotion of Plant Growth: Water, prune, fertilize, mulch, adjust stakes, guys and turnbuckles, re-wrap, eradicate weeds and perform other operations necessary to promote plant growth.
- C. Planter Bed Maintenance: Planter beds shall be weeded, fertilized, dead flower stalks and seed heads removed, and mulch levels maintained. A plant bed is defined as an area comprised of trees, shrubs, vines, wildflowers, perennials, ground cover, and a mulch topdressing excluding turf. Planter beds shall be kept weed, turf and pest free. Ground covers shall not be allowed to grow into vines, perennials, shrubs or trees.
1. Ground Cover Maintenance: Herbaceous and Woody ground cover shall be trimmed, pruned, irrigated, and fertilized to present a healthy and manicured appearance. Ground cover will not be allowed to encroach into turf areas. A definite break shall be maintained between turf and ground cover. In areas where ground cover and shrubs, vines and wildflowers are planted together, the ground cover shall not be allowed to grow onto or otherwise dominate the planter bed area. Ground cover will not be allowed to grow onto or into, and be removed from both sides of fences, ditches, gutters, paved areas, buildings, walls, trees, shrubs and storm drains.
 2. Shrub Maintenance: Shrubs shall be trimmed and pruned for health, safety, and aesthetic appearance. Shrubs or shrub masses shall be pruned to evenly form and balance a plant to its natural growth characteristics. Water shoots, suckers, and branches of shrubs not conforming to desired shape and size shall be removed.
 3. Shrub Selective Maintenance: In addition to the above requirements, shrubs shall be selectively pruned, and shaped for health and safety when the following conditions exist. Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections. Remove dead, damaged or diseased branches or limbs. Shrub growth obstructs pedestrian walkways. Shrub growth found growing against or over structures. All pruning debris shall be disposed of in a proper manner.
 4. Shrub Irrigation: All earth mound watering basins around the base of shrubs intended to retain water for proper irrigation shall be maintained in good condition to permit the most efficient application of water and reduce waste.
 5. Tree Maintenance: Tree maintenance includes adjustment of stake ties, guy supports and turnbuckles, watering, fertilizing, pest control, pruning for health and safety and fall leaf cleanup. Stakes, ties, guy supports, and turnbuckles shall be inspected and adjusted to avoid girdling and promote natural development. All trees within the project boundaries, regardless of caliper, shall be selectively pruned for safety and health reasons. These include but are not limited to removal of dead and broken branches, correction of structural defects, or whenever the following conditions exist. Remove diseased wood or structurally weak limbs that may cause a safety hazard. Remove branches that extend over buildings and endanger roofs and in front of windows and which obstruct traffic signs or street intersections. Provide clearance for buses, moving vans and similar vehicles along streets. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced. Pruning of all trees including palm trees shall be accomplished by or in the presence of a certified member of the International Society of Arboriculture and in accordance with ANSI Z133.1. All pruning debris generated shall be disposed of in a proper manner.
 6. Palm Tree Pruning: The Contractor shall prune palm trees to remove dead, dying, diseased, damaged or unwanted fronds, seed pods and fruit clusters. Fronds shall be pruned to a 90-degree angle above the horizontal plane. All tools shall be disinfected with a 50 percent chlorine bleach solution or an approved disinfectant where a possible transmission of disease between individual palm tree exists. Climbing spikes shall not be used in the performance of pruning tasks.
 7. Tree Irrigation: All earth mound watering basins around the base of individual trees or clumps of trees intended to retain water in place for proper irrigation shall be maintained in a good condition to permit the most efficient application of water and reduce waste.

- D. **Water Restrictions:** The Contractor shall abide by state, local or other water conservation regulations in force during the establishment period. Irrigation rates shall be adjusted to comply with the water conservation regulations schedule.
- E. **Planter Bed Post-Fertilizer Application:** Apply fertilizer in a manner that promotes health, growth, color and appearance of newly installed planter bed areas. The method of application, fertilizer type and frequencies shall be determined by the laboratory soil analysis result and recommendations of the soils at the site. Organic fertilizer shall be used. In the event that organic fertilizer is not producing the desired effect, the Contractor shall contract the Architect, in writing, for approval prior to the use of a non-organic type of fertilizer. Fertilizer shall be applied by approved methods in accordance with the manufacturer's recommendations. For bidding purposes only apply at rates for the following:
- Organic Fertilizer "A" 10 pounds per 1000 square feet at intervals of every 10 weeks.
- F. **Policing:** The Contractor shall police all landscaped areas. Policing includes removal of leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks or other debris. Policing shall extend to both sides of fencing or walls. Collected debris shall be promptly removed and disposed of at an approved disposal site.
- G. **Removal of Dead Plants:** Remove dead plants and provide new plants immediately, and replace stakes, guys, wraps, mulch and eroded earth mound water basins. No additional plant establishment period will be required for replacement plants.
- H. **Tracking of Unhealthy Plants:** Note plants not in healthy growing condition, as determined by the Architect, and remove and replace with plants of the same species and sizes as originally specified. Install replacement plantings in accordance with Section 32 93 00, PLANTS.
- I. **Final Inspection:** Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the planter bed establishment period.
- J. **Final Acceptance:** Based on compliance with the following:
1. **Total Plants on Site:** Plants have been accepted and required number of replacements have been installed.
 2. **Mulching and Weeding:** Planter beds and earth mound water basins are properly mulched and free of weeds.
 3. **Fertilizing:** Planter beds have been fertilized as required with correct type of material and application rates.
 4. **Tree Supports:** Stakes, guys and turnbuckles are in good condition.
 5. **Remedial Work:** Remedial measures directed by the Architect to ensure plant material survival and promote healthy growth have been completed.

3.5 PESTICIDE APPLICATION

The Contractor shall furnish all labor, supervision, tools, materials, equipment, and transportation necessary to provide Pest Control Services as required.

- A. **State Licensing:** The Contractor shall be licensed by the State to provide pest control in the categories in which work will be performed.
- B. **Licensed Applicators:** All pesticide applications shall be performed by a licensed pesticide applicator. The individual must be responsible, and all pesticides must be used in accordance

with the Federal, state, local, and installation laws publications, and any requirements identified in attachments. All pesticides shall be procured, processed, handled, and applied in strict accordance with the manufacturer's label. All pesticides shall be registered with the U.S. Environmental Protection Agency and State.

- C. Application and Reporting Procedure: Notify the Architect 24 hours before application. Apply pesticides in accordance with EPA label restrictions and recommendations and federal and state laws. Make daily reports to the Architect stating areas treated with each chemical, the quantity applied, and spray mixture or formulation used. The Contractor shall maintain a label book of pesticides used, including all appropriate Material Safety Data Sheets (MSDS), and have it readily available at all times for inspection. Pesticides shall always be stored in original containers having EPA-registered labels or in containers meeting EPA label requirements.
- D. Application Precautions: Apply in well ventilated areas. Avoid inhalation, injection, or spilling on clothing or skin. Wear protective clothing in accordance with manufacturer's Material Safety Data Sheet recommendations. Do not expose personnel to pesticides exceeding the exposure levels recommended in the most stringent of the following: OSHA, 29 CFR 1910-SUBPART Z, or the manufacturer's material safety data sheet. If excessive exposures are unavoidable, use respirators approved by the National Institute for Occupational Safety and Health for protection from pesticides. Conform to the selection and usage guidance in ANSI Z88.2.
- E. Hydraulic Equipment: For liquid application of chemicals, hydraulic equipment shall have leak-proof tanks and a positive agitation method. Calibrate and meter equipment so that application of chemicals in specified amounts can be determined. Provide equipment with gages and valves capable of maintaining constant application pressures. Use application equipment appropriate for the nature and size of work, that is clean, calibrated, and in proper operational condition. Never leave equipment unattended during filling, and during application usage.
- F. Personnel Injury and Property Damage Prevention: Apply in a manner to prevent injury to personnel, and damage to property, from either direct spray, or drifting of chemicals both on and off Owner's property.
- G. Pesticide Disposal: The Contractor shall dispose of all excess pesticides, pesticide rinse water, empty pesticide containers, and any pesticide contaminated article in accordance with the label, applicable State and Federal regulations. Pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated articles shall not be disposed of on the Owner's property. However, rinse water may be used as diluents for the formulation of the same pesticide.
- H. Pesticide Spills, Clean Up and Decontamination: The Contractor shall be responsible for proper reporting, clean up and decontamination of pesticide spills, as required by EPA and State Laws and Regulations. All spills shall be immediately reported to the Architect.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING AND BASE COURSE**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Specifications Section 31 20 00, EARTH MOVING, apply to work of this section.
- B. All work shall be in conformance with the South Carolina State Highway Standard Specifications for Highway Construction, Edition of 2007, with the latest addenda and revisions as specified in the Supplemental Technical Specifications; hereafter referred to as "SCDOT-SS."

1.2 DESCRIPTION OF WORK

Extent of asphalt concrete paving work is as shown on construction drawings.

1.3 SUBMITTALS

- A. Material Certificates: Provide copies of material certificates signed by material supplier and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- B. Mx Design: Provide copies of each type of asphaltic concrete mix, approved by the SCDOT within the last 12 months, indicated to be used in the project.
- C. Test Reports
 - 1. Sampling and Testing of aggregate base course material. Contractor shall make the proposed source material stockpiles available to the approved testing laboratory for sampling and testing for sieve analysis. If recycled concrete is submitted, also provide a percent content by volume of foreign and deleterious material and a description of such foreign and deleterious material. Contractor must select a single type of aggregate material from the options allowed and that selected source, once approved may not be substituted or mixed with any other source or type of aggregate material without express written permission by the Engineer.
 - 2. Field Density Tests: provide field density tests of the aggregate base course material in-place as specified.

1.4 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor and performed by an approved testing laboratory. Test the materials to establish compliance with the specified requirements; perform testing at the specified frequency. The Engineer may specify the time and location of the field density tests at his discretion; otherwise the test points will be randomly selected. Furnish copies of test results to the Engineer within 24 hours of completion of the tests.

- A. Sampling: Take samples of aggregate base course for laboratory testing in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the Engineer. Test results of sampling shall confirm material supplied meets the specified gradation. If Crushed Recycled Concrete (CRC) material is used, sample testing shall also measure the quantity of any foreign material by volume.
- B. Preconstruction Tests: Perform one of each of the following tests, on the proposed aggregate base course material prior to commencing construction, to demonstrate that the proposed

material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

1. Sieve Analysis: Make sieve analysis in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11. Submit certified copies of test results for approval not less than 30 days before material is required for the work.
2. Liquid Limit and Plasticity Index: Determine liquid limit and plasticity index in accordance with ASTM D 4318. Submit certified copies of test results for approval not less than 30 days before material is required for the work.
3. Moisture-Density Determinations: Determine the laboratory maximum dry density and optimum moisture content in accordance with AASHTO T 180, Method D and corrected with AASHTO T 224. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

1.5 JOB CONDITIONS

Weather Limitations: Asphalt mixture shall be placed in conformance with Section 401.4.4 of the SCDOT-SS. Minimum ambient air temperature shall not be below 55 degrees F; minimum ground surface temperature shall not be below 45 degrees F.

1.6 GRADE CONTROL

Establish and maintain required lines and elevations as specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE COURSE MATERIALS

- A. Graded Aggregate Base Course (GABC): Graded aggregate base course (GABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction. Provide GABC consisting of clean, sound, durable particles of crushed natural stone, crushed gravel, crushed recycled concrete, angular sand, or other approved material. GABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine aggregate. All material shall pass a 2-inch mesh sieve and shall be graded uniformly down to dust. Fine material shall consist entirely of dust of fracture. Liquid limit shall not exceed 35 and material shall be non-plastic as determined by ASTM D4318.
1. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels and shall meet all the requirements specified below.
 2. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.
 3. Crushed Recycled Concrete: Provide crushed recycled concrete consisting of previously hardened Portland cement concrete. The recycled material shall be free of all reinforcing steel, bituminous concrete, surfacing materials, and any other foreign material (i.e. PVC or metal conduits, ceramic tile, composite floor tile, wood, plastics, wire or other metals, etc.) and shall be crushed and processed to meet the required gradations. The Owner has the right to reject any CRC base if the material supplied contains foreign matter and deleterious material.
- B. Gradation Requirements: Apply the specified gradation requirements to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE 1. GRADATION OF AGGREGATES
 Percentage by Weight Passing Square-Mesh Sieve

<u>SIEVE</u>	<u>MACADAM*</u>	<u>MARINE LIMESTONE</u>
2 inch	100	100
1 ½ inch	95-100	95-100
1 inch	70-100	70-100
½ inch	48-75	50-85
No. 4	30-60	30-60
No. 30	11-30	17-38
No. 200	0-12	0-20

*As defined in the SCDOT Standard Specifications. Recycled Concrete Base Course gradation shall conform to the gradation specified for Macadam Base Course Material.

2.2 ASPHALT MATERIALS

A. Asphaltic Concrete Intermediate Course

1. Asphaltic Concrete Intermediate Course shall comply with SCDOT-SS standard Hot Mixed Asphalt (HMA) Intermediate Course, Type B or Type C, as indicated and per the following specifications:
 - a. Coarse Aggregate: ASTM D 692, Maximum Los Angeles Abrasion loss 60 percent per ASTM C131.
 - b. Fine Aggregate: ASTM D1073; except as modified herein
 - c. Mineral Filler: ASTM D 242.
2. Mix: Produce mix in an approved plant from an approved job-mix formula based on the following:

<u>SIEVE</u>	<u>GRADATION (% passing by weight)</u>	
	<u>TYPE B</u>	<u>TYPE C</u>
1 inch	100	100
¾ inch	98 - 100	90 - 100
½ inch	90 - 95	80 - 95
¾ inch	72 - 90	68 - 87
No. 4	44 - 62	45 - 68
No. 8	23 - 43	30 - 46
No. 30	10 - 25	12 - 29
No. 100	4 - 12	4 - 13
No. 200	2 - 8	2 - 8

- a. Binder Limits, % 4.5 - 6.0* 4.0 - 6.0*
- b. Binder Grade: PG 64-22 PG 64-22
- c. Total Air Voids: 3.2 - 4.0 3.5 - 4.5
- d. Voids Filled w/Asphalt (VFA): 70% - 78% 70% - 77%
- e. The use of recycled asphalt pavement (RAP) in the mix shall be in conformance with the SCDOT-SS.

* Asphalt binder content may be increased on percentage of aged binder in mixture as approved by SCDOT. AV & VFA limits will be allowed to extend outside of design ranges above once binder content is adjusted and approved by SCDOT OMR.

B. Asphaltic Concrete Surface Course

1. Asphaltic concrete surface course shall comply with SCDOT-SS standard Hot Mixed Asphalt (HMA) Surface Course, Type B or Type C, as indicated and per the following specifications:
 - a. Coarse Aggregate: ASTM D 692, Maximum Los Angeles Abrasion loss 40 percent per ASTM C131.
 - b. Fine Aggregate: ASTM D1073; except as modified herein
 - c. Mineral Filler: ASTM D 242.
 - d. Asphalt Binder: AASHTO M 320, PG 64-22, Performance grade.
2. Mix: Produce mix in an approved plant from an approved job-mix formula based on the following:

<u>SIEVE</u>	<u>GRADATION (% passing by weight)</u>	
	<u>TYPE B</u>	<u>TYPE C</u>
1 inch	100	100
3/4 inch	98 - 100	100
1/2 inch	90 - 100	97 - 100
3/8 inch	72 - 90	83 - 100
No. 4	44 - 62	58 - 80
No. 8	23 - 43	42 - 62
No. 30	10 - 25	20 - 40
No. 100	4 - 12	8 - 20
No. 200	2 - 8	3 - 9

- a. Binder Limits, %: 4.8 - 6.0* 5.0 – 6.8*
- b. Binder Grade: PG 64-22 PG 64-22
- c. Air Voids, %: 3.0 – 4.0 3.5 – 4.5
- d. Voids Filled w/Asphalt: 70% - 80% 70% - 77%
- e. The use of recycled asphalt pavement (RAP) in the mix shall be in conformance with the SCDOT-SS.

* Asphalt binder content may be increased on percentage of aged binder in mixture as approved by SCDOT. AV & VFA limits will be allowed to extend outside of design ranges above once binder content is adjusted and approved by SCDOT OMR.

2.3 BITUMINOUS PRIME COAT AND TACK COAT MATERIALS

- A. Bituminous Prime Coat: Bituminous prime coat materials shall be RC-70 or RC-250, liquid asphalt conforming to ASTM D2028; or emulsified asphalt Grades SS-1 or SS-1h conforming to ASTM D977; or cationic emulsified asphalt grades CSS-1 or CSS-1h conforming to ASTM D2397. Emulsified asphalt may be diluted in equal proportion with water.
- B. Bituminous Tack Coat: Provide a tack coat material consisting of binder or emulsified asphalt as identified on the SCDOT Qualified Product List 37 or 38. The acceptable grades of emulsified asphalt are RS-1, MS-1, MS-2, HFMS-1, HFMS-2, SS-1, CRS-1, CRS-2, CMS-2, and CSS-1. Emulsified asphalt, with the exception of Grades RS-1 and CRS-1, may be diluted with up to 50 percent with water provided the dilution occurs at the manufacturing plant using acceptable procedures and not diluted at the point of use.
- C. Contractor's Option: The contractor may use, at his option, any prime or tack coat material on the current SCDOT list of approved materials.

PART 3 - EXECUTION**3.1 SURFACE PREPARATION**

- A. Inspect finished subgrade surface for smoothness, compaction and stability (proof-roll) in accordance with Section 31 20 00, EARTH MOVING. Remove loose material from compacted subgrade surface immediately prior to installation of base course material. Notify Engineer of unsatisfactory conditions. Do not begin installation of base course until deficient subgrade areas have been corrected.

3.2 INSTALLATION

- A. Compacting and Finishing of Aggregate Base Course: Spread finished mixture uniformly and compact to at least 100 percent of maximum laboratory density as determined in accordance with ASTM D1557, Method D. Determine in-place density in accordance with ASTM D1556 or ASTM D2922. After compaction, finished surface of aggregate base course shall not vary more than 3/8 inch when tested with a 10-foot straightedge. Finished thickness of base course shall not vary more than 1/2 half inch from the required thickness at any point and the average of all depth measurements shall be at least that indicated. Areas not meeting the specified requirements will be rejected until corrected by the Contractor at no additional cost to the Owner.
- B. Bituminous Prime Coat and Tack Coat
 1. Prime Coat for Aggregate Base Course: When specifically indicated on construction drawings, apply bituminous prime coat to the completed and accepted aggregate base course after receiving approval for priming. For macadam or recycled concrete, apply at a rate of not less than 0.25 gallons per square yard and not more than 0.30 gallons per square yard. For marine limestone base course, apply at a rate of not less than 0.08 gallons per square yard and not more than 0.12 gallons per square yard. Obtain the Engineer's approval for the temperature of application and weather conditions for application. Do not permit traffic on the primed area until the prime coat has cured adequately.
 2. Bituminous Tack Coat: Before laying any new asphalt pavement over existing pavement, uniformly apply the tack coat to the surface of the existing pavement at the rate of 0.05 to 0.15 gallons per square yard. Place lesser amounts on new pavements and greater amounts on older pavements to ensure a bond between the surface being paved and the new overlying asphalt paving course. Also apply tach to the edges of all pavements when patching pavements, tying new pavements into existing, or making trench repairs.
- C. Spreading and Compacting of Asphaltic Concrete Intermediate and Surface Courses:
 1. Spread wearing course with a bituminous spreader at a temperature of not less than 225 degrees F nor more than 325 degrees F. Roll, while hot with a steel-wheel roller weighing not less than 10 tons and a pneumatic-tired roller.
 2. In areas where the use of machine-spreading is impractical, spread the mixture on approved dump boards or an adjacent approved area outside the area to be paved and distribute into place from the dump boards or from the approved area by means of hot shovels. Spread mixture with hot rakes in a uniformly loose layer of thickness that when compacted will conform to the required grade and thickness. During hand spreading, carefully place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. In no case shall the mixture be placed by throwing or broadcasting from a shovel. Do not dump the loads any faster than can be properly handled by the shovelers and rakers.
 3. The finished thickness and surface tolerances shall be as specified in paragraph entitled

FIELD QUALITY CONTROL. The average thickness of all depth measurements shall be at least the thickness indicated. Reject any area not meeting any one of the above requirements until corrected by the Contractor.

3.3 FIELD QUALITY CONTROL

- A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Engineer.
- B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness.
 - 1. Aggregate Base Course: 1/2", plus or minus
 - 2. HMA Intermediate Course: 1/4", plus or minus
 - 3. HMA Wearing Course: 1/4", plus or minus
- C. Surface Smoothness: Test finished surface of each construction course, aggregate base and asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area, at intervals as directed by the Engineer. Surfaces will not be acceptable if, exceeding the following tolerances of smoothness.
 - 1. Aggregate Base Course Surfaces: 3/8"
 - 2. HMA Intermediate Course Surfaces: 1/4"
 - 3. HMA Wearing Course Surfaces: 1/8"

END OF SECTION

CONCRETE PAVEMENTS FOR ROADS AND SITE FACILITIES

SECTION 32 13 13**CONCRETE PAVEMENTS FOR ROADS AND SITE FACILITIES****PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. The work shall include construction of concrete vehicular pavements and aprons on a prepared subgrade or base course as specified herein and to the dimensions, typical sections and notations as shown on the Drawings. Construction shall be to the lines and grades as shown on the Drawings.
- B. All work covered under this section shall conform to the appropriate requirements of the "Standard Specifications for Highway Construction", Edition 2007, Section 501, "Portland Cement Concrete Pavement" and any additional specifications as may be indicated on the construction drawings or as contained in the following subsections.
- C. All concrete work for exterior pedestrian walks and curbs shall be in accordance with the requirements specified in Section 32 16 23, CONCRETE SIDEWALKS, CURBS AND GUTTERS.
- D. Related Sections: For aggregate base course under concrete pavement, refer to Section 32 12 16, ASPHALT PAVING AND BASE COURSE, in addition to this section.

1.2 REFERENCE STANDARDS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of this specification shall in no way invalidate the minimum requirements of the referenced standards.

ACI INTERNATIONAL (ACI)

ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	Specifications for Structural Concrete
ACI 305R	Hot Weather Concreting
ACI 306.1	Standard Specification for Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 143/C 143M	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 150	Standard Specification for Portland Cement
ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete

CONCRETE PAVEMENTS FOR ROADS AND SITE FACILITIES

ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 494/C 494M	Standard Specification for Chemical Admixtures for Concrete
ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 94/C 94M	Standard Specification for Ready-Mixed Concrete
ASTM C 989	Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 5893	Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

1.3 SUBMITTALS

The following shall be submitted for approval:

A. Product Data:

1. Curing materials
2. Admixtures
3. Joint Sealants

B. Design Data:

1. Concrete mix design:

Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

- C. Test Reports:
1. Concrete slump tests
 2. Air content tests
 3. Strength tests

1.4 QUALITY ASSURANCE

- A. Required Information: Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size. Test reports shall be submitted along with the concrete mix design. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to ASTM C 1077.
- B. Workmanship: The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances and finished. Correct deficient concrete as directed by the Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cementitious Materials
1. Cement: ASTM C 150, Type I or II.
 2. Fly Ash and Pozzolan: ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalis content shall be 1.5%, and maximum calcium oxide (CaO) content 8%.
 3. Slag: ASTM C 989, Ground Granulated Blast Furnace Slag (GGBFS), Grade 100 or 120.
- B. Water: ASTM C 94/C 94M, fresh, clean, and potable.
- C. Aggregate
1. Fine Aggregates: ASTM C 33.
 2. Coarse Aggregates: ASTM C 33. Allowable coarse aggregates include No.67 and No. 57 stone; and No.467 stone will be allowed in slabs not less than 6 inches in thickness.
- D. Admixtures: ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Where not shown or specified, the use of admixtures is subject to written approval of the Architect.

ASTM C 260: Air-entraining.

2.2 PORTLAND CEMENT CONCRETE PAVEMENT

- A Contractor Furnished Mix Design: Contractor-furnished mix design concrete shall be designed in accordance with the South Carolina State Highway Department Standard Specifications, (2007 Edition), Section 501. The concrete shall have a minimum compressive strength of 4000 psi or flexural strength of 550 pounds per square inch (psi) at 28 days. All concrete shall be ready mixed as produced by a reputable manufacturer, acceptable to the Architect. The

CONCRETE PAVEMENTS FOR ROADS AND SITE FACILITIES

concrete shall be air entrained at 5.0%, plus or minus 1.0 percent. Maximum size aggregate for slip forming shall be 1.5 inches. Concrete slump shall be 4 inches, maximum. Concrete used in slip form paving must be stiff enough to hold its shape without deformation once the form has passed.

2.3 FORMS

- A. Forms shall be of wood or metal and of a depth equal to or greater than the typical section shown on Drawings. Provide flexible or curved forms where required or directed to prevent a "chord" effect between tangent points when placing forms in areas having specified radii as indicated on the Drawings.
- B. Forms shall be free form warp, and of sufficient strength when staked to hold the alignment specified during concrete placing and finishing operations.
- C. All forms shall be cleaned and oiled prior to placement of concrete.

2.4 JOINTS AND JOINT FILLERS

- A. Expansion Joint Filler, Premolded: Premolded expansion joint filler shall conform to ASTM D 1751 or ASTM D 1752, 3/4-inch thick extending for the full depth of the concrete section, unless indicated otherwise.
- B. Sealants: Joint sealant material for sealing all joints in Portland cement concrete pavements shall be a cold applied, single component, chemically curing silicone sealant, per ASTM D 5893.
- C. Backup Material: Provide backup material in sealed contraction joints that is a compressible, non-shrinking, non-staining, non-absorbing material, nonreactive with the joint sealant. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The material shall have a water absorption of not more than 5 percent of the sample weight when tested in accordance with ASTM C 509. The backup material shall be 25 plus or minus 5 percent larger in diameter than the nominal width of the crack.

2.5 CONCRETE CURING MATERIALS

- A. Impervious Sheet Materials: Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.
- B. Liquid Membrane-Forming Curing Compound: Shall be a white pigmented membrane-forming curing compound conforming to ASTM C 309, Type 2, Class B, free of paraffin or petroleum.

PART 3 - EXECUTION**3.1 SITE PREPARATIONS**

- A. The Contractor shall compact the existing or fill subgrade to 95% Modified Proctor per ASTM D-1557 for a depth of 1 foot below the finished subgrade, per requirements of specification Section 31 20 00, EARTH MOVING.
- B. Aggregate Base Course, or subbase, where indicated, shall be installed in accordance with Section 32 12 16, ASPHALT PAVING AND BASE COURSE.
- C. The Contractor will be required to proof-roll the compacted subgrade and base course in the

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presence of and under the direction of the Engineer, as specified in the appropriate technical specification. Any areas found to be unacceptable shall be repaired by the CONTRACTOR.

3.2 FORMS

- A. Construction: Construct static forms to be removable without damaging the concrete.
- B. Coating: Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bond breaker before concrete is placed.
- C. Grade and Alignment: Check and correct grade elevations and alignment of the forms immediately before placing the concrete. These forms shall have a vertical tolerance of 0.05 feet and a horizontal tolerance of 1" at any point.

3.3 MEASURING, MIXING, AND CONVEYING CONCRETE

- A. ASTM C 94/C 94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, reduce mixing time and place concrete within 60 minutes. Additional water may be added to bring slump within required limits as specified in Section 11.7 of ASTM C 94/C 94M, provided that the specified water-cement ratio is not exceeded.

3.4 PLACING CONCRETE

- A. Placing: Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete continuously at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.
- B. Vibration: Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds.
- C. Cold Weather: Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 degrees and 80 degrees F. Methods of heating materials are subject to approval of the Architect. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer.
- D. Hot Weather: Maintain required concrete temperature in accordance with Figure 2.1.5 in ACI 305R to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing

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concrete. Follow practices found in ACI 305R.

3.3 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms or slipforms, depending on the best method for the area to be paved.

- A. Consolidation: The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.
- B. Operation: When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of any debris, and placing rubber mats beneath the paver tracks. Transversely oscillating screeds and extrusion plates shall overlap the existing pavement the minimum possible, but in no case more than 8 inches.
- C. Required Results: The paver-finisher shall be operated to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. It shall produce only a very minimum amount of paste at the surface. Multiple passes of the paver-finisher shall not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.
- D. Fixed Form Paving: Forms shall be steel, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.
- E. Slipform Paving: The slipform paver shall shape the concrete to the specified and indicated cross section in one pass and shall finish the surface and edges so that only a very minimum amount of hand finishing is required. Dowels shall not be installed by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete. If a keyway is required, a 26-gauge thick metal keyway liner shall be installed as the keyway is extruded. The keyway liner shall be protected and shall remain in place and become part of the joint.

3.4 FINISHING CONCRETE

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse

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bridge. Hand finishing equipment shall be available for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

- A. Side Form Finishing: Strike off and screed concrete to the required crown or slope and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Architect. Elevation of concrete shall be such that, when consolidated and finished, pavement surface will be adequately consolidated and at the required grade. Equip finishing machine with two screeds which are readily and accurately adjustable for changes in pavement slope and compensation for wear and other causes. Make as many passes over each area of pavement and at such intervals as necessary to give proper compaction, retention of coarse aggregate near the finished surface, and a surface of uniform texture, true to grade and slope. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.
1. Equipment Operation: Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screed for its entire length.
 2. Joint Finish: Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.
 3. Hand Finishing: Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated, and finished pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.
 4. Longitudinal Floating: After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.
- B. Edging: At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. When brooming is specified for the final surface finish, edge transverse joints before starting brooming, then operate broom to obliterate as much as possible the mark left by the edging tool without disturbing the rounded corner left by the edger. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill surface voids and defect solidly with a mixture of suitable proportions and consistency and refinish per ACI 301. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.
- C. Final Surface Finishing: The Contractor shall provide a medium broom finish with broom corrugations not to exceed 1/8" in depth and placed transversely on the pavement surface. Brooming operations shall remove surface traces of edging operation but shall not damage the joint edges.

3.5 JOINTS

Joints shall be constructed to divide the surface into rectangular areas, as indicated. Transverse contraction joints shall be spaced at 10 feet on centers, or as indicated, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all roadways, drives or traffic ways intended for vehicular use 10 feet or more in width. Transverse expansion joints shall be installed at 50-foot intervals on long runs, and as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk

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pavement, using joint filler of the type, thickness, and width indicated.

- A. **Contraction Joints:** The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the pavement thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw as soon as the concrete is stiff enough to support the weight of workmen and equipment without damage, preferably within 3-6 hours, but not more than 24-hours after placement. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8-inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations. At the end of the curing period, contraction joints shall be cleaned and sealed with specified joint sealant
- B. **Expansion Joints:** Expansion joints shall be formed with minimum 3/4-inch joint filler strips, unless wider joints are indicated. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and sealed with specified joint sealant.

3.6 INSTALLATION OF SEALANT

- A. **Time of Application:** Seal joints immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints, that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.
- B. **Sealing Joints:** Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/4 inch plus or minus 1/16 inch below the pavement surface. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Architect. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

3.7 CURING AND PROTECTION

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use White-Burlap-Polyethylene Sheet or liquid membrane-forming compound, except as specified otherwise herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.

- A. **Impervious Polyethylene Sheet Method:** Wet entire exposed surface thoroughly with a fine spray of water. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure sheeting has not lost all moisture. If moisture evaporates, re-spray concrete surface re-place sheeting on pavement (re-saturation and re-placing shall take no longer than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for

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at least 7 days.

- B. Liquid Membrane-Forming Compound Method: A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet per gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above.
1. Protection of Treated Surfaces: Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to ensure that the concrete is properly cured at sawed joints.
- C. Protection: Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 FIELD QUALITY CONTROL

- A. General Requirements: The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to ensure that the requirements of these specifications are met.
- B. Sampling: The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with ASTM C 172 during each working day as required to perform tests specified herein. Make test specimens in accordance with ASTM C 31/C 31M.
- C. Slump Tests: The Contractor's approved laboratory shall perform concrete slump tests in accordance with ASTM C 143/C 143M. Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted. Any load of concrete with a slump greater than 4" shall not be used for this project. The Contractor shall incur all losses due to substandard concrete.
- D. Strength Tests: The Contractor's approved laboratory shall test concrete for strength. Samples of concrete shall be taken for every 250 cubic yards of concrete placed, but not less than once a day. Make six test specimens for each set of tests. Test two specimens at 7 days, two at 28 days, and two at 90 days. Concrete strength will be considered satisfactory when the minimum

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of the 28-day test results equals or exceeds the specified 28-day compressive strength. If the ratio of the 7-day strength test to the specified 28-day strength is less than 65 percent, make necessary adjustments for conformance. Concrete which is determined to be defective based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.

- E. Air Content Tests: Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C 231 on samples taken during placement of concrete in forms.
- F. Surface Testing: Surface testing for surface smoothness, edge slump and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced to the site plan, and a report submitted to the Architect within 24 hours after measurement is made. A final report of surface testing, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Architect upon conclusion of surface testing.
 - 1. Surface Smoothness Requirements: The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified when checked with a 12 foot straightedge: 1/5 inch longitudinal and 1/4 inch transverse directions for roads and streets and 1/4 inch for both directions for other concrete surfaces, such as parking areas.
 - 2. Surface Smoothness Testing Method: The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.
- G. Plan Grade Testing and Conformance: The surfaces shall vary not more than 0.05 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.
- H. Test for Pavement Thickness: Measure during concrete placement to determine in-place thickness of concrete pavement.

END OF SECTION

SECTION 32 16 23**CONCRETE SIDEWALKS, CURBS AND GUTTERS****PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. The work shall include construction of pedestrian Portland cement concrete walkways, curbs and gutters on a prepared subgrade as specified herein and to the dimensions, typical sections and notations as shown on the Drawings. Construction shall be to the lines and grades as shown on the Drawings.

1.2 REFERENCE STANDARDS

Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these specifications shall in no way invalidate the minimum requirements of the referenced standards.

SCDOT SS	South Carolina State Highway Department Standard Specifications (2007 Edition), Section 720, "Concrete Curb, Gutter, Curb and Gutter, Sidewalk, Driveway, and Median"
ASTM C 31/C 31M	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 143/C 143M	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM D 1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

1.3 WORKMANSHIP

- A. The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Engineer.

1.4 SUBMITTALS

The following shall be submitted for approval prior to starting work:

A. Design Data

1. Concrete Mix Design: Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit a new mix design for each material source change.

B. Test Reports

1. Field Quality Control Tests
 - a. Strength Test
 - b. Slump Test
 - c. Surface evaluation

Copies of all test reports within 24 hours of completion of the test

1.5 WEATHER LIMITATIONS

- A. Placing During Cold Weather: Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If concrete must be placed when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 degrees and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.
- B. Placing During Warm Weather: The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

PART 2 - PRODUCTS**2.1 FORMS**

- A. Forms shall be of wood or metal and of a depth equal to or greater than the typical section shown on Drawings. Provide flexible or curved forms where required or directed to prevent a "chord" effect between tangent points when placing forms in areas having specified radii as indicated on the Drawings.
- B. Forms shall be free from warp, and of sufficient strength when staked to hold the alignment specified during concrete placing and finishing operations.
- C. All forms shall be cleaned and oiled prior to placement of concrete.

2.2 PORTLAND CEMENT CONCRETE

- A. Concrete shall be Class 3000 (3,000 psi 28-day compressive strength), as defined by the South Carolina State Highway Department Standard Specifications, (2007 Edition), Section 701, "Portland Cement Concrete for Structures." All concrete shall be ready mixed as produced by a reputable manufacturer, acceptable to the Engineer.
1. Air Content: Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.
 2. Slump: The concrete slump for static formed work shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C 143/C 143M. At the Contractor's option, he may provide two different mix designs: one for curb and gutter with a maximum slump of 2 inches; and one for sidewalks with a maximum slump of 4 inches. Concrete used in slip form paving must be stiff enough to hold its shape without deformation once the form has passed.

2.3 EXPANSION JOINTS

- A. Bituminous preformed joint filler complying with requirements of ASTM D 1751 or ASTM D 1752, 1/2 inch thick, unless otherwise indicated.

2.4 CONCRETE CURING MATERIALS

- A. Impervious Sheet Materials: Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.
- B. White Pigmented Membrane-Forming Curing Compound: White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2, Class B, free of paraffin or petroleum.

PART 3 - EXECUTION

3.1 GENERAL

Construct forms to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, and grades.

3.2 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 31 20 00, EARTH MOVING.

- A. Sidewalk Subgrade: The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.
- B. Curb and Gutter Subgrade: The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.
- C. Maintenance of Subgrade: The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.3 FORMWORK

- A. Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed.

3.4 SIDEWALK CONCRETE PLACEMENT AND FINISHING

- A. Formed Sidewalks: Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.
- B. Concrete Finishing: After straight edging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, after edging.
- C. Edge and Joint Finishing: All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8-inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.
- D. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 5/16-inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

- A. Formed Curb and Gutter: Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".
- B. Curb and Gutter Finishing: Approved slip-formed curb and gutter machines may be used in lieu of hand placement.
- C. Concrete Finishing: Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2-inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.
- D. Joint Finishing: Curb edges at formed joints shall be finished as indicated.

CONCRETE SIDEWALKS, CURBS AND GUTTERS

- E. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.6 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, unless indicated otherwise on the drawings, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

- A. Sidewalk Contraction Joints: The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8-inch blade to the depth indicated as soon as the concrete is hard enough to support the sawing operation, preferably within 3-6 hours, but not greater than 24 hours. The sawing shall be performed at the locations of the hand tooled joint groove to ensure the proper depth of 1/4 of the total thickness is achieved at each joint location.
- B. Sidewalk Expansion Joints: Expansion joints shall be formed with 1/2-inch joint filler strips. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned.

3.7 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

- A. Contraction Joints: Contraction joints shall be constructed directly opposite contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.
 - 1. Contraction joints (except for slip forming) shall be constructed by means of 1/8-inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.
 - 2. When slip forming is used, the contraction joints shall be cut in the top portion of the gutter/curb hardened concrete in a continuous cut across the curb and gutter, using a power-driven saw. The depth of cut shall be at least one-fourth of the gutter/curb depth and 1/8-inch in width.
- B. Expansion Joints: Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting Portland cement concrete pavement and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut Portland cement concrete pavement, expansion joints at least 1/2-inch in width, unless specifically indicated otherwise, shall be provided at intervals not less than 30 feet nor greater than 120 feet.

3.8 CURING AND PROTECTION

- A. General Requirements: Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.
1. Impervious Sheeting Method: The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Damaged sheets shall be repaired or replaced, if damaged during the curing period. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.
 2. Liquid Membrane Curing Method: A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet per gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to ensure that the concrete is properly cured at sawed joints. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests.
- B. Backfilling: After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.
- C. Protection: Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.9 FIELD QUALITY CONTROL

- A. General Requirements: The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to ensure that the requirements of these specifications are met.

B. Concrete Testing:

1. **Strength Testing:** The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete shall be taken for every 250 cubic yards of concrete placed, but not less than once a day. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.
2. **Slump Test:** Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted.

C. Thickness Evaluation: The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine.

D. Surface Evaluation: The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.10 SURFACE DEFICIENCIES AND CORRECTIONS

- A. Thickness Deficiency:** When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.
- B. High Areas:** In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.
- C. Appearance:** Exposed surfaces of the finished work will be inspected by the Engineer and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

END OF SECTION

SECTION 32 17 23
PAVEMENT MARKINGS**PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. The work shall include construction of pavement markings, stripes, symbols, and other indicated markings for traffic control and parking delineation onto asphalt or concrete pavements as shown on the Drawings. Thermoplastic pavement markings shall be required in all public roadways and when specifically indicated on the construction drawings; Off-street parking lot markings may be painted markings if not specifically indicated otherwise.

1.2 SYSTEM DESCRIPTION

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads shall display low speed traffic markings and traffic warning lights.

A. Paint Application Equipment

1. Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines: The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results, and meet all performance requirements for work in SCDOT rights-of-way
2. Hand-Operated, Push-Type Machines: All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas

B. Thermoplastic Application Equipment

1. Thermoplastic Material: Thermoplastic material, when indicated on the construction drawings, shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe and meet all performance and application requirements for work in SCDOT rights-of-way.
 - a. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skip-lines". The equipment shall be capable of applying varying widths of traffic markings.
 - b. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.
- C. Reflective Media Dispenser: The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism.

1.3 SUBMITTALS

Submit the following for approval:

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Composition Requirements: Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.
- C. Qualifications: Documentation on personnel qualifications, as specified.
- D. Certificates: Volatile Organic Compound (VOC): Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.4 QUALITY ASSURANCE

- A. Qualifications: Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.
- B. Traffic Controls: Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.
- C. Maintenance of Traffic: When traffic in existing streets, roads or parking areas must be rerouted or controlled to accomplish the work, the necessary warning signs, flag-persons, and related equipment for the safe passage of vehicles shall be provided.

1.5 DELIVERY, STORAGE, AND HANDLING

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.6 ENVIRONMENTAL REQUIREMENTS

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 - PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for parking areas shall conform to FS TT-P-1952, color as indicated. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

Pavement markings for public streets and roads, when indicated on the project drawings, shall be reflectorized thermoplastic pavement marking compounds conforming to the requirements of the SCDOT Standard Specifications for Highway Construction, Section 627. The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

- A. Composition Requirements: The binder component shall meet all of the requirements of AASHTO M 249. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

Component	Percent by Weight	
	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-
Glass beads	20 min.	20 min.
Calcium carbonate and inert fillers	49 max.	*
Yellow pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of the SCDOT are met.

- B. Physical Properties
 1. Color: The color shall be as indicated.
 2. Drying Time: When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, after curing 15 minutes.
 3. Softening Point: The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E 28.
 4. Specific Gravity: The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.
- C. Asphalt Concrete Primer: The primer for asphalt concrete pavements shall be a thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved and/or dispersed in a volatile organic compound (VOC). Solids content shall not be less than 10 percent by weight at 70 degrees F and 60 percent relative humidity. A wet film thickness of 0.005 inch plus or minus 0.001 inch, shall dry to a tack-free condition in less than 5 minutes.
- D. Portland Cement Concrete Primer: The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D 4505 Type I or IV, Class optional.

2.4 RAISED REFLECTIVE MARKERS

Where indicated, either metallic or nonmetallic markers of the button or prismatic reflector type may be used. Markers shall be of permanent colors, as specified for pavement marking, and shall retain the color and brightness under the action of traffic. Button markers shall have a diameter of not less than 4 inches and shall be spaced not more than 40 feet apart on solid longitudinal lines. Broken centerline marker spacings shall be in segments indicated with gaps indicated between segments. Markers shall have rounded surfaces presenting a smooth contour to traffic and shall not project more than 3/4 inch above level of pavement. Pavement markers and adhesive epoxy shall conform to ASTM D 4280.

2.5 REFLECTIVE MEDIA

Reflective media for roads and streets shall conform to FS TT-B-1325, Type I, Gradation A or AASHTO M 247, Type I.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be marked before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

- A. Pretreatment for Early Painting: Where early painting is required on rigid pavements, apply a pretreatment with an aqueous solution, containing 3 percent phosphoric acid and 2 percent zinc chloride, to prepared pavement areas prior to painting.
- B. Cleaning Existing Pavement Markings:
 - 1. In general, markings shall not be placed over existing pavement marking patterns. Remove existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement markings shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

C. Cleaning Concrete Curing Compounds:

1. On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:
 - a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.
 - b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.
 - c. All remaining curing compound is intact; all loose and flaking material is removed.
 - d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.
 - e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

- A. **Paint:** Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. Provide guide-lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.
 1. **Rate of Application:**
 - a. **Reflective Markings:** Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.
 - b. **Nonreflective Markings:** Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet/gallon.
 2. **Drying:** The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.
- B. **Thermoplastic Compounds:** Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. At the time of installation, the pavement surface temperature shall be a minimum of 55 degrees F and the air temperature is 50 degrees F or higher. Thermoplastics, as placed, shall be free from dirt or tint.
 1. **Longitudinal Markings:** All centerline, skip-line, edge-line, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.
 2. **Primer:** After surface preparation has been completed the asphalt and/or concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic

composition. The asphalt concrete primer shall be allowed to dry to a tack-free condition, usually occurring in less than 10 minutes. The Portland cement concrete primer shall be allowed to dry in accordance with the thermoplastic manufacturer's recommendations. To shorten the curing time of the epoxy resins an infrared heating device may be used on the concrete primer.

- a. Asphalt Concrete Primer: Primer shall be applied to all asphalt concrete pavements at a wet film thickness of 0.005 inch, plus or minus 0.001 inch (265-400 square feet/gallon).
 - b. Portland Cement Concrete Primer: Primer shall be applied to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 0.04 to 0.05 inch (320-400 square feet/gallon).
3. Markings: After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 390 degrees F nor higher than 420 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.
- a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch.
 - b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 0.090 inch, plus or minus 0.005 inch, and edge-line markings at a wet thickness of 0.090 inch plus or minus 0.005 inch.
 - c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 pound/20 square feet of compound.
- C. Preformed Tape: The pavement surface temperature shall be a minimum of 60 degrees F and the ambient temperature shall be a minimum of 60 degrees F and rising. The preformed markings shall be placed in accordance with the manufacturer's written instructions.
- D. Raised Reflective Markers: Prefabricated markers shall be aligned carefully at the required spacing and permanently fixed in place by means of epoxy resin adhesives. To ensure good bond, pavement in areas where markers will be set shall be thoroughly cleaned by sandblasting and use of compressed air prior to applying adhesive.
- E. Reflective Media: Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to ensure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

END OF SECTION

SECTION 32 84 00
LANDSCAPE IRRIGATION**PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. The scope of work includes a complete automatic landscape irrigation system for all landscape planting areas within the limits of the project site. Extent of landscape irrigation system coverage shall be all planted areas as shown on landscape planting plans.
- B. Requirements of this section are in addition to requirements of Division one

1.2 REFERENCES

ANSI/ASTM D 2466	Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems
NFPA 70	National Electrical Code

1.3 QUALITY ASSURANCE

- A. Provide underground landscape irrigation system as a complete unit produced by a single manufacturer, including heads, valves, piping circuits, controls, and accessories.

1.4 SUBMITTALS

- A. Product Data - Submit manufacturer's technical data and installation instructions for underground landscape irrigation system.
- B. Shop Drawings - Submit shop drawings for landscape irrigation system including plan layout and details illustrating location and type of heads, valves, piping circuits, controls and accessories.
- C. Design Calculations – Submit pressure-flow calculations for the irrigation system verifying the layout design for each active zone provides the required flow with adequate residual pressure at the last head of each zone run.
- D. Closeout Documents – Submit Operations and Maintenance Manual for the installed system. This manual shall include operating instruction for the irrigation system controller; a copy of all of the material product data approved for installation; manufacturer's recommended maintenance for each component and recommended schedule; and 3 copies of "as-built" drawings for the irrigation system plan.

1.5 SPECIAL PROJECT WARRANTY

- A. Warranty irrigation system for a period of one year after date of substantial completion and final acceptance, against defects in materials and workmanship.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with requirements, provide products of one of the following or approved equal:
 - 1. The Toro Co., Irrigation Div.
 - 2. Rain Bird Sprinkler Mfg. Corp.
 - 3. Hunter Irrigation

2.2 MATERIALS

- A. Pressure pipe - PVC plastic pipe, ASTM D 1785, Schedule 40.
- B. Pipe fittings - PVC plastic pipe socket fittings, ASTM D 2466, Schedule 40, with ASTM D 2564 solvent cement.
- C. Automatic Control Valves - Automatic circuit control valves operated by low-power solenoid normally closed, manual flow adjustment; manufacturer's standard of type and size indicated.
- D. Sprinkler Heads - Manufacturer's standard unit designed to provide uniform coverage over entire area of spray as shown on drawings at available water pressure.
- E. Valve Box - Rigid plastic, green or black in color.
- F. Control Wire - Polyethylene insulation, UF rated, 14-gauge min., 600-volt rated.

2.3 AUTOMATIC CONTROL SYSTEM

- A. Furnish low voltage system manufactured expressly for control of automatic circuit valves of underground sprinkler systems. Provide unit of capacity to suit number of circuits as indicated.
- B. Exterior Control Enclosure - Manufacturer's standard weatherproof enclosure with locking cover, complying with NFPA 70.
- C. Transformer - To convert building service voltage to control voltage as required.
- D. Circuit Control - Each circuit variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each circuit.
- E. Timing Device - Adjustable, 24-hour and 7 or 14-day clocks to operate any time of day and skip any day in a 7-day or 14-day period. Allow for manual or semi-automatic operation without disturbing preset automatic operation.
- F. Rain Gauge - To provide automatic interruption of watering cycle when rainfall exceeds a pre-selected amount.

2.4 WATER SUPPLY SERVICE PIPING AND FIXTURES

- A. [A landscape irrigation supply service line shall be as indicated on the Contract Drawings.] [Coordinate with the requirements of specification Section 33 11 00, WATER DISTRIBUTION PIPING.] Water service supply piping from the water main to the meter is the responsibility of the Contractor. Coordinate with the local water utility having jurisdiction and provide materials that comply with the Water Utility's standards including, but not limited to, the following:
 - 1. Service tap fittings and tapping valve or corporation stop;

2. Water service piping and fittings;
3. Service line valves and curb stops;
4. Water service meter and meter box;

2.5 BACKFLOW PREVENTER

Provide exterior mounted backflow preventers where indicated or specified. Reduced pressure principle assembly shall be listed in the current FCCCHR List. Furnish proof that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current "Certificate of Approval" from the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR-USC). Listing of the particular make, model/design, and size in the current FCCCHR-USC will be acceptable as the required proof.

2.6 BACKFLOW PREVENTER ENCLOSURE

Pre-manufactured fiberglass, or other noncorrosive material, enclosure with mid-line hinge assembly to allow for easy access to the backflow preventer for maintenance and testing. Enclosure shall be specifically manufactured for the purpose of backflow preventer enclosure for the size and type of BFP indicated or specified. Enclosure shall provide thermal protection from freezing temperatures; shall have a lockable hasp or latch.

PART 3 - EXECUTION

3.1 SYSTEM DESIGN

- A. Contractor shall design a permanent automatic landscape irrigation system based upon Landscape Planting Plan and shall submit to Landscape Architect for approval. Provide a detailed layout of the proposed system to include the following:
 1. Main piping runs, size and material;
 2. Zone piping, sizes, and material;
 3. Location of main isolation valves and zone control valves;
 4. Zone chart identifying number of zones, flow requirement of each, and operational time of each zone in minutes;
 4. Location of individual spray heads and spray coverage areas, keyed to type, flow rate;
 5. Design calculations showing the system will perform based on the available water supply pressures and flow capabilities as follows:
 - Static pressure: [] psi
 - Q, Flow: [] gpm
 - Residual Pressure: [] psi
 - Q₂₀, (flow @ 20psi residual): [] gpm
 6. Location of System Controller
 7. Location of Backflow Preventer
- B. Layout may be modified, as needed to obtain required coverage, to suit manufacturer's standard heads. Do not decrease number of heads indicated unless otherwise acceptable to Landscape Architect.
- C. Minimum Water Coverage
 1. Turf areas - 100%
 2. Other planting areas - 100%

3.2 TRENCHING AND BACKFILLING

All earthwork, trenching and backfilling shall be in accordance with Section 31 20 00, EARTH MOVING, except as specified below:

- A. Excavate straight and true with bottom uniformly sloped to low points.
- B. Protect existing lawns and plantings. Remove and replant as necessary to complete installation. Replace damaged lawn areas with new to match existing.
- C. Excavate trenches to a depth of 3" below invert of pipe, unless otherwise indicated.
- D. Provide 12" minimum cover over PVC pipe in lawn areas; 18" minimum cover under paved pedestrian walks; and 24" minimum cover under paved drives.
- E. Backfill trenches with clean material from excavation. Remove organic material as well as rocks and debris larger than 1" diameter.
- F. Install 4" PVC pipe under proposed drives, walks and other site pavements or structures, where indicated, prior to construction of those pavements or structures, for use as a conduit, sleeve or chase for irrigation pressure pipe and wiring.
- G. Jack or wash piping under existing structures where necessary. Do not cut pavements.

3.3 INSTALLATION

- A. Unless otherwise indicated, comply with the requirements of the Uniform Plumbing code.
- B. Connect irrigation system to existing water main in location indicated, and in compliance with the requirements of the local water utility company having jurisdiction.
- C. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shut-off with Contractor.
- D. Provide Backflow Preventer union on downstream side. Install minimum 6" above highest ground level sprinkler head or as per manufacturer's instructions.
- E. Install Circuit Valves in valve box, arranged for easy adjustment and removal. Provide union on downstream side. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- F. Lay pipe on solid subbase, uniformly sloped without humps or depressions.
- G. For circuit piping, slope to drain valve at least 1/2" in 10' of run.
- H. At wall penetrations, pack the opening around pipe or wiring with non-shrink grout. At exterior face, leave a perimeter slot approximately 1/2" wide by 3/4" deep. Fill this slot with backer grade waterproofing disturbed by this work and make penetration watertight.
- I. Install PVC pipe in dry weather when temperature is above 40 degrees F in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours above 40 degrees F before testing, unless otherwise recommended by manufacturer.
- J. Flush circuit lines with full head of water and install heads after hydrostatic test is completed. Install heads at manufacturer's recommended height or as indicated. Locate part-circle heads to maintain a minimum distance of 4" from walls and 2" from other boundaries.

3.4 TESTING

- A. Notify Engineer when testing will be conducted. Conduct tests in presence of Engineer or Landscape Architect and landscape contractor.
- B. Perform hydrostatic test of main water lines. System shall hold 100 psi for one hour. Perform operational testing after construction is completed, backfill is in place, and sprinkler heads adjusted to final position.
- C. Demonstrate that system meets coverage requirements and that automatic controls function properly. Coverage requirements are based on operation of one circuit at a time.
- D. Contractor shall provide 3 "as-built" prints of system plan to Engineer.

END OF SECTION

(Text)

SECTION 32 92 19

SEEDING

PART 1 - GENERAL

1.1 REFERENCES

- A. The publications listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent referenced.

DEPARTMENT OF AGRICULTURE (DOA)

DOA FSA Federal Seed Act Rules and Regulations of the Secretary of Agriculture

- B. Related Documents: Drawing and general provisions of contract including General Conditions apply to work of this section.

1.2 SUBMITTALS:

- A. Certificate of Compliance:
 - 1. State certification and approval for seed.
 - 2. Fertilizer
- B. Request for Final Acceptance: The Contractor shall submit two copies of a written request for final acceptance of the grassing work. The request shall be submitted at least ten days prior to the anticipated date of acceptance. The condition of the grass will be noted, and the Contractor will be notified if maintenance is to continue.

1.3 DELIVERY AND STORAGE:

- A. Seed: All seed used shall be labeled in accordance with DOA FSA. All seed shall be furnished in sealed standard containers. Protect from drying out and from contamination during delivery, on-site storage, and handling. Store in cool, dry locations away from contaminants. Seed that is wet, moldy, or otherwise damaged in transit or in storage shall not be used.
- B. Fertilizer: Fertilizer shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Store in cool, dry locations away from contaminants. Any fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, shall not be used.

PART 2 - PRODUCTS

2.1 TOPSOIL

If the quantity of existing stored or excavated topsoil is inadequate for planting, sufficient additional topsoil shall be furnished. Topsoil furnished shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of subsoil and free from Johnson grass (*Sorghum Halepense*), nut grass (*Cyperus Rotundus*) and objectionable weeds and toxic substances.

(Text)

2.2 FERTILIZER

Organic, granular fertilizer shall be 20-10-10 formulation. It shall be granulated so that 80-percent is held on a 16-mesh screen, uniform in composition, dry and free-flowing.

2.3 SEED

A. Classification: Provide State-approved seed of the latest season’s crop delivered in original sealed packages, bearing producer’s guaranteed analysis for percentages of mixture, purity, germination, weed seed content, and inert material. Label in conformance with DOA FSA and applicable state seed laws.

B. Composition

	Min. % Pure Seed	Min. % Germination Seed and Hard Seed	Max. % Weed Seed
Common Bermuda Cynodon Dactylon	95	85	1.0
Annual Rye Grass Colium Multiflorum	98	90	0.5

Seed failing to meet the purity or germination requirements by no more than twenty-five percent may be used, but the quantity shall be increased to yield the required rate of pure live seed. Seed failing to meet the weed seed requirements shall not be used.

C. Seed Mixture

<u>Planting Season</u>	<u>Variety</u>	<u>Weight</u>
Spring/Summer	Common Bermuda (Hulled)	(80 lbs. Per acre)
Fall/Winter	Common Bermuda (unhulled) Annual Rye	(50 lbs. Per acre) (50 lbs. Per acre)

2.4 MULCH

Free from noxious weeds, mold and other deleterious materials.

A. Wood Cellulose Fiber Mulch: Use recovered materials of either paper-based (100 percent) or wood-based (100 percent) hydraulic mulch. Processed to contain no growth or germination inhibiting factors and dyed an appropriate color to visually monitor the material application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range of 3.5 to 5.0. Use with hydraulic application of grass seed and fertilizer.

2.5 WATER

Source of water shall be suitable quality for irrigation.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

All areas within the limits of work not indicated for paving, buildings, landscape planting, or other development, and all other areas disturbed by the Contractor’s operations, shall be grassed.

A. Grading: Areas to be grassed shall be graded to remove depressions, undulations, and

(Text)

irregularities in the surface before grassing.

- B. Placing Topsoil: Areas to be grassed shall have a minimum topsoil cover of 3 inches. Topsoil shall not be placed when the subgrade is excessive wet, extremely dry or in a condition otherwise detrimental to the proposed planting or proper grading.
- C. Tillage: The area to be grassed shall be thoroughly tilled to a depth of 3 inches using a plow and disc harrow or rotary tilling machinery until a suitable seed bed has been prepared and no clods or clumps remain larger than 1- 1/2 inches in diameter.
- D. Applying Fertilizer: Fertilizer shall be applied hydraulically with the seed and mulch at the rate of 10 pounds per 1,000 square feet.

3.2 HYDRO-SEEDING SEEDING METHOD:

First, mix water and fiber mulch. Fiber shall be added at 20 pounds per 1,000 square feet. Then add and mix seed and fertilizer to produce a homogeneous slurry. When hydraulically sprayed on the ground, material shall form a blotter-like cover uniformly impregnated with grass seed. Spread with one application with no second application of mulch.

3.3 WATERING:

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to insure thorough wetting of the soil to a depth of 3 inches without runoff. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.4 CLEAN-UP:

All excess soil, excess grass materials, stones, and other waste shall be removed from the site daily and not allowed to accumulate. All paved areas shall be kept clean at all times.

3.5 MAINTENANCE:

Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass. Coordinate and comply with requirements specified in Section 30 05 30 LANDSCAPE MAINTENANCE. Grassing will be considered for final acceptance when the permanent grass is healthy and growing on 97 percent of the area with no bare areas wider than 12 inches.

END OF SECTION

SECTION 32 92 23**SODDING****PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. Extent of turfgrass work is limited to those areas disturbed during the course of construction and not indicated to be paved.
- B. Subgrade Elevations: Excavation, filling and grading work required for establishing elevations shown on drawings is not specified in this section. Refer to Section 31 20 00, EARTH MOVING.

1.2 REFERENCES

- A. ANSI Z 60 - American Standard for Nursery Stock

1.3 QUALITY ASSURANCE

- A. General - Subcontract turfgrass work to a single firm specializing in such work. Ship materials with certificates of inspection required by governing authorities. Comply with regulations applicable to turf materials.
- B. Analysis and Standards - Package standard products with Manufacturer's certified analysis. For other materials, provide analysis by the recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
- C. Topsoil - Before delivery of topsoil, furnish Architect with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years.
- D. Inspection - The Architect may inspect turf materials either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Architect retains right to further inspect condition of root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected materials immediately from project site.

1.4 SUBMITTALS

- A. Certification-Submit certificates of inspection as required by Architect. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials - Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.
- B. Sod - Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips.

1.6 JOB CONDITIONS

- A. Proceed with and complete turfgrass work as rapidly as portions of site become available, working within seasonal limitations for kind of turf grass specified.

- B. Excavation - When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage condition, or obstructions, notify Architect before planting.

1.7 SPECIAL PROJECT WARRANTY

- A. Warranty grass, until final acceptance. Coordinate and comply with the specified maintenance and warranty requirements of Section 32 05 30 LANDSCAPE MAINTENANCE.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil has been (or will be) stockpiled for re-use in landscape work. If quantity of stockpiled topsoil is insufficient, provide additional topsoil as required to complete landscape work.
- B. Provide new topsoil which is fertile, friable, natural, loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.

2.2 SOIL AMENDMENTS

- A. Lime - Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve, not less than 50% passes a 100-mesh sieve.
- B. Commercial Fertilizer - Complete fertilizer of neutral character, with some elements derived from organic sources. Provide fertilizer with percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 100 sq. ft. of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic form.

2.3 SOD TURFGRASS

- A. Species of sod shall be [Common Bermuda (Cynodon Dactylon)] [Centipedegrass (Eremochloa ophiuroides)]. Quality of sod shall meet requirements of ANSI Z60.1
- B. Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses and machine cut to pad thickness of 3/4" ($\pm 1/4$ "), excluding top growth and development when planted (viable, not dormant). Provide sod of uniform pad sizes with maximum 5% deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10% of pad will be rejected.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Preparation for Planting Lawns
 1. Loosen subgrade of lawn areas to a minimum depth of 4". Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas to be planted promptly after preparation.
 2. Spread topsoil to 4" minimum depth so as to meet lines, grades and elevations shown, after light rolling and natural settlement. Add specified soil amendments and mix thoroughly into

upper 4" of topsoil.

3. Place approximately 1/2 of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.
4. Preparation of Unchanged Grades - Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6"; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions; till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.
5. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of Owner's property; do not turn over into soil being prepared for lawns.
6. Allow for sod thickness in areas to be sodded.
7. Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2" of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.
8. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas to be planted immediately after grading.
9. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
10. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.2 PLANTING

A. Sodding new lawns

1. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.
2. Anchor sod on slopes with wood pegs to prevent slippage.
3. Water sod thoroughly with a fine spray immediately after planting.

3.3 MAINTENANCE

- A. Begin maintenance immediately after planting. Maintain lawns for the duration of the contract and through the establishment period until final acceptance] [warranty period in compliance with the requirements of Section 32 05 30 LANDSCAPE MAINTENANCE.

3.4 INSPECTION AND ACCEPTANCE

- A. When turfgrass work is completed, including maintenance, Architect will, upon request, make an inspection to determine acceptability. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Architect and found to be acceptable. Remove rejected materials promptly from project site.

3.5 CLEANUP AND PROTECTION

- A. During landscape work, keep pavements clean and work area in an orderly condition.
- B. Protect landscape work and materials from damage due to landscape operations, operations by

other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

END OF SECTION

SECTION 32 93 00
LANDSCAPE PLANTS**PART 1- GENERAL****1.1 DESCRIPTION OF WORK**

- A. Extent of landscape development work is the installation and maintenance of new exterior plants, trees, shrubs, ornamentals, ground covers and mulches, as shown on drawings and in schedules. Permanent turf grass lawns shall be as specified separately in Section 32 92 19, SEEDING and 32 92 23, SODDING. Temporary erosion control grassing shall be as indicated on the civil site drawings.
- B. Subgrade Elevations: Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to Section 31 20 00, EARTH MOVING.

1.2 REFERENCES

- A. ANSI Z 60.1 - American Standard for Nursery Stock dated May 12, 2004.

1.3 QUALITY ASSURANCE

- A. General - Subcontract landscape work to a single firm specializing in landscape work. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
- B. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Architect, together with proposal for use of equivalent material.
- C. Analysis and Standards - Package standard products with manufacturer's certified analysis. For other materials, provide analysis by the recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
- D. Topsoil - Before delivery of topsoil, furnish Architect with written statement giving location of properties from which top soil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years.
- E. Trees, Shrubs and Plants - Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.
- F. Inspection - The Architect may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Architect retains right to further inspect trees and shrubs for size and condition of root balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

1.4 SUBMITTALS

- A. Certification - Submit certificates of inspection as required by the Architect. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials - Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.
- B. Trees and Shrubs - Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by the Architect. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.
- C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
- D. Do not remove container grown stock from containers until planting time.

1.6 JOB CONDITIONS

- A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
- B. Utilities - Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- C. Excavation - When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage condition, or obstructions, notify the Architect before planting.
- D. Coordination with Lawns - Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.7 SPECIAL PROJECT WARRANTY

- A. Warranty trees and shrubs, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control. [Coordinate and comply maintenance and warranty requirements with Section 32 05 30 LANDSCAPE MAINTENANCE.]
- B. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period.
- C. Only one replacement (per tree, shrub, or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS**2.1 TOPSOIL**

- A. Topsoil has been (or will be) stockpiled for re-use in landscape work. If quantity of stockpiled

topsoil is insufficient, provide additional topsoil as required to complete landscape work.

- B. Provide new topsoil which is fertile, friable, natural, loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.

2.2 SOIL AMENDMENTS

- A. Lime - Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve, not less than 50% passes a 100-mesh sieve.
- B. Peat Humus - FS Q-P-166 decomposed peat with no identifiable fibers and with ph range suitable for intended use.
- C. Mulch - Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants and consisting of the following: Pine Straw
- D. Commercial Fertilizer - Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available nutrients:
 - 1. For trees and shrubs, provide fertilizer with not less than 16% total nitrogen, 4% available phosphoric acid and 8% soluble potash.

2.3 PLANT MATERIALS

- A. Quality - Provide trees, shrubs, and other plants of size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock".
- B. Deciduous Trees - Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z260.1 for type and species required. Provide single stem trees except where special forms are shown or listed.
 - 1. Provide balled and burlapped (B&B) deciduous trees.
 - 2. Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.
- C. Palms - Palms shall have the specified height as measured from the base of the trunk to the base of the fronds or foliage in accordance with ANLA ANSI/ANLA Z60.1. The palm shall have straight trunk and healthy fronds or foliage as typical for the variety grown in the region of the project. Palms trimmed or pruned for delivery shall retain the central fronds located at the "cabbage" head of the tree, as a means of determining plant health.
- D. Coniferous Evergreen Plant Material - Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANLA ANSI/ANLA Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.4 GROUND COVER

- A. Provide plants established and well-rooted in removable containers, or integral peat pots and with not less than minimum number and length of runners required by ANSI Z60.1 for the size shown or listed.

2.5 STAKES AND GUYS

- A. Provide stakes, guys, and deadman anchors of sound new hardwood, treated softwood, or

redwood, free of knot holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire not lighter than 12 gauge with zinc-coated turnbuckles. Provide not less than 1/2" diameter rubber or plastic hose, cut to required lengths and of uniform color, material and size to protect tree trunks from damage by wires. Provide flagging of all guys with high visibility surveyors ribbon so as to maintain pedestrian visibility.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure the Architect's acceptance before start of planting work. Make minor adjustments as may be requested.
- B. Preparation of Planting Soil
 1. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
 2. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
 3. For pit and Trench type backfill, mix planting soil prior to backfilling, and stockpile at site.
 4. For planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.
 5. Mix lime with dry soil prior to mixing of fertilizer.
 6. Prevent lime from contacting roots of acid-loving plants.
- C. Preparation of Planting Beds
 1. Loosen subgrade of planting bed areas to a minimum depth of 6" using a culti-mulcher or similar equipment. Remove stones over 1-1/2" in any dimension, and sticks, stones, rubbish and other extraneous matter.
 2. Spread planting soil mixture to 4" minimum depth to meet lines, grades and elevations shown, after light rolling and natural settlement. Place approximately 1/2 of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer, then place remainder of the planting soil.
 3. Dig beds not less than 8" deep and mix with specified soil amendments and fertilizers.
 4. Planters - Place not less than 4" layer of gravel in bottom of planters, and fill with planting soil mixture consisting of 1-part topsoil, 1-part coarse sand, 1-part peat humus, and 3 lbs. dolomitic limestone per cubic yard of mix. Place soil in lightly compacted layers to an elevation 1-1/2" below top of planter allowing for natural settlement.
- D. Excavation for Trees and Shrubs
 1. Excavate pits, beds and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.
 2. For balled and burlapped (B&B trees and shrubs), make excavations at least half again as wide as the ball diameter and equal to the ball in depth, plus following allowance for setting of ball on layer of compacted backfill.
 3. Allow for 3" setting layer of planting soil mixture.
 4. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

5. Water tree and shrub plantings thoroughly immediately after planting.

3.2 PLANTING

A. Planting Trees and Shrubs

1. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When planting is complete, water thoroughly. Repeat watering until no more is absorbed.
2. Set container grown stock as specified for balled burlapped stock, except cut cans on 2 sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.
3. Dish top of backfill to allow for mulching.
4. Mulch pits, trenches, and planted areas. Provide not less than following thickness of mulch and work into top of backfill and finish level with adjacent finish grades.
5. Provide 4" thickness of mulch, type as indicated.
6. Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character.
7. Remove and replace excessively pruned or malformed stock resulting from improper pruning.
8. Wrap tree trunks of 2" caliper and larger. Start at ground level and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.
9. Guy and stake trees immediately after planting, as indicated.

B. Planting Ground Cover

1. Space plants as shown or scheduled.
2. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils.
3. Mulch areas between ground cover plants; place not less than 4" thick, of type indicated.

3.3 MAINTENANCE

- A. Begin maintenance immediately after planting. Maintain trees, shrubs and other plants for the duration of the contract, and the required maintenance and warranty period as specified in Section 32 05 30 LANDSCAPE MAINTENANCE.

3.4 INSPECTION AND ACCEPTANCE

- A. When landscape work is completed, including maintenance, Architect will, upon request, make an inspection to determine acceptability.
- B. Landscape work may be inspected for acceptance in parts agreeable to Architect, provided work offered for inspection is complete, including maintenance. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by the Architect and found to be acceptable. Remove rejected

plants and materials promptly from project site.

3.5 CLEANUP AND PROTECTION

- A. During landscape work, keep pavements clean from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.
- B. During landscape work, keep pavements clean and work area in an orderly condition.
- C. Protect landscape work and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

END OF SECTION

SECTION 33 11 10
WATER DISTRIBUTION SERVICE PIPING**PART 1 GENERAL****1.1 SUMMARY OF WORK**

- A. Work Included: Scope of work includes the installation of domestic water service lines, including all fittings, bends tees and other appurtenances as need for a complete system as indicated on the construction drawings. The construction is under the jurisdiction of the S.C. Department of Health and Environmental Control and the local water utility company.
- B. The Contractor shall perform the work covered under this section in such a manner that shall not disturb, crack, or undermine existing foundation and shall not damage existing underground utilities or previously constructed portions of the work. The Contractor shall furnish all labor, equipment, and materials necessary to install the water distribution system including water mains, casings, service lines, valves, and valve boxes.
- C. Related Work: Documents affecting work in the area include but are not limited to the general conditions and specifications Section 31 20 00, EARTH MOVING, and Record Drawing Closeout documents as specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING. The Contractor shall be responsible for the preparation and submittal of Final As-Built Record Drawings.

1.2 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SYSTEM DESCRIPTION**A. Water Service Lines**

Provide water service lines from water distribution main to building service at a point approximately 5 feet from building.

- 1. Water service lines from Water Main to Water Meter: Water service line material and installation shall be in accordance with the water utility company having jurisdiction.
- 2. Water Service Lines from the Water Meter to the building: Water service lines on private property downstream of the water meter for domestic services smaller than 4-inch shall be copper pipe, copper tubing, or polyvinyl chloride (PVC) plastic pipe; except polyethylene (PE) tubing is acceptable for services 2-inch and smaller; and ductile iron pipe is available for 3-inch diameter line sizes. Provide water service line appurtenances as specified and where indicated.

1.4 SUBMITTALS

Submit the following for approval prior to installation:

- A. Product Data
 - 1. Water Main Tapping sleeve
 - 2. Water Main Tapping valve
 - 3. Restrained joint clamps and fittings

4. Water service line piping, fittings, joints,
5. Service Line valves
6. Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

B. Test Results

1. Bacteriological Testing; two tests minimum 24 hours apart-maximum 72-hours apart.

C. Close-Out Documents

1. Water Distribution Piping As-Built Record Drawing Survey
2. Water Tapping Valve Record Valve Card

The above close-out documents must be submitted prior to requesting final inspection by the Jurisdictional Authority.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store all materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground, but on sills above storm drainage level. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

B. Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench.

PART 2 PRODUCTS

2.1 MATERIALS OPTIONS AND RESTRICTIONS

A. Environmental Lead Standards

All piping, fittings, solder and flux used in potable water distribution systems must be lead free in accordance with the Safe Drinking Water Act and the SC State Primary Drinking Water Regulations. Lead free is defined as not more than 0.25 percent lead in pipe and fittings, and not more than 0.2 percent lead in solders and fluxes.

B. National Sanitation Foundation (NSF) Standard

All materials/products that contact potable water must be certified as conforming to the requirements of NSF Standard 61. Natural rubber or other materials which will support microbiological growth shall not be used for any gasket, o-ring, or other product used for jointing pipes, valves, or other appurtenances which will be exposed to potable water.

C. Re-Use of Materials

Water service line materials which have been previously used for conveying potable water may not be reused. All materials installed in the scope of this work shall be new.

D. Jointing Lubricants

Jointing lubricants shall meet the requirements as recommended by the manufacturer; except lubricants that will support microbiological growth shall not be used on slip-on joints; nor shall any vegetable shortening be used as a lubricant.

E. PVC Pipe Restrictions

1. Thermoplastic (PVC) pipe may not be used above grade.

2.2 WATER SERVICE LINE PIPING MATERIALS**A. Ductile Iron Piping-Optional for 3" Sized Service Lines**

1. Pipe and Fittings: Pipe 3-inch diameter, except flanged pipe, ANSI/AWWA C151/A21.51, Pressure Class 350. Flanged pipe, AWWA C115/A21.15. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53; fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining, AWWA C104/A21.4, standard thickness.
2. Joints and Jointing Material:
 - (a) Joints: Joints for pipe shall be push-on joints or mechanical joints, unless otherwise indicated. Joints for fittings shall be mechanical joints, unless otherwise indicated. Provide flanged joints where indicated. Provide mechanically coupled type joints using a sleeve-type mechanical coupling where indicated, or where required to tie onto existing pipe. Joints made with sleeve-type mechanical coupling may be used in lieu of push-on joint, subject to the limitations specified in paragraph entitled "Sleeve-Type Mechanical Couplings."
 - (b) Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly, AWWA C111/A21.11.
 - (c) Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.
 - (d) Flanged Joints: Bolts, nuts, and gaskets for flanged connections as recommended in the Appendix to AWWA C115/A21.15. Flange for set-screwed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME/ANSI B16.1, Class 250. Setscrews for set-screwed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket for set-screwed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111/A21.11. Design of set-screwed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made.
 - (e) Sleeve-Type Mechanical Coupled Joints: As specified in paragraph entitled "Sleeve-Type Mechanical Couplings."
 - (f) Restrained Joint Pipe and Fittings:
 - (1) Restrained Joint Pipe: Pipe sizes 4" - 12" diameter, shall conform to the requirements of ductile-iron pipe, except the joint shall utilize a special locking gasket for push-on joint pipe. Typical style shall be "Fast-Grip" gasket by American Cast Iron Pipe Co., or "Field-Lok" gasket by U.S. Pipe and Foundry Co., or equal. Pipe larger than 12" diameter, when indicated, shall be mechanical joint type pipe

that utilize the EBBA Iron Sales, Inc. "Mega-Lug", or approved equal, restraining gland in lieu of the standard follower gland of the standard mechanical joint.

(2) Restrained Joint Fittings: Restrained joint fittings shall be mechanical joint type fittings that utilize the EBBA Iron Sales, Inc. "Mega-Lug", or approved equal, restraining gland in lieu of the standard follower gland of the standard MJ fitting.

B. Copper Pipe and Associated Fittings

For buried service line sizes from 3/4-inch to 3-inch in diameter, line material may be copper pipe. Copper Pipe shall conform to ASTM B 42, regular, with threaded ends. Fittings shall be brass or bronze, FS WW-P-460, 125-pound.

C. Plastic Piping Sizes 3-inch and Smaller

Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation (NSF) for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.

1. Polyvinyl Chloride (PVC) Plastic Piping with Screw Joints: ASTM D 1785, Schedule 40. Fittings, ASTM D 2464. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting respectively: PBVC 2120/ PVC II; PVC 2116/PVC II. Pipe couplings, when used shall be tested as required by ASTM D 2464.
3. Polyvinyl Chloride (PVC) Plastic Piping with Solvent Cement Joints: ASTM D 1785, Schedule 40. Fittings, ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting respectively: PBVC 2120/ PVC II; PVC 2116/PVC II. Solvent cement for jointing, ASTM D 2564.

D. Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.3 WATER SERVICE LINE APPURTENANCES

A. Gate Valves on Buried Service Piping

1. Gate valves 3-inch size and larger on buried piping shall conform to AWWA C509, resilient seated gate valves, designed for a minimum working pressure of 150 psi. Unless otherwise specified, valves shall be non-rising stem type with mechanical-joint ends and 2-inch square operating nut. Valves shall open by clockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

In lieu of mechanical joint ends, valves may have special ends for connection to tapping sleeves for tapping valves, or special requirements as indicated. All valves provided shall be of one manufacturer.

2. Gate valves smaller than 3-inch size on Buried Piping, MSS SP-80, Class 150, solid wedge, non-rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide hand-wheel operators.

B. Gate Valves in Valve Pits

1. Gate valves on service lines 3-inch size and larger in valve chambers or meter vaults shall have flanged joint ends, non-rising stems and shall have hand wheel operations. Valves at above ground locations shall be outside yoke and stem (OS + Y) type, as indicated.

2. Gate valves on service lines smaller than 3-Inch size shall conform to MSS SP-80, Class 150, solid wedge, inside screw, rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve and a hand-wheel operator, unless indicated specifically otherwise.

C. Valve Boxes

1. For service line valves 3-inch and smaller using hand-wheel operators, valve boxes shall be of cast iron, round or rectangular, and of a size suitable for the valve on which it is to be used. The word "WATER" shall be cast on the lid. The least diameter of the shaft of a round box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.4 TRACER WIRE FOR PIPING

Provide insulated solid copper wire not less than #10 AWG in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe. Insulation shall be blue in color and shall be rated for direct bury.

2.5 DETECTABLE WARNING TAPE

Metallic core or metallic-faced, acid-and alkali-resistant, polyethylene plastic warning tape manufactured specifically for detecting, warning and identification of buried water lines. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Provide tape on minimum 3-inch wide rolls, color coded blue, with the words "CAUTION: BURIED WATER LINE BELOW", or similar wording. Color and printing shall be permanent, unaffected by moisture or soil. Minimum thickness of tape shall be 0.004 inch, with a minimum strength of 1500 psi lengthwise and 1250 psi crosswise.

2.6. PIPE BEDDING

Pipe bedding materials shall be granular soil, sand, consisting of SW, SP, or SM-SP as classified in accordance with ASTM D 2487, or as indicated on the construction drawings. Continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Do not stones to contact within 6 inches of plastic pipe. If the existing in-situ soil meets the material requirements for bedding, the existing soil may be used.

2.7 METER VAULTS AND BOXES

- A. Water Meter boxes or enclosures vault shall be in compliance with the standards of the jurisdictional utility company.

PART 3 EXECUTION

3.1 GENERAL

- A. General Installation

Installation of water lines and appurtenances shall be conducted in accordance with Section C of the AWWA Standards and/or manufacturer's instructions. Pipe and fittings shall be unloaded so as to avoid damage to materials. All pipe and fittings shall be examined for possible defects including cracks, breaks, and damage to cement linings. Defective materials shall be removed from the job site and replaced with sound materials. All materials shall be stored on sills above storm drainage levels. All materials shall be thoroughly cleaned prior to installation. As work progresses, exposed ends of pipe and fittings shall be plugged to prevent soil, groundwater, and objectionable materials from entering the lines.

B. Environmental Protection

1. There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminated materials may be discharged or drawn into the system.
2. No flushing device shall be directly connected to any sewer.
3. Chambers, pits or manholes containing valves, blow-offs, meters, air relief valves, or other such appurtenances shall not be connected directly to any storm drain or sanitary sewer.

C. Earthwork

Perform earthwork operations in accordance with Section 31 20 00 EARTH MOVING.

3.2 PIPE LAYING AND JOINTING

- A. Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the side and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines, avoid the formation of dips and low points. Support pipe at proper elevation and grade with secure, firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding. Excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Keep trenches free of water until joints have been properly made. At the end of each workday, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Typical depth of cover over pipelines is 3 feet, unless specifically indicated otherwise. When pipe must rise over an existing utility crossing or conflict, the depth of cover on ductile iron pipe may be reduced to a minimum of 2-1/2 feet at that location, otherwise the piping must be routed below the conflicting utility or storm crossing. All exposed piping shall be insulated to prevent freezing.

3.3 CONNECTIONS TO EXISTING WATER MAINS

- A. Service Line Connections to Water Mains: Connect service lines smaller than 3-inch size to the main by a saddle tap and or tapping sleeve and corporation stop as indicated, and in accordance with local water utility standards. Tapping sleeves will be required when the service line tapping size is at least 1/2 the size of the main being tapped (i.e. a 2-inch tap onto a 4-inch main will require a tapping sleeve in lieu of a tapping saddle). Connect service lines 3-inch size and larger to the main with a rigid tapping sleeve connection regardless of main size and install a gate valve on service line as indicated. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

3.4 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER SERVICE PIPING**A. Location**

Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the points indicated; such water service lines shall be closed with plugs or caps.

B. Cross Connection Control

1. All service line piping shall be installed in accordance with the jurisdictional water utility company guidelines in relation to backflow prevention devices and piping material restrictions and special installation procedures prior to installation.
2. There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system.
3. No by-passes shall be allowed.
4. High hazard category cross connections shall require an approved reduced pressure backflow preventer.
5. Reduced pressure principal backflow prevention assemblies shall not be installed underground or in any area location subject to possible flooding.
6. All piping up to the inlet of the backflow prevention device must be suitable for potable water. The pipe must be AWWA or NSF approved. Black steel pipe cannot be used on the inlet side or within 10 feet of the outlet side of the device.

C. Installation of Ductile-Iron Piping

Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "Pipe Laying and Jointing" and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

1. **Jointing:** Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendation of Appendix A to AWWA C111/A21.11. Make flanged joints with the gaskets, bolts, and nuts specified for this type joint. Make flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the boltholes; use of undersized bolts to make up for misalignment of boltholes or for any other purpose will not be permitted.
2. **Exterior Protection:** Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A, low-density polyethylene film, 8-mils minimum thickness, light blue in color, in accordance with AWWA C105/A21.5.

D. Installation of Plastic Piping

1. **Installation of Plastic Piping Smaller than 4-inches:** Install pipe and fittings in accordance with paragraph entitled " Pipe Laying and Jointing " and with the applicable requirements of ASTM D 2774, unless otherwise specified.
 - a. **Jointing:** Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
 - b. **Plastic Pipe Connections to Appurtenances:** Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.
2. **Installation of Tracer Wire:**

Install a continuous length of tracer wire for the full length of each run of PVC pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction

operations. Tracer wire shall be brought up to grade inside all valve boxes, meter boxes, or other metallic above ground appurtenances located on the run of pipe being buried.

E. Installation of Copper Pipe or Tubing

1. Installation of Copper Piping: Install pipe and fittings in accordance with paragraph entitled " Pipe Laying and Jointing " and with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.

a. Jointing:

(1) Screwed Joints: Make screwed joints up tight with a stiff mixture of graphite and oil, inert filler and oil, or graphite compound; apply to male threads only. Threads shall be full cut; do not leave more than three threads on the pipe exposed after assembling the joint.

(2) Soldered Joints: Cut copper tubing with square ends; remove fins and burrs. Handle tubing carefully; replace dented, gouged, or otherwise damaged tubing with undamaged tubing. Make solder joints using ASTM B 32, 95-5 tin-antimony or Grade Sn96 solder. Solder and flux shall contain no more than 0.2 percent lead. Before making joint, clean ends of tubing and inside of fitting or coupling with wire brush or abrasive. Apply a rosin flux to the tubing end and on recess inside of fitting or coupling. Insert tubing end into fitting or coupling for the full depth of the recess and solder. For compression joints on flared tubing, insert tubing through the coupling nut and flare tubing.

(3) Flanged Joints: Make flanged joints up tight, taking care to avoid undue strain on flanges, valves, fittings, and accessories.

F. Buried Warning and Identification Tape

Install tape in accordance with the manufacturer's recommendations, except bury tape 12 inches below finished grade, or 6 inches below subgrade when under pavements.

3.5 THRUST RESTRAINTS

All tees, bends, plugs, and valves on lines 2.5 inches in diameter and larger shall be provided with restrained joints, tie rods, or other approved method of constraint, or as indicated.

A. Restrained Joint Pipe and Fittings

1. All ductile iron pipe shall be restrained joint pipe and fittings.
2. PVC pipe shall have restrained joint fittings and pipe joints either side of the fittings as indicated. Screw joints and solvent-cement joints are considered restrained joints.
3. The restrained joint pipe and fittings shall be installed per manufacturer's recommendations.

3.6 INSTALLATION OF GATE VALVES AND VALVE BOXES

A. Installation of Valves

Install all gate valves in accordance with AWWA C600 and with stems vertical and plumb at the locations indicated on the drawings. Prior to setting, each valve shall be checked for foreign materials and tested for opening and closing.

B. Valve Boxes

Valve boxes shall be set plumb and centered around the stem. Tops of boxes shall be adjusted to match the finished grade.

3.7 DISINFECTION

All new and existing water lines and fittings that may have been contaminated during the installation of the water system shall be disinfected.

A. Disinfection Procedure

Disinfection of all new water mains shall be in accordance with current American Water Works Association (AWWA) Standard C651 for the disinfection of water mains. In general, one approved method referred to as "continuous feed method" is as follows:

1. Before being placed in service, all new mains shall be thoroughly flushed then chlorinated with not less than twenty-five (25) milligrams per liter of available chlorine.
2. Water from the existing distribution system or other source of supply shall be controlled to flow slowly into the newly laid pipeline during the application of chlorine.
3. The solution shall be retained in the pipeline for not less than twenty-four (24) hours and then flushed thoroughly with a potable water of satisfactory bacteriological quality before starting the sampling program.

B. Bacteriological Sampling and Testing

1. The contractor shall collect a minimum of two (2) samples from each sampling site for total coliform analysis. The number of sites depends on the amount of new construction but must include all dead-end line, be representative of the water in the newly constructed mains and shall be collected a minimum of every 1200 linear feet.
2. Prior to sampling, the chlorine residual must be reduced to normal system residual levels or be non-detectable in those systems not chlorinating.
3. These samples must be collected at least twenty-four (24) hours apart, but not more than 72 hours apart, and must show the water line to be absent of total coliform bacteria.
4. The chlorine residual must also be measured and reported.
5. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must also be reported.
6. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) milliliters, the sample result is invalid and must be repeated.
7. All samples must be analyzed by a State certified laboratory.
8. Lab reports shall not be more than 30 days old for submittal to the jurisdictional utility for acceptance and for final approval.

3.8 FIELD TESTING REQUIREMENTS

A. Field Tests and Inspections

The Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide all labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete. The Contractor shall notify the Engineer 24 hours in advance when a completed system, or portion thereof, is ready for testing.

B. Hydrostatic/Leakage Testing Procedure

Test water mains and water service lines for water tightness by conducting a hydrostatic pressure/leakage test in accordance with the applicable specified standards. The system or that portion of the pipeline being tested shall be blown free of entrapped air and filled with water for a

soaking period of not less than 24 hours. For hydrostatic pressure/leakage test, the test pressure shall be 1.5 times the rated working pressure of the installed pipe, but not less than 150 PSIG. The system shall be tested for a period of 2 hours. Water lines under the jurisdiction of the water utility company shall have no apparent leakage. If leakage occurs on the private portion of the system, the leakage shall not exceed the total volume, per the requirements of AWWA C600, as computed by the following formula:

$$L = SD (P)^5/148,000$$

Where L is the allowable leakage in gallons per hour, S is the linear footage of pipe tested of specific diameter; D is the pipe diameter in inches; P is the test pressure in PSIG; and 148,000 is a constant.

All apparent leaks shall be repaired regardless of test results, and no leakage will be allowed at mechanical joints, screw joints, solvent cement joints or flanged joints.

3.9 RECORD CLOSEOUT DOCUMENTS

A. Record Drawings

An As-Built Record Drawing of the completed water system shall be prepared and submitted to the Architect for approval. The survey shall identify all bends, tees, valves, and accessories such as meter box and backflow preventer. Provide Northern and Eastern coordinates on S.C. State Plane coordinate system. Retain the services of a Registered Land Surveyor and comply with these and the requirements specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING.

B. Easement Plat

Provide a Final Easement Plat and appropriate associated easement documents for new water service line and meter vault installed on private property, and as indicated. Line lengths, sizes, locations and stationing shall match the Record Drawing. Retain the services of a Registered Land Surveyor and comply with these and the requirements specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING.

3.10 CLEAN-UP

Upon completion of the installation of all water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

END OF SECTION

SECTION 33 30 10
SANITARY SEWER SERVICE PIPING**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Work Included: Scope of work includes the installation of new gravity sanitary sewer main systems and other accessories as indicated on the construction drawings, within the jurisdiction of the South Carolina Department of Environmental Control (SCDHEC) and local jurisdictional authority water utility company.
- B. The Contractor shall perform the work covered under this section in such a manner that shall not disturb, crack, or undermine existing foundations and shall not damage existing underground utilities or previously constructed portions of the work. The Contractor shall furnish all labor, equipment, and materials necessary to install the sanitary sewer collection system including gravity sewer mains, manholes, service lines, sewer force mains, force man valves, appurtenances, and field quality control testing.
- C. The Contractor shall be responsible for the preparation and submittal of Final As-Built Record Drawings.
- D. Related Work: Documents affecting work in the area include but are not limited to the general conditions and specifications Section 31 20 00, EARTH MOVING.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performances of the work of this Section.
- B. Sanitary sewer system installers/subcontractors shall be on Charleston Water System approved contractor list with experience on jobs of similar scope.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog cut sheet or data sheets on specified materials being supplied. Where data sheets include more than one size or type of material, indicate which one is being provided for this project.
 - 1. Cleanout Inspection Frame and Cover castings
 - 2. Gravity sewer pipe and fitting, with joint materials

Submit manufacturer's standard drawings or catalog cuts, including for push-on rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.
- B. Certifications
 - 1. As-built Record Drawing: Final record drawing plans
- C. Test Reports
 - 1. Sewer Services CCTV Inspection report & DVD disc

PART 2 - PRODUCTS

2.1 SANITARY SEWER GRAVITY PIPING

A. Polyvinyl Chloride (PVC) Pipe and Fittings:

PVC gravity sewer pipe size 4" – 15" diameter shall conform to ASTM D 3034 for unplasticized polyvinyl chloride plastic sewer pipe. Pipe and fittings shall have a maximum standard dimension ratio (SDR) of 26, or as required by the local jurisdictional utility authority. Pipe shall be colored green for in-ground identification. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket which meets the requirements of ASTM F477. All PVC pipe shall have integral walls with bell and spigot joints. The minimum stiffness coefficient shall be 46, and a maximum deflection of 5% is allowable. The laying lengths for PVC gravity pipe shall be standard lengths of 20 feet. All PVC fittings shall be by the same manufacturer. The fittings shall have identical bell and spigot configuration as the pipe supplied. Installation of the PVC pipe and fittings shall conform to ASTM D 2321, except that Class I bedding shall be required.

B. Service Connections, Fittings and Cleanouts:

2. Services lines and cleanouts shall be installed where indicated on the construction drawings.
3. All service lines shall be 6 inches in diameter unless otherwise indicated or specified. All joints for PVC service lines and cleanouts shall be as specified. The use of solvent welded joints shall not be permitted.

2.2 BEDDING MATERIALS

- #### **A. Pipe bedding material shall be #57 Stone, Per ASTM C33. Material shall be natural crushed gravel, crushed stone or rock. Slag will not be allowed.**

2.3 DETECTABLE WARNING TAPE

- #### **A. Metallic core, acid-and alkali-resistant, polyethylene plastic warning tape manufactured specifically for detecting, warning and identification of buried sewer lines. Tape shall be manufactured with integral minimum 50-gauge solid aluminum foil core enabling detection by a metal detector when tape is buried up to 3 feet deep. Minimum thickness of tape shall be 5.0 mil. Provide tape on minimum 2-inch-wide rolls, color coded green, with the words "CAUTION: SEWER LINE BURIED BELOW", at no greater than 24" on center. Color and printing shall be permanent, unaffected by moisture or soil.**

PART 3 - EXECUTION

3.1 TRENCHING, BACKFILLING & COMPACTING

All earthwork operations shall be performed in accordance with Specification Section 31 20 00 EARTH MOVING, except as modified in the following paragraphs.

- #### **A. The Contractor shall furnish all labor, equipment, and materials necessary to install the gravity sewer lines as indicated on the construction drawings. Unless specified or indicated otherwise all sewer pipe shall be laid on gravel bedding as indicated. The pipe shall be laid to the specified line and grade with construction beginning at the low point or points and working upgrade with the bell end laid upgrade. Machine excavation shall be slightly below the required pipe grade to allow for installation of gravel. Materials disturbed due to excessive undercutting shall be removed and replaced with additional gravel bedding as specified. The cost of such additional**

bedding shall be included in the unit price of the sewer main. Should unsuitable foundation material be found to exist below the grade specified for the sewer main such material shall be removed as required by the Engineer to the required width and depth as indicated on the construction drawings and replaced with extra gravel bedding as specified. Such extra gravel bedding shall be measured along the horizontal centerline of the gravity main and payment shall be based upon the bid unit price.

- B. Pipe bedding materials shall be placed in uniform lifts not exceeding 6 inches in uncompacted thickness. Compaction of bedding materials shall be as indicated on the construction drawings.
- C. The Contractor shall furnish all labor, equipment and materials necessary to keep all trenches dewatered until pipes and structures are in place and backfilling operations have begun. Should conditions demand the use of wellpoints or when directed by the Engineer the Contractor shall furnish all labor, equipment and materials necessary to adequately install and operate the wellpoint apparatus. Comply with the requirements of Section 31 23 19, DEWATERING.
- D. The Contractor shall furnish all labor, equipment and materials necessary to satisfactorily compact the trenches as specified. Unless noted or specified otherwise suitable materials removed during trench excavation shall be used as backfill for trenching. All backfill material shall be subject to the approval of the Engineer. Compaction shall be as indicated on the construction drawings. Bedding materials and selected earth backfill shall be compacted to 95% of the maximum density as specified in ASTM specification D1557 (Modified Proctor) for a minimum distance of 1 foot above the top of the pipe. The remaining portion of the trench shall be compacted to 90% of the maximum density (Modified Proctor) except under asphalt or concrete pavement, the fill depth of excavation is to be backfilled in 6" lifts and compacted to 95% Modified Proctor.

3.2 INSTALLATION OF METALLIC TRACER TAPE

- A. All PVC sewer pipe force main and house sewer installations shall also include the installation of an electronically or magnetically detectable tape buried directly over the pipe twelve (12) inches below the ground surface continuously. The tape shall be at least two (2) inches wide, be green on top, and be boldly labeled every 18 to 32 inches as follows "CAUTION SEWER LINE BURIED BELOW." The tape shall have a tensile strength of not less than 4000 PSI, a dart impact strength of not less than 0.0055 inches thick, and sufficient metal content to allow easy detection at the above stated depths. The tape shall be designed to last as long as the pipe over which it is installed, even in adverse soils.

3.3 SERVICE CONNECTIONS TO MANHOLES

- A. Contractor shall notify the sewer utility company having jurisdiction a minimum of 72 hours, three business days, prior to commencing any work or connecting to existing manhole under their jurisdiction.
- B. Manhole inverts shall be modified as necessary to provide a flow channel from the new service pipe invert to the exiting flow channels in the manhole. New flow channel shall be constructed of cement grout and shall have the same cross section as the invert of the sewers, which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. All channels shall be troweled smooth. Changes in direction to flow through the manhole shall be made to a true curve with as large a radius as the size of the manhole will permit. Concrete brick will be used to form only the invert channel walls. All other annular space shall be filled with non-shrink concrete grout. No fillers such as broken block, gravel, sand, or excavated material, are allowed in the construction of fillets (benches). Inverts shall be "U" design with top of "U" even with the crown of the pipe. Invert piping shall not extend inside manhole any farther than 2". The slope of the invert benches shall be a minimum of 2" higher than the crown of the pipe. When dissimilar pipe size occurs, the elevation of the crown of the pipes must be the same, or the inflow pipe may be higher, as indicated.

3.4 TEMPORARY PLUGS AND FLUSHING

- A. The Contractor shall furnish and install suitable water-tight plugs as required to separate new work from existing facilities. These plugs shall remain in place until new work is found to be acceptable and approved for use.

3.5 TESTING REQUIREMENTS FOR GRAVITY SERVICE PIPING

- A. The Contractor will provide proof when requested that all piping has been installed in accordance with the indicated and specified requirements.
- B. Prior to backfilling the service line piping, a visual inspection shall be conducted to verify proper alignments and jointing installation has been performed. The Contractor may install sufficient bedding stone and initial backfill as needed to ensure the pipeline does not shift, but the joints shall be left uncovered for Record Drawing as-built documentation as well as the aforementioned visual inspection. Comply with standards of the sewer utility authority and Building Inspections Department inspection requirements for service lateral piping.

3.6 RECORD CLOSEOUT DOCUMENTS

- A. **AS-BUILT RECORD DRAWINGS:** Provide all sanitary sewer as-built drawings to the Owner prior to request for final CWS approval for use. The Record drawings shall identify the invert elevation of the service connection in the existing manhole, location of all cleanouts, bend and wyes, with distances between and final pipe slope.

These Record Drawings are in addition to any record drawing requirements specified in the Division One General Conditions Sections. Retain the services of a Registered Land Surveyor and comply with these and the requirements specified in Section 01 71 23, CONSTRUCTION STAKING AND FIELD ENGINEERING and the requirements of this section. The Contractor will be provided a copy of the original Site electronic CAD files to use as a base for the creation of these as-built record drawings.

END OF SECTION

SECTION 33 41 00
STORM DRAINAGE PIPING**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Work Included: Scope of work includes the installation of gravity storm water sewers, culverts, roof drains, and storm water management detention basins and other accessories as indicated on the construction drawings.
- B. The Contractor shall perform the work covered under this section in such a manner that shall not disturb, crack, or undermine existing foundations and shall not damage existing underground utilities or previously constructed portions of the work.
- C. Related Work: Documents affecting work in the area include, but are not limited to the general conditions and specifications Section 31 20 00, EARTH MOVING; Storm Water SWPPP and erosion control as specified in Section 01 57 13, TEMPORARY EROSION AND SEDIMENT CONTROL, and Record Drawing Closeout documents as specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING.

1.2 SUBMITTALS

Submit the following prior to commencing work on the system.

- A. Manufacturer's Catalog Data
 - 1. Piping and jointing materials
 - 2. Cast-Iron Frames and Grates
 - 3. Pre-cast boxes or manholes

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage
 - 1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
 - 2. Metal Items: Check upon arrival, identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Handling: Handle pipe, fittings, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care not to damage pipe and fittings; if damaged, make repairs. Carry, do not drag pipe to trench.

PART 2 - PRODUCTS**2.1 PIPELINE MATERIALS****A. Concrete Piping**

1. Concrete storm drainage pipe shall be reinforced concrete pipe conforming to ASTM C76, Class III, Wall B, bell and spigot joint.
2. Jointing materials for concrete piping:
 - a. ASTM C 990, bitumen or butyl-rubber sealant.
 - b. ASTM C 443, rubber o-ring type gasket.

B. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings

1. PVC plastic pipe and fittings shall conform to ASTM D 3034, SDR 26, having ends adaptable for elastomeric gasket joints.
2. Joints for PVC plastic pipe and fittings shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

C. Ductile Iron Pipe (DIP) and Fittings

1. Ductile iron pipe used for storm drainage applications shall conform to ASTM A 746, or AWWA C150, Thickness Class 50. Pipe shall have cement mortar lining in conformance with AWWA C104. Fittings shall conform to AWWA C110 and shall also be cement mortar lined.
2. Joints for ductile iron pipe and fittings shall be push on joints. Shape of pipe ends and fitting ends, gaskets, and lubricants for joint assembly shall conform to AWWA C111, except that the gaskets shall be suitable for exposure to sewage.

D. High Density Polyethylene (HDPE) Corrugated Plastic Pipe

1. High density polyethylene plastic pipe and fittings shall have a corrugated exterior and a smooth-flow interior. Pipe sizes 4-inch through 10-inch diameter shall meet the requirements of AASHTO M252, Type S. Pipe sizes 12-inch through 36-inch diameter shall meet the requirements of AASHTO M294, Type S. Fittings shall be constructed of the same material and have the same strength and flow characteristics as the pipe.
2. Joints for HDPE pipe and fittings shall be a bell and spigot configuration using an elastomeric gasket seal. Gaskets shall conform to ASTM F 477.

2.2 SUBSURFACE DRAINS

- A. Subsurface drainpipe: Corrugated perforated high-density polyethylene pipe meeting AASHTO M252, Type C, size as indicated. The piping shall have a factory installed geotextile wrapping, or "sock".
- B. Rock/Gravel Backfill - No. 789 Stone, Per ASTM C33.

2.3 MISCELLANEOUS MATERIALS

- A. Frames, Covers, and Gratings: Frames, covers, and gratings shall be of the nominal type and size indicated on the construction drawings. Where applicable, use of SCDOT standard frame and cover/grates are acceptable.

- B. Precast Concrete Manhole/Drop Inlet Sections: Precast concrete drop inlet boxes shall conform to South Carolina State Highway Department Standard Specifications, Edition 2007, Section 701.02 and 719.10.
- C. Pre-manufactured Yard/Landscape Inlets: Pre-manufactured Yard/Landscape inlets and boxes, shall be of the size and type indicated. They shall have square integral hinged cast-iron or ductile-iron frames and grates for easy access and cleaning, unless specifically indicated otherwise. The inlet basins shall be manufactured to be compatible with PVC or HDPE pipe and fittings. The system shall be used in landscape or grassed areas for the purpose of draining confined areas and building roof drain systems not susceptible to vehicular traffic.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

- A. General Requirements for Installation of Pipelines: These requirements shall apply to pipeline installation except where specific exception is made under paragraph entitled "Special Requirements."
 - 1. Location: The work covered by this section shall be as indicated on the drawings.
 - 2. Earthwork: Perform earthwork operations in accordance with Section 31 20 00, EARTH MOVING.
 - 3. All new storm drainage inlet structures and pipe openings shall be protected from water borne sediments by silt barrier erosion control devices, as indicated, or as specified in the approved Storm Water Pollution Prevention Plan (SWPPP).
- B. Pipe Laying and Jointing: Start storm drain piping system installation at the low point in the system and install all piping in the in the upslope direction. Lay pipe with the bell or groove ends in the upgrade direction. Inspect each pipe and fitting before and after installation; remove those found defective from site and replace with new. Provide proper facilities for lowering sections of pipe into trenches. Adjust spigots in bells or tongues in grooves to produce a uniform space. Blocking or wedging between tongues and grooves will not be permitted. Install joint gasket material as recommended by the manufacturer of the pipe being laid.

Concrete tongue and groove pipe joints shall be wrapped with an exterior layer of non-woven filter fabric with a minimum width of 12 inches, and a minimum of 12 inches of overlap at the ends, with the top overlap being from the top and ending on the side of the pipe not the crown. Ensure wrapping is firmly secured to pipe and itself to prevent loosening or separation during the backfilling operations. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint gasket material.

Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Comply with the requirements of Section 31 23 19 DEWATERING. When pipes are protected by headwalls or connect with drainage structures, the exposed ends of the pipe shall be placed or cut flush with the face of the structure as close as possible but protruding into the structure by no more than 1 inch. After the pipe is cut, the rough edges shall be smoothed up in an approved manner.

At the end of each workday, close open ends of pipe temporarily with wood blocks or bulkheads, or other approved erosion control material to protect pipe from erodible soils and debris. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of

batterboards for the same purpose. All pipe in-place shall be inspected and approved before being covered and concealed.

- C. Special Requirements: Polyethylene subsurface drains shall be installed per manufacturer's recommendations. Gravel backfill shall be laid to depths and compaction levels as indicated.
- D. Curb Inlet/Drop Inlet/Junction Box Construction: Construct base slab of cast-in-place concrete or use precast concrete base sections. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. For precast concrete construction, make joint between sections with the gaskets specified for this purpose; install in the manner specified for joints in concrete piping. Give a smooth finish to inside joints of precast concrete storm boxes. Provide a soil-tight seal at all joints including the joint between top-of-box wall and top slab or cast-iron inlet frame using non-shrink grout between the two surfaces as well as grouting the exterior and interior surfaces of the joint to seal any voids or gaps. Parging will not be required for precast concrete manholes. Drop inlets, or other structures shall be constructed to the line and dimension shown on the construction drawings.
- E. Yard/Landscape Drain Inlets: Install pre-manufactured Yard/Landscape Inlets at the location and elevations indicated. Install in accordance with the construction drawings, these specifications and the manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: The Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide, labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed properly in accordance with the drawings and specifications.
- B. Pipeline Testing: Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. Upon completion of work, the entire piped drainage system shall be cleaned.
- C. Closed Circuit Television (CCTV) Inspection
 - 1. Scope of Work:
 - a. The contractor shall conduct a Closed-Circuit Television (CCTV) inspection of the completed storm drainage system in accordance with the Pipeline Assessment Certification Program (PACP) inspection standards and closed-circuit television techniques. The CCTV Contractor shall video inspect all mainline sections of pipe sized 10 inches in diameter and larger from storm box to storm box. Video inspection shall be performed immediately after construction and prior to Final Inspection of the system.
 - b. Prior to performing CCTV inspection, all storm drain piping shall be thoroughly cleaned of all sand, sediments, debris, and equipment.
 - 2. CCTV Equipment:
 - a. Television inspection equipment shall have an accurate footage counter that will display on the monitor and record the camera distance from the centerline of the starting manhole/storm box. Prior to beginning of each CCTV inspection segment, manhole/storm box identification numbers, as indicated on the construction drawings, or as provided by the Program Manager, will be displayed in the title and be a part of the video record.
 - b. The camera shall be a remote operated pan/tilt type, with rotating camera and light head with a 360-degree rotating view angle and a minimum 270-degree pan angle. The variable intensity control of the camera light shall be adjustable from the remote viewing station controls.

c. The camera, television monitor and other components shall be color, and camera/light quality shall allow a clear, in-focus picture for the entire periphery of the pipelines extending at least ten (10) feet in front of the camera. In High Density Polyethylene (HDPE), lighting should be sufficient for a clear view at least two (2) feet in front of the camera.

3. Execution:

a. Internal inspection of pipelines shall be performed by PACP certified personnel, trained in the identification of pipe deficiencies and condition assessment utilizing CCTV equipment. The pipe must be clear of any dirt or debris. The CCTV inspection technician shall have full control of the movement of the camera unit at all times. The travel speed of the camera may be variable, but uniform with no jerky or movement, with a maximum speed of 20 feet per minute.

b. The interior of the pipe shall be carefully inspected to determine the location and extent of all deficiencies. Pipe conditions that result in a question of proper installation procedures shall be noted so these conditions can be reviewed and, if necessary, corrective actions can be taken prior to Final Acceptance by the owner. Continuous footage readings for identifying the location of defects must be accurate to within 3 percent tolerance. Deficiency identifications are to be called out and recorded to the nearest full foot.

c. As directed by the Program Manager, or his representative, the camera shall be stopped to view and analyze conditions that appear unusual or uncommon.

d. CCTV Contractor shall record inspections in a PACP format and shall be recorded in a high-quality CD/DVD format. The title shall include the following information:

- 1) date and time
- 2) Storm Segment number
- 3) Upstream manhole number and downstream manhole number
- 4) Size of pipe and pipe material
- 5) Location (start and end counter distance in feet from the beginning point) and description of obstructions; structural defects; longitudinal or circumferential cracking; joints that are open or leaking; sags; sediments and other abnormalities. The CCTV Contractor's written log shall contain the same information.

e. The CCTV Inspection Video shall be submitted to the Program Manager for review upon completion of the inspection and completion of any discrepancies. Any pipeline segments that must be repaired or found to have deficiencies repaired, shall have those section re-inspected by the CCTV and updated reports submitted.

3.3 RECORD CLOSEOUT DOCUMENTS

A. Provide final As-built Record Drawings of the completed storm water system in compliance with the SC DHEC NPDES General Permit for Stormwater Discharge from Large and Small Construction Activities, SCR100000 (2012 CGP) and as required by SCDHEC or the Public Works Storm Water Management MS4 office for Final approval and closeout. At a minimum the Record Drawings shall include the following data:

1. each storm drain sewer and culvert pipe installed, its size, material, invert elevation at the downstream outlet and the upstream inlet, length and the resultant pipe slope.
2. each storm box structure, manhole, catch basin and curb inlet; the structure top elevation; for curb inlets, swale inlets and detention basin outlet control structures, also indicate the inlet elevation and size of weirs and orifices.
3. each detention basin, the location and elevation of the top of bank, and toe of bank at bottom of basin around its perimeter.

4. all roof drain piping, bends, tees, wyes, cleanouts, pipe sizes and pipe material, and depth of bury to top of pipe at each one of these locations.
- B. Retain the services of a Registered Land Surveyor and comply with these and the requirements specified in Section 01 71 23, CONSTRUCTION STAKEOUT AND FIELD ENGINEERING and the requirements of this section. The Contractor will be provided a copy of the original Site electronic CAD files to use as a base for the creation of these as-built record drawings.

END OF SECTION

Benson Street and Klein Street Resurfacing

SPECIAL PROVISIONS & SPECIFICATIONS

PROJECT NUMBER

CPST-13

COUNTY

Colleton

This project is to be constructed under the South Carolina Department of Transportation's Specifications for Highway Construction Edition of 2007, the South Carolina Department of Transportation's 2004 Construction Manual, and the Supplemental Technical Specifications in effect at the time of the letting, and the following Special Provisions.

DEFINITION AND TERMS

Delete Paragraph 101.3.27, (the) Engineer, of the 2007 Version of the Standard Specifications for Highway Construction in its entirety and replace with the following:

Colleton County, acting directly, shall function as the Engineer's duly authorized representative with authority as described in Section 105, "CONTROL OF WORK", of the Standard Specifications for Highway Construction, latest Edition.

The project Owner is COLLETON COUNTY. In the specifications where the terms "SCDOT" or "Department" or other like terms are used to describe the facility Owner, it shall be interpreted as meaning Colleton County, as appropriate.

ERRATA TO 2007 STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION

See attached Supplemental Specification dated **May 4, 2009**.

STANDARD DRAWINGS

The Bidders are hereby advised that this project shall be constructed using the latest Standard Drawings with all updates effective at the time of the letting. The Standard Drawings are available for download at http://www.scdot.org/doing/sd_disclaimer.shtml. All drawings that are updated are labeled with their effective letting date in red.

The Standard Drawings are available to purchase through the SCDOT Engineering Publications Sales Center. The Engineering Publication Sales Center is located in Room G-19 (basement level) of the SCDOT Headquarters Building, 955 Park Street, Columbia, South Carolina.

All references in the plans, standard specifications, supplemental specifications, supplemental technical specifications or special provisions to drawings under the previous numbering system are hereby updated to the new drawing numbers. Refer to sheets 000-205-01 through 000-205-07 to find new drawing numbers when looking for references to older drawing numbers.

All references to Resident Construction Engineer (RCE) should be replaced with County Engineer or assigned engineering agent.

AWARD OF CONTRACT

Subsection 103.2 of the Standard Specifications is amended to allow sixty (60) days for the award of a contract after the opening of proposals.

CONSTRUCTION STAKES, LINES AND GRADES

Stakes, Lines, and Grades shall be provided by the Contractor as necessary.

QUALIFIED PRODUCT LISTINGS

All references to "Approval Sheet" or "Approval Policy" are to be replaced with "Qualified Products Listings (QPL)" and "Qualified Products Policies (QPP)" respectively. This change includes all references in the SCDOT Standard Drawings, SCDOT Standard Specifications, SCDOT Supplemental Specifications, SCDOT Special Provisions, SCDOT Supplemental Technical Specifications, SCDOT Internet and Intranet websites, and all other documents produced by SCDOT.

SOUTH CAROLINA MINING ACT

See Attached Supplemental Specification Dated **March 20, 2003**.

This Supplemental Specification is hereby modified as follows:

Paragraph 9 is hereby deleted and replaced with the following:

The deputy secretary for engineering, or his duly appointed representative, will make a final inspection of the reclaimed area and keep a permanent record of his approval thereof. A map or sketch providing the location and approximate acreage of each pit used on the project will be provided to the engineer for inclusion in the final plans.

The last paragraph is hereby deleted and replaced with the following:

The contractor shall comply with the provisions of the plan that are applicable to the project as determined by the engineer. Seeding or other work necessary to comply with the plan on pits furnished by the contractor shall be at the expense of the contractor. Seeding shall be in accordance with SC-M-810 (latest version) which can be found at http://scdot.org/doing/sup_tech_specs.shtml.

DBE PARTICIPATION GOAL

The contractor should be in compliance with the State Set-Aside Law (South Carolina Code Section 12-28-2930:

- A minimum of five (5%) percent of this contract is set-aside for qualified and certified Disadvantaged Business Enterprises (DBE's); AND
- A minimum of five (5%) percent of this contract is set-aside for qualified and certified Woman Business Enterprises (WBE's).

Listings of certified DBE/WBE Contractors can be found on the SCDOT website at Doing Business with SCDOT Contractor-Consultant/Prequalified Contractors (<http://www.scdot.org/doing/prequalified.shtml>) or Doing Business with SCDOT, Office of Business Development and Special Programs/DBE Directory (<http://www.scdot.org/doing/dbelisting.shtml>). Contractors with DBE and WBE shown adjacent to the company name are prequalified with SCDOT.

The prime Contractor shall provide documentation and certification of DBE and WBE contract amounts including proof of final payment. DBE's and WBE's shall be indicated on the DBE Subcontractors Form provided.

If no certified DBE or WBE Contractors are available, the contractor shall verify and document this fact. Documentation shall include, but is not limited to: written records of efforts made to contact and/or negotiate prices with available DBE's or WBE's.

CONSTRUCTION QUALITY CONTROL AND ASSURANCE TESTING

The contractor shall provide construction quality control and quality assurance testing for this project, except for MANUFACTURERS MATERIALS CERTIFICATIONS AND CERTIFIED TEST REPORTS as required by the provision included below.

MANUFACTURERS MATERIALS CERTIFICATIONS AND CERTIFIED TEST REPORTS

The contractor shall supply the Engineer with all required materials certifications and manufacturers test reports for items to be permanently incorporated into the project, prior to their use. The County must approve these certifications and reports before payment can be made to the contractor for these items.

REQUIRED MEDIA NOTIFICATION FOR CONSTRUCTION PROJECTS

Contractors are encouraged to co-operate with the news media since all projects are constructed with public funds. Because the scope of this project will cause disruption of normal traffic flow, the Contractor is required to notify the public, in a timely manner, of disruptive activities such as lane closures.

The Contractor is required to utilize area media to accomplish public notification of traffic disruptions.

The Contractor is required to deal directly with the news media and all reasonable efforts should be made to co-operate with the media. However, the safety, security and construction schedule on site should not be disrupted in order to accomplish this. The Contractor may coordinate these activities with and receive guidance from the Engineer.

CONTRACT PROVISION TO REQUIRE CERTIFICATION AND COMPLIANCE CONCERNING ILLEGAL ALIENS

By submission of this bid, the bidder as the prime contractor does hereby agree:

- a. to certify its compliance with the requirements of Chapter 14 of Title 8 of the S.C. Code of Laws regarding Unauthorized Aliens and Public Employment;
- b. to provide SCDOT with any documents required to establish such compliance upon request; and
- c. to register and participate and require agreement from subcontractors and subcontractors to register and participate in the federal work authorization program to verify the employment authorization of all new employees, or to employ only workers who supply the documents required pursuant to S.C. Code 8-14-20(B)(2).

PROSECUTION OF THE ROAD IMPROVEMENT WORK

It is the County's intentions that work on this contract be performed in a sequential manner. Once a construction activity has started on a road, the Contractor will continue this activity until it is

complete before moving to another road. In the event the Contractor elects to use multiple crews on this project, work may proceed on more than one area. However, in no case will construction activities be initiated on more area than the number of work crews engaged in the work without the approval of the Engineer.

CONTRACT TIME AND DETERMINATION AND EXTENSION OF CONTRACT TIME

Any extensions of these completion dates will adhere to Section 108.6 of the Standard Specifications.

COORDINATION OF UTILITY RELOCATION WORK WITH HIGHWAY CONSTRUCTION

As it is not economically feasible to complete the rearrangement of all utility conflicts in advance of the highway construction, such rearrangements may be underway concurrently with construction.

It shall be the responsibility of the contractor to inspect the site for potential utility conflicts.

It is the responsibility of the Contractor to call Palmetto Utility Protection Service (1-888-721-7877) three (3) days prior to work so that existing utilities can be properly marked.

DRESSING OF SHOULDERS

Prior to beginning work on the Asphalt Resurfacing, the contractor shall be required to remove all vegetation in the existing roadway and to a distance of 12 inches outside the edge of the new pavement and any other area which impedes the placement of the base and or asphalt mixture to the specified width.

The contractor shall also remove and dispose of all excess asphalt and debris which is disturbed during minor grading for widening or during removal of debris or grass from existing surface during preparation of surface for new lift. After the surfacing has been placed, the contractor shall blade the disturbed material to the extent that the shoulder is left in a neat and presentable condition. All excess material shall be removed from the project. No direct payment shall be made for this work. All costs are to be included in the price of other items of work.

BORROW EXCAVATION FOR SHOULDERS

This work shall consist of satisfactory placement of all materials necessary to bring the shoulder grade flush with the final pavement edge grade. The Contractor shall furnish all earth material necessary to eliminate any edge of final pavement to shoulder gradient differential that exceeds 1 inch.

Selected materials shall be used for this operation. The selected material shall consist of a friable material such as topsoil, etc., containing grass roots and having the properties of being comparatively porous; capable of growing grass and of a stable nature in that when compacted it will resist erosion and be capable of supporting vehicles when relatively wet. When the area where material is to be placed, is greater than 4 feet in width, it shall be scarified and/or disked to a minimum depth of 3 inches prior to placing any material. Scarifying or disked is not required for areas less than 4 feet in width. Borrow shall be mixed with the existing scarified and/or disked shoulder material in such a manner as to provide a seed bed in accord with Section 810.15 of the Standard Specifications. The Contractor has the option of placing the borrow material (a) Prior to placing final surface course or (b) Following the placing of the finished surface course.

MAINTENANCE STONE

Maintenance Stone used on this project shall conform to the gradation requirements of Section 305, or to the gradation specified for Aggregate No. CR-14 in the Standard Specifications.

ROADWAYS TO BE INCLUDED IN THIS PROJECT

Colleton County, due to budget considerations or any other reason, reserves the right to adjust the amount of work to be performed on this project. Projects (complete roads) may be added or deleted only at the discretion of the County. The Contractor shall, by signing this request for bids, agree to adjust, as indicated by the County, the lengths or quantities of roadways and corresponding pay items to be performed, at the times and locations determined to be beneficial to the County.

MAINTENANCE OF TRAFFIC

In addition to the Contractor maintaining traffic throughout the length of this project as required by the Specifications, it will also be necessary that the Contractor, prior to beginning any work, submit to the Engineer for approval his plan for constructing this project.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

The Contractor is advised that all work involving design or installation of traffic control devices, including but not limited to signs, pavement markings, elements of work zone traffic control, signals, etc., shall be in compliance with the FHWA's Manual on Uniform Traffic Control Devices (MUTCD), latest edition. The latest edition is defined as the edition that the Traffic Engineering Division of SCDOT recognizes as having been officially adopted (Engineering Directive, Memorandum 19) at the time the project is let, unless stated otherwise in the Special Provisions.

A suggested permanent construction sign schedule has been included. It shall be the responsibility of the contractor to verify the correctness and mark the location of all signs.

TRAFFIC CONTROL

The Contractor shall execute the item of Traffic Control as required by the Standard Specifications, the plans, the Standard Drawings for Road Construction, these special provisions, all supplemental specifications, the MUTCD, and the Engineer. This is an amendment to the Standard Specifications to require the following:

GENERAL REGULATIONS

These special provisions shall have priority to the plans and comply with the requirements of the MUTCD and the standard specifications. Revisions to the traffic control plan through modifications of the special provisions and the plans shall require approval by the County. **Final approval of any revisions to the traffic control plan shall be pending upon review.**

All signs mounted on portable sign supports shall have a minimum mounting height of 5' from the ground to the bottom of the sign. All signs mounted on ground mounted u-channel posts shall have a minimum mounting height of 7' from the ground to the bottom of the sign.

When covering signs with opaque materials, the County prohibits attaching a covering material to the face of the sign with tape or a similar product or any method that will leave a residue on the retroreflective sheeting. Residue from tape or similar products, as well as many methods utilized to remove such residue, damages the effective reflectivity of the sign. Therefore, contact of tape or a similar product with the retroreflective sheeting will require replacement of the sign. Cost for

replacement of a sign damaged by improper covering methods will be considered incidental to providing and maintaining the sign; no additional payment will be made.

Signs not illustrated on the typical traffic control standard drawings designated for permanent construction signs shall be considered temporary and shall be included in the lump sum price bid item for "Traffic Control" unless otherwise specified.

Install and maintain any necessary detour signing as specified by the typical traffic control standard drawings designated for detour signing, Part VI of the MUTCD, these Special Provisions, and the Engineer. The lump sum price bid item for "Traffic Control" includes payment for installation and maintenance of the detour signing.

The Contractor shall maintain the travel patterns as directed by the traffic control plans and shall execute construction schedules expeditiously. The Contractor shall provide the Engineer with no less than a two-week prior notification of changes in traffic patterns.

Upon completion of the final riding surface on each road, the Contractor will be allowed up to 3 working days to begin eliminating shoulder drop-offs greater than 2" and continue the work until these drop-offs are eliminated.

During paving operations, the County requires lane closures at all times where grade elevation differences and drop-offs greater than 2" exist adjacent to or between the travel lanes of a roadway opened to traffic, unless otherwise specified by these special provisions. Maintain lane closure restrictions at all times unless otherwise directed by these special provisions.

During surface paving and milling operations, the County requires lane closures at all times where grade elevation differences and drop-offs greater than 1" exist adjacent to or between the travel lanes of a roadway open to traffic, unless otherwise specified by these special provisions. If this grade elevation difference exceeds 1", mill the adjacent travel lanes or pave the milled travel lanes as necessary to eliminate these grade elevation differences before opening the travel lanes to traffic at these locations. Maintain lane closure restrictions at all times unless otherwise directed by these special provisions.

During the paving operations, the length of roadway with an acceptable grade elevation difference less than or equal to 2" shall not exceed 2 miles.

During the surface paving operations, the length of roadway with an acceptable grade elevation difference less than or equal to 1" shall not exceed 2 miles.

LANE CLOSURE RESTRICTIONS

The Contractor shall install all lane closures as directed by the Standard Specifications for Highway Construction (Edition of 2007), the Standard Drawings for Road Construction, these special provisions, the MUTCD, and the Engineer. The Contractor shall close the travel lanes of two-lane two-way roadways by installing flagging operations. The Contractor shall close the travel lanes of multilane roadways as directed by the typical traffic control standard drawings designated for lane closures on primary routes.

The County prohibits lane closures on primary routes during any time of the day that traffic volumes exceed 800 vehicles per hour per direction. The County reserves the right to suspend a lane closure if any resulting traffic backups are deemed excessive by the Engineer. Maintain all lane closure restrictions as directed by the plans, these special provisions, and the Engineer.

The County reserves the right to restrict the installation of lane closures on high volume primary routes when the presence of a lane closure will seriously hinder normal traffic flow during extended holiday periods. An extended holiday period is hereby defined as those days preceding and following the holiday that experience significant increases in the volume of traffic due to the holiday as determined by the County. Also, the County reserves the right to increase an extended holiday period if excessive traffic disruptions occur during those days prior to and after the established extended holiday period. Extended holiday periods include but are not limited to the week of Thanksgiving, the weeks before and after Christmas, and the weeks before and after the 4th of July. The Contractor should submit inquiries to the Engineer regarding specific days of an extended holiday period no less than two weeks prior to entering into an extended holiday period. The Contractor should make these inquiries annually due to the progressive nature of the calendar.

Flagging operations are considered to be lane closures for two-lane two-way operations and shall be subject to all restrictions for lane closures as specified by this contract.

Lane closures, including flagging operations, are restricted to maximum distances of 2 miles. Install all lane closures according to the typical traffic control standard drawings. On occasions when daytime lane closures must be extended into the nighttime hours, substitute the nighttime lane closure standards for the daytime lane closure standards.

The County reserves the right to suspend a lane closure if any resulting traffic backups are deemed excessive by the Engineer. Maintain all lane closure restrictions as directed by the Standard Specifications, these special provisions, and the Engineer.

TYPICAL TRAFFIC CONTROL STANDARD DRAWINGS

Typical traffic control standard drawings of the “Standard Drawings for Road Construction” for this project shall be as shown below or as required:

STD 605-010-02	PERMANENT CONSTRUCTION SIGNING	PRIMARY ROUTES
STD 610-005-00	FLAGGING OPERATIONS	GENERAL NOTES
STD 610-005-10	FLAGGING OPERATIONS	FLAGGING OPERATIONS W/OUT INTERSECTIONS
STD 610-005-20	FLAGGING OPERATIONS	WORK ZONE THRU STOP SIGN SIDE ROADS
STD 610-005-30	FLAGGING OPERATIONS	WORK ZONE THRU STOP SIGN ALL APPROACHES
STD 610-005-60	FLAGGING OPERATIONS	WORK ZONE INTERSECTION DEPARTURE
STD 610-005-70	FLAGGING OPERATIONS	WORK ZONE INTERSECTION APPROACH

Install the permanent construction signs as shown on the provided permanent construction sign map as provided in the bid documents.

CONSTRUCTION SCHEDULE

The successful Bidder shall, prior to commencement of work, submit to the County a schedule showing the order in which he proposes to carry on the Work indicating the periods during which he will perform work on each roadway. The County reserves the right to determine

priority of schedule items, but unless modified by the parties, in writing, the successful Bidder shall have sole Responsibility for following and coordinating its schedule.

SURPLUS MATERIAL

The contract bid price for other items of work shall be full payment for excavating, hauling, disposing of and seeding any surplus material.

LUMP SUM BID ITEMS

It is predetermined that all lump sum bid items shall be applied equally among all roads, unless otherwise stated. This will apply to pay estimates as well deletion or addition of a road should one be deleted or added.

HOT MIX ASPHALT

All driveways will be paved to a distance needed to safely transition from the final riding surface to the existing paved driveway surface. The contractor shall furnish to the Engineer a plant mix lab report for each mix used on a daily basis.

TESTING

The contractor will be responsible for all quality control and testing. Roller patterns, daily plant test reports, and other tests required by SCDOT will be required on HMA.

ASPHALT BINDER ADJUSTMENT INDEX

See attached Supplemental Specification Dated **March 3, 2009**. For this project the Basic Bituminous Material Index will be determined on the first calendar day of the month in which this project is let. The index and adjustment table will be available on the internet at http://www.scdot.org/doing/constructionletting_monthlyindex.aspx.

MILLED MATERIAL

All milled material will be delivered to Colleton Public Works, 113 Mable T. Willis Blvd., Walterboro, SC 29488. Coordinate delivery with Ms. Carla Harvey, County Engineer, 843-539-1968.

STOP BARS

Will be placed parallel to the centerline of the road being intersected, typically 6 feet off the edge line of the road being intersected to the closest edge of the stop bar.

SUPPLEMENTAL SPECIFICATIONS

ERRATA TO 2007 STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (MAY 4, 2009)

Make the changes listed below to correct errata in the SDCOT *2007 Standard Specifications for Highway Construction*:

DIVISION 100 GENERAL PROVISIONS

SECTION 101 DEFINITIONS AND TERMS

Subsection 101.2 Abbreviations and Acronyms

Amend the table of **SCDOT OFFICIALS AND OFFICES** as follows:

DELETIONS		REPLACEMENTS	
BDE*	Bridge Design Engineer	PSE*	Preconstruction Support Engineer
BDGE*	Bridge Design Geotechnical Engineer	GDSE*	Geotechnical Design Support Engineer
SHE*	State Highway Engineer	DSE*	Deputy Secretary for Engineering

*Wherever it appears in the text, replace the deleted abbreviation with the new abbreviation.

SECTION 105 CONTROL OF WORK

Subsection 105.6 Cooperation with Utilities

Paragraph 1, last sentence; change the word "THE" to "the".

DIVISION 200 EARTHWORKS

SECTION 202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Subsection 202.5 Measurement

Paragraph 5, second bullet; change the words "Brick sidewalk" to "Concrete, brick or stone sidewalks".

SECTION 204 STRUCTURE EXCAVATION

Subsection 204.2.1.2 Structure Excavation for Culverts

Paragraph 1, at the end of the first sentence; change "**Subsection 204.4**" to "**Subsection 204.5**".

DIVISION 400 ASPHALT PAVEMENTS

SECTION 401 HOT MIXED ASPHALT (HMA) PAVEMENT

Subsection 401.2.1.2 Liquid Anti-Stripping Agent

Paragraph 1, first sentence; delete the period at the end of the sentence and add "and SC-M-406."

Subsection 401.2.5 Material for Full Depth Patching

Paragraph 1, delete and replace with the following:

"Use an approved SCDOT Intermediate Type C mix for all Full Depth Patching."

Subsection 401.5 Measurement

After paragraph 10, add the following paragraph:

11 The measurement of Prime Coat is the number of gallons of asphalt material applied to the completed and accepted base course.

Subsection 401.6 Payment

After paragraph 12, add the following paragraph:

13 "The payment for Prime Coat is at the contract unit price for Prime Coat and includes compensation for all labor, equipment, tools, maintenance, and incidentals necessary to complete that work."

Subsection 401.6 Payment

Paragraph 13, **Table of Pay Items**

Change paragraph reference number "13" to "14" and add the following Pay Item:

Item No.	Pay Item	Unit
4010005	Prime Coat	GAL

SECTION 403 HMA SURFACE COURSE

Subsection 403.5 Measurement

Paragraph 1, first sentence; change "HMA Intermediate Course" to "HMA Surface Course".

Subsection 403.6 Payment

Paragraph 1, first sentence; change "HMA Intermediate Course" to "HMA Surface Course".

SECTION 407 ASPHALT SURFACE TREATMENT – DOUBLE TREATMENT

Subsection 407.5 Measurement

Paragraph 1, first sentence; add the word "is" after "(Double Treatment Type (1, 2, 3, 4, or 5))".

SECTION 408 ASPHALT SURFACE TREATMENT – TRIPLE TREATMENT

Subsection 408.5 Measurement

Paragraph 1, first sentence; add the word "is" after "(Triple Treatment Type (1 or 2))".

DIVISION 600 MAINTENANCE AND TRAFFIC CONTROL

SECTION 625 PERMANENT PAVEMENT MARKINGS FAST DRY WATERBOURNE PAINT

Subsection 625.2.2.4.11 Lead Content

Paragraph 1, first sentence; change 6% to 0.06%.

SECTION 627 THERMOPLASTIC PAVEMENT MARKINGS

Subsection 627.4.10 Inspection and Acceptance of Work

Paragraph 2, first sentence; change "period of 90 days" to "period of 180 days".

Subsection 627.4.10 Inspection and Acceptance of Work

Paragraph 2, second sentence; change "90-day observation period" to "180-day observation period".

Subsection 627.4.10 Inspection and Acceptance of Work

Paragraph 3, first sentence; change "90-day period" to "180-day period".

DIVISION 700 STRUCTURES

SECTION 709 STRUCTURAL STEEL

Subsection 709.4.3.5.2 Submittals and Notification

Paragraph 1, delete the last two sentences and replace them with, "The County's review and acceptance are required before any field welding will be permitted."

Subsection 709.6.3 Pay Items (page 650)

Subsection heading number; change subsection heading number from "709.6.3" to "709.6.4".

SECTION 712 DRILLED SHAFTS AND DRILLED PILE FOUNDATIONS

Subsection 712.4.4 Dry Construction Method

Paragraph 2, last sentence in A; change "*Drilled Shaft Report*" to "*Drilled Shaft Log*".

Subsection 712.4.10.4 Excavation Cleanliness

Paragraph 1, last sentence; change "*Drilled Shaft Report*" to "*Drilled Shaft Log*".

Subsection 712.4.10.6 Shaft Load Test

Change first paragraph reference number from "2" to "1".

Subsection 712.6.10 Drilled Pile Set-Up

Insert paragraph reference number "1" to the left of the first paragraph.

SECTION 723 DECK JOINT STRIP SEAL

Subsection 723.1 Description

Insert paragraph reference number "3" to the left of the third paragraph.

SECTION 726 BRIDGE DECK REHABILITATION

Subsection 726.4.1 General

Insert paragraph reference number "1" to the left of the first paragraph.

Subsection 723.4.6 Full Depth Patching (page 790)

Subsection heading number; change subsection heading number from "723.4.6" to "726.4.6"

SECTION 727 CROSSHOLE SONIC LOGGING OF DRILLED SHAFT FOUNDATIONS

Subsection 726.6 Payment (page 807)

Subsection heading number; change subsection heading number from "726.6" to "727.6"

DIVISION 800 INCIDENTAL CONSTRUCTION

SECTION 805 GUARDRAIL

Subsection 805.5 Measurement

Paragraph 4; amend as follows:

"The quantity for the pay item 8053000 Additional Length Guardrail Post is the length of required post installed in excess of the standard-length post based on the system being installed, measured by the linear foot (LF), complete, and accepted."

SECTION 815 EROSION CONTROL

Subsection 815.1 Description

Paragraph 1, first sentence; change "temporary flexible pipe" to "temporary pipe".

Subsection 815.5 Measurement

Paragraph 13; delete the first sentence and replace it with the following sentence:

"The quantity for Temporary Pipe Slope Drains is measured and paid for in accordance with **Subsections 803.5** and **803.6** respectively."

Subsection 815.5 Measurement

Delete paragraph 19.

Subsection 815.6 Payment

After paragraph 15, add the following paragraph:

16 Payment for Removal of Silt Retained by Silt Fence is full compensation for removing and disposing of sediment deposits accumulated by silt fences as specified or directed and includes all materials, labor, equipment, tools, supplies, transportation, and

incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, the Specifications, and other terms of the Contract.

Subsection 815.6 Payment

Change original paragraph number "16" to "17".

Subsection 815.6 Payment

Pay Item table; change the Unit for Item No. 8156214 to "EA".

INDEX:

Amend as follows:

Page I-3, after "Bridge Deck Rehabilitation, measurement and payment:"

Delete page 807.

Page I-12, after "Letting:"

Replace page 19 with page 9.

Page I-13, after "Overhead Sign Structure:"

Replace page 488 with page 495.

Page I-15, after "Proof Rolling:"

Delete page 98.

Page I-18, after "Structural Steel, turned and ribbed bolts:"

Replace page 624 with page 625.

Page I-19, after "Waterproofing, bridge deck:"

Delete page 907.

Page I-20, after "Working Drawings:"

Replace page 543 with page 779

THE SOUTH CAROLINA MINING ACT (MARCH 20, 2003)

The South Carolina Mining Act enacted by the General Assembly in 1973 requires that the County adopt reclamation standards to govern activities of the County and any person acting under contract with the County, on highway rights-of-way or material pits maintained solely in connection with the construction, repair and maintenance of the public road systems in South Carolina.

STANDARD PLAN FOR THE RECLAMATION OF EXCAVATED AREAS ADOPTED BY THE South Carolina DEPARTMENT OF TRANSPORTATION

Reclamation plans as stated herein shall include all areas disturbed in excavations of borrow and material pits, except planned inundated areas.

The final side slopes of areas excavated for borrow and material pits shall be left at such an angle so as to minimize erosion and the possibility of slides. The minimum slope in every case shall be not less than 3:1.

Small pools of water should not be allowed that are, or are likely to become noxious, odious, or foul to collect or remain on the borrow pit. Suitable drainage ditches, conduits, or surface gradient shall be constructed to avoid collection of noxious, odious, or foul pools of water unless the borrow pit is to be reclaimed into a lake or pond.

Borrow pits reclaimed to a lake or pond must have an adequate supply of water to maintain a water sufficient level to maintain a minimum water depth of four (4) feet on at least fifty (50) percent of the surface area of the lake or pond.

Excavated areas will be drained where feasible unless otherwise requested by the property owner where, in such instances, the property owner may wish to develop the excavated area for recreational purposes or for the raising of fish, or for other uses, in compliance with the South Carolina Mining Act.

Where material is stripped from the ground surface in relatively thin layers, the area, after excavation has been completed, will be thoroughly scarified and terraced and planted to establish satisfactory vegetation necessary to control erosion. Vegetative cover should be established on a continuing basis to ensure soil stability appropriate to the area. Conservation practices essential for controlling both on-site and off-site erosion and siltation must be established. A minimum of seventy-five (75) percent vegetative ground cover, with no substantial bare spots, must be established and maintained into the second growing season.

Excavated areas that are drained will be seeded to obtain a satisfactory vegetative cover. The side slopes of excavated area will be planted to vegetation.

The State Highway Engineer, or his duly appointed representative, will make a final inspection of the reclaimed area and keep a permanent record of his approval thereof. A map or sketch providing the location and approximate acreage of each pit used on the project will be made available to the Final Plans Engineer.

All applicable regulations of agencies and statutes relating to the prevention and abatement of pollution shall be complied with by the contractor in the performance of the contract.

The Contractor shall comply with the provisions of the Plan which are applicable to the project as determined by the Engineer. Seeding or other work necessary to comply with the plan on pits furnished by the contractor shall be at the expense of the contractor. Bermuda shall not be planted on ground surface pit areas. The quantity of fescue seed specified in Subsection 810.04 of the Standard Specifications shall be increased to fifteen (15) pounds in lieu of the deleted Bermuda seed.

PROMPT PAYMENT CLAUSE (JUNE 14, 2000)

- (1) Subject to the provisions on retainage provided in Paragraph (2) below, when a subcontractor has satisfactorily performed a work item of the subcontract, the Contractor must pay the subcontractor for the work item within seven (7) calendar days of the Contractor's receipt of payment from SCDOT. A subcontractor shall be considered to have "satisfactorily performed a work item of the subcontract" when the SCDOT pays the Contractor for that work item.
- (2) The Contractor may withhold as retainage up to five (5%) percent of a subcontractor's payment until satisfactory completion of all work items of the subcontract. "Satisfactorily completion of all work items of the subcontract" shall mean when the SCDOT pays the Contractor for the last work item of the subcontract. The Contractor must release to the subcontractor any retainage withheld within seven (7) calendar days from the date the Contractor receives payment from SCDOT for the last work item of the subcontract.
- (3) Prior to receiving payment of each monthly estimate, the Contractor shall certify to SCDOT that the construction estimate is complete and that all subcontractors have been paid for work covered by previous estimates.
- (4) Failure to comply with any of the above provisions shall result in one or more of the following sanctions: (1) no further payments to the Contractor unless and until compliance is achieved; (2)

the Contractor being placed in default; and/or (3) the Contractor being declared delinquent, such delinquency being subject to procedures and penalties provided in 108.08 of the Standard Specifications.

ASPHALT BINDER ADJUSTMENT INDEX (MARCH 3, 2009)

General: The Bidder is advised that the County will apply Asphalt Binder Adjustments for specified items of work when the Index for Asphalt Binder (PG64-22) varies more than 5% from the Base Index price established for the contract.

Index: The Department maintains an Index for Asphalt Binder, which is an average of quotations from current asphalt binder suppliers, effective on the 1st and 17th of each month.

The resulting Index is posted in spreadsheet form on the Department’s Internet at http://www.scdot.org/doing/constructionletting_monthlyindex.aspx.

Base Index: The County sets a Base Index date for each contract subject to Asphalt Binder adjustments with the date set prior to the highway letting. The Index for Asphalt Binder on that Base Index date sets the framework of the 5% adjustment increments to be used for the contract. Tables showing the adjustment increments are displayed in the above noted spreadsheet (AC Binder Chart tab).

Asphalt Binder Content Factors: The following table shows the Asphalt Binder Content factor (tons of Asphalt Binder per unit of work) for SCDOT work items that are subject to this specification. In order to be eligible for index adjustments, the work item(s) must be specifically indicated in the Special Provisions of the Contract.

Items of Work Eligible for A.C. Binder Adjustments	Unit	AC Binder Tons
Liquid Asphalt Binder (PG64-22)	TON	1.0000
Liquid Asphalt Binder (PG76-22)	TON	1.0000
Full Depth Patching - 4" (AC Binder)	SY	0.0110
Full Depth Patching - 6" (AC Binder)	SY	0.0165
Full Depth Patching - 8" (AC Binder)	SY	0.0220
Full Depth Patching - 10" (AC Binder)	SY	0.0275
Full Depth Patching - 12" (AC Binder)	SY	0.0330
Single Treatment Type-1 (0.38 gal/sy AC)	SY	0.0016
Single Treatment Type-2 (0.38 gal/sy emulsion)	SY	0.0011
Single Treatment Type-3 (0.25 gal/sy emulsion)	SY	0.0007
Single Treatment Class-A (0.30 gal/sy emulsion)	SY	0.0008
Double Treatment Type-1 (0.82 gal/sy emulsion)	SY	0.0023
Double Treatment Type-2 (0.97 gal/sy emulsion)	SY	0.0027
Double Treatment Type-3 (0.55 gal/sy emulsion)	SY	0.0015
Double Treatment-Class A Special (0.66 gal/sy emulsion)	SY	0.0018
Triple Treatment-Type 1 (0.85 gal/sy emulsion)	SY	0.0024
Triple Treatment-Type 2 (0.71 gal/sy emulsion)	SY	0.0020
Triple Treatment-Type 4 (0.82 gal/sy emulsion)	SY	0.0023
Asph Surf Trmt - Single Treatment (0.28 gal/sy mod. Emulsion)	SY	0.0008
Asph Surf Trmt - Double Treatment (0.48 gal/sy mod. Emulsion)	SY	0.0013
Micro surfacing, Type II	SY	0.0007
Micro surfacing, Type II - Leveling	TON	0.0800
Emulsion for High Performance Chip Seal (Macro surfacing)	Gal	0.0028

Per unit index adjustments are determined by multiplying the Asphalt Binder Content factor by the Asphalt Binder Index Change (minimum of incremented range). The resulting per unit amount is then applied to the construction estimate as a line item adjustment.

Additional Provisions:

A. The County will calculate and apply Asphalt Binder Index Adjustments to estimates based on Index values set at the beginning of the estimate period.

- Districts 2, 3, and 5 - Estimate period begins on the 1st of the month and ends on the last day of the month. The 1st of the month Index will be compared to the contract Base Index to determine Index adjustments for the estimate period.
- Districts 1, 4, 6, and 7 - Estimate period begins on the 17th of the month and ends on the 16th day of the following month. The 17th of the month Index will be compared to the contract Base Index to determine Index adjustments for the estimate period.

B. In the event the work (on a contract item subject to asphalt binder adjustment) continues after expiration of the contract completion date, the asphalt binder index in effect on the contract completion date will become the ceiling (or maximum) of indexes to be applied for the work. Lower indexes will be applied, while higher indexes will be limited to the ceiling noted.

C. This provision shall apply to supplemental agreements, overruns and extensions to this project for the specified item(s) to be adjusted.

D. The Base Index, Current Index and Adjustments may be referenced directly on the Department's Index spreadsheet at http://www.scdot.org/doing/constructionletting_monthlyindex.aspx.

Road Name: Benson Street S-15-293
Start: US-15/S. Jefferies Blvd
Stop: Klein Street S-15-293
Road Length: 435'
Width in feet: 38'

Road Name: Klein Street S-15-293
Start: Benson Street S-15-293
Stop: W. Washington St. S-15-128
Road Length: 435'
Width in feet: 38'

ITEM #	DESCRIPTION	UNIT	QUANTITY
1	Traffic Control	LS	1
2	Mill Existing Asphalt Pavement (1.5" uniform)	SY	3675
3	Full Depth HMA Patching 6" Uniform	SY	75
4	Liquid Asphalt Binder PG64-22	TON	35
5	H/M Asphalt Surface Course Type C (200 lbs/sy)	TON	410
6	Permanent Construction Signs (Ground Mounted) – Scheme E	SF	96
7	24" White Solid Lines (Stop) Fast Dry Paint	LF	40
8	24" White Solid Lines (Stop) Thermoplastic-125 mil	LF	40
9	Permanent Yellow Pavement Markers Bi-Dir.-4"x4"	EA	55

Notes: Uniform milling required from curb to curb. Variable milling will be used at roadway termini, intersection tie-ins, and across the culvert crossing. Asphalt surface quantities include quantities for intersections and driveway tie-ins.

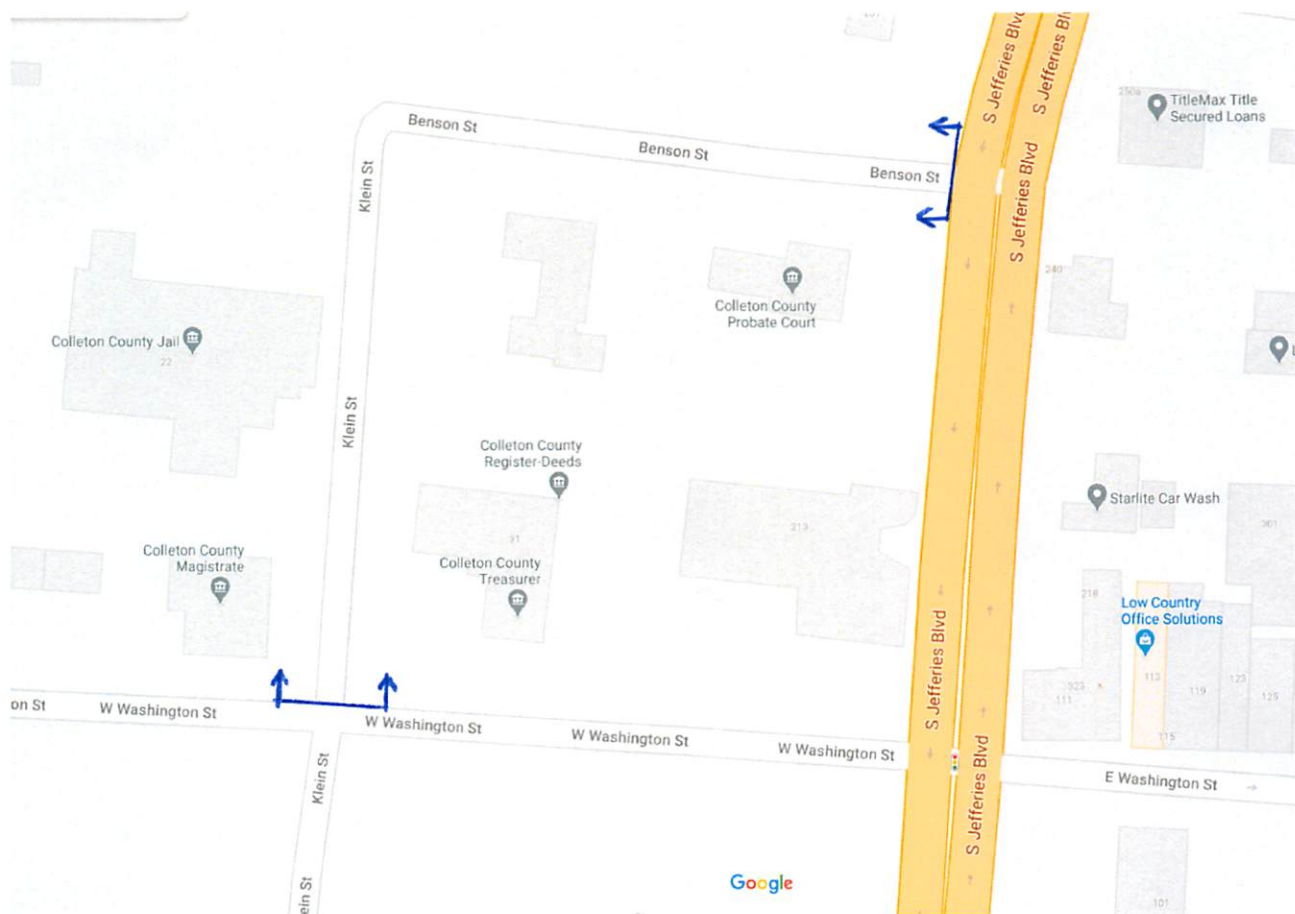
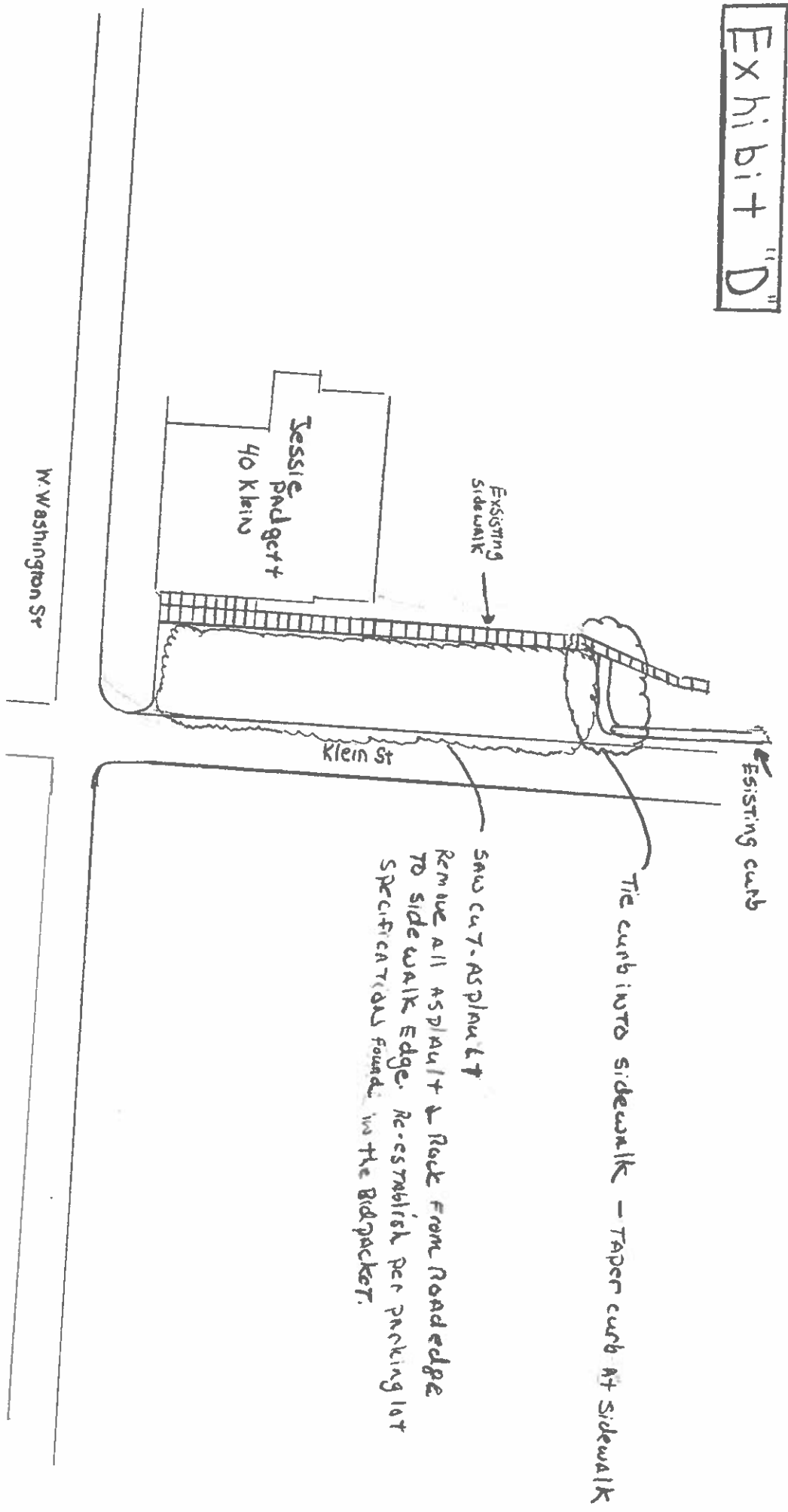


Exhibit "D"



40 Klein street
Parking lot

NOT TO SCALE !!

Project shall include:
Parking space striping
Parking space - parking blocks
(secure w/pins)