



FLORENCE COUNTY
SOUTH CAROLINA

INVITATION-TO-BID NO. 02-16/17

NEW STATION AT FRIENDFIELD

BID OPENING: THURSDAY, JULY 28, 2016 AT 3:05 P.M.

TABLE OF CONTENTS

<u>ITEM DESCRIPTION</u>	<u>PAGE NUMBER</u>
SUPPLEMENTAL PLANS LISTING	3
INVITATION-TO-BID	4
IRAN DIVESTMENT ACT- CERTIFICATION	5
MINIMUM MANDATORY REQUIREMENTS	5
INSTRUCTIONS TO BIDDERS	5-9
VENDOR AGREEMENTS	9-12
BID BOND REQUIREMENTS	13
PAYMENT BOND REQUIREMENTS	14
PERFORMANCE BOND REQUIREMENTS	15
BID FORMS	16-20
SAMPLE CONTRACT	21-31

SUPPLEMENTAL PLANS LISTING
(ATTACHED UNDER SEPARATE COVER)

FILE NAME

COVER SHEET

CS COVER SHEET

AE055_00ACS_Des_050416

ARCHITECTURAL DRAWINGS:

A1.0	FLOOR PLAN & NOTES	<i>AE055_2A1.0_Des_050416</i>
A2.0	REFLECTIVE CEILING & ROOF PLAN	<i>AE055_2A2.0_Des_050416</i>
A3.0	ELEVATIONS	<i>AE055_2A3.0_Des_050416</i>
A4.0	DETAILS & SCHEDULES	<i>AE055_2A4.0_Des_050416</i>
A5.0	SECTIONS	<i>AE055_2A5.0_Des_050416</i>
A6.0	WALL SECTIONS	<i>AE055_2A6.0_Des_050416</i>

CIVIL DRAWINGS:

C1.0	EXISTING SITE CONDITIONS	<i>AE055_1C1.0_Des_050716</i>
C2.0	SITE DEVELOPMENT PLAN	<i>AE055_1C2.0_Des_050716</i>
C3.0	GRADING & DRAINAGE PLAN	<i>AE055_1C3.0_Des_050716</i>
C4.0	SEDIMENT & EROSION CONTROL PLAN	<i>AE055_1C4.0_Des_050716</i>
C5.0	WATER & SEWER PLAN	<i>AE055_1C5.0_Des_050716</i>
C6.0	SITE DEVELOPMENT DETAILS	<i>AE055_1C6.0_Des_052516</i>
C7.0	SEDIMENT & EROSION CONTROL DETAILS	<i>AE055_1C7.0_Des_050716</i>
	CIVIL SPECIFICATIONS	<i>AE055 Full Signed Specs</i>

PLUMBING DRAWINGS:

P1.0	PLUMBING NOTES	<i>AE055_3P1.0_Des_050416</i>
P2.0	PLUMBING PLANS	<i>AE055_3P2.0_Des_050416</i>
P3.0	PLUMBING DETAILS	<i>AE055_3P3.0_Des_050416</i>

MECHANICAL DRAWINGS:

M1.0	MECHANICAL NOTES	<i>AE055_4M1.0_Des_050416</i>
M2.0	MECHANICAL PLANS	<i>AE055_4M2.0_Des_050416</i>
M3.0	MECHANICAL DETAILS	<i>AE055_4M3.0_Des_050416</i>

ELECTRICAL DRAWINGS:

E1.0	ELECTRICAL NOTES	<i>AE055_5E1.0_Des_050416</i>
E2.0	ELECTRICAL SCHEDULES	<i>AE055_5E2.0_Des_050416</i>
E3.0	ELECTRICAL DETAILS	<i>AE055_5E3.0_Des_050416</i>
E4.0	ELECTRICAL PLANS	<i>AE055_5E4.0_Des_050416</i>

COUNTY OF FLORENCE, SOUTH CAROLINA
INVITATION-TO-BID #02-16/17

Florence County, South Carolina is accepting sealed bids from a qualified contractor to provide labor, materials, equipment, and services required to construct a new fire station for the Hannah-Pamplico-Friendfield Fire Department.

The project is to be located on 2190 Hyman Road, currently an agricultural field. The parcel is on the south side of the road approximately 3000 feet east (0.6 miles) of the intersection of Hyman Road and Friendfield Road. The nearest residence is 2227 Hyman Road, about 200 feet west of the site.

The new station is to be a 2,250 square foot prefabricated metal building situated on a 1-acre site. It will have two bays for fire rigs and a single restroom. A 6" thick concrete apron will run from the bays to access Hyman Road. An eight-space gravel parking lot will connect to this. A public water well will be installed to serve the new station. A septic system will be installed to serve the building..

In order to be considered, all bids must be hand carried or mailed in a sealed envelope to the Florence County Procurement Office, County Complex, 180 N. Irby Street – MSC-R, Rm. B-5, Florence, SC 29501-3431 no later than Thursday, July 28, 2016 at 3:00 p.m.

The sealed bids will then be opened and read aloud in Room 210-C at the County Complex on Thursday, July 28, 2016 at 3:05 p.m.

The successful respondent must have a minimum Group 2 General Contractors (GC) license in the state of South Carolina to do this type of work.

Each responder, by submission of a bid, agrees to each and every term and condition set forth within this Invitation-To-Bid and associated project documents, including any addendum that may be issued, and to be bound thereby.

All bids and supporting documents will be retained by Florence County for a period of ninety (90) calendar days from the date the bids are opened, and no bid shall be received, nor shall any responder be allowed to withdraw a bid after the opening hour commences.

Florence County under Title VI of the Civil Rights Act of 1964 and related statutes ensures that no person shall on the grounds of race, color, national origin, sex, disability, and age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity it administers.

This request for bids does not commit Florence County to award a contract; to pay any cost incurred in the preparation of a bid; or, to procure or contract for the services. Florence County reserves the right to accept or reject any or all bids received as a result of this request; to negotiate with any or all qualified proposers; or, to cancel in part or in its entirety this bid invitation, if it is in the best interest of the County to do so.

Florence County reserves the right to accept or reject, in whole or in part, any and all responses as appears in its judgment to be in the best interests of the County, or to waive any and all technicalities and informalities in determining the action of each bid.

IRAN DIVESTMENT ACT- CERTIFICATION (JAN 2015):

1. The Iran Divestment Act List is a list published by the Board pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the following URL: http://procurement.sc.gov/PS/20150105_SC_IDA_List-Final.pdf Section 11-57-310 requires the government to provide a person ninety days written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the State to award a contract to you.
2. By signing your Offer, you certify that, as of the date you sign, you are not on the then-current version of the Iran Divestment Act List. (c) You must notify the Procurement Officer immediately if, at any time before posting of a final statement of award, you are added to the Iran Divestment Act List. [02-2A077-1]

MINIMUM MANDATORY REQUIREMENTS

The following minimum mandatory requirements shall be met and documented:

1. The successful respondent must at a minimum have a group 2 general contractor (GC) license in the state of South Carolina. No bid will be considered unless the respondent is legally qualified under Title 40, Chapter 11 of the Code of Laws of South Carolina, 1976 as amended.
2. In business for at least the past five (5) years under the current business name without declaring bankruptcy. A letter on company letterhead declaring that the company has been in business for five (5) years + and has not declared bankruptcy can be included with the bid form in lieu of a bid bond. (Include with bid).
3. The successful bidder must provide three (3) references for similar projects.
4. Copy of Worker's Compensation and General Liability Insurance with Florence listed as additional insured supplied to the Procurement Office prior to contract execution or commencement of any work.
5. The successful vendor must be able to meet all Federal, State, and local regulations required for this project.

INSTRUCTIONS TO BIDDERS

1. TAXES:
 - a) Florence County pays SC Sales Taxes in the amount of 8%. **INCLUDE SC SALES TAX WITH YOUR BID.**
2. RECEIPT AND OPENING OF SEALED BIDS:
 - a) Sealed bids will be received and opened as specified in this Invitation-To-Bid document.
 - b) The Owner will consider as non-responsive any bid not prepared and submitted in accordance with the provisions hereof and may waive any informality or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within ninety (90) calendar days after the actual date of the opening thereof or as provided for the in the bid documents whichever is later.

3. PREPARATION OF BID:

- a) All bids will be evaluated in accordance with procedures and specifications contained herein and Florence County Code. The responsiveness to same determined in accordance to the instructions and criteria in this document. Any bid not providing sufficient information and documentation to comply with the Invitation-To-Bid Evaluation requirements will be considered non-responsive and removed from further consideration.
- b) A bid shall be made in the official name of the firm or individual under which business is conducted (showing the official business address) and must be signed in ink by a person duly authorized to legally bind the person, partnership, company, or corporation submitting the bid.
- c) All information requested of the bidder shall be entered in the appropriate spaces on the provided forms. If additional space is required, attach additional pages as needed within the sealed bid response.
- d) Bidders mailing their bid must allow a sufficient mail delivery period to insure timely receipt of their bid. Florence County is not responsible for bids delayed by mail and/or delivery services of any nature. It is the bidder's sole responsibility to insure that all documents are received by person (or office) at the time indicated in the bid document. No facsimile or email submissions.
- e) Bidders must clearly mark as "Confidential" each part of their offer 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. Florence County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against Florence County or his agents for its determination in this regard.
- f) All information shall be entered in ink or typewritten.
- g) All proposed costs shall be for all licenses, permits, taxes, labor, material, transportation, equipment and any other components/services that are required to complete the work embraced herein this Invitation-To-Bid document.
- h) All addendums in association with this invitation to bid may be obtained from the Florence County Procurement Office located at the City-County Complex, 180 N. Irby Street; Room B-5, Florence, SC 29501, by e-mailing pfletcher@florenceco.org, or by visiting the Florence County public bids web page at the following link for 02-16/17: <http://www.florenceco.org/offices/procurement/bids/>.
- i) Each bidder shall acknowledge receipt of all addendum(s) by its submission of a bid. It shall be each bidder's responsibility to assure that all addendum(s) have been received.
- j) Each bid must be submitted in a sealed envelope, addressed to the Owner along with the name of the project for which the bid is submitted. The bidder shall also show his name and address, on the outside of the envelope. Failure to show the required information may result in rejection of the response and removal from further consideration. If forwarded by mail or carrier, the sealed envelope containing the bid must be enclosed in another outer envelope. Florence County shall not be responsible for unidentified bids.

4. INTERPRETATIONS OF SPECIFICATIONS:

- a) No binding interpretation of the meaning of the documents or any questions relating to the bid will be made to any bidder orally prior to the receipt of bids. Any request for such interpretation or questions shall be made in writing via e-mail the Florence County Procurement Director

(pfletcher@florenceco.org) or his designee. To be given consideration, such requests must be received by 5:00 p.m. Friday, July 22, 2016. Any such interpretations or supplemental instructions will be issued in the form of addendum(s) to the Contract Documents which will be mailed or emailed to persons receiving a set of documents, not later than three days prior to the date for opening of bids. Failure of any bidder to receive such addendum(s) shall not relieve the successful bidder of any obligation under the awarded contract and this Document.

5. BIDDER QUALIFICATIONS:

- a) To be acceptable to the Owner, bidders must be skilled and/or licensed, if applicable, in the class of work on which they respond, and no bid will be considered from any bidder who is unable to show that he has actually performed considerable work of similar character to that on which he is bidding.

6. BID BOND (SURETY) REQUIREMENTS:

- a) As discussed in the Bid Surety Requirement document contained herein, Bid Surety must accompany any and all responses submitted that contain estimated project costs exceeding twenty-five thousand dollars (\$25,000.00). Failure to satisfy this Bid Surety requirement will result in your bid being considered non-responsive and removed from further consideration for award of the subject contract. Bid Surety can be provided as discussed below.
- b) Bid Surety will not be required from Contractors that have been in business for five (5) consecutive years without filing for bankruptcy. A statement on the company's letterhead from the firm stating this qualification will replace the bid bond and must accompany the bid.
- c) For all bidders not meeting the criteria of "b" above, a deposit in the amount of five percent (5%) of the proposed total contract price shall accompany the bid. These deposits shall take the form of certified check, cashier's check or bond executed by a corporate surety licensed under the laws of this state. The cashier's check or certified check shall be deposited to the County's account if the successful bidder fails to enter into the proposed contract within ten (10) days after the award. Bid deposits of unsuccessful bidders will be returned as soon as the contract is awarded.
- d) **One of the above requirements must be met for your response to be considered.**

7. EXECUTION OF CONTRACT:

- a) The bidder to whom an award is made shall deliver to the County a certificate of insurance as discussed in **Item 9 below**. The County's issuance of a purchase order and/or verbal notification of such execution may serve as the official "Notice to Proceed". Bidders failing to enter the proposed contract may be subject to Debarment and Suspension, as prescribed under Section 11-102 of the Florence County Code, from future consideration for award of contracts. Bidders failing to enter the proposed contract may result in claims against bonds.

8. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:

- a) The successful bidder, upon his failure or refusal to execute and deliver the contract required within twenty one (21) calendar days after he has received "Notice of Award", shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid. Forfeiture of guaranty under this section may result in the bidder being subjected to Debarment or Suspension, as prescribed under Section 11-102 of the Florence County Code, from future consideration for award of contracts.

9. TERM OF CONTRACT AND CONTRACT DOCUMENTS:

- a) The contract documents that will form the contract shall include:
 - The Complete Bid Document
 - All Addenda
 - The Successful Bidder's Submitted Bid Document

Notice of Award (Verbal or Written)
Purchase Order/Agreement/Contract
Insurance Certification

10. ORDER OF PRECEDENCE

- a) In the event of inconsistent or conflicting provision of this contract and referenced documents, the following descending order of precedence shall prevail: (1) Florence County Procurement Ordinance, as amended (2) Bid Announcement/Advertisement (3) Instructions to Responders and Vendor Agreements (4) Other provisions of the contract whether incorporated by reference or otherwise, and (5) the Specifications.

11. INSURANCE AND BONDS:

- a) Upon award of the contract or Purchase Order, the bidder shall maintain, throughout the performance of its obligations a policy of Worker's Compensation insurance with such limits as may be required by SC law, and a policy or policies of general liability insurance insuring against liability for injury to, and death of, persons and damage to, destruction of, property arising out of, or based upon, any act or omission of the bidder or any of its subcontractors of their respective officers, directors employees or agents. Such liability insurance shall have limits sufficient to cover any loss or potential loss resulting from this contract. Florence County must be listed as additional insured. The certificate must allow a minimum of a 30 day written notice of cancellation. Bidder shall provide a Certificate of Insurance to the Florence County Procurement offices prior to start of work.

12. EXAMINATION OF PROJECT'S WORK SITES:

- a) Each of the bidders shall fully familiarize itself with the conditions relating to the bid to insure complete understanding of all the details involved. The bidder shall satisfy itself as to the actual requirements of the bid by personal examination of its location or other means, so as to enable the bidder to make an informed bid. Failure to do so shall not relieve the successful bidder of its obligation to furnish all materials, products, and/or labor necessary to complete the provision of the awarded contract and failure to do so may result in the claims against bonds. No allowance will be made for any claims that a bid and/or response was based on incomplete information as to the nature and character of the sites and of the work involved.

13. INTERPRETATIONS OF PLANS AND SPECIFICATIONS:

- a) No binding interpretation of the meaning of the Documents or any questions relating to the bid will be made to any bidder orally prior to the receipt of bids. Any request for such interpretation or questions shall be in writing addressed to the Owner or designee. To be given consideration, such requests must be received at least seven (7) days prior to the scheduled date for opening sealed bids. Any such interpretations or supplemental instructions will be issued in the form of addenda to the Contract Documents which will be mailed or emailed to persons receiving a set of documents, not later than three days prior to the date for opening of bids. Failure of any bidder to receive such addenda shall not relieve the successful bidder of any obligation under the awarded contract and this Document.

14. RIGHT TO INCREASE OR DECREASE THE AMOUNT OF WORK:

- a) The Owner reserves the right to increase or decrease the amount of work under the Contract at the unit prices quoted in the bid received from the successful bidder.

15. POWER OF ATTORNEY:

- a) Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power-of-attorney

16. LAW AND REGULATIONS:

- a) The bidder's attention is directed to the fact that all applicable Federal, State (including SCDHEC), and Local laws, statutes, ordinances, and the rules and regulations of all authorities having jurisdiction over the project shall apply to the contract and the project throughout, and they will be deemed to be included in the contract the same as though herein written out in full.
- b) The bidder's attention is directed to the fact that all bids will comply as prescribed under the most current Florence County Code.

17. METHOD OF AWARD:

- a) Purchase Order will be awarded to the bidder whose bid appears to serve the best interest of the owner. The successful bidder will be determined as prescribed herein this Document.
- b) Florence County reserves the right to accept or reject, in whole, in part, together or separately, any and all responses as appears in its judgment to be in the best interests of the County, or to waive any and all technicalities and informalities in determining the action of each bid.

18. OBLIGATION OF BIDDER:

- a) At the time of the opening of bids, each bidder will be presumed to have inspected the site, if applicable, and to have read and to be thoroughly familiar with the Documents (including all addendum(s)). The failure or omission of any bidder to examine any form, instruction or document shall in no way relieve any bidder from any obligation in respect to this Invitation-To-Bid.

VENDOR AGREEMENTS

1) STATEMENT OF RIGHTS

- a) Florence County reserves the right to obtain clarification or additional information necessary to properly evaluate a bid. Vendors may be asked to give a verbal presentation of their bid after submission. Failure of vendor to respond to a request for additional information or clarification could result in rejection of that vendor's bid. Florence County reserves the right to accept or reject any and all bids, in whole or in part, separately or together, with or without cause; to waive technicalities in submissions, to secure a project that is deemed to be in the best interest of the County. Florence County also reserves the right to make purchases outside of the awarded contracts where it is deemed in the best interest of the County.

2) GENERAL TERMS:

- a) Each bidder by submitting a response to Florence County as a result of this Invitation-To-Bid, agrees to and acknowledges its acceptance of and agreement with the procedures outlined below and the terms, conditions and requirements of the applicable Florence County Invitation-To-Bid document. Agreement is evident by the submission of a response to Florence County. If a vendor cannot agree to these terms, or violates these procedures, the response will be judged non-responsive and not considered. If the procedures are violated during the evaluation process or prior to the issuance of a contract by Florence County, the offer of the firm in question will be void and Florence County will procure the goods/services in question from other eligible vendors.

3) SPECIFIC TERMS:

- a) Products offered shall meet all requirements of the Uniform Commercial Code, if applicable.
- b) Responses submitted are final and complete offers by the vendor. No additions, corrections, modifications, changes or interpretations will be allowed. In the event questions arise on what is meant by an offer, the Procurement Officer will make a determination as to the county interpretation of the vendor's offer. If, after informing the vendor of the county's opinion, disagreement as to scope of the offer is present, the offer will be declared VOID.

- c) Florence County reserves the right to award bids received on the basis of individual items, groups of items, or the entire list of items; to reject any and all bids; and to waive any technicalities. In every case, Florence County reserves the right to make awards deemed to be in the best interest of the County and to negotiate further the offer determined by the County to be in the best interest of the County.
- d) Unit prices will govern over extended prices. Prices must be stated per unit and extended for the total quantity.
- e) Florence County is not exempt from sales tax, if applicable. Sales, use, or excise tax, as well as any handling and shipping charges, must be shown as separate items.
- f) Florence County has a local preference of 2%, which may be applied in bid award determination.
- g) Any deviation from specifications in the bid must be clearly pointed out; otherwise, it will be considered that the items offered are in strict compliance with these specifications, and the successful bidder will be held responsible therefore. Unless otherwise stated, it is understood and agreed that any item offered or shipped on this bid shall be new and suitable for storage or shipment, and that prices include standard commercial packaging and handling.
- h) Any attempt by a vendor to influence the opinion of the county staff, or County Council, by discussion, promotion, advertising or any procedure to promote their offer, will constitute grounds to judge such an offer non-responsive. All offers presented to Florence County will be evaluated based on the current County Code and the offer as presented to the county on the date/time specified in the given bid.
- i) In the event of inconsistent or conflicting provision of this contract and referenced documents, the following descending order of precedence shall prevail: (1) Florence County Procurement Ordinance, as amended (2) Bid Announcement/Advertisement (3) Special Terms and Conditions, (4) Instructions to Responders and Vendor Agreements (5) Other provisions of the contract whether incorporated by reference or otherwise, and (6) the Specifications.
- j) Florence County reserves the right to make periodic inspections of the manner and means the service is performed or the goods are supplied.
- k) All vendors are informed that the Procurement Officer may exercise the County's option to extend the contract, (purchase order) under the provisions of County Code should such extension be mutually agreeable between the County and the selected vendor.
- l) The Bidder agrees to secure at Bidder's own expense all personnel necessary to carry out Bidder's obligations under this Bid. Such personnel shall not be deemed to be employees of the County nor shall they or any of them have or is deemed to have any direct contractual relationship with the County. The County shall not be responsible for withholding taxes with respect to the Bidder's compensation hereunder. Bidder shall not hold himself out as an employee of the County, and shall have no power or authority to bind or obligate the County in any manner, except County shall make payment to Bidder for services as herein provided. Bidder shall obtain and maintain all licenses and permits required by law for performance of this contract by him. The Bidder shall have no claim against the County hereunder or otherwise for vacation pay, sick leave, retirement benefits, social security, worker's compensation, health or disability benefits, unemployment insurance benefits, or employee benefits of any kind. State or Federal governments, including but not limited to Social Security, workmen's compensation, Employment Security, sales or use tax and any other taxes and licenses or insurance premiums required by law. The County shall pay no employee benefits or insurance premiums of any kind to or for the benefit of Bidder or his employees, agents, and servants by reason of this contract. The Bidder will carry

liability insurance relative to any service that he performs for the County. A certificate of insurance must be submitted to the procurement office prior to services performed, with the requested coverage and limits per the County, with Florence County listed as additional insured.

- m) The vendor will act in an independent capacity and not as officers or employees of the County. The vendor shall indemnify, defend and hold harmless Florence County, its officers, agents and employees from liability and any claims, suits, judgments, and damages of any nature brought because of, arising out of, or due to breach of the agreement by Vendor, its subcontractors, suppliers, agents, or employees or due to any negligent act or occurrence or any omission or commission of Vendor, its subcontractors, suppliers, agents, or employees.
- n) The successful vendor shall indemnify and hold harmless the Florence County, its officers, agents and employees from all suits or claims of any character resulting from patent, trademark or copyright infringement or accidents/injury at any point in the delivery of goods/services.
- o) It is the responsibility of the prospective bidder to review the entire invitation for bids packet and to notify the Procurement Department if the specifications are formulated in a manner that would unnecessarily restrict competition. Any such protest or question regarding the specifications or bidding procedures must be received by the Procurement Department not less than five (5) days prior to the time set for bid opening. These requirements also apply to specifications or instructions that are ambiguous.
- p) Should any vendor fail to perform or comply with any provision or terms and conditions of any documents referenced and made part hereof, Florence County may terminate this contract, in whole or in part, and may consider such failure or non-compliance a breach/default of contract. The County, the County reserves the right to purchase any/all items or service in default on the open market. By submittal of a response all vendors agree to this provision. No additional responses will be considered from a firm in default until the default expenses are paid. No principals of a defaulting firm may submit a response under another organization or individual name until their previous default is settled.
- q) Florence County may terminate this agreement with or without cause at any time. In the event of termination by either party, fees due for services satisfactorily performed or goods accepted prior to the termination shall be paid.
- r) Unless specifically requested, submit one (1) copy of your response.
- s) In the event no funds are appropriated by Florence County for the goods or services in any fiscal year or insufficient funds exist to purchase goods or services, then the Contract shall expire upon the expenditure of previously appropriated funds or the end of the current fiscal year, whichever occurs first, with no further obligations owed to or by either party.
- t) All submittals become the property of Florence County.
- u) All bids (and supporting documents) will be retained by Florence County for a period of one hundred twenty (120) days from the date the bids are opened, and no bid shall be received nor shall any bidder be allowed to withdraw a bid after the opening hour commences.
- v) Brand names and numbers, when used, are for reference only to indicate character or quality desired and do not indicate a preference. Equal items will be considered; equal items shall state the brand name or quality; and Florence County's determination of what shall constitute equality shall be final and conclusive.

- w) S.C. LAW CLAUSE: Upon award of a contract or Purchase Order under this bid, the person, partnership, association, or corporation to whom the award is made must comply with the laws of South Carolina, which require such person or entity to be authorized and/or licensed to do business in this state. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this state, by submission of this signed bid, the bidder agrees to subject itself to the jurisdiction and process of the courts of the State of South Carolina, to all matters and disputes arising or to arise under the contract and performance thereof, including any questions as to the liability for taxes, licenses, or fees levied by the State.
- 4) LIQUIDATED DAMAGES: The time limit that is set for this project is One Hundred Twenty (120) calendar days. In order to ensure a sincere and reasonable effort on the Contractor's part to accomplish the work in a timely fashion, delay damages due to inconveniences to the owner for work not being accomplished on time will be at the rate of five hundred dollars (\$500.00) per day. The Contractor should realize that delays due to bad weather, materials, and such, not under the control of the Contractor will be considered by the Engineer for time extension.

BID BOND (SURETY) REQUIREMENT

Bid Surety acts to protect the County from delays and expenses incurred in the lengthy competitive sealed bidding and competitive sealed bid processes, and provides the County with some financial assurance that should the bidder be awarded the project, the successful bidder will enter into the contract with the County. The successful bidder forfeits its Bid Surety in the event it cannot perform the work required by the invitations-for-bid or request-for-bids.

For all responses submitted with estimated project costs exceeding twenty-five thousand dollars (\$25,000.00), Bid Surety in the amount of at least five percent (5%) of the proposed project costs must be submitted with the response. Failure to satisfy this Bid Surety requirement will result in your bid being considered non-responsive and removed from further consideration for award of the subject contract. Bid Surety can be provided as discussed below.

BID SURETY OPTIONS:

Option A:

Bid Surety will not be required from Contractors that have been in business for five (5) consecutive years without filing for bankruptcy. A certificate or statement on business letterhead from the firm stating it meets this qualification will replace the bid surety and must accompany the bid. Bidders not meeting this requirement must furnish Bid Surety as discussed in Option B below.

Option B:

For all bidders not meeting the criteria of “Option A” above, a deposit in the amount of five percent (5%) of the proposed contract price must accompany the bid. These deposits shall take the form of a certified check, cashier's check or a surety bond executed by a corporate surety licensed under the laws of this state. **PERSONAL OR COMPANY CHECKS DO NOT MEET THIS REQUIREMENT.** The cashier's check or certified check shall be deposited to the County's account if the successful bidder fails to enter into the proposed contract. Bid deposits of unsuccessful bidders will be returned as soon as the contract is awarded.

One of the above requirements must be met and submitted with for your response. Failure to satisfy this Bid Surety requirement will result in your response being considered non-responsive and removed from further consideration for award of the subject project's contract.

PAYMENT BOND REQUIREMENT

A Payment Bond must be submitted to the County by the successful responder (“Contractor”) once it has been awarded the contract. Payment Bonds encompass the prime Contractor’s obligation to pay subcontractor and others for material and labor used in the project. A Payment Bond guarantees that the Contractor will pay certain bills for labor and materials (including those from subcontractors and suppliers), which are associated with the subject contract. The Payment Bond requirement helps assure that the Contractor provides suitable evidence of its financial condition and ability to complete the project without financial difficulty.

For all contracts submitted with costs exceeding twenty-five thousand dollars (\$25,000.00), a Payment Bond in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. Failure to satisfy this Payment Bond requirement will result in the Contractor being considered non-responsive and possibly removed from consideration for award of future County contracts. Payment Bond guaranty options are discussed below.

PAYMENT BOND GUARANTY OPTIONS:

For all contracts submitted with costs exceeding twenty-five thousand dollars (\$25,000.00), a Payment Bond guaranty in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. This Payment Bond requirement can be satisfied utilizing one of the two options below:

(1) Option A:

The Contractor with the executed contract must submit a Payment Bond in the required amount discussed above and executed by a corporate surety licensed under the laws of this state. Contractors not meeting this requirement must furnish an alternative Payment Bond Guaranty as discussed in Option B below.

(2) Option B:

For all Contractors not meeting the criteria of “Option A” above, a deposit in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. This deposit shall take the form of a certified check, or a cashier's check deposited with the County. An irrevocable standby letter of credit issued by the bank is an acceptable alternate. **PERSONAL OR COMPANY CHECKS DO NOT MEET THIS REQUIREMENT.** Failure of the Contractor to satisfactorily fulfill its obligations under the subject contract shall result in the forfeiture of this deposit.

One of the above requirements must be met and submitted by the successful Contractor with its proposed contract to the County. Failure to satisfactorily fulfill its obligations under the subject contract shall result in the forfeiture of the Payment Bond guaranty.

Responders failing to enter the proposed contract and also post the required Payment Bond may be subject to Debarment or Suspension from future consideration for award of contracts.

PERFORMANCE BOND REQUIREMENT

A Performance Bond must be submitted to the County by the successful responder ("Contractor") once it has been awarded the contract. The Performance Bond insures that the project will be completed even if the prime Contractor defaults or abandons the project. A Performance Bond guarantees contract performance by the Contractor, according to the contract specifications, terms and conditions. The Performance Bond requirement helps assure that the Contractor provides suitable evidence of its financial condition and ability to complete the project without financial difficulty.

For all contracts submitted with costs exceeding twenty-five thousand dollars (\$25,000.00), a Performance Bond in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. Failure to satisfy this Performance Bond requirement will result in the Contractor being considered non-responsive and possibly removed from consideration for award of future County contracts. Performance Bond guaranty options are discussed below.

PERFORMANCE BOND GUARANTY OPTIONS:

For all contracts submitted with costs exceeding twenty-five thousand dollars (\$25,000.00), a Performance Bond Guaranty in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. This Performance Bond guaranty requirement can be satisfied utilizing one of the two options below:

(3) Option A:

The Contractor with the executed contract must submit a Performance Bond in the required amount discussed above and executed by a corporate surety licensed under the laws of this state. Contractors not meeting this requirement must furnish an alternative Performance Bond Guaranty as discussed in Option B below.


(4) Option B:

For all Contractors not meeting the criteria of "Option A" above, a deposit in the amount of one hundred percent (100%) of the contract price must be submitted by the Contractor with the proposed contract to the County. This deposit shall take the form of a certified check, or a cashier's check deposited with the County. An irrevocable standby letter of credit issued by the bank is an acceptable alternate. **PERSONAL OR COMPANY CHECKS DO NOT MEET THIS REQUIREMENT.** Failure of the Contractor to satisfactorily fulfill its obligations under the subject contract shall result in the forfeiture of this deposit.

One of the above requirements must be met and submitted by the successful Contractor with its proposed contract to the County. Failure to satisfactorily fulfill its obligations under the subject contract shall result in the forfeiture of the Performance Bond Guaranty.

Responders failing to enter the proposed contract and also post the required Performance Bond may be subject to Debarment or Suspension, as prescribed under Section 11-102 of the Florence County Code, from future consideration for award of contracts.

BID SHEET PAGE 1 OF 3

FLORENCE COUNTY, SOUTH CAROLINA , a Body Politic and Corporate and a Political Subdivision of the State of SC	MAIL TO: Florence County Procurement 180 N. Irby Street City-County Complex MSC-R Florence, SC 29501	
SEALED BID NO. 02-16/17 NEW STATION AT FRIENDFIELD	HAND CARRY TO: Procurement Office, Room B-5 City-County Complex, 180 N. Irby Street Florence, South Carolina 29501	
Bids will be accepted at the Procurement Office, County Complex, 180 N. Irby Street, Rm. B-5 until Thursday, July 28, 2016 at 3:00 p.m. (EST)	TELEPHONE NO. (843) 665-3018 E-MAIL ADDRESS: pfletcher@florenceco.org	
Then Publicly Opened in Room 210-C of the County Complex @ 3:05 p.m. (EST)	SC General Contractor License No. _____ NOTE: Provide three (3) references for similar earth moving projects.	

NAME: _____

**D/B/A IF
PPLICABLE:** _____

**MAILING
ADDRESS:** _____

**LEGAL COMPANY
PHYSICAL
ADDRESS:** _____

**CITY-STATE-
ZIP:** _____

TELEPHONE NO: _____ **FAX NO:** _____

FEDERAL ID (TAX ID) NO: _____ **E-MAIL:** _____

AUTHORIZED SIGNATURE: _____

**PRINTED
NAME:** _____

TOTAL BID PRICE: \$ _____

Total Bid Amount in Words _____

BID SHEET BREAKDOWN PAGE 2 OF 3

ITEM	BUILDING	UNIT	QTY.	UNIT PRICE	COST
01	Pre-Engineered Metal Building	LS	1		
02	Building Mechanical	LS	1		
03	Building Plumbing	LS	1		
04	Building Electrical	LS	1		
05	Building Millwork	LS	1		
06	Building Slab	LS	1		
07	Bay Doors	EA	2		
08	Grading & Sitework	LS	1		
09	Well	LS	1		
10	Septic System	LS	1		
11	Driveway & Concrete Apron	LS	1		
12	Muck & Fill (unit price)	CY	1		
13	Allowance for Soil	LS	1	\$20,000	\$20,000
SUBTOTAL=					

Total =

BID SHEET BREAKDOWN PAGE 3 OF 3

The Bidder declares their Bid Response is made without any connection with any other individual that may be submitting a Bid Response to this IFB and their Bid Response, in all respects, is fair and in good faith, without collusion or fraud, with another Bidder, representative or agent.

By submission of a response to this Invitation for Bid, the bidder agrees and certifies, to deliver all required services and perform all required work with the strictest conformance to meet or exceed the scope of services, specifications and minimum requirements contained within this Invitation to Bid.

All pricing is firm and will remain firm for at least ninety (90) calendar days from the time and date of the IFB submittal and opening. During this period, the Bidder may only withdraw their Bid Response by submitting a written request to Florence County and Florence County approving said written request.

The bidder agrees to abide by all conditions of this bid and verifies that he is authorized to sign this bid for the offerer. The bidder further states that the company affiliated with this bid currently complies with all applicable federal and state laws and directives relative to non-discriminatory practices in employment.

The Bidder, in compliance with the Invitation-To-Bid, and having examined the Project Documents, and being familiar with all of the conditions surrounding the proposed project, including the availability of materials, labor, and work site environmental conditions, hereby proposes to furnish all permits, labor, materials, supplies, and equipment and to perform the duties in accordance with the contract documents of which this Bid Form is a part.

The Bidder declares that he has read, understands, and accepts the Vendor Agreements and Instructions to Responders which are part of the bid documents.

The Bidder further proposes and agrees, if this Bid is accepted, to contract with Florence County, to furnish all permits, materials, equipment, tools, apparatus, means of transportation, and labor necessary hereto, and to complete the proposed project in full and complete accordance with the Project Documents, to the full and entire satisfaction of the Owner, at the prices listed in the Bid Schedule. The amounts listed on the Bid Schedule section of this Bid Form also include all costs associated with the compliance of all applicable State laws, local ordinances, and the rules and regulations of all authorities and professional association standards having jurisdiction over the project or the materials used throughout, and they will be deemed to be included in the contract the same as though herein written out in full. Unit prices and/or lump sums are shown in the Bid Schedule section below. In case of error in extension, the Unit Price shall govern rather than the Amount. Where Lump Sum Amounts are bid, the amount for each bid item shall govern rather than the total of any several items.

STATE OF SOUTH CAROLINA)
COUNTY OF FLORENCE)
SAMPLE CONTRACT)

CONTRACT NO. (SAMPLE)

THIS AGREEMENT (hereinafter the "Agreement" or "Contract") entered into this _____ day of _____, 2015 by and between the **COUNTY OF FLORENCE**, South Carolina, a body politic and corporate under the State of South Carolina (hereinafter the "County") and XXXXXXXXXXXXXXXXXXXXXXXXXXXX, a Corporation, the address of which is: XXXXXXXXXXXXXXXXXXXXXXXXXXXX (hereinafter the "Contractor"), for and in consideration of the mutual covenants herein set forth, and for other good and valuable consideration, the sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

ARTICLE 1

DOCUMENTS INCORPORATED BY REFERENCE

- 1.1 This Contract includes the specifications for the Project identified thereon as such, the County's invitation for Invitation for Bids. No. XX-XX/XX, and all addenda thereto, as well as the Contractor's bid submission, including all forms required in the Bid Documents. All these documents specified in this Article 1 are hereby incorporated herein by reference and made a part hereof (hereinafter collectively referred to as the "Contract" or "Contract Documents"). Change orders issued hereafter and any other amendments properly executed by the County and the Contractor shall become and be a part of this Contract. Documents not included or expressly contemplated in this Article 1 do not, and shall not, form any part of this Contract. The Contract Documents are intended to be complementary, and a requirement in one document shall be deemed to be required in all documents.
- 1.2 Contractor shall comply with all applicable Federal, State, and Local laws which may be applicable to any aspect of its activities under this Contract. By entering into this Contract, Contractor affirmatively warrants that the Contractor, to the best of its knowledge, information, and belief, is currently in compliance with all applicable Federal, State, and Local laws and further warrants that during the term of this Contract, Contractor shall remain in compliance therewith.

ARTICLE 2

REPRESENTATIONS OF THE CONTRACTOR

In order to induce the County to execute this Contract and recognizing that the County is relying thereon, the Contractor, by executing this Contract, makes the following express representations to the County:

- 2.1 The Contractor is fully qualified to act as the general contractor for the Project and has, and shall maintain throughout the effective term of this Contract, any and all licenses, permits, and other authorizations necessary to act as the general contractor for, and to construct, the Project.
- 2.2 The Contractor has become familiar with the Project site and the local conditions under which the Project is to be constructed and operated.
- 2.3 The Contractor has received, reviewed and examined all the documents which make up the Contract, including, but not limited to, all plans and specifications, and has found them, to the best of its knowledge, to be complete, accurate, adequate, consistent, coordinated and sufficient to complete the Project.

ARTICLE 3

SPECIFICATIONS/SCOPE OF WORK

The Contractor shall perform the work as outlined in the XX-15/16 invitation to bid document, bid plans, and all addendums thereto (if any). All work required, implied, or reasonably inferable from this Contract includes, but is not limited to, the following:

- 3.1 The Contractor will complete the complete work as described in the contract documents, in accordance with the terms herein, and the specifications/scope of work, all as may be amended from time to time.
- 3.2 Contractor shall furnish any and all required insurance certificate(s) and endorsement(s) as requested by the County.
- 3.3 Contractor agrees to perform and furnish all labor, supervision, materials, equipment, transportation and supplies necessary for the XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX as stated in the specifications/scope of work of bid no. XX-15/16 and the Contractor's response to bid no. XX-15/16.
- 3.4 Coordination of the work and administration of this Agreement shall be XXXXXXXXXXXXXXXXXXXX located at XXXXXXXXXXXXXXXXXXXX in Florence, SC. (add e-mail address here)

ARTICLE 4

INTENT AND INTERPRETATION

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

- 4.1 This Contract (along with its exhibits and all documents incorporated herein by reference), together with the Contractor's and Surety's performance and payment bonds for the Project, constitute the entire and exclusive agreements between the parties with reference to the project, and said Contract supersedes any and all prior discussions, communications, representations, understanding, negotiations, or agreement.
- 4.2 Anything that may be required or reasonably inferred by the documents which make up this Contract, or any one or more of them, shall be provided by the Contractor for the Contract Price.
- 4.3 Nothing contained in this Contract shall create, nor be interpreted to create, privity or any other relationship whatsoever between the County and any person except the Contractor.
- 4.4 When a word, term or phrase is used in this Contract, it shall be interpreted or construed first, as defined herein; second, if not defined, according to its generally accepted industry meaning; and third if there is no generally accepted industry meaning, according to its common and customary usage.
- 4.5 The words "include," "includes," and "including," as used in this Contract, shall be deemed to be followed by the phrase, "without limitation".
- 4.6 The listing herein of any items as constituting a material breach of this Contract shall not imply that any other, non-listed item will not constitute a material breach of this Contract.
- 4.7 In the event of any conflict, discrepancy, or inconsistency among any of the documents which make up this Contract, the following shall control:
 - 4.7.1 As between this Contract document and any discrepancies among other conflicting or inconsistent documents, this Contract document shall govern.
 - 4.7.2 In the case of any conflict, discrepancy or inconsistency among any of the other documents, the Contractor shall notify the County immediately upon discovery of the same.

ARTICLE 5

CONTRACTOR'S PERFORMANCE

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

- 5.1 The Contractor will complete the entire Scope of Work as described in the Invitation to Bid No. XX-15/16 Bid Documents, in accordance with the specifications and terms therein.

- 5.2 Contractor shall furnish any and all required surety bonds and insurance certificate(s) and endorsement(s).

ARTICLE 6

TIME FOR CONTRACTOR'S PERFORMANCE

- 6.1 The Contractor shall commence the performance of this Contract on the date of execution of this Contract and shall diligently continue its performance until the Substantial Completion of the project in no more than one hundred twenty (120) calendar days following the issuance of the notice to proceed letter from the County. By signing this contract, the contractor agrees that the Contract Time is a reasonable time for accomplishing Completion of the Project.
- 6.2 The term "Substantial Completion," as used herein, shall mean that point at which, as certified in writing by the County, the Project is sufficiently complete in accordance with the Contract Documents so that the County can utilize the work for its intended use.
- 6.3 The County has the right to impose liquidated damages in the amount of \$500 per calendar day for any days after the required date of completion noted above that the project is not substantially complete.

ARTICLE 7

FIXED PRICE AND CONTRACT PAYMENTS

- 7.1 The County shall pay, and the Contractor shall accept, as full and complete payment for the Contractor's timely performance of its obligations hereunder **in the amount not to exceed XXXXXXXXXXXXXXXXXXXX Dollars and XXXXXXXXXXXX Cents (\$XX,XXX.XX).** This price shall constitute the Contract Price.
- 7.2 Progress billings shall be submitted to the County for payment by the Contractor on a monthly basis (less 10% retainage) no later than the 25th of each month based on the percentage of work completed. The County (or County's representative) shall verify work completed and billed before payment shall occur. When the project is complete and the Contractor is ready for a final review, the Contractor shall notify the County. Thereupon, the County will perform a final site review of the project. If the County concurs that the project is complete and in full accordance with this Contract and that the Contractor has performed all of its obligations to the County thereunder, the County will make final payment of the Contract price to the Contractor.
- 7.3 Guarantees and equipment warranties required by this Contract shall commence on the date of substantial completion.

ARTICLE 8

DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF THE CONTRACTOR

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

- 8.1 The Contractor shall not perform work without adequate plans and specifications. If the Contractor performs work knowing or believing, or if through exercise of reasonable diligence it should have known, that such work involves an error, inconsistency or omission in the Contract without first providing written notice to the County, the Contractor shall be responsible for such work and shall correct same bearing the costs therefore.
- 8.2 All work shall strictly conform to the requirements of this Contract. To that end the Contractor shall be solely responsible for and have control over the performance of all portions of the Work, unless otherwise specified in the Contract Documents.
- 8.3 The work shall be strictly supervised, the Contractor bearing full responsibility for any and all acts, errors or omissions of those engaged in the work on behalf of the Contractor, including, but not limited to all subcontractors or employees. The Contractor shall provide on-site supervision while any portion of the work is being performed.
- 8.4 The Contractor hereby warrants that all laborers furnished under this Contract shall be qualified and competent to perform the tasks undertaken, that the product of such labor shall yield only first-class results, that all materials and equipment provided shall be new (unless otherwise specified) and of high quality, that the completed work will be complete, of high quality, without defects, and that all work strictly complies with the requirements of this Contract. Any work not strictly complying with the requirements of this section shall constitute a breach of the Contractor's warranty.
- 8.5 The Contractor shall maintain the Project site and adjacent areas affected by its work and/or acts of its employees and subcontractors in a reasonably clean condition during the performance of the work. Upon substantial completion, the Contractor shall clean the Project site of all debris, trash and excess materials and equipment. If the Contractor fails to do so, the County may complete the cleanup, by its own forces or by separate contract, and shall be entitled to charge the Contractor for the same through the collection or withholding of funds through the mechanisms provided elsewhere herein.
- 8.6 At all times relevant to this Contract, the Contractor shall permit the County and its designated representative(s) to enter upon the Project site to review or inspect the work and any materials on the site without formality or other procedure.

- 8.7 **PROTECTION OF PERSONS AND PROPERTY.** It shall be the responsibility of the Contractor to initiate, continue and supervise all safety programs and precautions in performance of the terms of this Contract. The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to its employees, subcontractors, employees of the County and members of the public, the Work itself and unassembled components thereof, and other property at the site or adjacent thereto. As part of the Contractor's obligations hereunder, the Contractor shall erect and maintain safeguards, barriers, signs, warnings, etc.

ARTICLE 9 INDEMNITY

The Contractor hereby expressly agrees to indemnify and hold the County harmless against any and all expenses and liabilities arising out of the performance or default of this Contract or arising from or related to the Work as follows:

- 9.1 Contractor expressly agrees to the extent that there is a causal relationship between its negligent, reckless or intentionally wrongful action or inaction, or the negligent, reckless or intentionally wrongful action or inaction of any of its employees or any person, firm or corporation directly or indirectly employed or retained by the Contractor, and any damage, liability, injury, loss or expense (whether in connection with bodily injury or death or property damage or loss) that is suffered by the County or its employees or by any member of the public, to indemnify and save the County and its employees harmless against any and all liabilities, penalties, demands, claims, lawsuits, losses, damages, costs, and expenses arising out of the performance or default of this Contract or arising from or related to the Work, regardless of whether such liabilities, penalties, demands, claims, lawsuits, losses, damages, costs, and expenses are caused in part by the County. Such costs are to include, without limitation, defense, settlement and reasonable attorneys' fees incurred by the County and its employees. This promise to indemnify shall include without limitation, bodily injuries, death occurring to Contractor's employees and any person, directly or indirectly employed or retained by the Contractor (including without limitation any employee of any subcontractor), the County's employees, the employees of any other independent contractors, or occurring to any member of the public. When the County submits notice, Contractor shall promptly defend any aforementioned action.
- 9.2 The limits of insurance required herein shall not limit the Contractor's obligations under this Article. The terms and conditions contained in this Article shall survive the termination of this Agreement or the suspension of the Work hereunder. The recovery of fees and costs specified herein will also apply to any actions to enforce this Article.

ARTICLE 10

DISCOVERING AND CORRECTING DEFECTIVE OR INCOMPLETE WORK

- 10.1 In the event that the Contractor covers, conceals or obscures its work in violation of this Contract or in violation of an instruction from the County, such work shall be uncovered and displayed for review by the County upon request, and shall be reworked at not cost in time or money to the County.
- 10.2 The Contractor shall, at no cost in time or money to the County, correct work rejected by the County as defective or failing to conform to this Contract. Additionally, the Contractor shall reimburse the County for all review, inspections and other expenses incurred as a result thereof.
- 10.3 In addition to its warranty obligations set forth elsewhere herein and any manufacturer's warranties provided on the project, and in addition to other remedies provide herein or by law to the County, the Contractor shall be specifically obligated to promptly correct any and all defective or nonconforming work, whether obvious or after-discovered, for a period of twelve (12) months following Substantial Completion upon written direction from the County.

ARTICLE 11

TERMINATION BY THE COUNTY

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

- 11.1 The County may, by written notice, terminate this Contract in whole or in part at any time, for the failure to fulfill the Contract obligations. Upon receipt of such notice, services shall be immediately discontinued unless the notice directs otherwise, and all materials as may have been accumulated in performing this Contract, whether completed or in progress delivered to the County.
- 11.2 Termination due to the failure to fulfill the Contractor's obligations may cause the County to take over the work and prosecute the same to completion by Contract or otherwise. In such case, the contractor shall be liable to the County for any additional cost occasioned to the County thereby.
- 11.3 The rights and remedies of the County provided in this Article are in addition to any other rights and remedies provided by law or under this Contract.
- 11.4 Notwithstanding any other provision contained herein, any violation or breach of terms of this Contract on the part of the Contractor or their subcontractors may result in the suspension or termination of this Contract or such other action that may be necessary to enforce the rights of the parties of this Contract. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise impose or available by law.

ARTICLE 12
INSURANCE

The Contractor shall have and maintain insurance in accordance with the requirements of the Contract Documents

ARTICLE 13
SURETY BONDS

The contractor shall furnish separate performance and payment bonds to the county, as required by the Invitation to Bid. Each bond shall set forth a penal sum in an amount not less than the Contract Price. Each bond furnished by the Contractor shall incorporate by reference the terms of this Contract as fully as though they were set forth verbatim in such bonds. The performance and payment bonds furnished by the Contractor shall be in form suitable to the County and shall be executed by a surety, or sureties, reasonably acceptable to the County.

ARTICLE 14
ENTIRE AGREEMENT

Any modification to this Contract must be supported by an additional, articulated consideration, and must either be in writing, executed by the parties hereto, or, if made orally, should be confirmed in writing, which writing should state the consideration which supports the modification. Failure to confirm an oral modification in writing shall constitute a waiver of any claim for additional compensation with regard to the oral modification. Nothing in this Article shall be construed to limit the County's authority to issue changes.

ARTICLE 15
SEVERABILITY

If any term or condition of this Contract or application thereof to any person(s) or circumstances is held invalid, this invalidity shall not affect other terms, conditions or applications which can be give effect without the invalid term, condition, or application. To this end, the terms and conditions of this Contract are agreed to be severable

ARTICLE 16
WAIVER

Waiver of any breach of any term or condition of this Contract shall not be deemed a waiver of any prior or subsequent breach, and shall not entitle any party hereto to any subsequent waiver of any terms hereunder. No term or condition of this Contract shall be held to be waived, modified or deleted except by an instrument, in writing, signed by the parties hereto.

ARTICLE 17
NOTICES

All notices to each party to this Contract shall be in writing, and sent as follows:

To County:

Patrick D. Fletcher, Procurement Director
Florence County
180 North Irby Street, MSC-R
Florence, SC 29501
Telephone: (843) 665-3019 E-mail: pfletcher@florenceco.org
Fax: (843) 664-9668

To Contractor:

XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX, XX XXXXX
Telephone: (XXX) XXX-XXXX E-mail:
Fax: (XXX) XXX-XXXX

All notices, demands, requests, consents or approvals that may or are required to be given by any party to another shall be in writing and shall be deemed given if: (i) served personally by hand delivery; (ii) sent by nationally-recognized overnight courier with return receipt; or (iii) sent by United States registered or certified mail, by depositing the same in the United States Mail in the continental United States, postage prepaid, return receipt requested and addressed to such other party at the address specified above or at such other place as such other party may from time to time designate by notice in writing to the other parties hereto. Rejection or other refusal to accept a notice, demand, request or consent, or the inability to deliver because of a changed address, of which no notice was given, shall be deemed to be actual receipt thereof. In the event given by registered or certified mail, such notice, demand, request, or consent so mailed shall be effectively conveyed upon receipt or shall be presumed to have been effectively conveyed and received by the addressee 72 hours after deposit of same in the mail, whichever first occurs.

ARTICLE 18
APPLICABLE LAW

The laws of South Carolina shall govern this Contract. In any litigation arising under this Contract, all such litigation shall be litigated in the Circuit Court within the Twelfth Judicial Circuit Court of Florence County, South Carolina. Without limitation upon the prevailing party's rights to recovery such fees and costs, the relevant provisions of Section 15-37-10 et seq. of the Code of Laws of South

Carolina (1976, as amended) shall apply to this Article, as the case may warrant. This Contract is **not** subject to arbitration.

ARTICLE 19
SUCCESSOR AND ASSIGNS

Each party binds itself, its successor, assigns, executors, administrators or other representative to the other party hereto and to successors, assigns, executors, administrators or other representatives of such other party in connection with all terms and conditions of this Contract. The Contractor shall not assign this Contract without prior written consent of the County

IN WITNESS WHEREOF, the parties have executed this Agreement in two (2) originals under their several seals the day and year first written above.

WITNESSETH:

FOR CONTRACTOR:

Printed Name: _____

Printed Name: _____

Title: _____

Title: _____

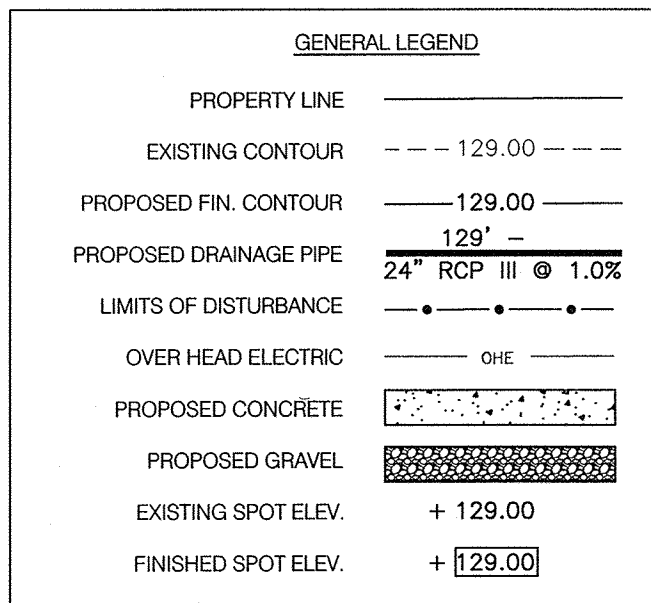
Federal Tax I.D. No.: XX-XXXXXX

SC Contractor's License Number: XXXXXXX

FOR FLORENCE COUNTY:

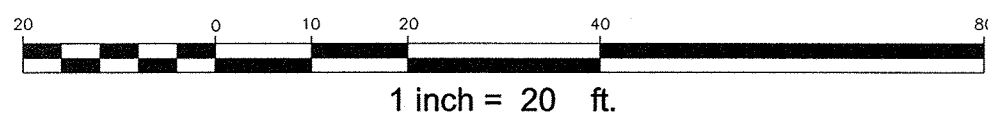
Patrick D. Fletcher, CPPB
Procurement Director

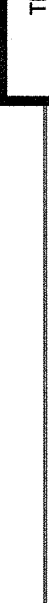
K. G. (Rusty) Smith
Florence County Administrator



1. THE AREA WITHIN THE SITE THAT HAS PROPOSED BUILDINGS, ROADS, UTILITY CONSTRUCTION, OR FILL SHALL BE STRIPPED OF ALL ASPHALT, DEBRIS, TOPSOIL, AND ORGANIC MATERIAL. TOPSOIL SHALL BE STOCK PILED FOR REPLACING ON DISTURBED AREAS.
2. THE SUB-GRADE UNDER THE LOT & DRIVES SHOULD BE COMPACTED TO 98% OF ASTM DESIGNATION D-898 WITHIN 3% OF ITS OPTIMUM MOISTURE CONTENT.
3. THE AREA UNDER THE LOT & DRIVES SHALL BE FILLED IN WITH WELL GRADED GRANULAR, NON-EXPANSIVE MATERIAL. IT SHOULD BE PLACED IN LAYERS OF NOT MORE THAN 8 INCHES IN THICKNESS AT OPTIMUM MOISTURE AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY.
4. DRIVES - AFTER THE SUB-GRADE SOLIDS HAVE BEEN PROPERLY COMPACTED, FINE GRADED AND PROOF-ROLLED, THE GRANULAR BASE COURSE MAY BE PLACED. THIS SHOULD CONSIST OF CRUSHED GRANULAR MATERIAL THAT MEETS THE SUB-GRADE REQUIREMENTS OF MACADAM BASE, SECTION 305 OR GABC SECTION 306 OF THE SOUTH CAROLINA HIGHWAY DEPARTMENT SPECIFICATIONS, 2007 EDITION. THE SELECT AGGREGATE BASE SHALL BE COMPACTED TO 100% OF ASTM DESIGNATION D-898 MAXIMUM DRY DENSITY.
5. SEE DETAILS SHEET FOR PAVING, BASE, AND SUB-GRADE THICKNESS.

- 1) ALL LAND DISTURBANCE ACTIVITIES ARE TO REMAIN WITHIN THE LIMITS OF CONSTRUCTION AS APPROVED BY SD DCHC AND DELINEATED ON THE GRADING PLANS. THIS SITE WILL BE MASS-GRASSED.
- 2) USE SEDIMENT & EROSION CONTROL DETAILS SHEET FOR GRASSING AND SEDIMENT CONTROL INFORMATION. CONTRACTOR SHALL SPREAD TOPSOIL ON ROAD SHOULDERS, EASEMENTS, OR OTHER AREAS PRIOR TO GRASSING.
- 3) THE CONTRACTOR SHALL RESTORE EXISTING YARD AREAS TO SAME CONDITION AS THAT PRIOR TO CONSTRUCTION. THIS INCLUDES ROAD SHOULDERS, EASEMENTS, LOT GRADES, DITCHES, GRASSED OR VEGETATED AREAS, SILT FENCES OR ANY OTHER SEDIMENT CONTROL STRUCTURE.
- 4) THE CONTRACTOR IS TO NOTIFY THE ENGINEER OF ANY KNOWN DRAINAGE, SEWER OR WATER CONFLICTS PRIOR TO START OF WORK. IF ANY UNEXPECTED OR UNUSUAL CONDITIONS ARE ENCOUNTERED THAT MAY OR MAY NOT BECOME A CONFLICT, THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY.
- 5) REFER TO MECHANICAL DRAWINGS FOR DETAILS CONCERNING UTILITY LINES. COORDINATE ALL UTILITY SERVICE LINE TIE-INS WITH BUILDING CONTRACTOR.
- 6) NO CONSTRUCTION IS TO TAKE PLACE WITHIN EXISTING ROAD RIGHTS OF WAY UNTIL THE APPROPRIATE ENCROACHMENT PERMITS HAVE BEEN RECEIVED FROM SCOTT OR THE APPROPRIATE CITY/LOCAL JURISDICTION. ANY CONSTRUCTION AND PAVEMENT WITHIN STREET OR HIGHWAY RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH SPECIFICATIONS CONTAINED IN THE ENCROACHMENT PERMIT ISSUED BY THE PROPER AUTHORITY.
- 7) DURING STAKING, THE STAKING CONTRACTOR SHALL MAKE SUCH ADDITIONAL MEASUREMENTS AS ARE NECESSARY TO FIELD VERIFY THAT USE OF THE COORDINATES SHOWN ON THIS DRAWING PLANS THE PROPOSED SITE IMPROVEMENT IN ITS CORRECT AND PROPER LOCATION. ANY SIGNIFICANT DISCREPANCY NOTED DURING THE STAKING OPERATION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO CONSTRUCTION OF THE PORTION OF WORK IN QUESTION.
- 8) THE LOCATION OF ALL UTILITY LINES SHOWN ON THIS DRAWING ARE APPROXIMATE AND ARE SHOWN FOR THE CONTRACTOR'S CONVENIENCE ONLY. THERE MAY BE OTHER UTILITIES NOT SHOWN ON THESE PLANS. ANY UTILITY COMPANIES SHOULD BE CONTACTED PRIOR TO ANY EXCAVATION TO PROVIDE LOCATION ASSISTANCE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE LOCATIONS SHOWN AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATIONS OF ALL UTILITIES WITHIN THE LIMITS OF THE WORK. ALL DAMAGE MADE TO EXISTING UTILITIES BY THE CONTRACTOR SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- 9) ALL DCHC SEDIMENT CONTROL STRUCTURES MUST REMAIN IN PLACE UNTIL ALL LOTS ARE DEVELOPED OR UNTIL FINAL APPROVAL HAS BEEN GIVEN BY DCHC.
- 10) ALL DRIVEWAY CULVERTS SHALL BE INSTALLED AND SEALED ACCORDING TO SCOTT TYPICAL 714-205-01, ON PROPER GRADE TO ALLOW FOR POSITIVE STORM WATER FLOW WITHIN THE PIPE AND TO FORM ADJACENT PILES/CROSS LINES. INSTALL FLARED END SECTIONS WITH RIPRAP ACCORDING TO SCOTT TYPICAL 719-610-00.



DESCRIPTION: GRADING & DRAINAGE PLAN		CLIENT: HANNAH-SALEM-FRIENDFIELD FIRE DEPARTMENT				THIS DRAWING & DESIGN HEREON ARE THE PROPERTY OF A/E/ENGINEERING, LLC. THE REPRODUCTION, USE, OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.	
PLAN SET: DESIGN		PLAN SET: NEW STATION AT FRIENDFIELD		DESC: GRADING & DRAINAGE PLAN			
DATE: May 04, 2016		PROJECT: AE055					
SHEET: C3.0							

GENERAL NOTES:

- COPIES OF THE FOLLOWING DOCUMENTS ARE TO REMAIN ON THE CONSTRUCTION SITE AT ALL TIMES:
 - STORMWATER POLLUTION PREVENTION PLANS (SWPPP) - (CONSTRUCTION PLANS APPROVED & STAMPED BY SCDHEC)
 - SC DHEC NOTICE OF INTENT (STORMWATER PERMIT APPLICATION)
 - STORMWATER PERMIT
 - GENERAL PERMIT
 - CO-PERMITTEE AGREEMENTS OR CONTRACTOR CERTIFICATION STATEMENTS

- LAND-DISTURBING ACTIVITIES SHALL BE CONDUCTED IN A MANNER MINIMIZING EROSION, INCLUDING BUT NOT LIMITED TO THE BEST-MANAGEMENT PRACTICES (BMPs) OUTLINED IN THE SC DHEC BMP HANDBOOK (AUGUST 2005 ISSUE). SEE GENERAL DESIGN PRINCIPLES, BELOW.

DHEC STANDARD NOTES:

- 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 INITIATED AS SOON AS PRACTICAL IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW:

- WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICAL.
- 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 MEASURES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTIONS OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, 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 FOLLOWING 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 ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

- ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.

- THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM THE 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 SC REG. 72-300 ET. SEQ. AND SCR100000. A GENERALIZED INDIVIDUAL LOT PROTECTION PLAN IS PROVIDED ON THIS SHEET.

- TEMPORARY BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

- ALL WATERS OF THE STATE (W6s), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED WHERE A 50-FOOT BUFFER CANNOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL W6s. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL W6s.

- LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.

- A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR 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 WAS WATER, AND OTHER WAS WATERS. WASH WATER MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDED EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.

- MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DE-WATERING 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 CLEAN-OUT 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 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 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-LINER PROJECTS THAT DISTURB 10 ACERS OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

GENERAL DESIGN PRINCIPLES:

- EXPOSURE. ALL LAND DISTURBANCE ACTIVITIES SHALL REMAIN WITHIN THE LIMITS OF CONSTRUCTION. THE ACTIVITY SHALL CONFORM TO EXISTING TOPOGRAPHY AND SOIL TYPE AS TO CREATE THE LOWEST PRACTICAL EROSION POTENTIAL. THE DISTURBED AREA AND THE DURATION OF EXPOSURE TO EROSION ELEMENTS SHALL BE KEPT TO A MINIMUM. DISTURBED SOIL SHALL BE STABILIZED AS QUICKLY AS PRACTICAL.

- VEGETATION. WHENEVER FEASIBLE, NATURAL VEGETATION SHALL BE RETAINED, PROTECTED AND SUPPLEMENTED. TEMPORARY VEGETATION OR MULCHING SHALL BE EMPLOYED TO PROTECT EXPOSED CRITICAL AREAS DURING DEVELOPMENT. PERMANENT VEGETATION AND STRUCTURAL EROSION CONTROL MEASURES SHALL BE INSTALLED AS SOON AS POSSIBLE.

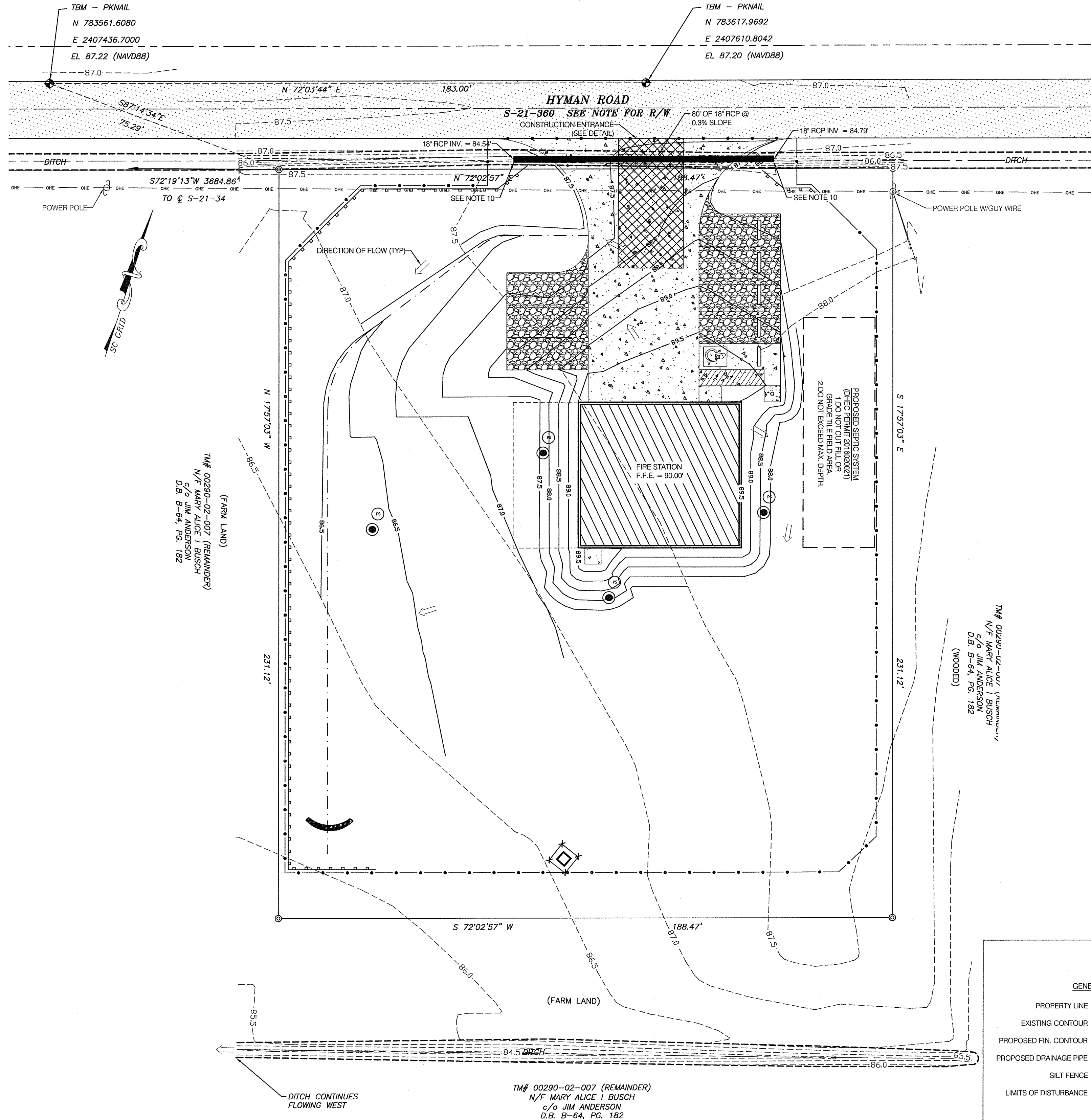
- CUT-FILL. CUT-FILL OPERATIONS SHALL BE KEPT TO A MINIMUM. FILLS MAY NOT ENROACH UPON NATURAL WATERCOURSES OR CONSTRUCTED CHANNELS IN A MANNER SO AS TO ADVERSELY AFFECT OTHER PROPERTY OWNERS. ADEQUATE PROVISIONS MUST BE PROVIDED TO STABILIZE SLOPES AND MINIMIZE DAMAGE FROM SURFACE WATER TO THE CUT FACES OF EXCAVATIONS OR THE SLOPING SURFACE OF FILLS. CUTS AND FILLS MAY NOT ENDANGER ADJOINING PROPERTY. KEEP A 20-FOOT MINIMUM BUFFER FROM THE PROPERTY LINE WHEREVER POSSIBLE.

- SEDIMENT CONTROL. TO THE EXTENT NECESSARY, SEDIMENT IN RUNOFF WATER MUST BE TRAPPED BY THE USE OF DEBRIS BASINS, SEDIMENT BASINS, SILT TRAPS, OR SIMILAR MEASURES UNTIL THE DISTURBED AREA IS STABILIZED. NO HAY BALES ARE TO BE USED AS INLET PROTECTION UNLESS IN CONJUNCTION WITH FILTER FABRIC.

- SILT FENCES. CONSTRUCT SILT FENCES IN LOW AREAS TO TRAP SEDIMENT. STEEL POSTS ARE A MANDATORY DHEC REQUIREMENT. HOG WIRE OR OTHER REINFORCEMENT IS RECOMMENDED, ESPECIALLY IN HIGH RUNOFF AREAS. DO NOT PLACE SILT FENCE IN AREAS OF CONCENTRATED FLOWS. REPLACE ERODED SOIL UNTIL GRASS IS ESTABLISHED.

- MAINTENANCE. MAINTENANCE OF ALL SOIL EROSION AND SEDIMENTATION CONTROL PRACTICES, WHETHER TEMPORARY OR PERMANENT, SHALL BE AT ALL TIMES THE RESPONSIBILITY OF THE PERSON AND/OR PROPERTY OWNERS CONDUCTING THE LAND-DISTURBING ACTIVITY. MAINTENANCE PROCEDURES FOR SPECIFIC SEDIMENT CONTROL DEVICES ARE INDICATED ON THE DETAILS, THIS SHEET. FOR MORE INFORMATION, SEE DHEC'S BMP HANDBOOK (AUGUST 2005 EDITION).

- THE CONTRACTOR SHALL PROVIDE A TEMPORARY STONE SPLASH PAD AT ALL FIRE HYDRANTS OR OTHER POINTS OF DISCHARGE DURING TESTING OF THE WATER DISTRIBUTION SYSTEM.



EROSION CONTROL LEGEND	
GENERAL	SEDIMENT & EROSION CONTROL
PROPERTY LINE	PERMANENT SEEDING (SEE GRASSING NOTES SHEET 7.0)
EXISTING CONTOUR	TOPSOILING
PROPOSED FIN. CONTOUR	TYPE 'A' INLET PROTECTION
PROPOSED DRAINAGE PIPE	12" SEDIMENT TUBE
SILT FENCE	CONSTRUCTION ENTRANCE
LIMITS OF DISTURBANCE	

1 inch = 20 ft.

DESIGNED BY:	JOE	REVISION	BY
DRAWN BY:	JCS		
CHECKED BY:	GEV		
APPROVED BY:	MAE		
DATE:	May 04, 2016		
CITY:	FRIENDFIELD		
COUNTY:	FLORENCE		
PROJECT #	AE055		
DWG. #	C4.0		
CADW. #	AE055-Friendfield DES 050416.dwg		

STATE OF SOUTH CAROLINA

REGISTERED PROFESSIONAL ENGINEER

NO. 31130

JOHN CORBETT SAKMAY, P.E.

5/7/16

STATE OF SOUTH CAROLINA

REGISTERED PROFESSIONAL ENGINEER

NO. 5025

ALIGNED ENGINEERING

STATE OF AUTHORITY

CLIENT: HANNAH-SALEM-FRIENDFIELD FIRE DEPARTMENT

PLAN SET: NEW STATION AT FRIENDFIELD

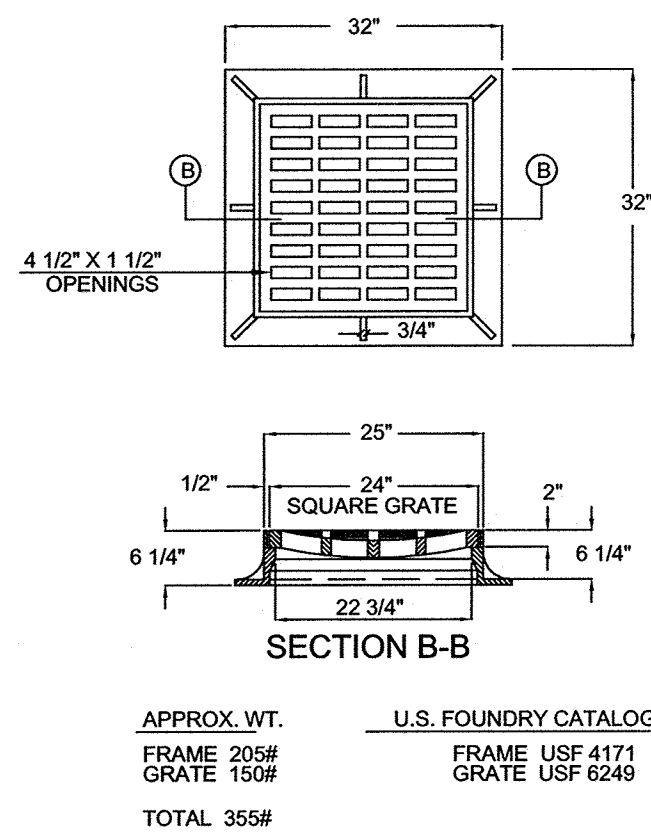
DESCRIPTION: SEDIMENT & EROSION CONTROL PLAN

PLAN SET: DESIGN

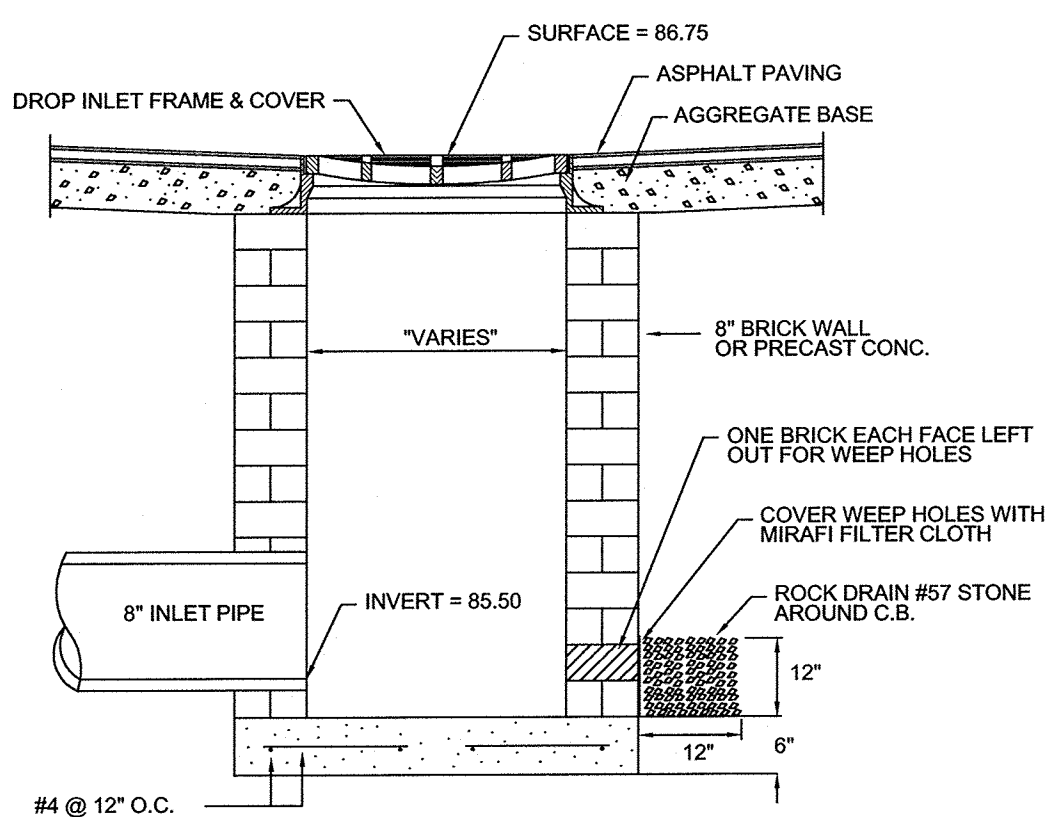
DATE: May 04, 2016

PROJECT: AE055

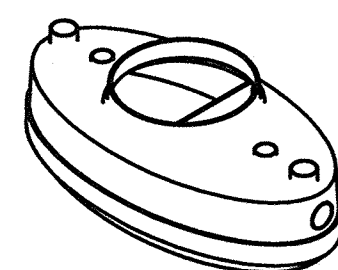
SHEET: C4.0



DROP INLET FRAME & GRATE
N.T.S.

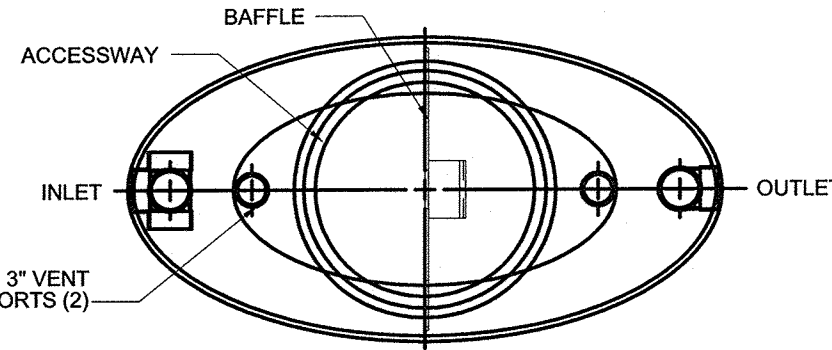


DROP INLET CATCH BASIN
N.T.S.
(TO BE USED IN DRIVE PATHS)

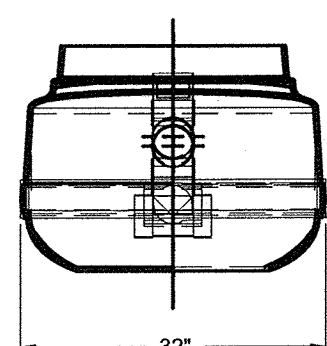


ISOMETRIC VIEW
N.T.S.

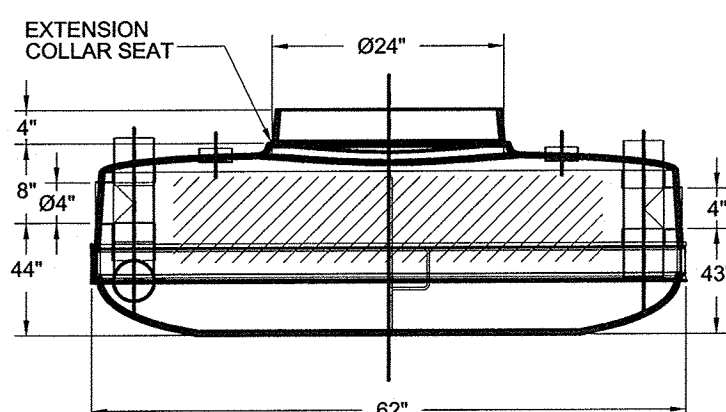
- NOTES:**
- FOR GRAVITY APPLICATIONS ONLY.
 - ALL PROCEPTOR UNITS ARE MANUFACTURED WITH FIBERGLASS REINFORCED PLASTIC. PHYSICAL CHARACTERISTICS AND THICKNESS: POLYESTER RESIN AND E-Glass.
 - MINIMUM THICKNESS 1/4" WALL AND 3/8" TOP AND BOTTOM BOWLS.
 - ALL PROCEPTOR UNITS ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTION.
 - STANDARD PIPING IS 8" DIA. 40' P.C.
 - UNLESS OTHERWISE NOTED, ALL UNITS COME STANDARD WITH 4" INLET AND OUTLET (OTHER PIPE SIZE OPTIONS AVAILABLE ON REQUEST).
 - EXTENSION COLLAR TO BE ORDERED TO MEET FINISHED GRADE. CUT ON SITE FOR FINAL ADJUSTMENT AND CALLED WITH SINKERS BY CONTRACTOR FOR WATER-TIGHT SEAL.
 - COVERS AVAILABLE FOR 140 TRAFFIC LOADINGS. PRESTRESS LOADING OR ABOVE GROUND INSTALLATION.
 - CONCRETE GREEN TURTLE FOR OTHER SIZES.
 - 90 DAY WARRANTY AGAINST LEAKS AND STRUCTURAL FAILURE.
 - U.S. PATENT #5,746,912; CON. PATENT #2,165,622



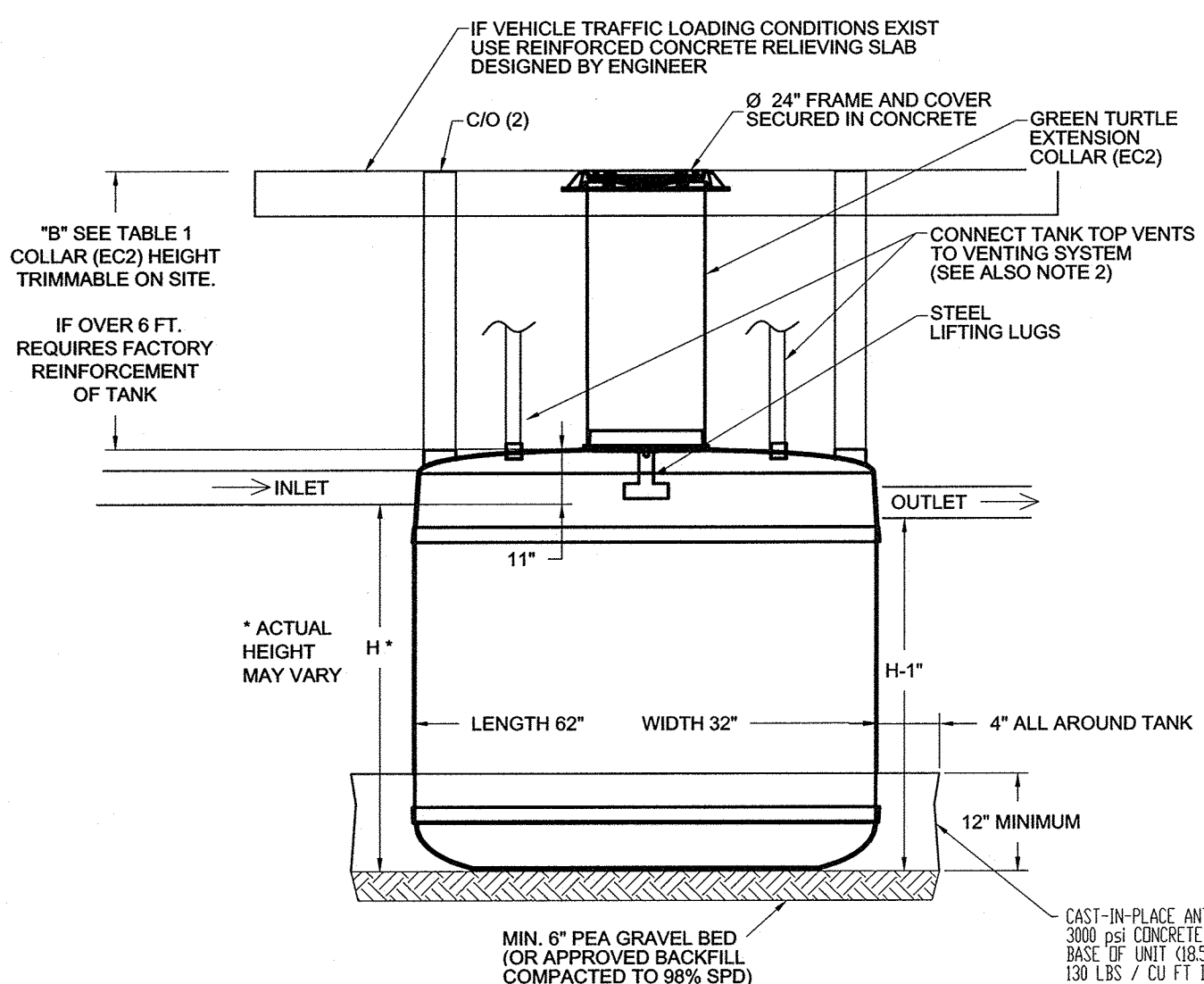
TOP VIEW
N.T.S.



SIDE VIEW
N.T.S.



FRONT VIEW
N.T.S.

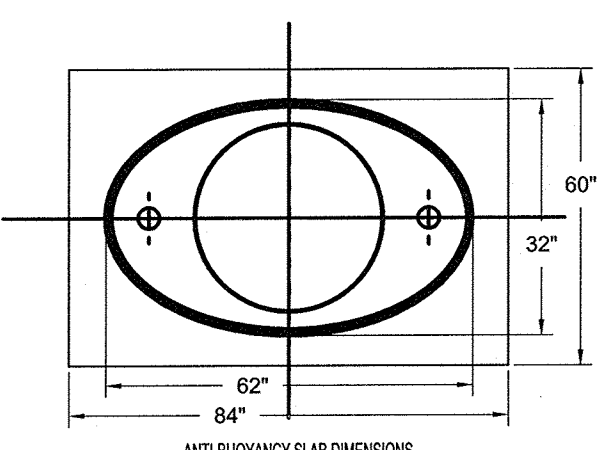


INSTALLATION DRAWING
FOR GMC/CMC/SMC MODELS: 50-300
N.T.S.

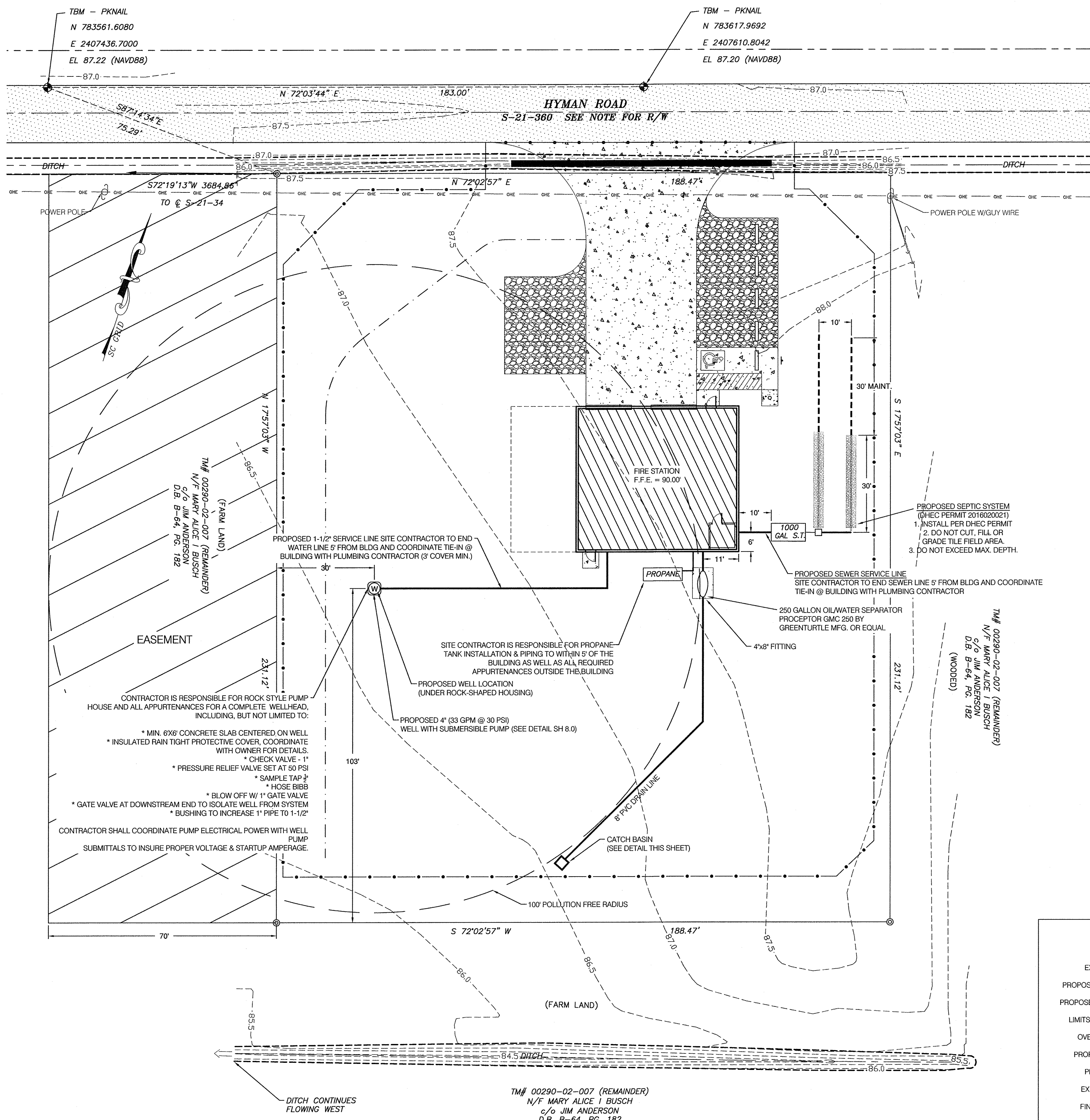
GMC 250 GALLON INTERCEPTOR
INLET & OUTLET
ACCESSWAY
ALL DIMENSIONS IN INCHES
DO NOT SCALE DRAWING

SEPARATOR MODEL	INLET INVERT TO TANK BOTTOM (H')	DRY WEIGHT OF TANK
GMC/CMC/SMC 250	44"	230 lbs

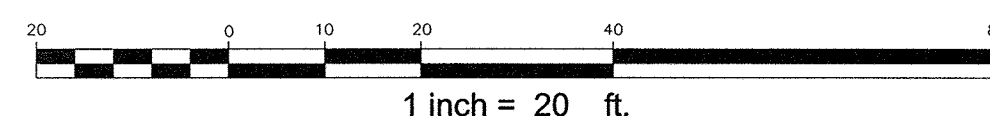
- NOTES:**
- REFER TO INSTALLATION PROCEDURE AND INSTALLATION CHECKLIST.
 - PROCEPTOR OR SEPARATOR UNITS MUST BE INSTALLED IN ACCORDANCE WITH ALL RELEVANT FEDERAL, PROVINCIAL/STATE AND LOCAL CODES INCLUDING LOCAL PLUMBING CODE.
 - U.S. PATENT # 5,746,912; CON. PATENT # 2,165,622



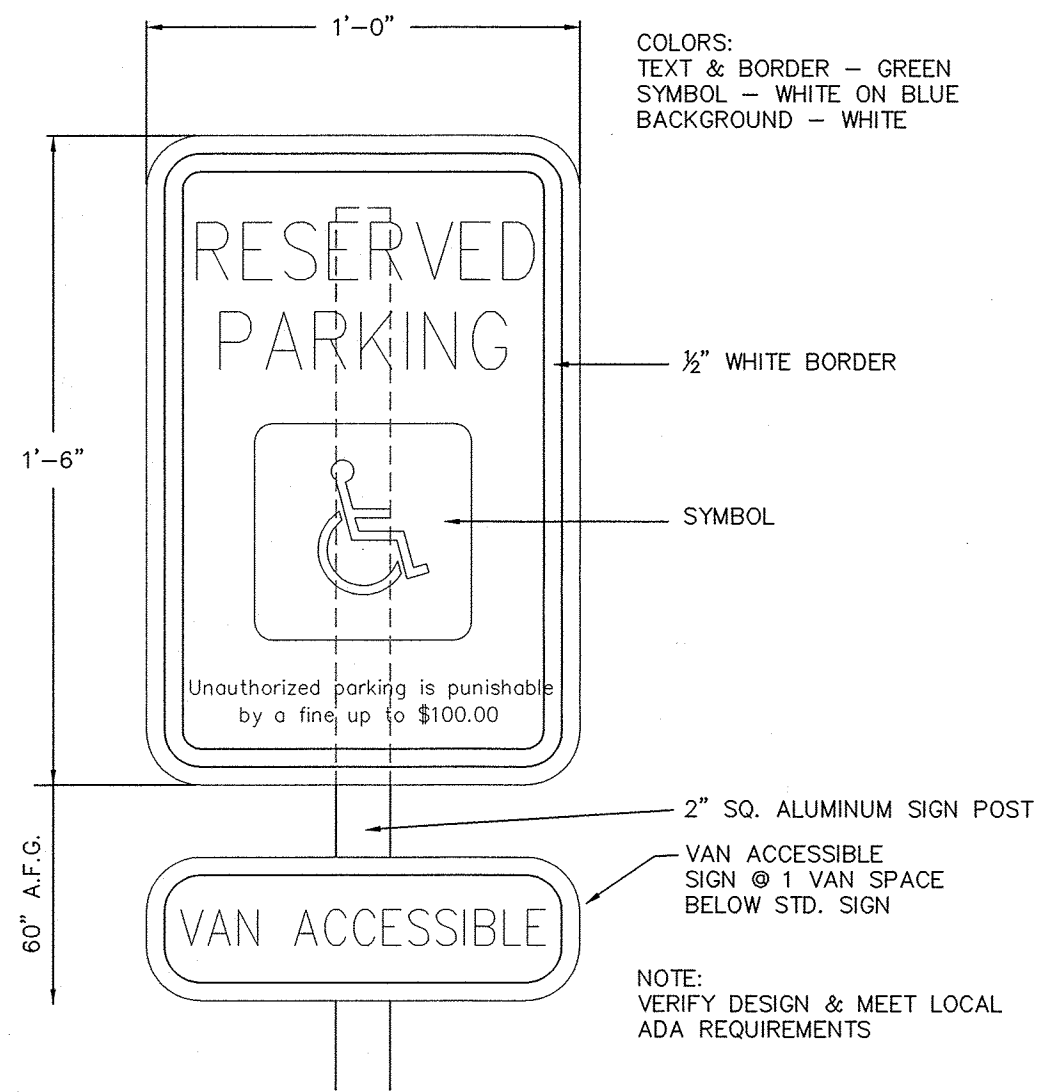
BURIAL DEPTH	8
MAX	9 FT.
MIN. With Traffic	36"
MIN. NO Traffic**	12"



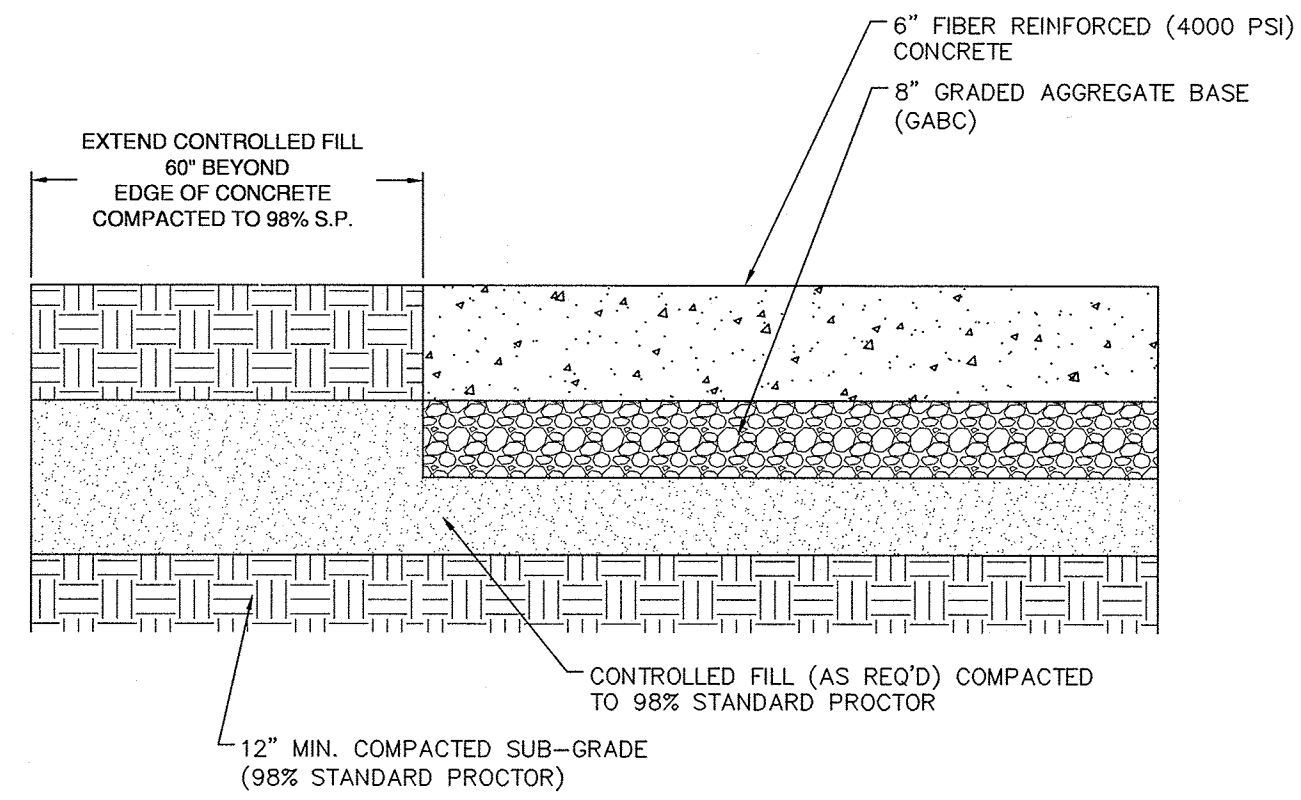
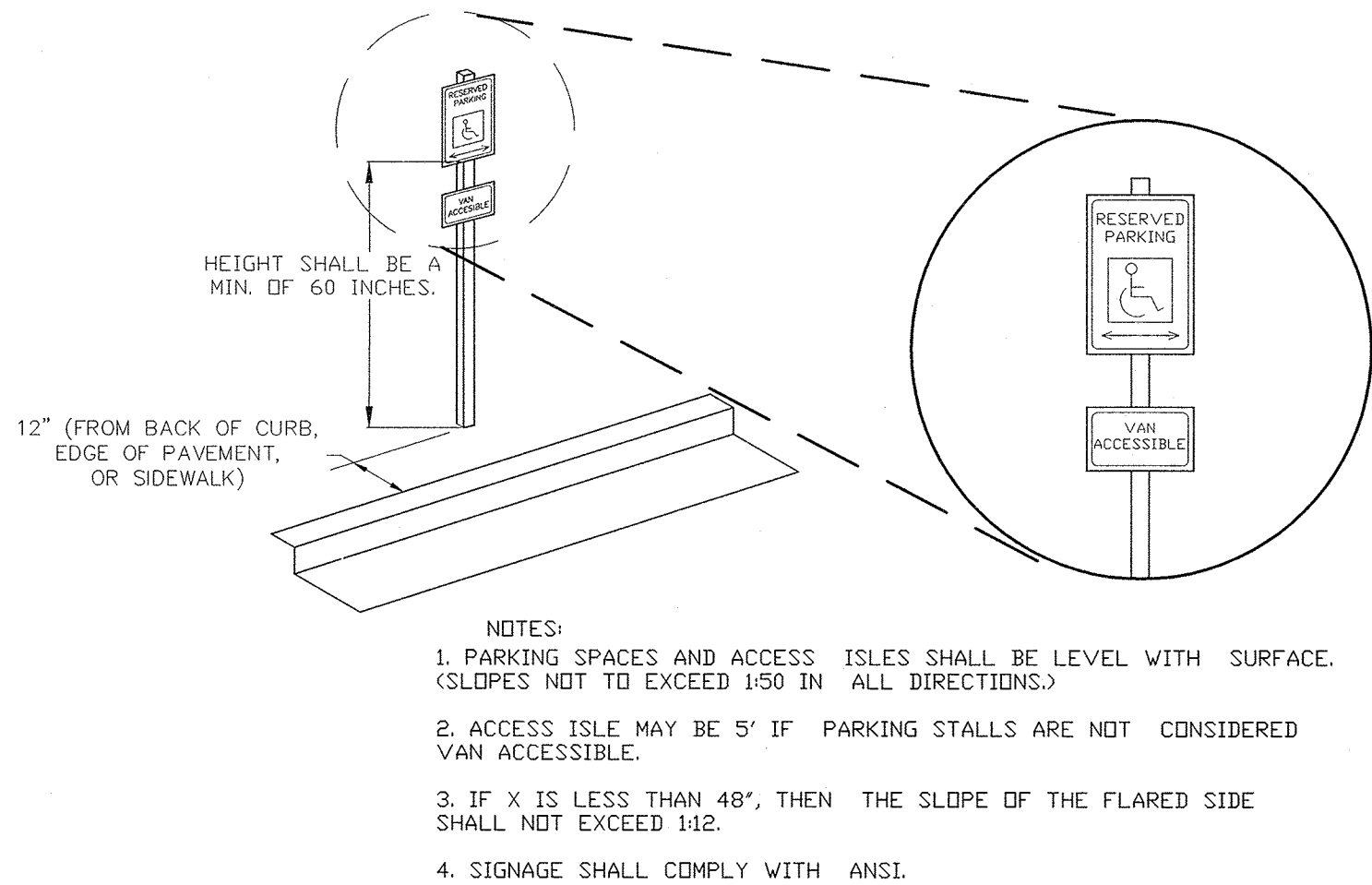
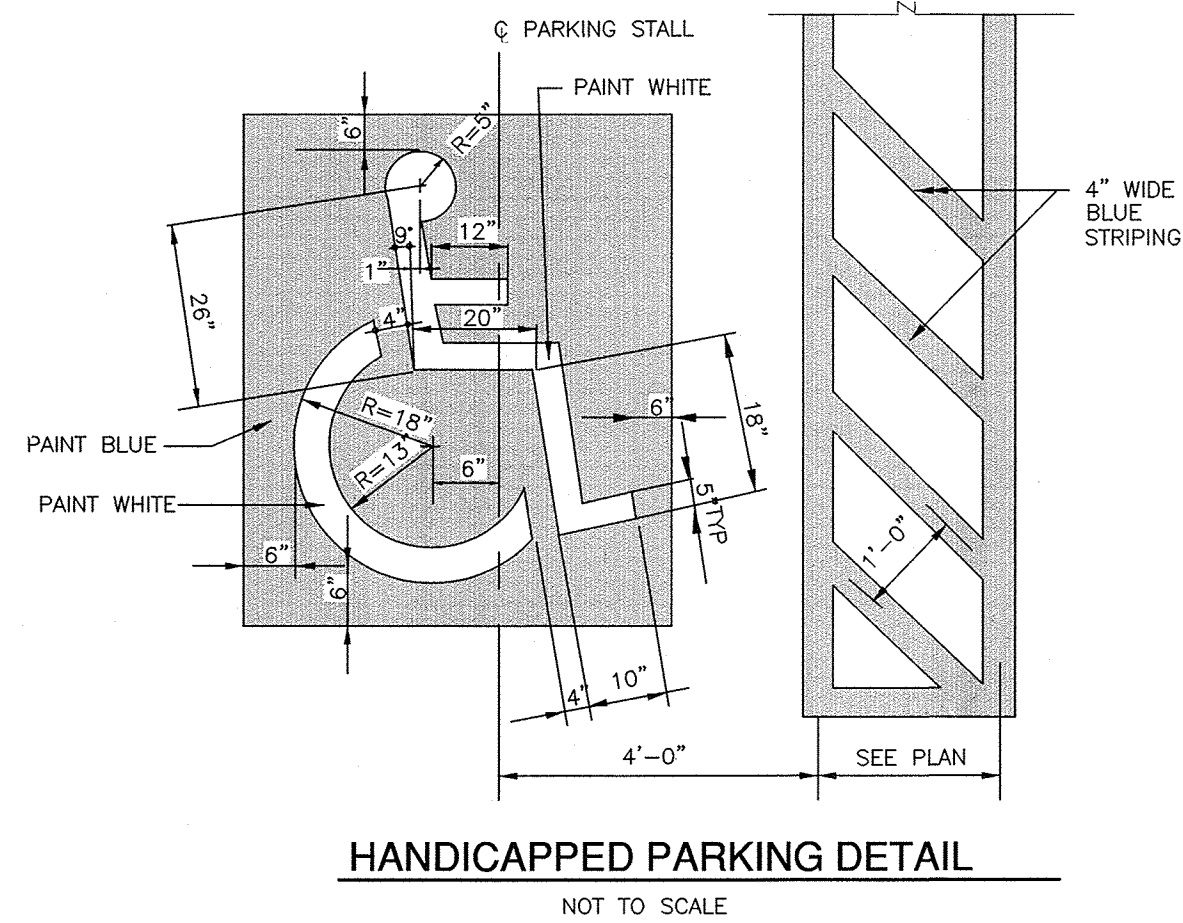
GENERAL LEGEND	
PROPERTY LINE	---
EXISTING CONTOUR	--- 129.00 ---
PROPOSED FIN. CONTOUR	--- 129.00 ---
PROPOSED DRAINAGE PIPE	24" RCP III @ 1.0%
LIMITS OF DISTURBANCE	---
OVER-HEAD ELECTRIC	---
PROPOSED CONCRETE	---
PROPOSED GRAVEL	---
EXISTING SPOT ELEV.	+ 129.00
FINISHED SPOT ELEV.	+ 129.00



DESIGNED BY: JCS	CHECKED BY: GEV	DATE: May 04, 2016	PROJECT: FRIENDFIELD	COUNTY: AEROS	PROJECT #	DWG. #	DATE	NO.	REVISION	BY
<p>AE ENGINEERING</p> <p>THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING. WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.</p> <p>CLIENT: HANNAH-FAHRENDFIELD FIRE DEPARTMENT</p> <p>PLAN SET: NEW STATION AT FRIENDFIELD</p> <p>DESCRIPTION: WATER & SEWER PLAN</p> <p>PLAN SET: DESIGN</p> <p>DATE: May 04, 2016</p> <p>PROJECT: AE055</p> <p>SHEET: C5.0</p>										

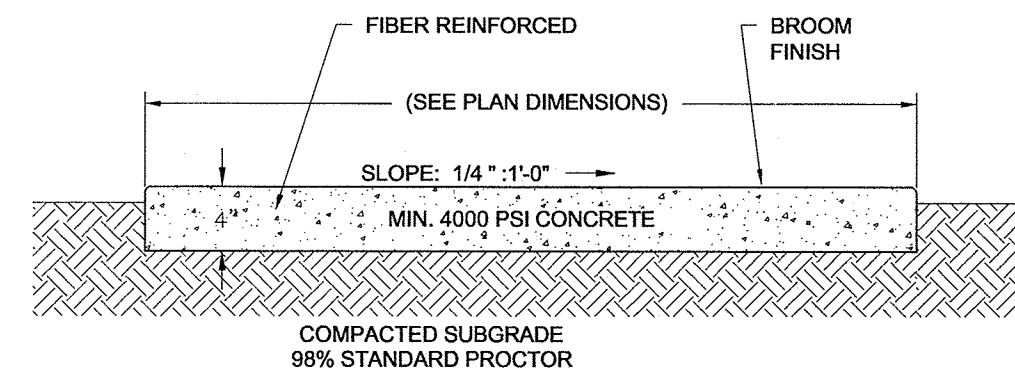
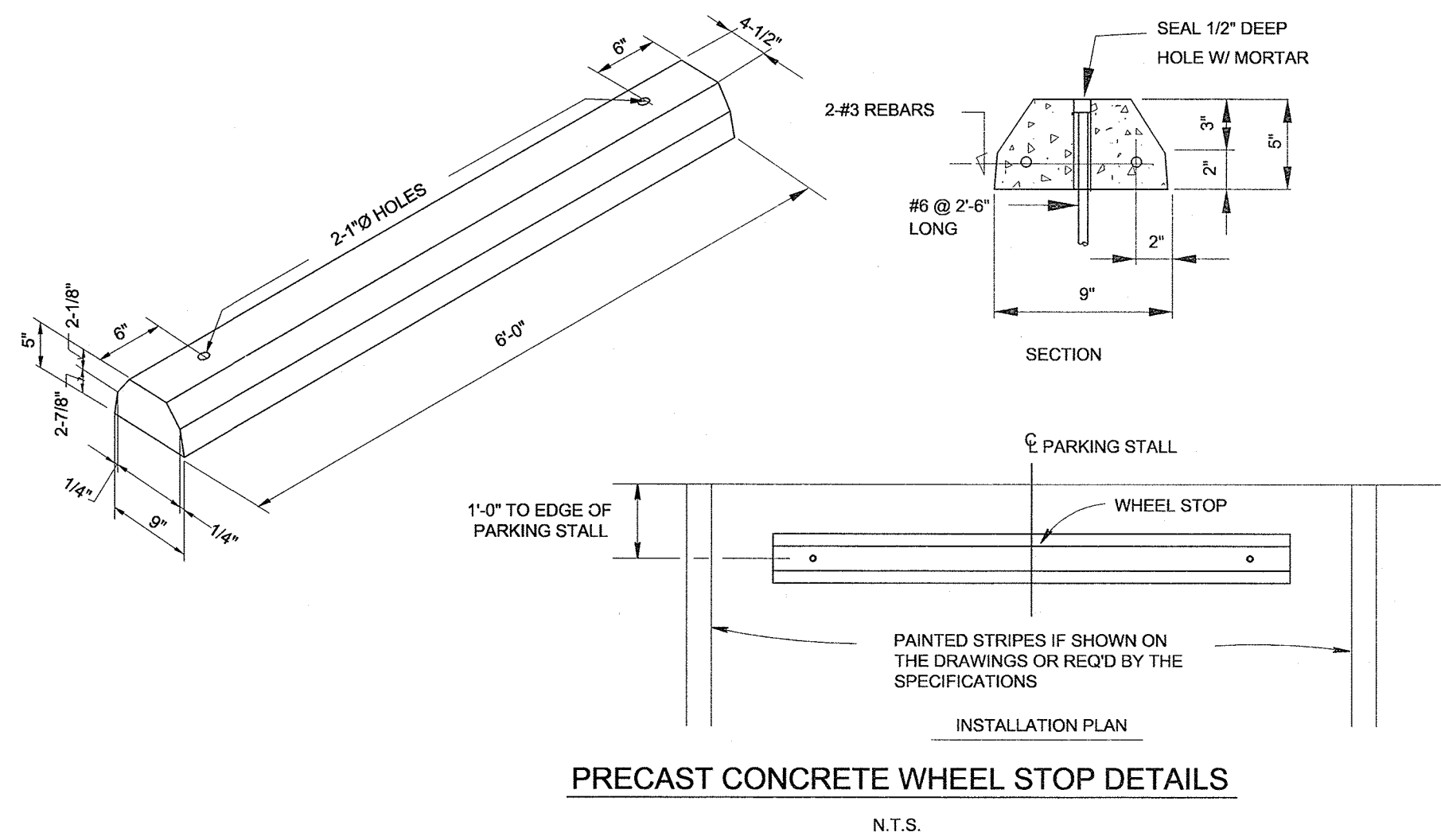


ACCESSIBLE PARKING SIGN DETAIL
SCALE: NTS

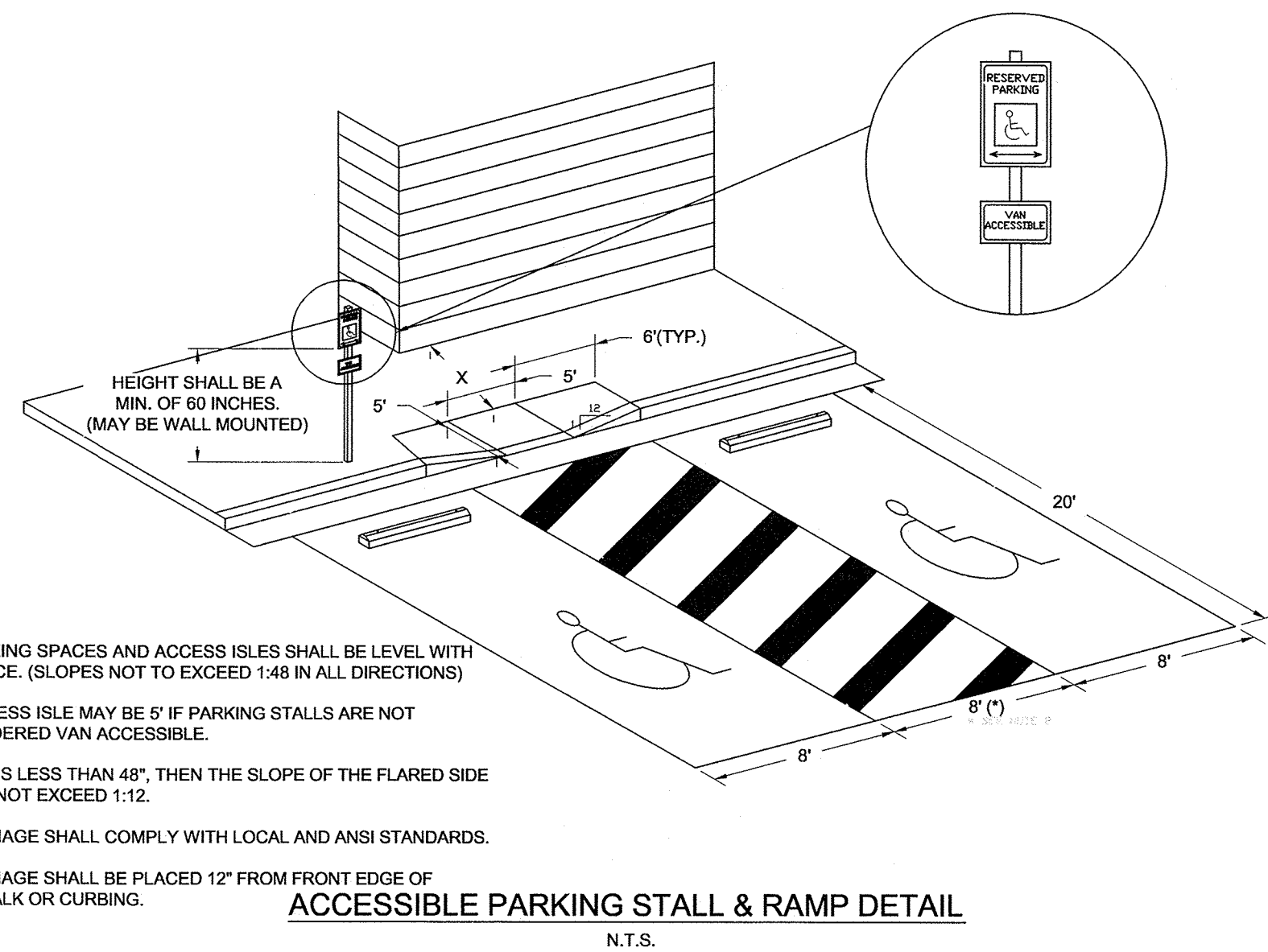
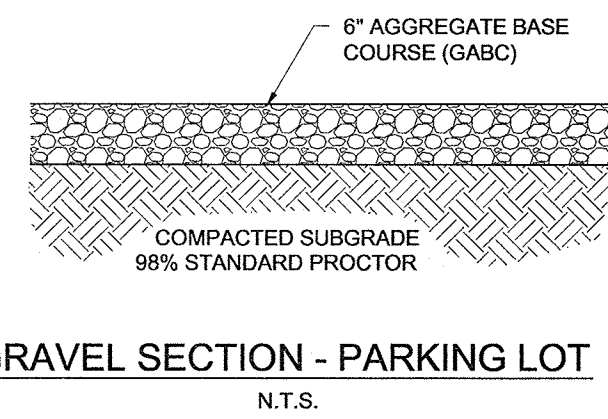
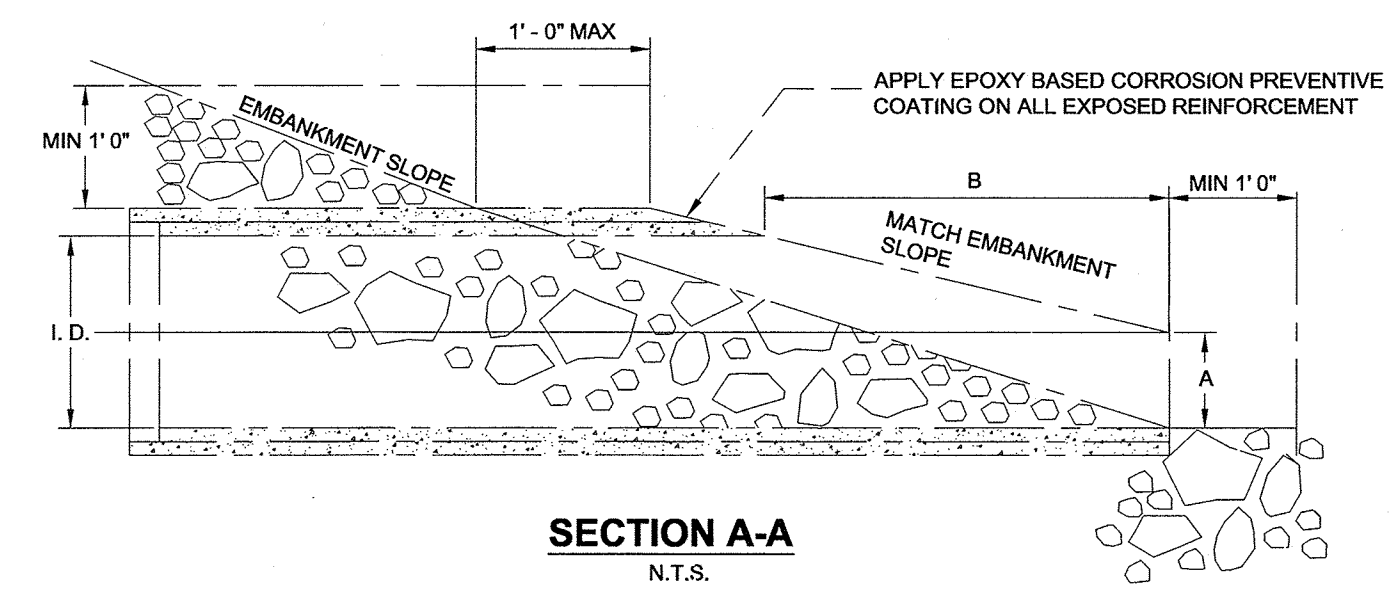
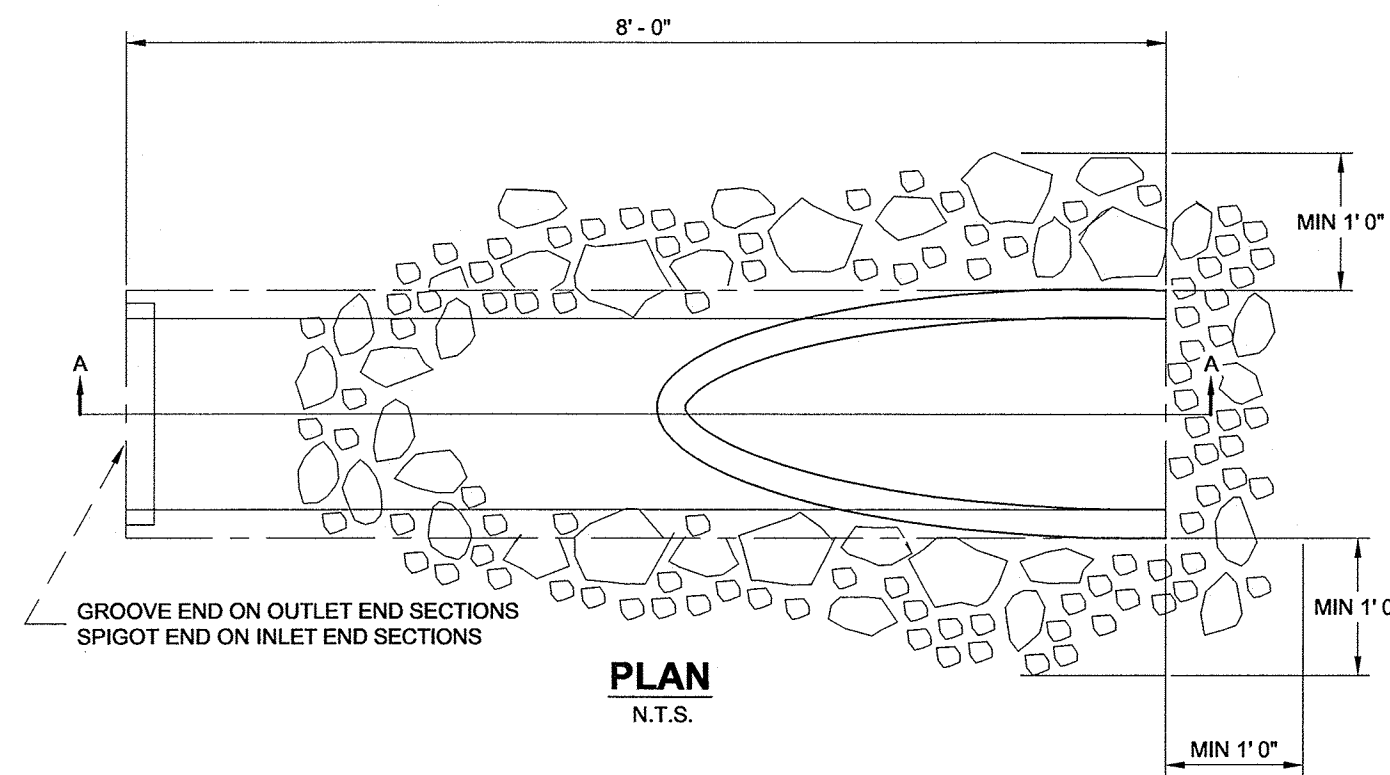


HEAVY DUTY CONCRETE
N.T.S.

- NOTES:
1. BEVELED END SECTIONS WILL BE MANUFACTURED IN ACCORDANCE WITH SCOOT TECHNICAL SPECIFICATIONS SC-M-714. THESE SPECIAL PIPE SECTIONS WILL BE MADE DURING THE MANUFACTURING OF OTHER STATE APPROVED REINFORCED CONCRETE PIPE.
2. THE PIPE BEVEL MAY BE SAWS IN THE FIELD IN LIEU OF BEING MANUFACTURED. IN FIELD SAWING, THE PIPE OPENING MAY COME TO A POINT AT THE PIPE CREST RATHER THAN A RADIUS IF APPROVED BY THE PIPE MANUFACTURER. ALTERNATE PIPE FOR SIDELINES MUST HAVE EACH END BEVELED TO MATCH THE ADJACENT SLOPES.
3. PLACE RIPRAP AS DIRECTED BY THE RCE.
4. PAYMENT FOR BEVELED END SECTIONS WILL BE AS DIRECTED IN SC-M-714.
5. THE PAY ITEM SHALL BE:
7199100 BEVELING OF PIPE ENDS _____ EA.
8041XXX RIPRAP (CLASS) _____ TON
8048XXX GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP (CLASS 2) TYPE 1 _____ S.Y.



SIDEWALK SECTION
N.T.S.



DESIGNED BY: JCS	CHECKED BY: JCS	DRAWN BY: JCS	DATE: May 25, 2016	SCALE: AS NOTED	CITY: FRIENDFIELD	COUNTY: FLORENCE	STATE: AL	PROJECT: AE055	DATE: 05/25/16	NO. 1	BY: JCS
REVISION	NO.	DATE	DESCRIPTION	REVISION	NO.	DATE	DESCRIPTION	REVISION	NO.	DATE	DESCRIPTION
1	NO.	05/25/16	ADDED H.C. RAMP DETAIL	1	NO.	05/25/16	ADDED H.C. RAMP DETAIL	1	NO.	05/25/16	ADDED H.C. RAMP DETAIL

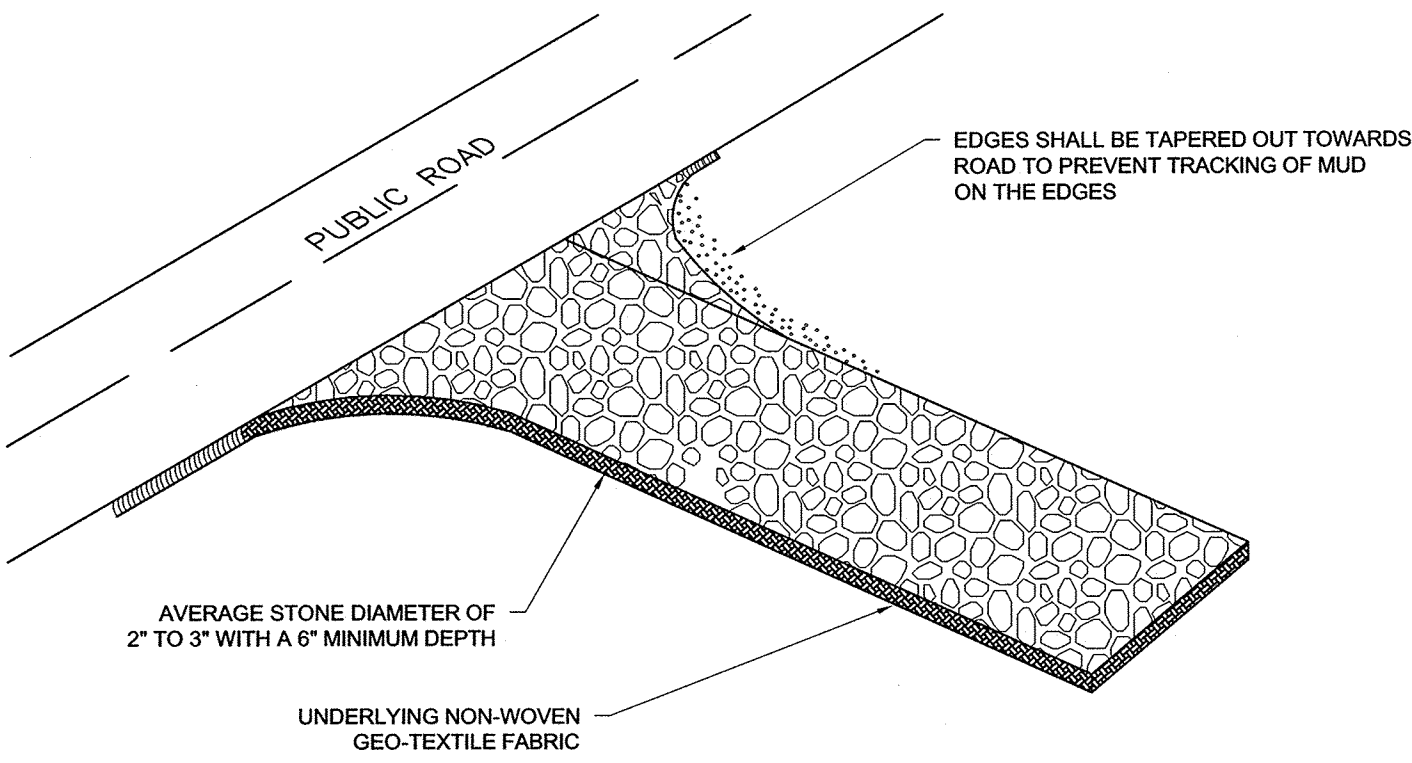
AE ALIGNED ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
No. 31120
SOUTH CAROLINA
CORBETT SAWYER

REGISTERED PROFESSIONAL ENGINEER
No. 5025
SOUTH CAROLINA
CORBETT SAWYER

THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION, USE, OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.

CLIENT: HANNAH-SALEM-FRIENDFIELD FIRE DEPARTMENT	PLAN SET: NEW STATION AT FRIENDFIELD	DESCRIPTION: DEVELOPMENT DETAILS
PLAN SET: DESIGN	DATE: May 25, 2016	PROJECT: AE055
SHEET: C6.0		



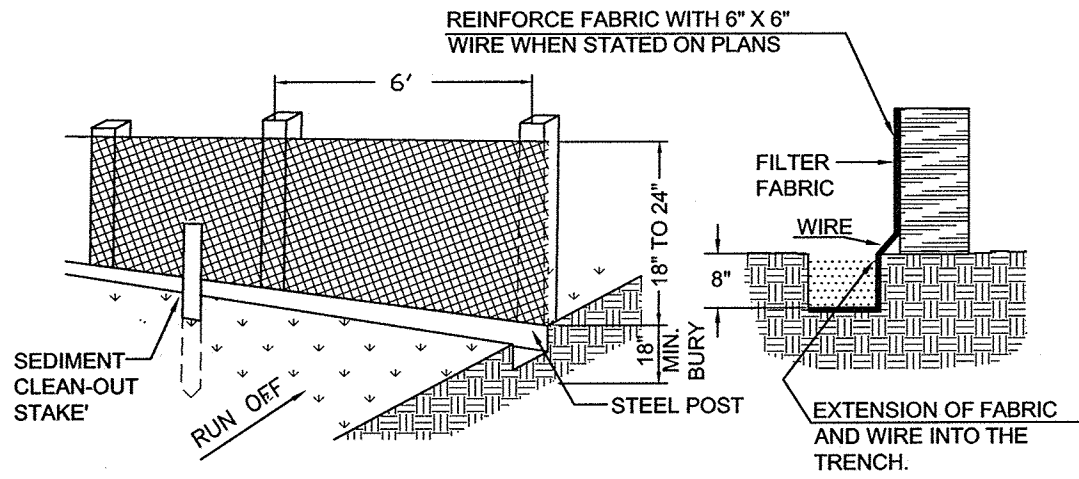
- NOTE:
- 1) ENTRANCE SHALL BE AT FINISHED GRADE AND SHALL BE DESIGNATED FOR CONSTRUCTION ACCESS UNTIL SUCH TIME AS ALL SABC BASE HAS BEEN INSTALLED ON REMAINING ROAD.
 - 2) CONSTRUCTION ENTRANCE SHALL BE COMPLETED FIRST AND PRIOR TO TRUCK TRAFFIC EXITING THE SITE.
 - 3) THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO TO THE PAVED ROADWAY FROM CONSTRUCTION AREAS. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM THE PAVEMENT AS MAY BE REQUIRED

SPECIFICATION	SIZE
ROCK PAD THICKNESS	6 INCHES
ROCK PAD WIDTH	20 FEET
ROCK PAD LENGTH	40 FEET
ROCK PAD STONE SIZE	D = 2-3 INCHES

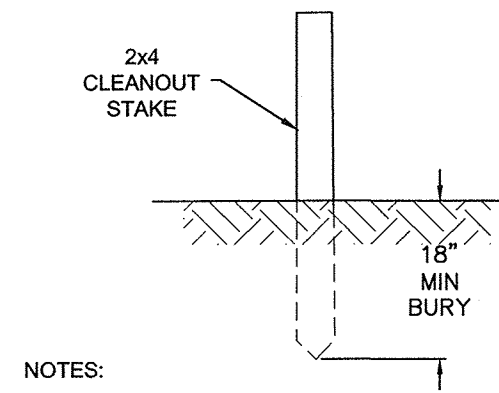
CONSTRUCTION ENTRANCE DETAIL N.T.S.

CONSTRUCTION OF A SILT FENCE

- 1) SET STEEL POST 6\" OC AND EXCAVATE A 6\" X 6\" TRENCH UPSLOPE ALONG THE LINE OF POST 6\" OCS. 2) STAPLE WIRE FENCING TO THE POST.
- 3) ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.
- 4) BACKFILL AND COMPACT THE EXCAVATED SOIL.
- 5) WHEN EXTRA STRENGTH FILTER FABRIC AND CLOSER POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POST.
- 6) SILT FENCES SHOULD BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
- 7) ANY SEDIMENT REMAINING IN PLACE AFTER THE FENCE HAS BEEN REMOVED SHOULD BE IMMEDIATELY REMOVED OR DRESSED TO CONFORM TO THE EXISTING GRADE, AND THE AREA SHOULD BE VEGETATED.
- 8) SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED EVERY SEVEN (7) DAYS. DAMAGED OR INEFFECTIVE DEVICES SHALL BE REPAIRED OR REPLACED, AS NECESSARY.
- 9) SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH ONE-THIRD THE HEIGHT OF THE SEDIMENT FENCE.
- 10) FOR DOUBLE ROW SILT FENCE, PARALLEL WITH 3\" TO 5\" BETWEEN ROWS FOR MAINTENANCE.

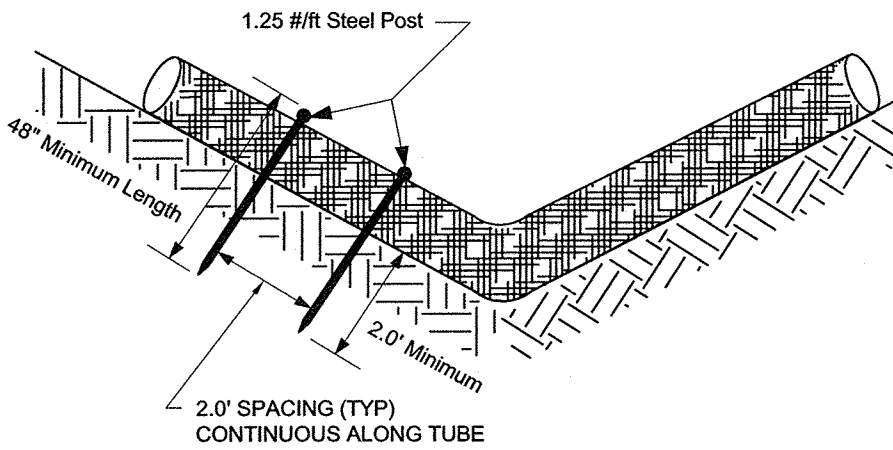
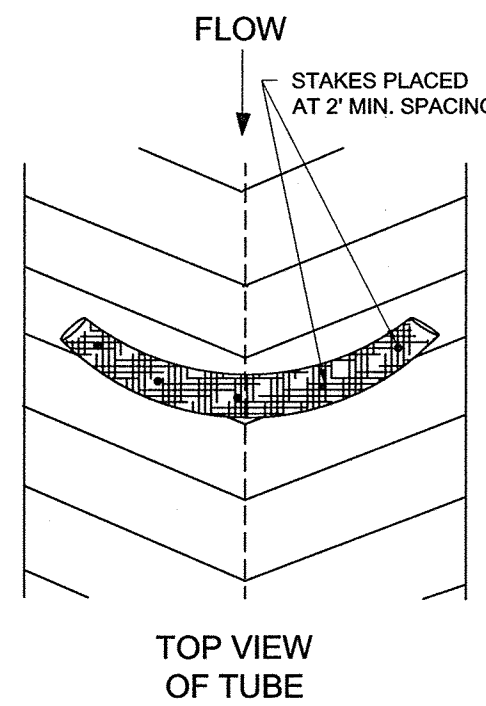


REINFORCED SILT FENCE **NOTE: ONLY METAL POST SHALL BE USED

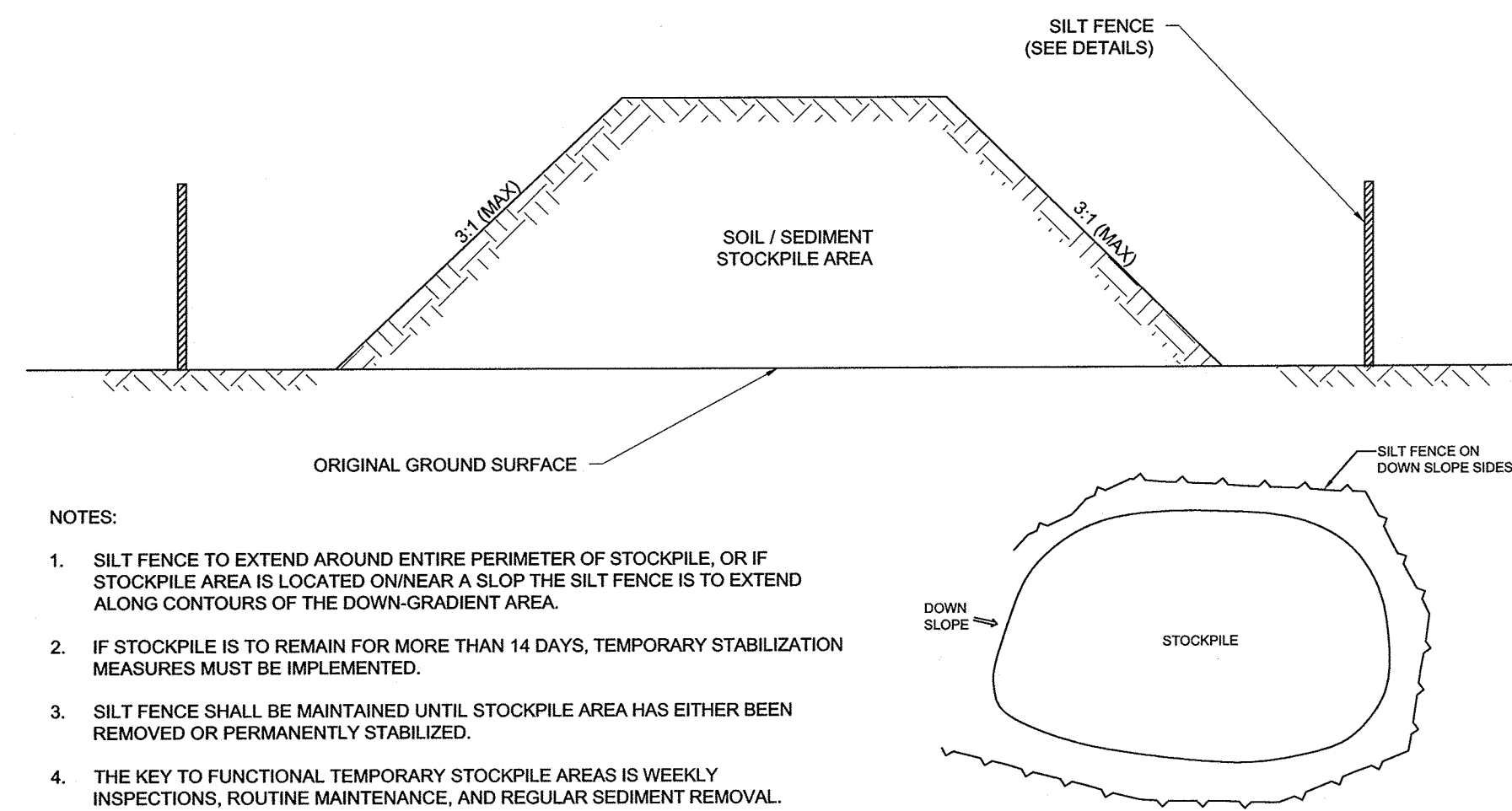
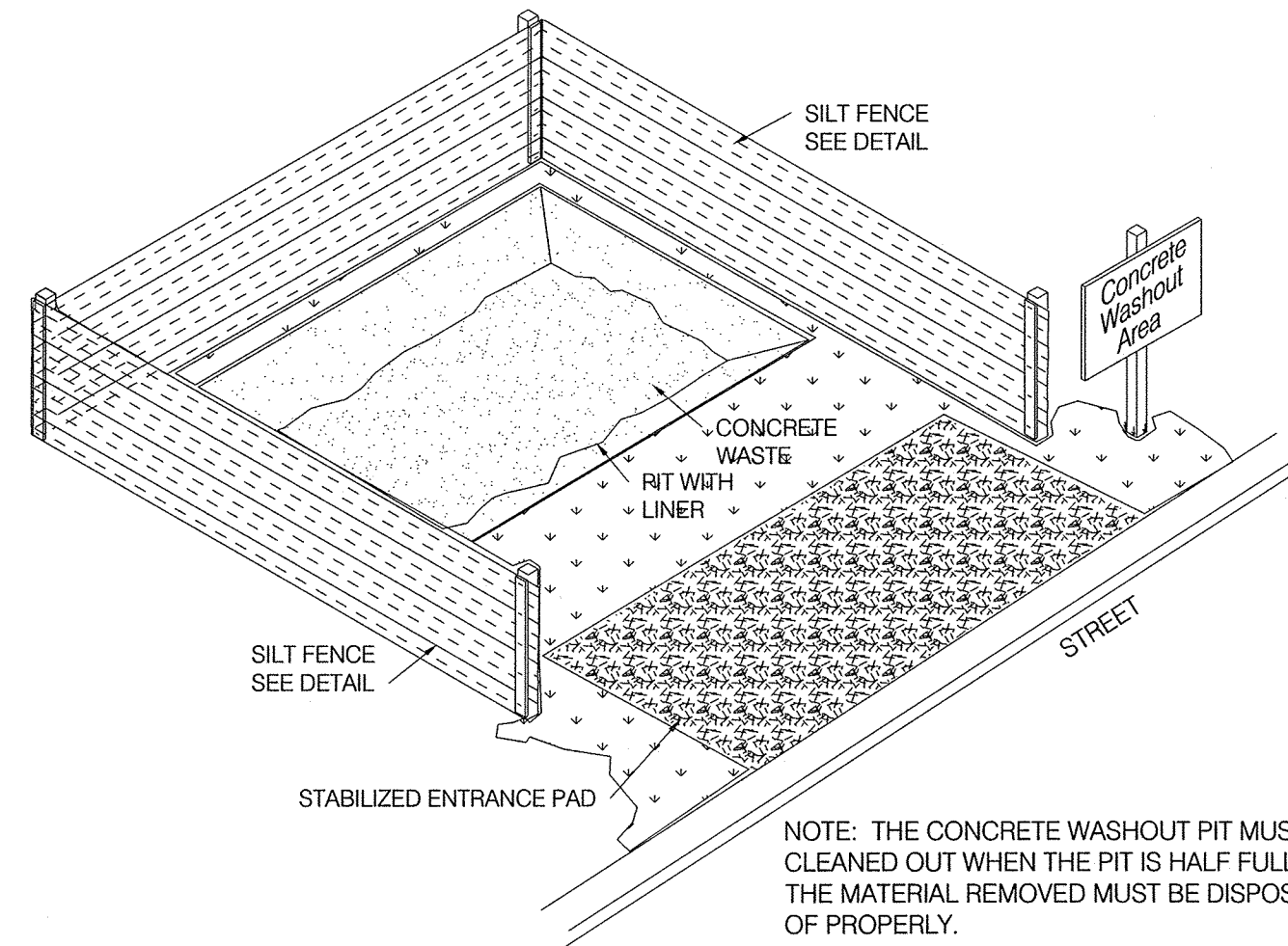


- NOTES:
1. MARK EACH STAKE TO INDICATE 12\", 18\", AND 24\" ABOVE THE DESIGN GROUND LEVEL.
 2. REMOVE SEDIMENT WHEN IT REACHES THE 18\" MARK.
 3. REMOVE STAKE AND CLEAN SEDIMENT TO DESIGN LEVEL AT END OF CONSTRUCTION.

SEDIMENT CLEAN-OUT STAKE N.T.S.



END VIEW OF TUBE SEDIMENT TUBE



- NOTES:
1. SILT FENCE TO EXTEND AROUND ENTIRE PERIMETER OF STOCKPILE, OR IF STOCKPILE AREA IS LOCATED ONNEAR A SLOP THE SILT FENCE IS TO EXTEND ALONG CONTOURS OF THE DOWN-GRADIENT AREA.
 2. IF STOCKPILE IS TO REMAIN FOR MORE THAN 14 DAYS, TEMPORARY STABILIZATION MEASURES MUST BE IMPLEMENTED.
 3. SILT FENCE SHALL BE MAINTAINED UNTIL STOCKPILE AREA HAS EITHER BEEN REMOVED OR PERMANENTLY STABILIZED.
 4. THE KEY TO FUNCTIONAL TEMPORARY STOCKPILE AREAS IS WEEKLY INSPECTIONS, ROUTINE MAINTENANCE, AND REGULAR SEDIMENT REMOVAL.

SOIL STOCKPILE DETAIL N.T.S.

TEMPORARY SEEDING REQUIREMENTS (SITE SPECIFIC)

TEMPORARY SEEDING MAY BE APPLIED DURING TIMES SHOWN. THE FOLLOWING TYPES OF SEED AND APPLICATION RATES ARE ALLOWED:

SPECIES	Lbs/Ac	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	NOV	DEC
SANDY, DROUGHTY SITES												
BROWNTOP MILLET	40											
RYE, GRAIN	56											
RYEGRASS	50											
WELL DRAINED, CLAYEY/LOAMEY SITES												
BROWNTOP MILLET	40											
OR JAPANESE MILLET	40											
RYE, GRAIN	56											
OR OATS	75											
RYEGRASS	50											

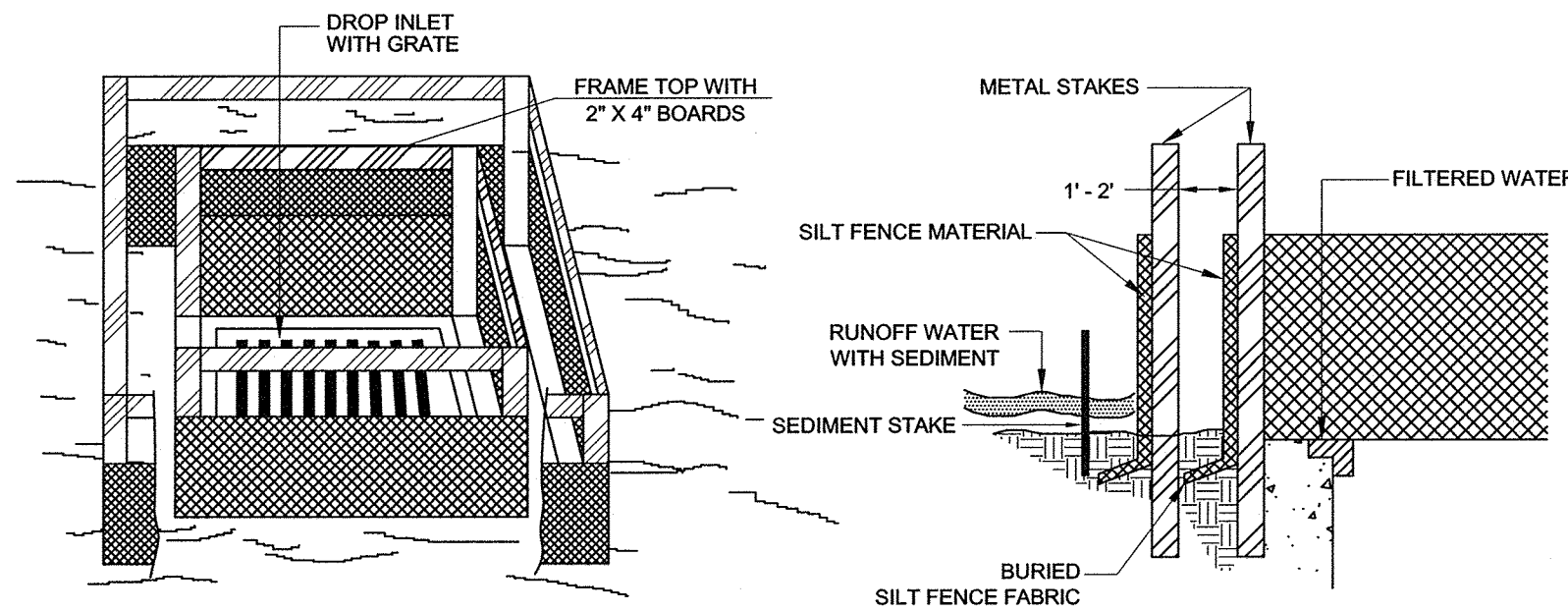
- 1- APPLY A MINIMUM OF 500 POUNDS PER ACRE OF 10-10-10 FERTILIZER (11.5 POUNDS PER 1000 SQUARE FEET) OR EQUIVALENT DURING TEMPORARY SEEDING UNLESS A SOIL TEST INDICATES A DIFFERENT REQUIREMENT. INCORPORATE FERTILIZER AND LIME (IF USED) INTO THE TOP 4-6 INCHES OF THE SOIL BY DISCING OR OTHER MEANS WHERE CONDITIONS ALLOW.
- 2- LOOSEN THE SOIL SURFACE BEFORE BROADCASTING THE SEED. APPLY SEED EVENLY BY THE MOST CONVENIENT METHOD AVAILABLE FOR THE TYPE OF SEED USED AND THE LOCATION OF THE TEMPORARY SEEDING.
- 3- COVER APPLIED SEED BY RAKING OR DRAGGING A CHAIN, AND THEN LIGHTLY FIRM THE AREA WITH A ROLLER OR CULTI-PACKER.
- 4- USE MULCH WITH TEMPORARY SEED APPLICATIONS TO RETAIN SOIL MOISTURE AND REDUCE EROSION DURING THE ESTABLISHMENT OF VEGETATION. TYPICAL MULCH APPLICATIONS INCLUDE STRAW, WOOD FIBER, HYDRO-MULCHES, BFM AND FGM. USE HYDRO-MULCHES WITH A MINIMUM BLEND OF 70% WOOD FIBERS.
- 5- APPLY THE STRAW MULCH BY HAND OR MACHINE AT THE RATE 1.5-2 TONS PER ACRE (80 POUNDS PER 1000 SQUARE FEET). FREQUENT INSPECTIONS ARE NECESSARY TO CHECK THAT CONDITIONS FOR GROWTH ARE GOOD.
- 6- SEEDED AREAS SHOULD BE KEPT ADEQUATELY MOIST. IRRIGATE THE SEEDED AREA IF NORMAL RAINFALL IS NOT ADEQUATE FOR THE GERMINATION AND GROWTH OF SEEDLINGS.
- 7- RE-SEED AREAS WHERE SEEDING DOES NOT GROW QUICKLY, THICK ENOUGH, OR ADEQUATELY TO PREVENT EROSION. INSPECT EVERY 7 CALENDAR DAYS AND WITHIN 24-HOURS AFTER EACH RAINFALL EVENT THAT PRODUCES 1/4-INCHES OR MORE OF PRECIPITATION.

PERMANENT SEEDING REQUIREMENTS (SITE SPECIFIC)

PERMANENT SEEDING MAY BE APPLIED DURING TIMES SHOWN. THE FOLLOWING TYPES OF SEED AND APPLICATION RATES ARE ALLOWED:
PLS - PURE LIVE SEED

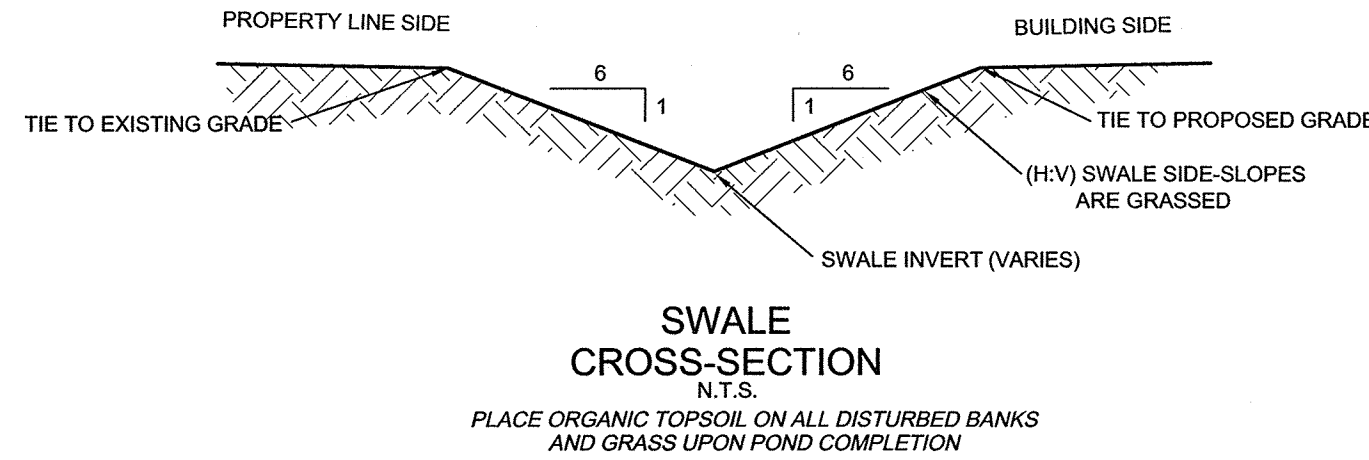
SPECIES	Lbs/Ac	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	NOV	DEC
SANDY, DROUGHTY SITES												
BROWNTOP MILLET	10											
BAHIAGRASS	40											
BROWNTOP MILLET	10											
BAHIAGRASS	30											
SERICEA LESPEDEZA	40											
BROWNTOP MILLET	10											
ATLANTIC COASTAL PANICGRASS	15 PLS											
BROWNTOP MILLET	10											
SWITCHGRASS (ALAMO)	8 PLS											
LITTLE BLUESTEM	4											
SERICEA LESPEDEZA	20											
BROWNTOP MILLET	10											
WEEPING LOVEGRASS	8											
WELL DRAINED, CLAYEY/LOAMEY SITES												
BROWNTOP MILLET	10											
BAHIAGRASS	40											
RYE, GRAIN	10											
BAHIAGRASS	40											
CLOVER, CRIMSON (ANNUAL)	5											
BROWNTOP MILLET	10											
BAHIAGRASS	30											
SERICEA LESPEDEZA	40											
BROWNTOP MILLET	10											
BERMUDA, COMMON	10											
SERICEA LESPEDEZA	40											
BROWNTOP MILLET	10											
BERMUDA, COMMON	12											
KOBE LESPEDEZA	10											
(ANNUAL)												
BROWNTOP MILLET	10											
BAHIAGRASS	20											
BERMUDA, COMMON	6											
SERICEA LESPEDEZA	40											
BROWNTOP MILLET	10											
SWITCHGRASS	8 PLS											
LITTLE BLUESTEM	3 PLS											
INDIANGRASS	3 PLS											

- 1- APPLY TOPSOIL IF THE SURFACE SOIL OF THE SEEDBED IS NOT ADEQUATE FOR PLANT GROWTH.
- 2- IF THE AREA HAS BEEN RECENTLY PLOWED, NO TILLAGE IS REQUIRED OTHER THAN RAKING OR SURFACE ROUGHENING TO BREAK ANY CRUST THAT HAS FORMED LEAVING A TEXTURED SURFACE. DISC THE SOIL FOR OPTIMAL GERMINATION WHEN THE SOIL IS COMPACTED LESS THAN 6-INCHES. IF THE SOIL IS COMPACTED MORE THAN 8-INCHES, SUB-SOILED AND DISC THE AREA.
- 3- SOIL TESTING IS AVAILABLE THROUGH CLEMSON UNIVERSITY COOPERATIVE EXTENSION SERVICE.
- 4- UNLESS A SPECIFIC SOIL TEST INDICATES OTHERWISE, APPLY 1 1/2 TONS OF GROUND COURSE TEXTURED AGRICULTURAL LIMESTONE PER ACRE (70 POUNDS PER 1000 SQUARE FEET).
- 5- APPLY A MINIMUM OF 1000 POUNDS PER ACRE OF A COMPLETE 10-10-10 FERTILIZER (23 POUNDS PER 1000 SQUARE FEET) OR EQUIVALENT DURING PERMANENT SEEDING OF GRASSES UNLESS A SOIL TEST INDICATES A DIFFERENT REQUIREMENT. INCORPORATE FERTILIZER AND LIME (IF USED) INTO THE TOP 4-6 INCHES OF THE SOIL BY DISCING OR OTHER MEANS WHERE CONDITIONS ALLOW. DO NOT MIX THE LIME AND THE FERTILIZER PRIOR TO THE FIELD APPLICATION.
- 6- LOOSEN THE SURFACE OF THE SOIL JUST BEFORE BROADCASTING THE SEED. EVENLY APPLY SEED BY THE MOST CONVENIENT METHOD AVAILABLE FOR THE TYPE OF SEED APPLIED AND THE LOCATION OF THE SEEDING. TYPICAL APPLICATION METHODS INCLUDE BUT ARE NOT LIMITED TO CYCLONE SEEDERS, ROTARY SPREADERS, DRIP SPREADERS, BROADCAST SPREADERS, HAND SPREADERS, CULTI-PACKER SEEDER, AND HYDRO-SEEDERS. COVER APPLIED SEED BY RAKING OR DRAGGING A CHAIN OR BRUSH MAT, AND THEN LIGHTLY FIRM THE AREA WITH A ROLLER OR CULTI-PACKER. DO NOT ROLL SEED THAT IS APPLIED WITH A HYDRO-SEEDER AND HYDRO-MULCH. 7- COVER ALL PERMANENT SEEDED AREAS WITH MULCH IMMEDIATELY UPON COMPLETION OF THE SEEDING APPLICATION TO RETAIN SOIL MOISTURE AND REDUCE EROSION DURING ESTABLISHMENT OF VEGETATION. APPLY THE MULCH EVENLY IN SUCH A MANNER THAT IT PROVIDES A MINIMUM OF 75% COVERAGE. TYPICAL MULCH APPLICATIONS INCLUDE STRAW, WOOD FIBER, HYDRO-MULCHES, BFM AND FGM. USE HYDRO-MULCHES WITH A MINIMUM BLEND OF 70% WOOD FIBERS.
- 7- APPLY STRAW MULCH BY HAND OR MACHINE AT THE RATE 2 TONS PER ACRE (80 POUNDS PER 1000 SQUARE FEET). FREQUENT INSPECTIONS ARE NECESSARY TO CHECK THAT CONDITIONS FOR GROWTH ARE GOOD.
- 8- KEEP PERMANENT SEEDED AREAS ADEQUATELY MOIST, ESPECIALLY LATE IN THE SPECIFIC GROWING SEASON. IRRIGATE THE SEEDED AREA IF NORMAL RAINFALL IS NOT ADEQUATE FOR THE GERMINATION AND GROWTH OF SEEDLINGS. WATER SEEDED AREAS AT CONTROLLED RATES THAT ARE LESS THAN THE RATE AT WHICH THE SOIL CAN ABSORB WATER TO PREVENT RUNOFF. RUNOFF OF IRRIGATION WATER WASTES WATER AND CAN CAUSE EROSION.
- 9- INSPECT PERMANENTLY SEEDED AREAS FOR FAILURE. MAKE NECESSARY REPAIRS AND RE-SEED OR OVER-SEED WITHIN THE SAME GROWING SEASON IF POSSIBLE. IF THE GRASS COVER IS SPARSE OR PATCHY, RE-EVALUATE THE CHOICE OF GRASS AND QUANTITIES OF LIME AND FERTILIZER APPLIED. FINAL STABILIZATION BY PERMANENT SEEDING OF THE SITE REQUIRES THAT IT BE COVERED BY A 70% COVERAGE RATE.
- 10- INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RE-SEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND REPLACE FAILED PLANTS WHERE NECESSARY.
- 11- IF VEGETATIVE COVER IS INADEQUATE TO PREVENT RILL EROSION, OVER-SEED AND FERTILIZE IN ACCORDANCE WITH SOIL TEST RESULTS.
- 12- IF A STAND OF PERMANENT VEGETATION HAS LESS THAN 40 PERCENT COVER, RE-EVALUATE CHOICE OF PLANT MATERIALS AND QUANTITIES OF LIME AND FERTILIZER.
- 13- RE-ESTABLISH THE STAND FOLLOWING SEED BED PREPARATION AND SEEDING RECOMMENDATIONS, OMITTING LIME AND FERTILIZER IN THE ABSENCE OF SOIL TEST RESULTS.
- 14- IF THE SEASON PREVENTS RE-SOWING, MULCH IS AN EFFECTIVE TEMPORARY COVER.
- 15- FINAL STABILIZATION OF THE SITE REQUIRES A 70 PERCENT OVERALL COVERAGE RATE. THIS DOES NOT MEAN THAT 30 PERCENT OF THE SITE CAN REMAIN BARE. THE COVERAGE IS DEFINED AS LOOKING AT A SQUARE YARD OF COVERAGE, IN WHICH 70 PERCENT OF THAT SQUARE YARD IS COVERED WITH VEGETATION.



TYPE "A" FILTER FABRIC INLET PROTECTION N.T.S.

NOTE: DOUBLE ROW SILT FENCE ONLY NEEDED TO PROTECT WETLANDS BOUNDARY OR WHERE SPECIFICALLY SHOWN ON PLANS.



SWALE CROSS-SECTION N.T.S.

PLACE ORGANIC TOPSOIL ON ALL DISTURBED BANKS AND GRASS UPON POND COMPLETION

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:	PROJECT #:	CITY:	COUNTY:	STATE:	DATE:	NO.	REVISION:
JCS	JCS	GEW	MJF	May 04, 2016	31130	FLORENCE	AL	AL055	C7.0		
SOUTH CAROLINA PROFESSIONAL ENGINEERING BOARD											
CORBETT SUMNER											
SOUTH CAROLINA PROFESSIONAL ENGINEERING BOARD											
ALIGNED ENGINEERING No. 5026											
STATE OF AUTHORITY											
AE ALIGNED ENGINEERING											
THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING. NO PART OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.											
CLIENT:	HANNAH-SALEM-FRIENDFIELD FIRE DEPARTMENT										
PLAN SET:	NEW STATION AT FRIENDFIELD										
DESC:	SEDIMENT & EROSION DETAILS										
DESCRIPTION:											
PLAN SET:	DESIGN										
DATE:	May 04, 2016										
PROJECT:	AE055										
SHEET:	C7.0										

ZONING - UNZONED

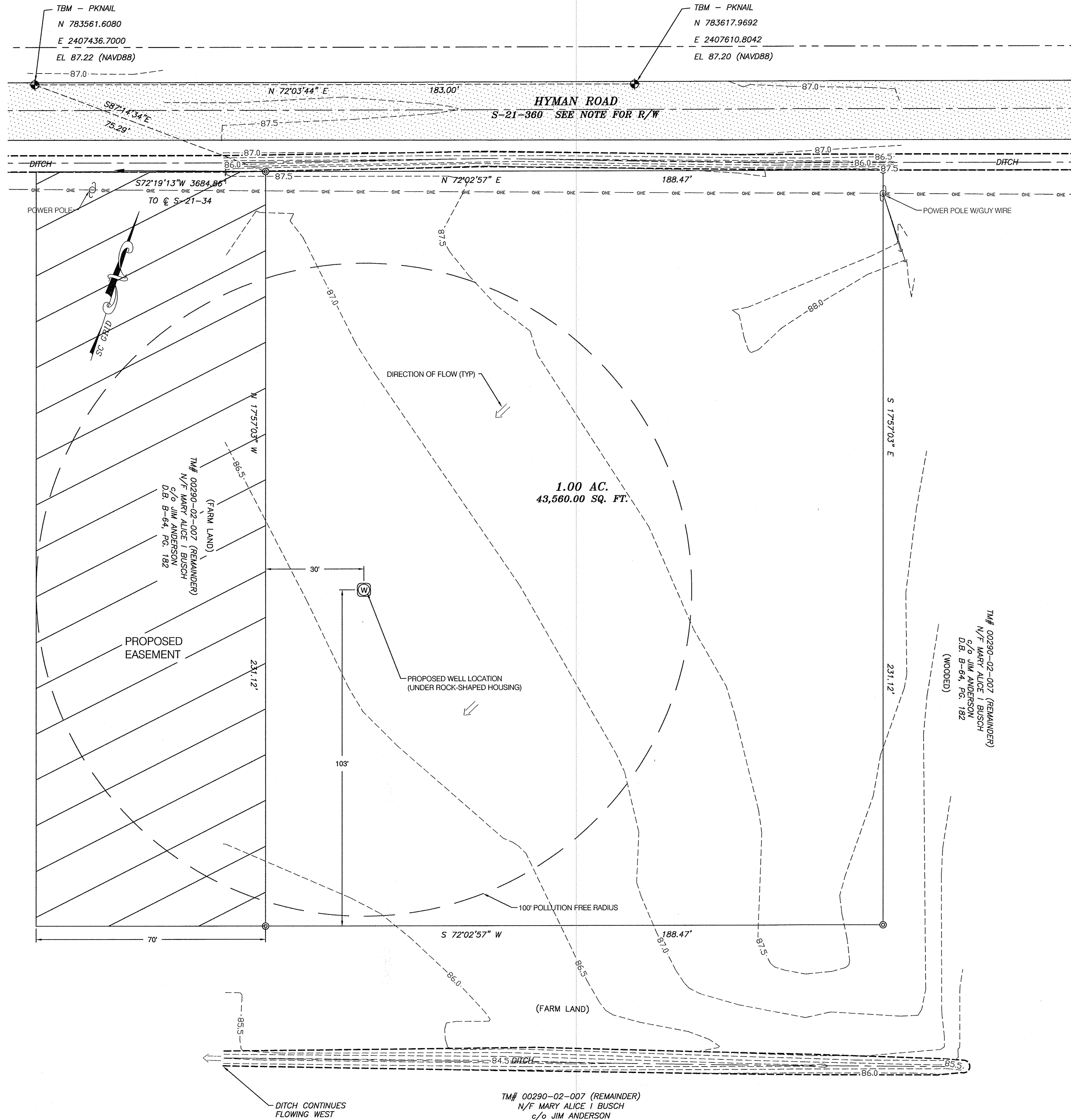
INSTITUTIONAL - PUBLIC ADMINISTRATION - FIRE PROTECTION

FRONT BUILDING SETBACKS = 25 FT.

SIDE BUILDING SETBACKS = 10 FT.

REAR BUILDING SETBACKS = 20 FT.

MAX IMPERVIOUS RATIO = 90%



GENERAL LEGEND	
PROPERTY LINE	---
RIGHT OF WAY	---
EXISTING CONTOUR	---129.00---
PROPOSED CONTOUR	---129.00---
EXISTING FORCE MAIN	---FM---FM---
EXISTING RCP	---T---T---
EXISTING TELEPHONE	---T---T---

R/W NOTE: PER SCDOT THE CLAIMED RIGHT-OF-WAY ALONG HYMAN ROAD (S-21-360) BY SCDOT IS THE BACK OF DITCH TO BACK OF DITCH.

LEGEND

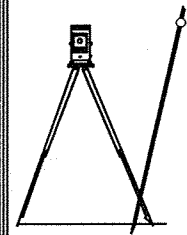
- IRON PIN FOUND (TYPE & SIZE AS NOTED)
- #4 REBAR SET (UNLESS OTHERWISE NOTED)
- COMPUTED POINT

PLAT

OF ONE (1) ACRE OF LAND LOCATED IN THE FRIENDFIELD COMMUNITY, FLORENCE COUNTY, SOUTH CAROLINA, BEING A PORTION OF THE PROPERTY SHOWN AS TAX MAP PARCEL 00290-02-007, BEING FURTHER DESCRIBED IN DEED BOOK B-64, PAGE 182. SURVEYED FOR:

FLORENCE COUNTY

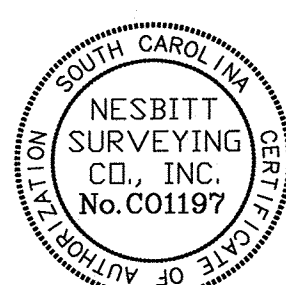
I HEREBY STATE TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "B" SURVEY AS SPECIFIED THEREIN. ALSO THERE ARE NO ENCROACHMENTS, PROJECTIONS, OR SETBACKS AFFECTING THE PROPERTY OTHER THAN THOSE SHOWN. ALSO I HAVE CONSULTED THE FEDERAL INSURANCE ADMINISTRATION FLOOD HAZARD MAP 450410038E, EFFECTIVE DATE DECEMBER 18, 2014 AND FOUND THAT THE SUBJECT PROPERTY DOES NOT LIE WITHIN A SPECIAL FLOOD ZONE. NOTE: THIS PROPERTY IS SUBJECT OF ANY AND ALL RIGHTS-OF-WAY, EASEMENTS, COVENANTS AND RESTRICTIONS, RECORDED OR UNRECORDED, THAT MAY APPLY. UNLESS NOTED HEREON THIS MAP DOES NOT ADDRESS ENVIRONMENTAL CONCERNS OR SUBSURFACE INVESTIGATION.



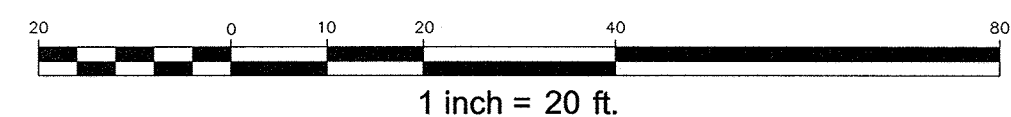
NESBITT SURVEYING CO., INC.
4340 ALLIGATOR ROAD
U.S. HIGHWAY 76 & ALLIGATOR ROAD
TIMMONSVILLE, S.C. 29161
PHONE (843) 346-3302
FAX (843)-346-5802

EMAIL: jon@nesbittsurveying.com

JONATHAN W. NESBITT
PLS NO 24770

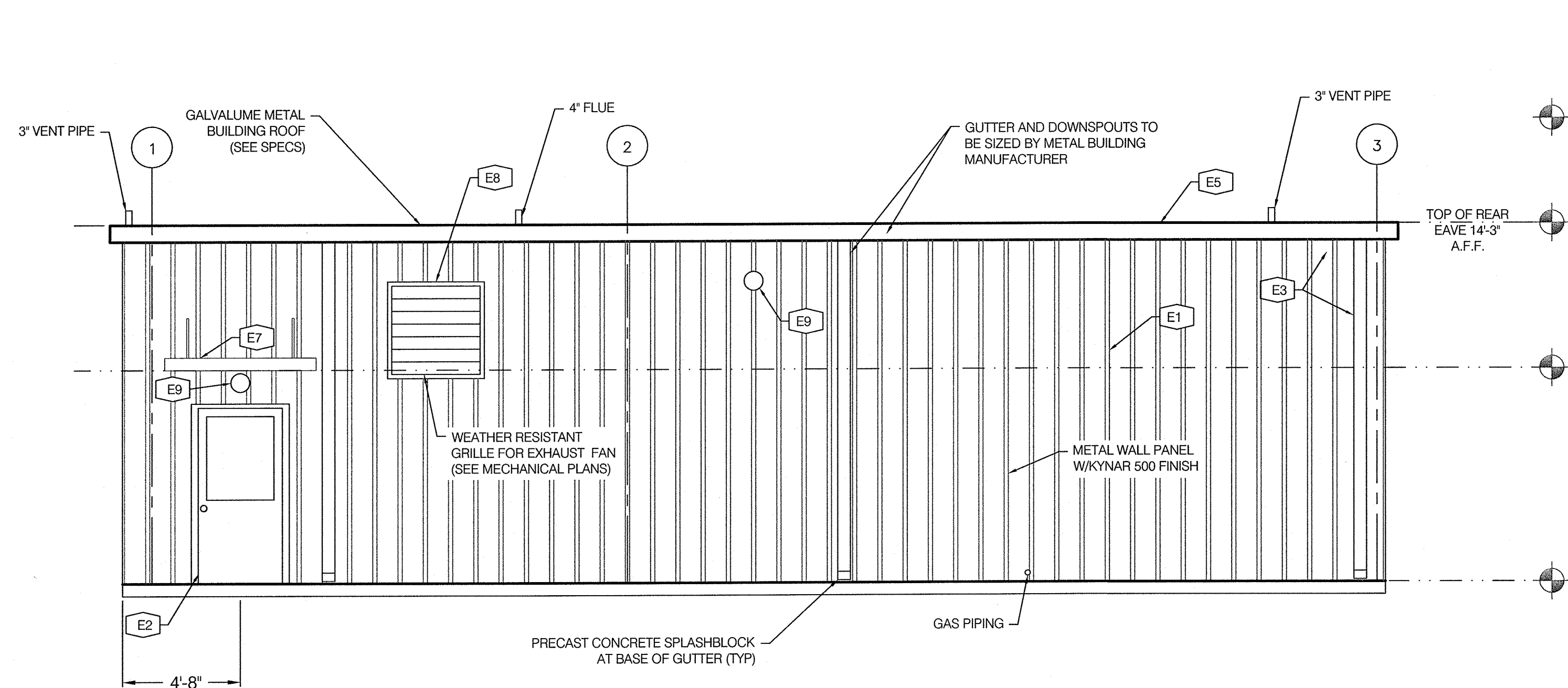


DATE: APRIL 5, 2016
JOB NO: 16235
FLD BK: 326
PAGE: 37
REF JOB:
TAX MAP #: 00290-02-007 (PORTION)



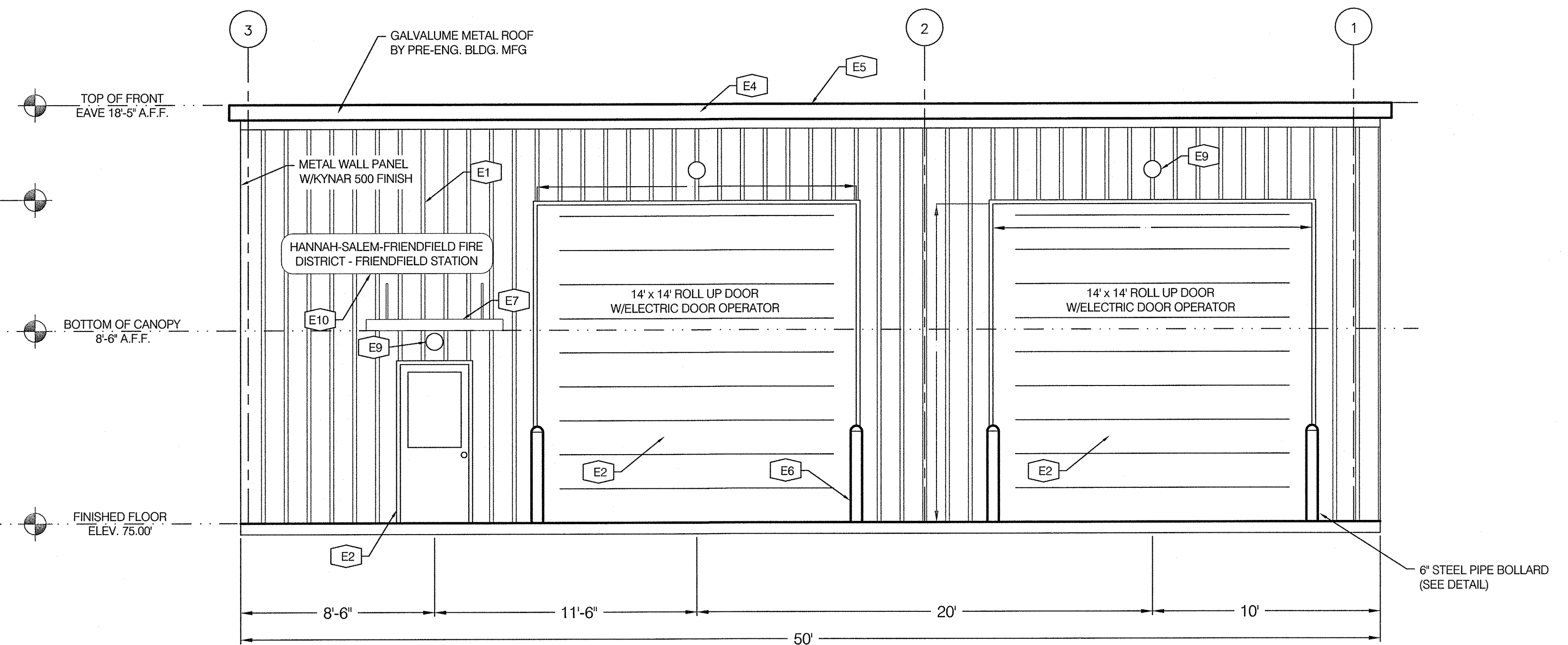
DESIGNED BY: JCS	CHECKED BY: MUF	DATE: May 04, 2016	SCALE: 1"=200'	COUNTY: FLORENCE	PROJECT #	DWG #	REVISION	
SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 31130 JAMES CORBETT SAWYER							DATE	NO.
SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 5025 ALIGNED ENGINEERING							DATE	NO.
HANNAH-FALEND-FRIENDFIELD FIRE DEPARTMENT NEW STATION AT FRIENDFIELD							DATE	NO.
EXISTING SITE CONDITIONS							DATE	NO.
PLAN SET: DESIGN							DATE	NO.
DATE: May 04, 2016							DATE	NO.
PROJECT: AE055							DATE	NO.
SHEET: C1.0							DATE	NO.

[illegible]



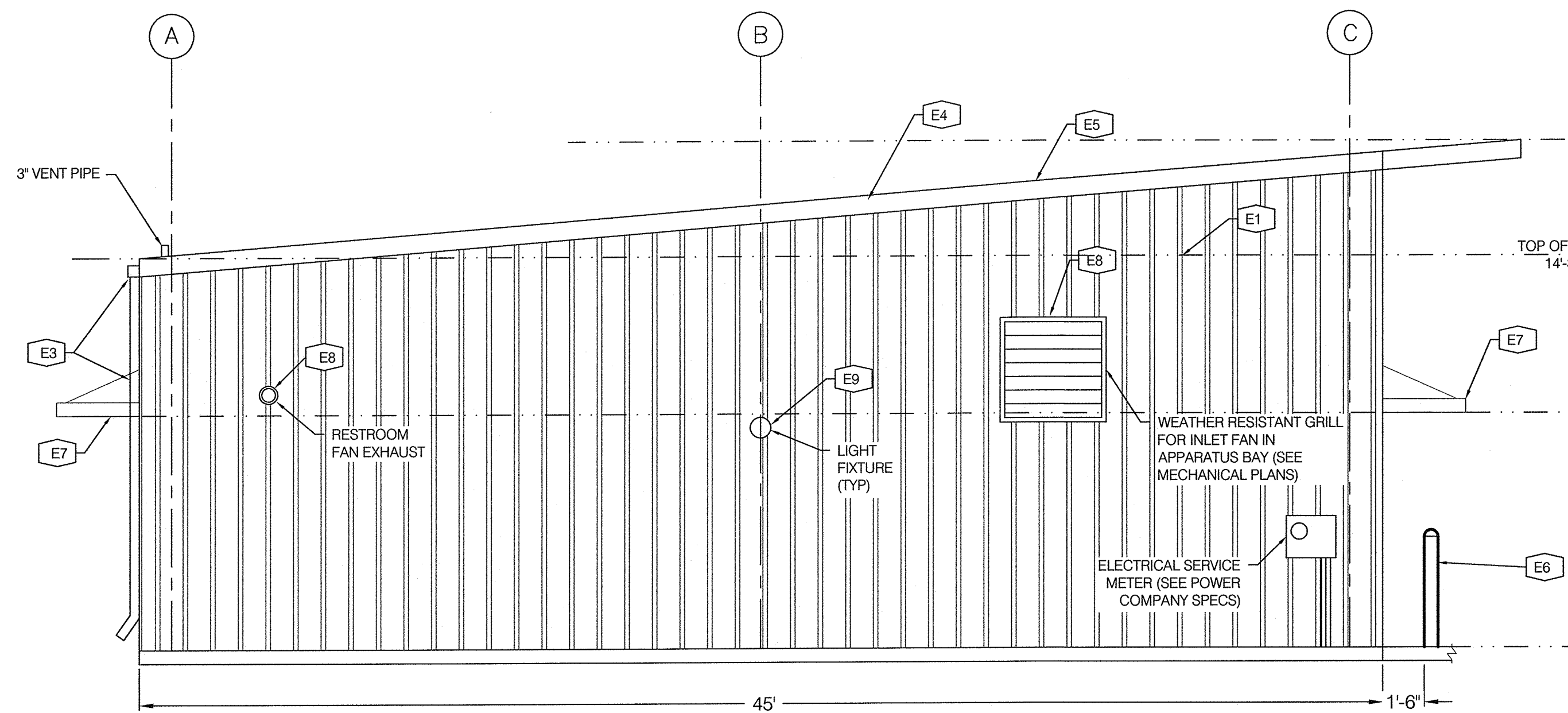
REAR ELEVATION

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



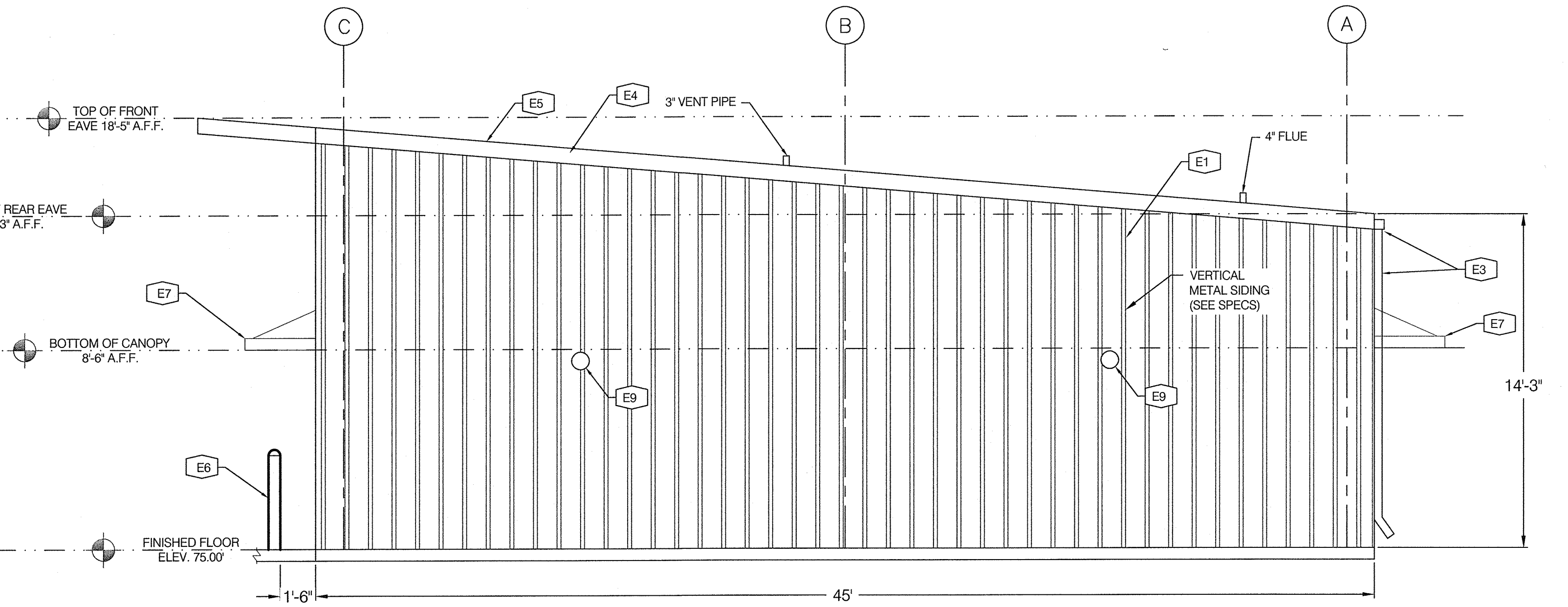
FRONT ELEVATION

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



LEFT SIDE ELEVATION

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



RIGHT SIDE ELEVATION

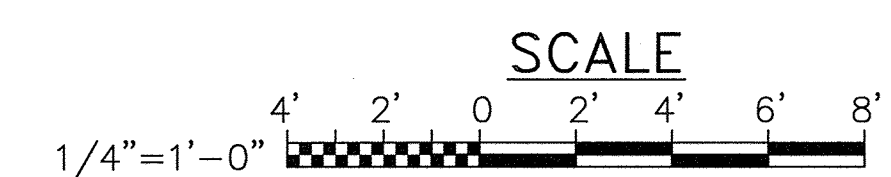
SCALE: 1/4" = 1'-0"

ELEVATION NOTES

- 1) ANY VISIBLE EXTERIOR BUILDING ELEMENT (I.E.: LIGHT FIXTURE, MECHANICAL LOUVER, ETC.) WHERE LOCATION IS NOT OTHERWISE INDICATED SHOULD BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
- 2) ROOF PENETRATIONS (I.E.: WASTE VENTS) TO RECEIVE PAINT (COLOR TO BE SELECTED BY THE ENGINEER).
- 3) MECHANICAL VENTS SHALL RECEIVE MANUFACTURER'S APPLIED PAINTED FINISH (CUSTOM COLOR TO BE SELECTED BY THE ENGINEER).

ELEVATION KEY NOTES

E1	METAL WALL PANELS	E5	STANDING SEAM METAL ROOF (GALVALUME)	E9	LIGHT FIXTURE (SEE ELECTRICAL DRAWINGS)
E2	DOOR AS SCHEDULED, TYPICAL	E6	STEEL BOLLARD (SEE PLAN FOR LOCATIONS)	E10	SIGNAGE / LOGO (BY ALLOWANCE, SEE SPECIFICATIONS)
E3	ALUMINUM GUTTER AND DOWNSPOUTS (DS)	E7	ALUMINUM CANOPY: PRE-ENGINEERED METAL BUILDING MANUFACTURER TO COORDINATE ATTACHMENT POINTS WITH CANOPY SUPPLIER. PROVIDE SUPPORT AS REQUIRED.		
E4	ALUMINUM CORNICE / RAKE TRIM (MATCH GUTTER PROFILE)	E8	LOUVER / EXHAUST FAN, TYPICAL (SEE MECHANICAL DRAWINGS) - PROVIDE CUSTOM COLOR TO MATCH METAL BUILDING METAL WALL PANEL FINISH; PRE-ENGINEERED METAL BUILDING MANUFACTURER TO COORDINATE ATTACHMENT POINTS WITH SUPPLIER. PROVIDE SUPPORT AS REQUIRED.		



DESIGNED BY:	MAE	DATE:	AS05	REVISION:	BY
DRAWN BY:	LCS				
CHECKED BY:	MIF				
DATE:	May 04, 2016				
SCALE:	1/4" = 1'-0"				
COUNTY:	FRIENDFIELD				
PROJECT #:	AE055				
DWG. #:	AS05				
CAD:	AS05				

THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION, USE OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.

ALIGNED ENGINEERING

CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT

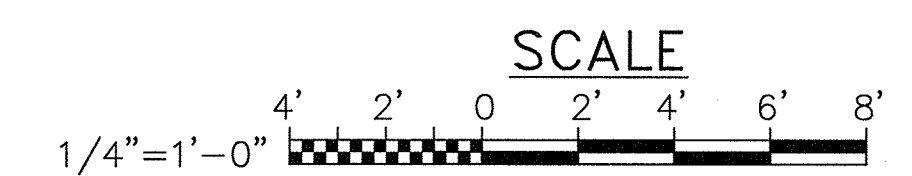
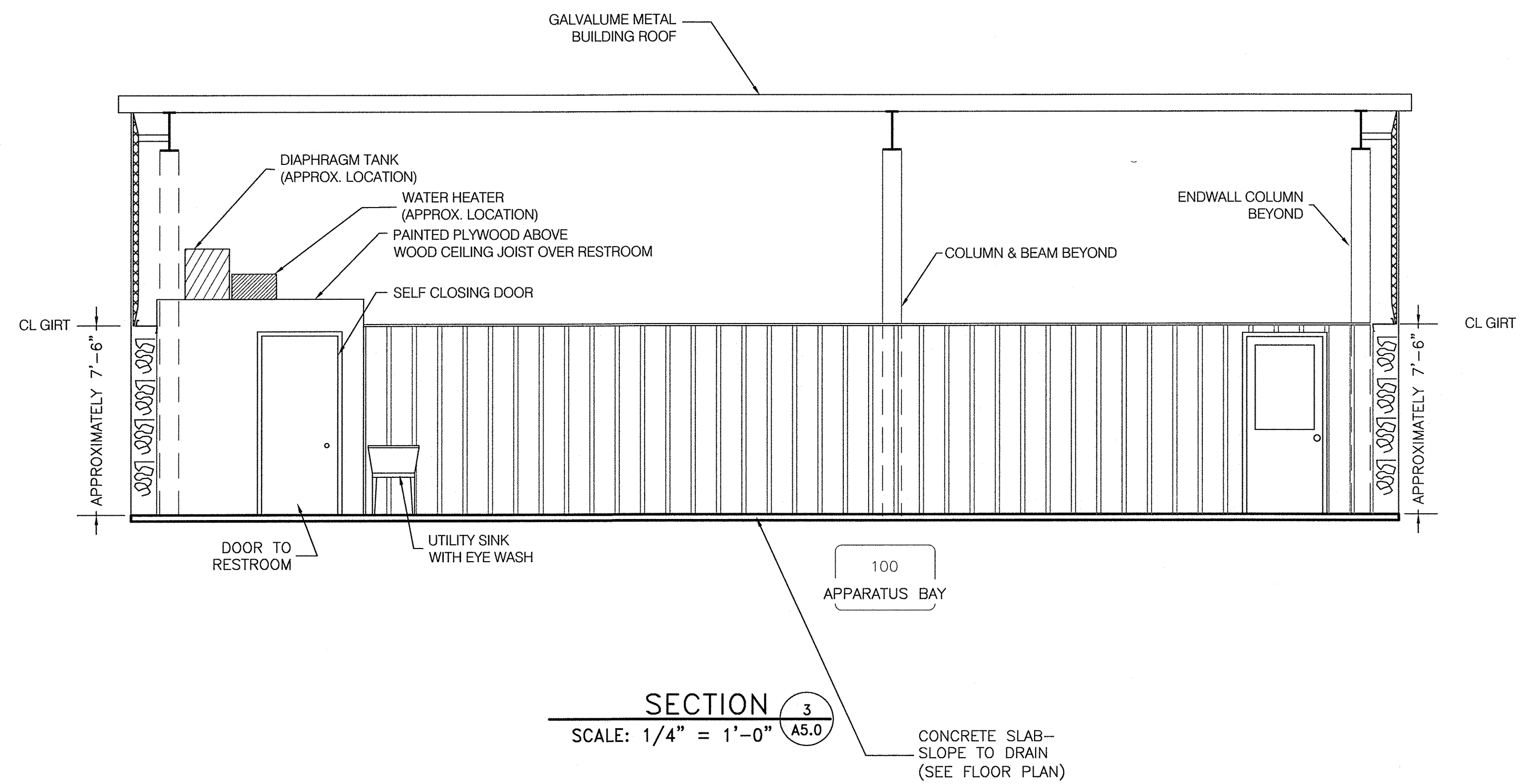
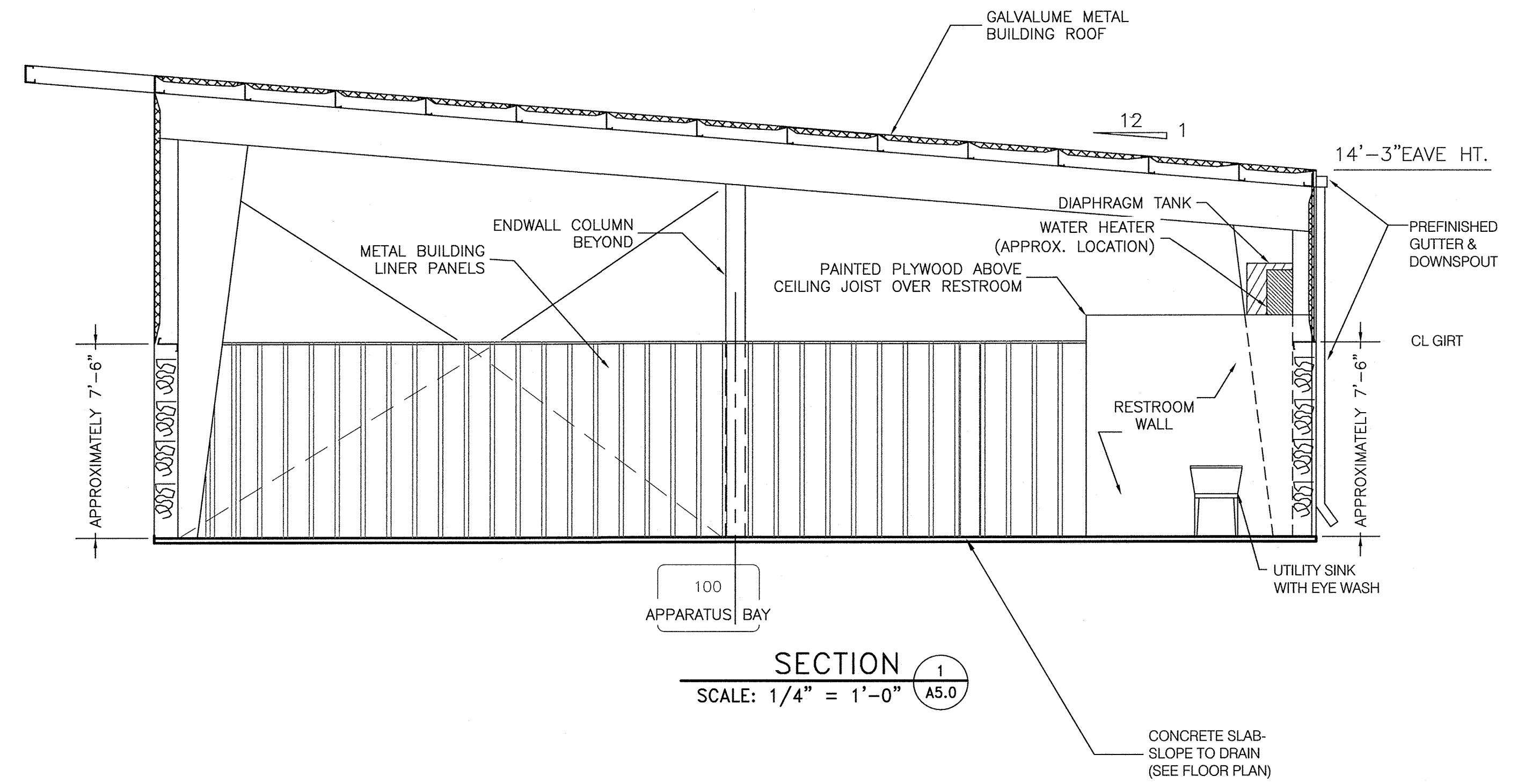
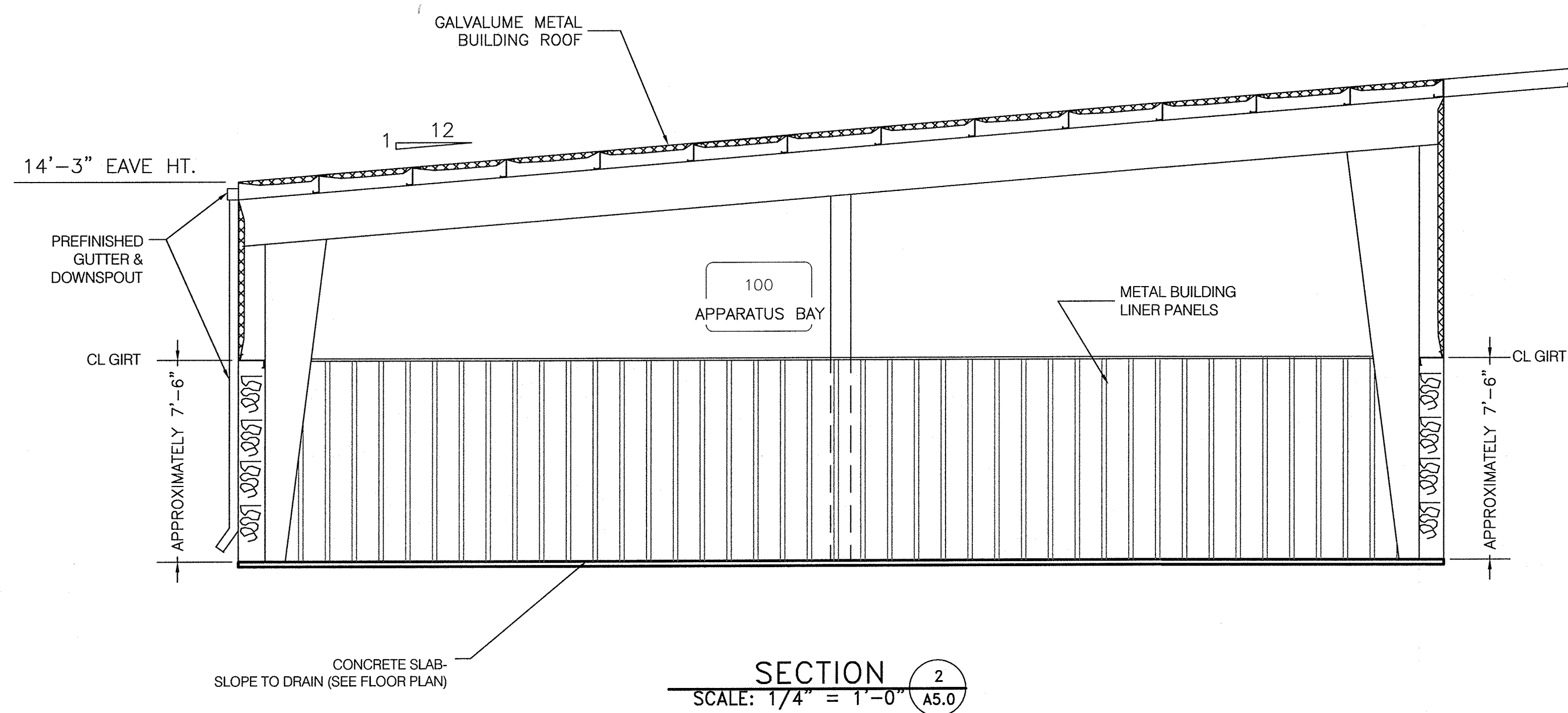
PLAN SET: NEW STATION AT FRIENDFIELD

DESCRIPTION: ELEVATIONS

DATE: May 04, 2016

PROJECT: AE055

SHEET: A3.0



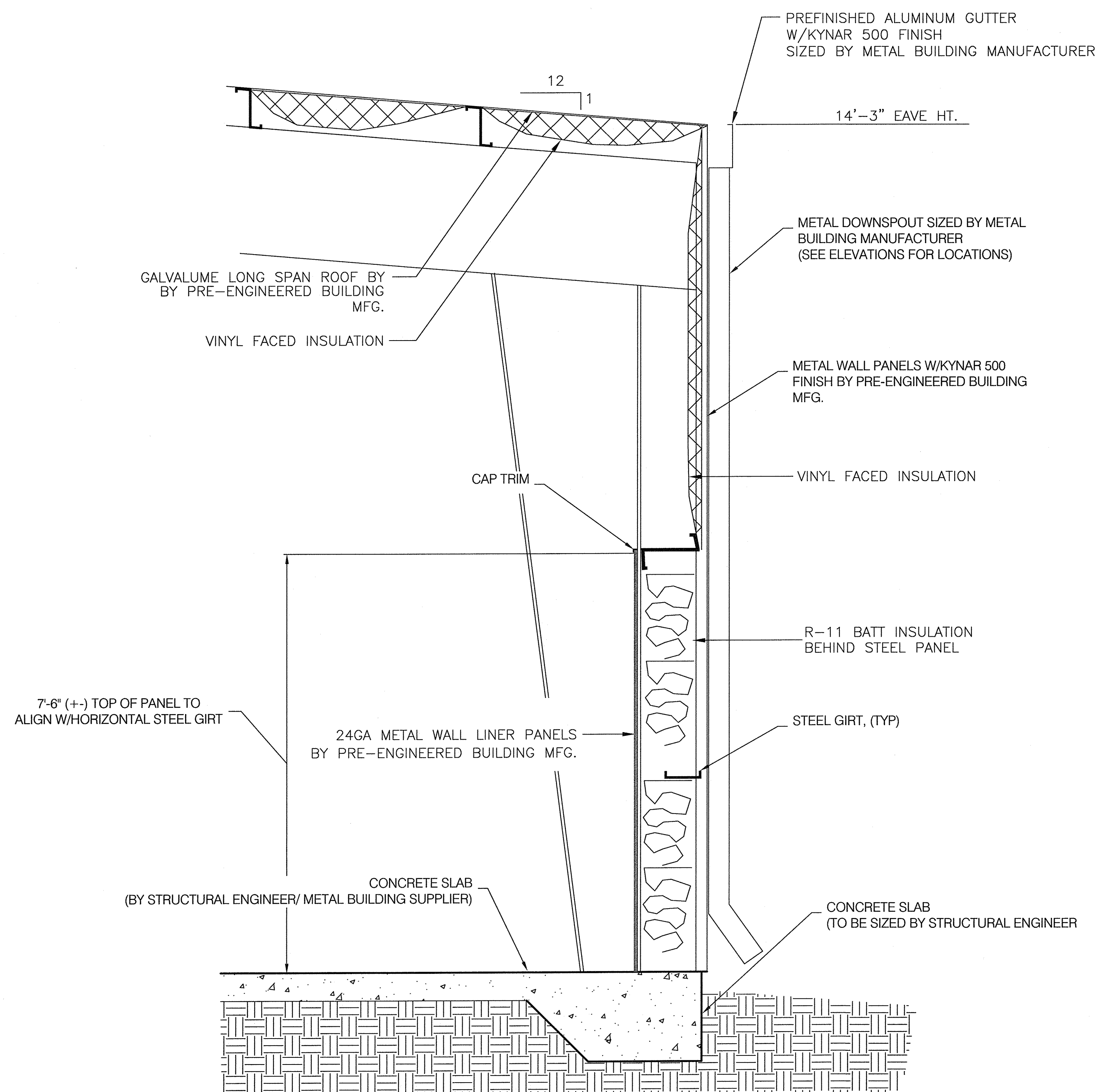
DESIGNED BY:	ME	DATE:	NO.	REVISION	BY
DRAWN BY:	UCS				
CHECKED BY:	MJE				
DATE:	May 04, 2016				
SCALE:	FRIENDFIELD				
COUNTY:	FLORENCE				
PROJECT #:	AE055				
DWG. #:	AS0				
CAD#: AS055-06-00016-00000					

--	--

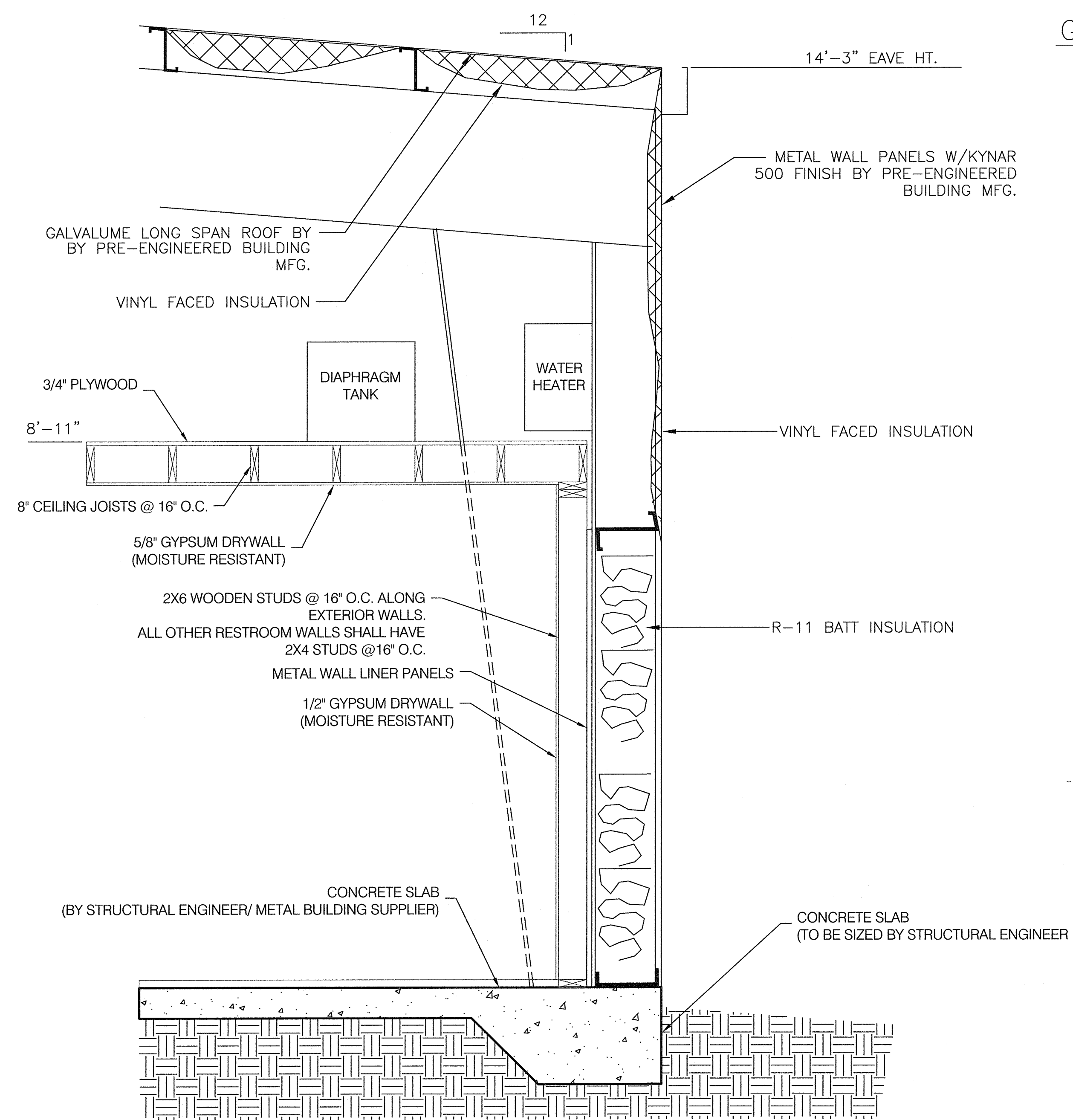
	<p>THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION, USE, OR DISSEMINATION OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.</p>
--	---

CLIENT:	HANNAH-SALEM FRIENDFIELD
PLAN SET:	FIRE DEPARTMENT
DESC:	NEW STATION AT FRIENDFIELD

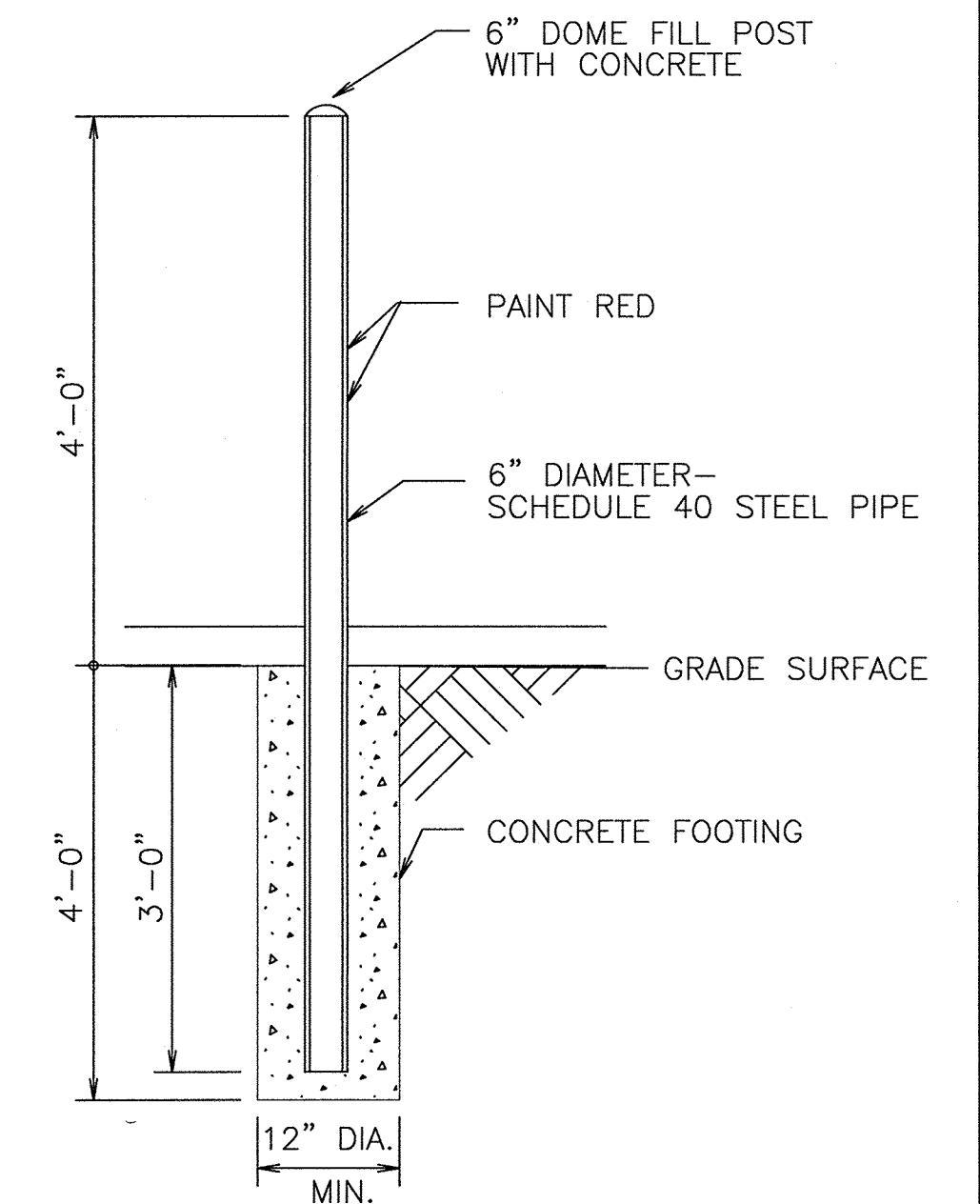
DESCRIPTION:	SECTIONS
PLAN SET:	DESIGN
DATE:	May 04, 2016
PROJECT:	AE055
SHEET:	AS.0



WALL SECTION @ BAY 5
SCALE: 3/4"=1'-0"



WALL SECTION @ RESTROOM 4
SCALE: 3/4"=1'-0"



GUARD POST DETAIL
N.T.S.

DESIGNED BY:	ME	DATE:	NO.	REVISION	BY
DRAWN BY:	JCS				
CHECKED BY:	MJE				
APPROVED BY:	MJE				
DATE:	May 04, 2016				
SCALE:	AS SHOWN				
COUNTY:	FLORENCE				
PROJECT #:	AE055				
DWG #:	AS0				
CAD:	AE055.dwg, 050316, #01.dwg				

CLIENT:	HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT
PLAN SET:	NEW STATION AT FRIENDFIELD
DESC:	WALL SECTIONS

DESCRIPTION:	WALL SECTIONS
PLAN SET:	DESIGN
DATE:	May 04, 2016
PROJECT:	AE055
SHEET:	A6.0

GENERAL (PG)

PG-2 PERMITS: APPLY AND PAY FOR ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ANY PUBLIC AUTHORITY HAVING JURISDICTION. ACREAGE CHARGES, FACILITIES CHARGES AND BOND PROPERTY ASSESSMENTS ARE NOT TO BE CONSTRUED TO BE A PART OF THIS CONTRACT.

PG-4. SUBSTITUTIONS: THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH SUBSTITUTION TO SPECIFIED PLUMBING FIXTURES AND EQUIPMENT INCLUDING BUT NOT LIMITED TO; PROVIDING MAINTENANCE ACCESS CLEARANCE, PIPING, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC. AND ANY MODIFICATIONS TO ASSOCIATED MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS REQUIRED BY THE EQUIPMENTS INSTALLATION INSTRUCTIONS. ALL COSTS ASSOCIATED WITH SUBSTITUTIONS SHALL BE INCLUDED IN THE ORIGINAL BASE BID.

PG-6 PLUMBING PLANS SHALL NOT BE SCALED. REFERENCE THE ARCHITECTURAL PLANS FOR ALL LOCATIONS OF PLUMBING FIXTURES, WALLS, DOORS, WINDOWS, ETC.

PG-7 PLUMBING SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO: PLUMBING FIXTURES AND EQUIPMENT, FIRE STOPPING
SEISMIC BRACING, PIPE IDENTIFICATION, DOMESTIC WATER SYSTEM, SANITARY WASTE AND VENT SYSTEM, LP GAS
PIPING.

PG-9 VERIFY PROPER OPERATION OF EXISTING SYSTEMS BEFORE STARTING CONSTRUCTION. NOTIFY THE ARCHITECT/ENGINEER OF RECORD OF ANY PROBLEMS OR DISCREPANCIES BETWEEN THE OBSERVED SYSTEM BEFORE CONTINUING WORK IN THE EFFECTED AREAS.

PG-11 ALL PIPING SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA.

PG-12 ALL VALVES, BACKFLOW PREVENTERS, BOOSTER PUMPS, ETC. SERVING THE DOMESTIC WATER SYSTEM SHALL MEET LEAD FREE STANDARDS PER ANSI/NSF 372 AND NSF 61, ANNEX G.

INSTALLATION (PI)

PI-2 PLUMBING FIXTURES AND EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS.

PI-3 CUT WALLS, FLOORS AND CEILINGS AS REQUIRED FOR INSTALLATION OF PLUMBING WORK. ALL CUTTING SHALL BE HELD TO A MINIMUM. PATCH AND FINISH SURFACES TO MATCH ADJOINING SURFACES.

PI-4 PLUMBING PIPING AND SPECIALTIES SHALL BE LOCATED CONCEALED IN WALLS, PARTITIONS OR ABOVE CEILINGS UNLESS NOTED OTHERWISE. PLUMBING PIPING IN EXPOSED AREAS SHALL BE RUN TIGHT TO UNDERSIDE OF STRUCTURE. PROVIDE ACCESS DOORS FOR CONCEALED SPECIALTIES.

PI-5 PROVIDE ACCESS DOORS FOR VALVES, WATER HAMMER ARRESTORS, TRAP PRIMERS, ETC. CONCEALED IN MASONRY WALLS, GYPBOARD WALLS AND/OR CEILINGS THAT WILL REQUIRE MAINTENANCE ACCESS.

PI-6 PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.

PI-7 PIPE IDENTIFICATION:

1. PIPE IDENTIFICATION SHALL MATCH THE FACILITY'S EXISTING STANDARD. IF NO STANDARD EXISTS, THEN THE PIPE IDENTIFICATION SHALL BE IN ACCORDANCE WITH ANSI A13.1.
2. PROVIDE PIPING LABELS FOR ALL PLUMBING PIPING. PIPING LABELS SHALL BE ACRYLIC FACED, WRAP-AROUND TYPE. EACH LABEL SHALL INDICATE THE PIPING CONTENTS, DIRECTION OF FLOW AND SHALL BEAR THE MANUFACTURER'S STANDARD COLOR FOR THE SERVICE INDICATED.

PIPE PENETRATIONS (PP)

PP-1 FIRE STOP ALL PENETRATIONS, BY PIPING OR CONDUITS, OF FIRE RATED WALLS, FLOORS, AND PARTITIONS. PROVIDE A DEVICE(S) OR SYSTEM(S) WHICH HAS BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E-814 AND INSTALL IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE A DEVICE(S) OR SYSTEM(S) WITH AN 'I' RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED. REFER TO ARCHITECTURAL PLANS FOR WALL AND FLOOR TYPES

PP-2 PLUMBING PIPING, VENTS, ETC. EXTENDING THROUGH EXTERIOR WALLS AND/OR THE ROOF SHALL BE FLASHED AND COUNTER FLASHED IN A WATERPROOF MANNER. COORDINATE FLASHING WITH THE GENERAL CONTRACTOR.

PP-3 DO NOT INSTALL PLUMBING PIPING IN AREAS SUBJECT TO FREEZING TEMPERATURES. INSTALL PLUMBING PIPING SHOWN IN EXTERIOR WALLS ON THE CONDITIONED SIDE OF THE WALL INSULATION.

SEISMIC BRACING (PB)

PB-1 PROPERLY SUPPORT AND BRACE VERTICALLY AND HORIZONTALLY ALL PIPING, APPARATUS, EQUIPMENTS, ETC. ACCORDANCE WITH APPLICABLE CODES TO PREVENT EXCESSIVE MOVEMENT DURING SEISMIC CONDITIONS.

PB-2 ATTACH HANGERS TO STRUCTURE, HANGERS SHALL NOT ATTACH TO THE DECK.

DOMESTIC WATER PIPING (DW)

DW-1 DOMESTIC WATER PIPING AND JOINTS BELOW GRADE: PROVIDE PEX PIPING AND JOINTS.

DW-2 DOMESTIC WATER PIPING AND JOINTS ABOVE GRADE; PROVIDE PEX PIPE AND JOINTS

DW-3 STERILIZE THE DOMESTIC WATER SYSTEM IN ACCORDANCE WITH THE AMERICAN WATER WORKS ASSOCIATION'S SPECIFICATIONS AND LOCAL HEALTH DEPARTMENT REGULATIONS.

DW-4. INSULATE DOMESTIC WATER PIPING ABOVE GRADE (EXCEPT EXPOSED CONNECTIONS TO PLUMBING FIXTURES) WITH GLASS FIBER INSULATION HAVING A VAPOR BARRIER AND JACKET. PIPE INSULATION SHALL HAVE A CONDUCTIVITY NOT EXCEEDING 0.27 BTUH X SQ. FT. FOLLOW SCHEDULE BELOW:

SERVICE TYPE	PIPE SIZE	MODEL FROM PROFILES
DOMESTIC HOT WATER	1/2" - 1 1/4"	1"
DOMESTIC COLD WATER	1/2" - 1 1/4"	1/2"
DOMESTIC COLD WATER	1 1/2" - 4"	1"

DW-5 DOMESTIC WATER PIPING INSULATION, JACKETS, COVERINGS, SEALERS, MASTICS, AND ADHESIVES ARE REQUIRED TO MEET A FLAME-SPREAD RATING OF 25 OR LESS AND A SMOKE-DEVELOPED RATING OF 50 OR LESS, AS TESTED BY ASTM E84 (NFPA 255) METHOD AND SHALL BE PLENUM RATED. PROVIDE PVC JACKET FOR EXPOSED PIPING IN MECHANICAL ROOMS.

DW-6 DOMESTIC WATER PIPING SHALL BE SLOPED FOR DRAINAGE WITH DRAIN VALVES INSTALLED AT LOW POINTS.

SANITARY WASTE AND VENT PIPING (SS)

SS-1 SANITARY WASTE PIPING BELOW GRADE: PROVIDE SERVICE WEIGHT CAST IRON HUB AND SPIGOT PIPE (ASTM A 74) WITH COMPRESSION JOINTS (CISPI HSN) AND NEOPRENE GASKETS (ASTM C 564) OR NO-HUB PIPE AND FITTINGS (CISPI 301) WITH NEOPRENE GASKET/STAINLESS STEEL CLAMP JOINTS (CISPI 310) OR PROVIDE SCHEDULE 40 PVC PIPE AND SOCKET FITTINGS (ASTM D 2665) WITH SOLVENT WELD JOINTS (ASTM D2855). FOAM CORE PIPE IS NOT APPROVED.

SS-2 SANITARY WASTE/VENT PIPING ABOVE GRADE: PROVIDE SERVICE WEIGHT CAST IRON NO-HUB PIPE AND FITTINGS (CISPI 301) WITH NEOPRENE GASKET AND STAINLESS STEEL CLAMP JOINTS (CISPI 310) OR PROVIDE SCHEDULE 40 PVC PIPE AND SOCKET FITTINGS (ASTM D 2665) WITH SOLVENT WELD JOINTS (ASTM D2855). FOAM CORE PIPE IS NOT APPROVED.

SS-3 SLOPE SANITARY WASTE PIPING AT 1/4" PER FOOT MINIMUM FOR PIPING 2 1/2" OR SMALLER AND 1/8" PER FOOT MINIMUM FOR PIPING 3" AND LARGER UNLESS PERMITTED OTHERWISE.

SS-4 PROVIDE CLEAN-OUTS AT EVERY TURN IN PIPING IN EXCESS OF 45 AND NO FURTHER THAN 100'-0" APART IN A LOCATION THAT PERMITS ACCESS FOR SERVICE WITHOUT DAMAGE TO THE BUILDING OR FINISHED MATERIALS

SS-5 PROVIDE FLOOR CLEANOUTS WITH TOPS DESIGNED TO MATCH SPECIFIC FLOOR FINISHES SUCH AS CARPET, TILE, ETC. YARD CLEANOUTS SHALL BE PROVIDED IN AN 18"x18"x6" CONCRETE PAD.

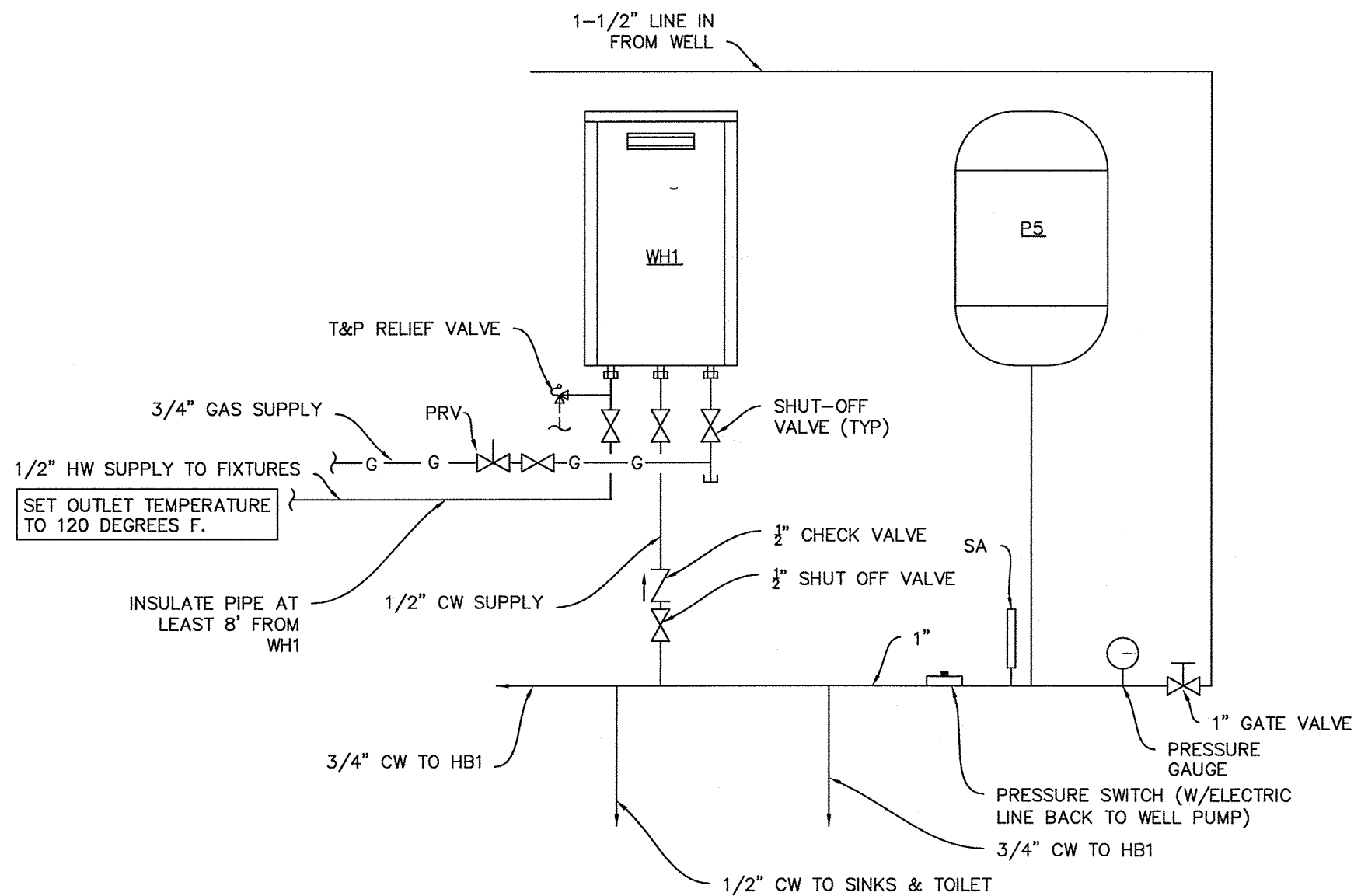
SS-6 WHERE WASTE PIPING IS EXPOSED IN REST ROOM AREAS, PROVIDE REMOVABLE P-TRAPS, MATCHING STOPS AND ESCUTCHEONS FOR ALL LAVATORIES.

SYMBOL	DESCRIPTION	CONNECTIONS (IN.)				SPECIFICATION	REMARKS
		W	V	CW	HW		
P1	WATER CLOSET, HET ADA COMPLIANT ELONGATED BOWL FLOOR MOUNTED FLUSH TANK, 1.28 GPF	4"	2"	1/2"	—	FIXTURE: AMERICAN STD. 211AA.104 "CHAMPION" SEAT: CHURCH 9500CT STOP: McGUIRE 185-LK MATERIAL: VITREOUS CHINA COLOR: WHITE	SEAT HEIGHT 17"—19" PROVIDE LEVER ON WIDE SIDE OF STALL.
P2	LAVATORY ADA COMPLIANT 20"x18" WLL MOUNTED 0.5 GPM FAUCET	2"	1½"	1/2"	1/2"	FIXTURE: AMERICAN STD. 0355.012 "LUCERNE" GRID DRAIN: McGUIRE 155A GRID STRAINER FAUCET: MOEN 8210FD5 (LEVER HANDLES) P=TRAP: McGUIRE 8902 1½" X 1½" STOPS: McGUIRE 175-LK	SEE NOTE 1 BELOW SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. PROVIDE 0.5 GPM AERATOR
P3	S.S. UTILITY SINK FREE STANDING (24"x24" BOWL) WALL MOUNTED SERVICE FAUCET	1 1/2"	1½"	1/2"	1/2"	FIXTURE: JUST F-127 DRAIN: JUST J-35-SF FAUCET: JUST JVB-1200 P=TRAP: McGUIRE 8912 1½"x1½" STOPS: McGUIRE 175	
HB1	HOSE BIBB, EXPOSED NON-FREEZE, AUTOMATIC DRAINING ANTI-SIPHON VACUUM BREAKER	—	—	3/4"	—	EQUIPMENT: WOODFORD 25 WHEEL HANDLE	EXTERIOR: MOUNT 18" AFF. INTERIOR: MOUNT 24" AFF.
FCO	FLOOR CLEANOUT CAST IRON BODY ADJUSTABLE TOP	4"	—	—	—	CLEANOUT: JAY R. SMITH 4020 SERIES OUTLET: NO-HUB PLUG: ABS, IRON OR BRONZED WITH GASKET SEAL COVER: ROUND, NICKEL BRONZE	
YCO	YARD CLEANOUT ADJUSTABLE, CST IRON BODY, COATED CAST IRON TOP	4"	—	—	—	CLEANOUT: JAY R. SMITH 4050 SERIES OUTLET: NO-HUB PLUG: ABS, GASKET SEAL COVER: CAST IRON, HEAVY DUTY	SET IN CONCRETE PAD 18"W X 18"L X 6" THICK
FD1	FLOOR DRAIN CAST IRON BODY ADJUSTABLE TOP	2"	—	—	—	DRAIN: ZURN INDUSTRIES STRAINER: 5" DIA, TYPE —, NICKEL BRONZE P=TRAP: DEEP SEAL (MATCH DRAIN SIZE)	
SA	SHOCK ARRESTOR	—	—	1/2"	—	SIoux CHIEF 650 SERIES WATTS PPP, INC	PDI WH201 STANDARD DESIGNATION "A" INSTALL PER PDI WH201 GUIDELINES
WH1	GAS FIRED TANKLESS WATER HEATER	—	—	1"	1"	NORITZ MODEL WC1991-OD-LP FLUE SIZE: PER MFG GAS INLET PRESSURE: 8" WC BTU/HR INPUT: 198000 FLOW RATE AT 80°F RISE: 4.6	EQUIV MFG: RINNAI, TAKAXX ELEC RMTS: 120v 15 AMP BREAKER
P-4	EYE WASH (FAUCET MOUNT)	—	—	—	—	ITEM# BUKUO MFR. MODEL# OK II LAB UNSPSC# 46181810	
P-5	DIAPHRAGM TANK	—	—	—	—	UTILITECH 52-GALLON VERTICAL PRESSURE TANK, 50 PSI RATED	
TD1	TRENCH DRAIN PRE-CAST POLYESTER CONCRETE DUCTILE IRON GRATE 6" WIDECHANNEL SECTIONS	—	—	—	—	DRAIN: SMITH 9820 GRATE: SMITH 8970-465D-MS	EXTRA HEAVY DUTY GRATE (TRAFFIC RATED)

NOTES:

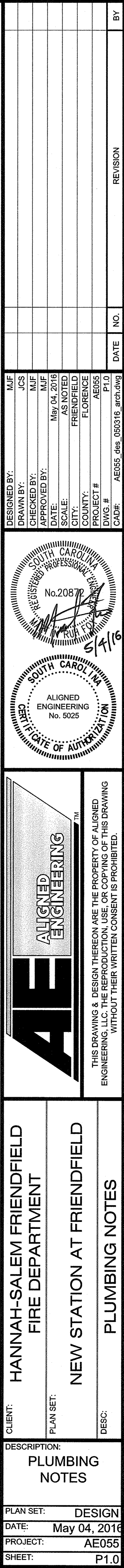
1. PROVIDE PRE-MANUFACTURED INSULATION KIT FOR EXPOSED TRIM UNDER SINK.
2. PROVIDE SURESEAL INLINE FLOOR DRAIN TRAP SEALER IN FLOOR DRAIN FOR WATERLESS TRAP PRIMER.

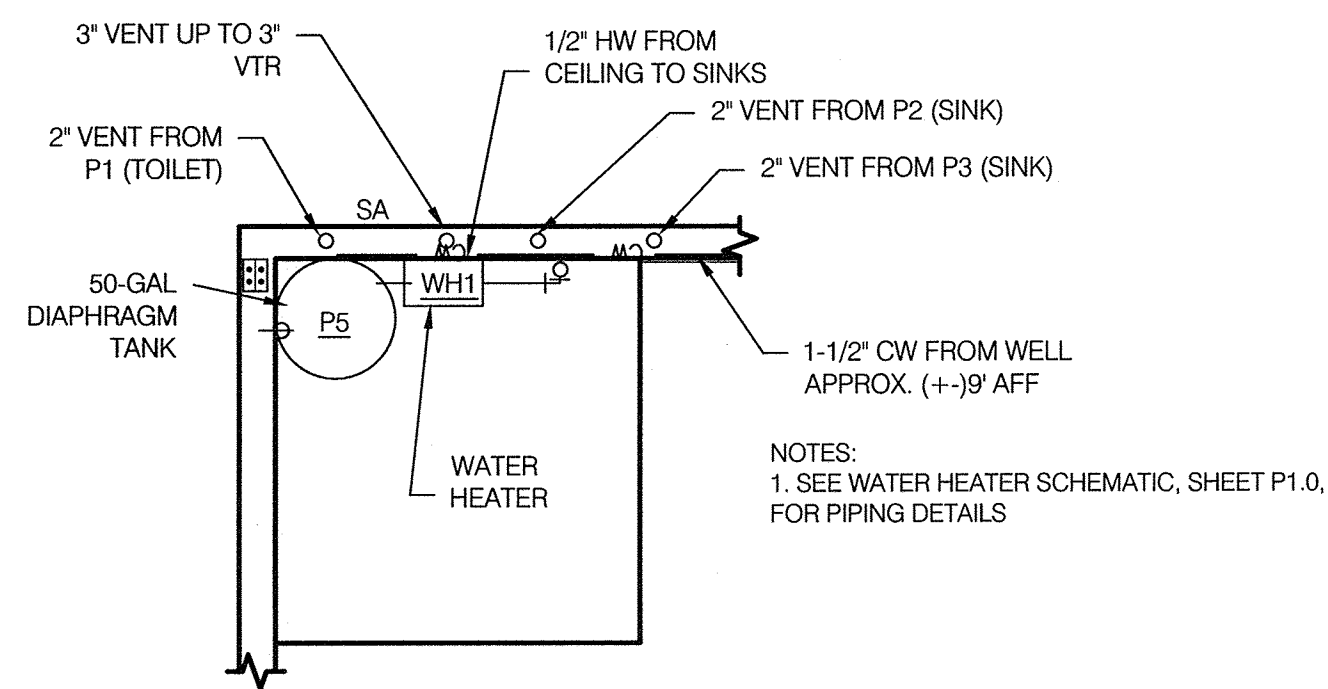
<p>APPROVED EQUALS: THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MODEL WHICH MOST CLOSELY MATCHES THE SPECIFIED PRODUCT. PROVIDE PRODUCTS MADE BY THE MANUFACTURER'S LISTED.</p>	<p>SPECIFIED PRODUCT:</p> <p>AMERICAN STANDARD (VITREOUS CHINA FIXTURES) MOEN (FAUCETS) ELKAY (S.S. SINKS) McGUIRE (SUPPLY STOPS) JAY R. SMITH (DRAINS, CLEANOUTS)</p>	<p>ACCEPTED EQUAL:</p> <p>KOHLER, ELIJER, TOPO DELTA, KOHLER, AMERICAN STANDARD JUST, ACCORD BRASSCRAFT, E.B.C. JURN, WADE</p>
---	--	--



WATER HEATER SCHEMATIC

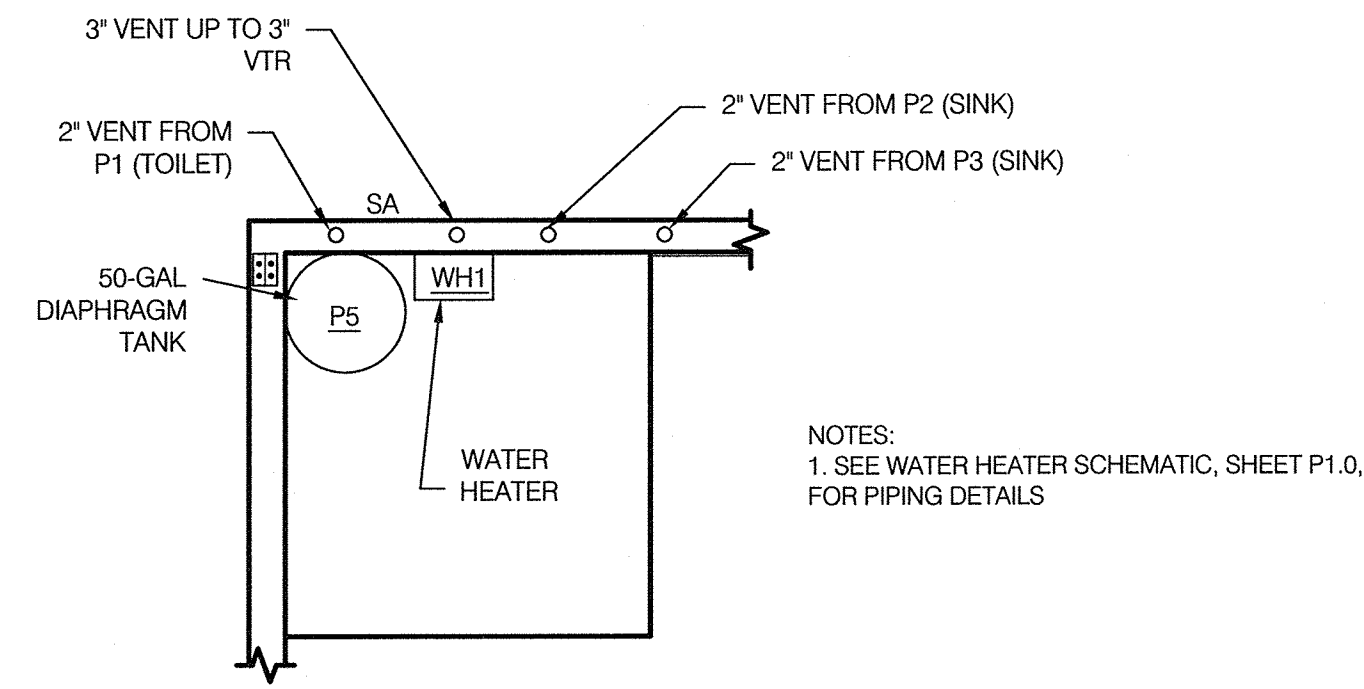
ABBR	DESCRIPTION
CW	COLD WATER PIPING
HW	HOT WATER PIPING
W	SANITARY WASTE PIPING
V	SANITARY VENT PIPING
G	GAS PIPING
D	DRAIN
-	ELBOW DOWN
-	ELBOW UP
-	PIPE CAP
GV	GATE VALVE
CV	CHECK VALVE
-	DIRECTION OF FLOW
-	REDUCER
FCO	FLOOR CLEAN OUT
YCO	YARD CLEAN OUT
FD	FLOOR DRAIN
HB	HOSE BIBB/WALL HYDRANT
SA	SHOCK ARRESTOR





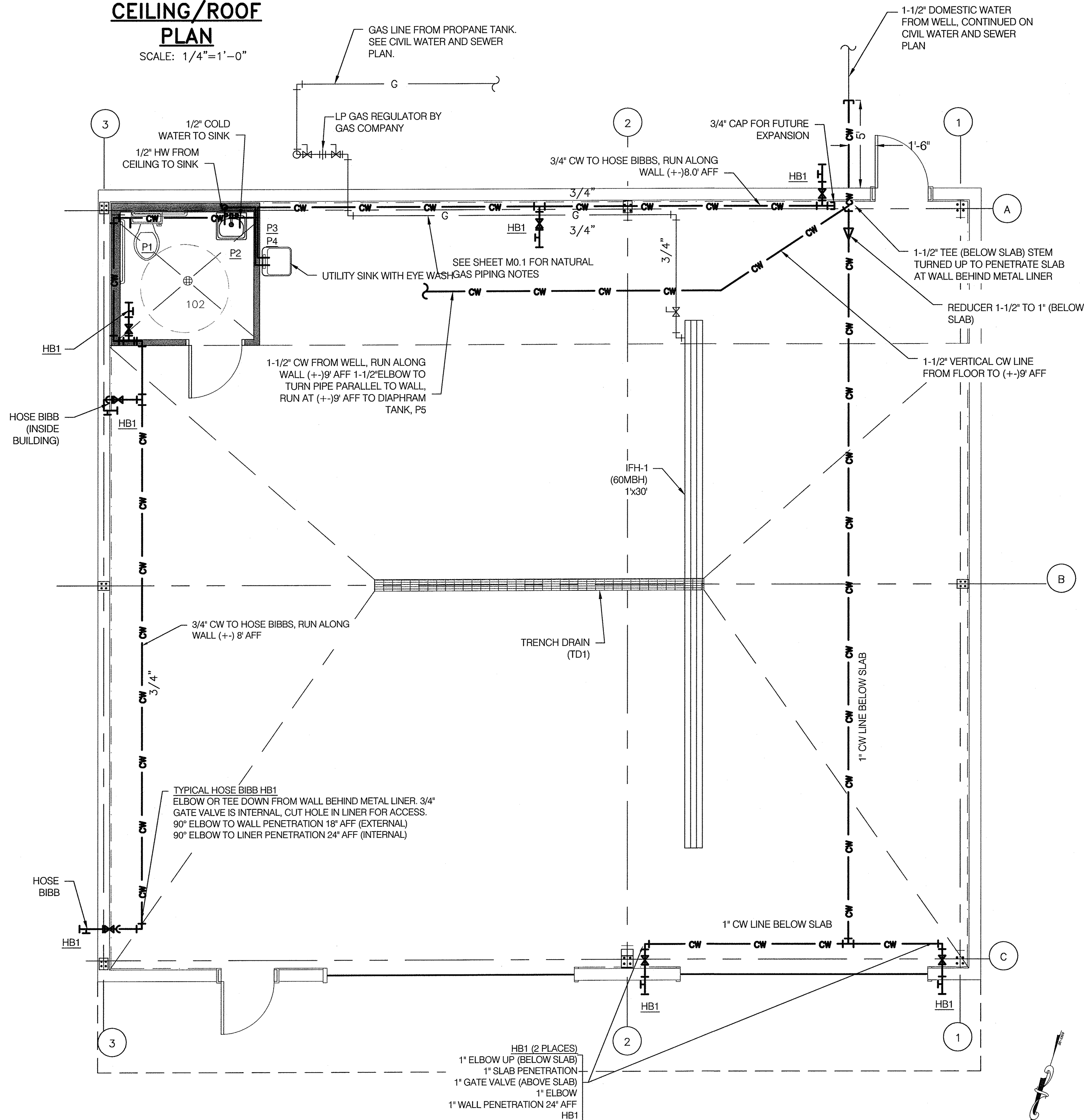
RESTROOM CEILING/ROOF PLAN

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



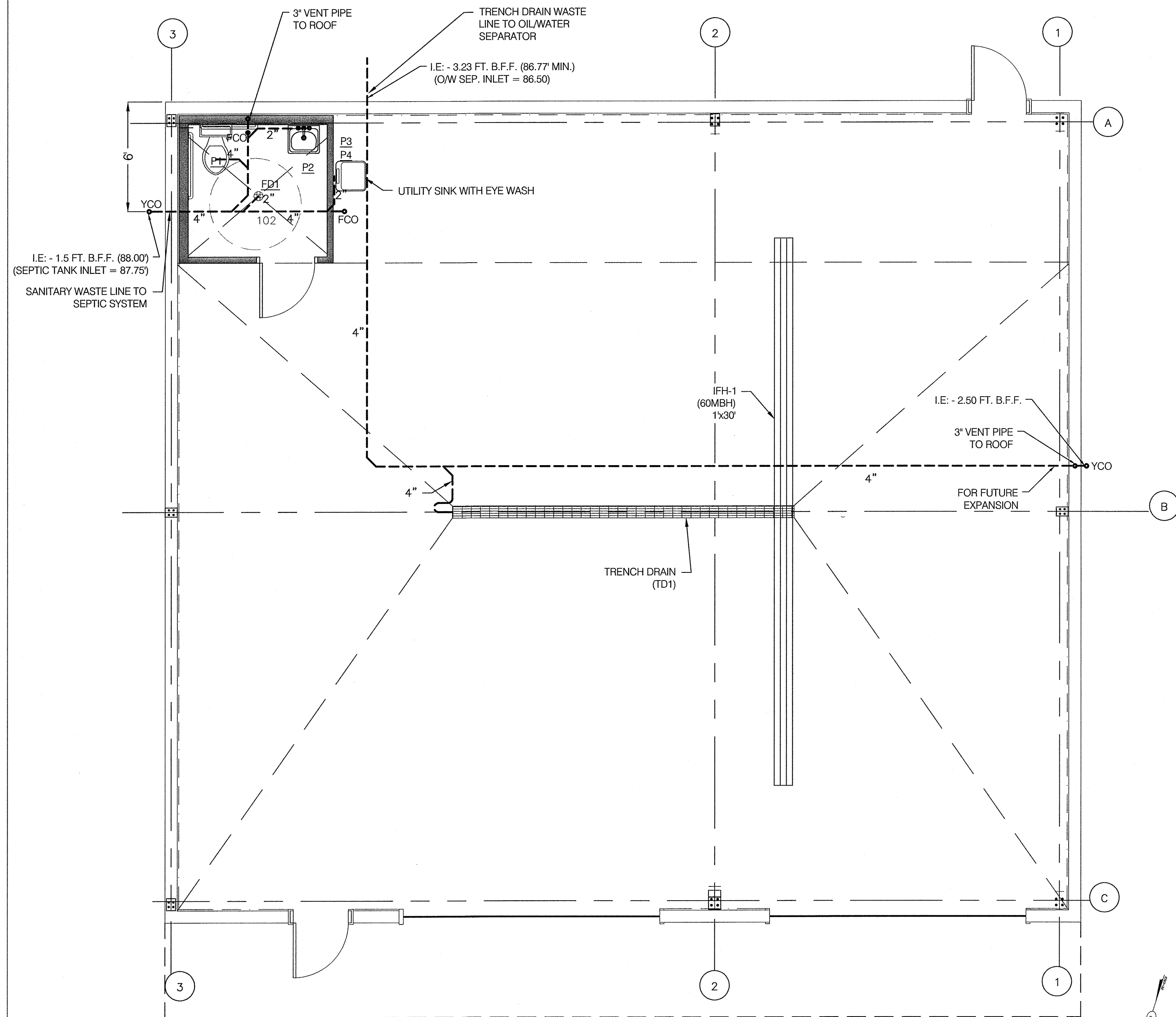
RESTROOM CEILING/ROOF PLAN

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



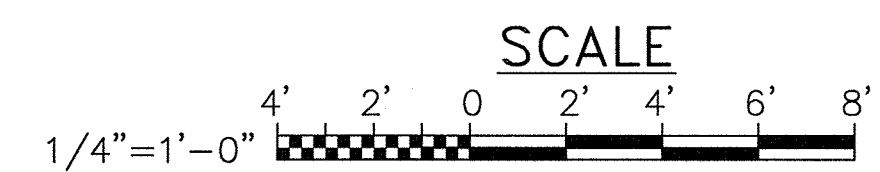
WATER PLUMBING PLAN

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






SEWER PLUMBING PLAN

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



DESIGNED BY: MJE	CHECKED BY: MJE	APPROVED BY: MJE	DATE: May 04, 2016	SCALE: 1/4"=1'-0"	COUNTY: FLORENCE	PROJECT #	DATE	NO.	REVISION	BY
<div> <div> </div> <div> </div> </div>										
<div> <div> </div> <div> <p>CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT</p> <p>PLAN SET: NEW STATION AT FRIENDFIELD</p> <p>DESC: PLUMBING PLANS</p> </div> </div>										
<div> <div> <p>PLAN SET: DESIGN</p> <p>DATE: May 04, 2016</p> <p>PROJECT: AE055</p> <p>SHEET: P2.0</p> </div> <div> <p>DESCRIPTION: PLUMBING PLANS</p> </div> </div>										

[illegible]

<div> <div>  </div> <div> <p> AE ALIGNED ENGINEERING <small>TM</small> </p> </div> </div>	<p> THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION, USE, OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED. </p>	<div> <div>  </div> <div>  </div> </div>	<div> <div>DESIGNED BY: MRF</div> <div>CHECKED BY: MRF</div> <div>APPROVED BY: MRF</div> <div>DATE: May 04, 2016</div> <div>SCALE: AS NOTED</div> <div>PROJECT: FRIENDFIELD</div> <div>COUNTY: FLORENCE</div> <div>PROJECT #: AE055</div> <div>DWG. #: P3.0</div> <div>CADD: AE055.dwg 050316.dwg (arch.dwg)</div> </div>	<div> <div>DATE</div> <div>NO.</div> <div>REVISION</div> <div>BY</div> </div>
	<div> <div>CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT</div> <div>PLAN SET: NEW STATION AT FRIENDFIELD</div> <div>DESC: PLUMBING DETAILS</div> </div>	<div> <div>DESCRIPTION:</div> <div> <div>PLAN SET: DESIGN</div> <div>DATE: May 04, 2016</div> <div>PROJECT: AE055</div> <div>SHEET: P3.0</div> </div> </div>		

1. THE ARCHITECTURAL DRAWINGS ARE THE LEAD DRAWINGS FOR THE DIMENSIONING FOR THE PROJECT. CONSTRUCTION AND DETAILING DIMENSIONS SHALL BE TAKEN (OR INFERRED) FROM THE ARCHITECTURAL DRAWINGS.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY AND ALL THE DESIGN AND ERECTION OF TEMPORARY BRACING AND SHORING AS REQUIRED FOR STABILITY OF THE STRUCTURAL SYSTEM AND STRUCTURAL COMPONENTS DURING ALL PHASES OF CONSTRUCTION. MEANS AND METHODS ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. THE DESIGN PROFESSIONALS DO NOT CONTROL THE CONTRACTOR'S CHOICE OF BRACING OR SHORING TECHNIQUE, PROPORTION, OR QUALITY CONTROL IN PERFORMING THE WORK. SITE SAFETY OR SAFETY PROGRAMS ARE THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL, PLUMBING AND/OR VENDOR DRAWINGS FOR LOCATIONS OF DERESSED FLOOR AREAS, FLOOR CURBS, FLOOR TOPPINGS AND FLOOR SLOPES.
4. A QUALIFIED TESTING LABORATORY SHALL BE RETAINED TO PERFORM CONCRETE TESTS. A TEST REPORT SHALL BE TAKEN FOR EACH CYLINDER, EVERY 500 CUBIC YARDS (OR FRACTION THEREOF) OF EACH CONCRETE TYPE AND STRENGTH. THE CONCRETE CYLINDERS SHALL BE TAKEN AFTER WATER AND ADMIXTURES ARE ADDED TO THE MIX. ONE CYLINDER SHALL BE TESTED AT 7 DAYS, TWO AT 28 DAYS AND ADD THE FINAL 28-DAY CYLINDER. IT IS RECOMMENDED THAT THE TEST REPORTS SHALL BE SENT DIRECTLY TO THE GENERAL CONTRACTOR, OWNER, ARCHITECT AND STRUCTURAL ENGINEER.

1. THE BUILDING SWAY SHALL BE NO GREATER THAT H/180 (WHERE H= BUILDING EAVE HEIGHT) FOR WIND AND SEISMIC LOADS.
2. (TODD) WILKES ENGINEERING, LLC IS THE STRUCTURAL ENGINEER FOR THE FOUNDATION FOR THIS PROJECT. ALL OTHER STRUCTURAL DESIGN CONSIDERATIONS ARE BY OTHERS.
3. THE PRE-ENGINEERED METAL BUILDING FOR THIS PROJECT SHALL BE DESIGNED TO LOADS PRESCRIBED BY THE APPLICABLE EDITION OF THE INTERNATIONAL BUILDING CODE.
4. PRE-ENGINEERED METAL BUILDING COLUMN ANCHOR BOLTS TO EXTEND DOWN TO 4" FROM BOTTOM OF COLUMN FOOTING.

INTERNATIONAL BUILDING CODE (IBC), 2012 EDITION	
INTERNATIONAL MECHANICAL CODE (IMC), 2012 EDITION	
NATIONAL PLUMBING CODE (NPC), 2012 EDITION	
NATIONAL ELECTRIC CODE, NFPA 70, LATEST EDITION	
State Fire Marshall Regulations, latest revision	
ICC / ANSI - A117.1-2003, Accessible and Usable Buildings and Facilities	
AMERICANS WITH DISABILITIES ACT (ADA) - TITLE III, latest revision	
Consolidated Zoning Ordinance of Florence County	
BASIC CODE REVIEW INFORMATION	
OCCUPANCY (per IBC Chapter 3):	STORAGE (S-2)
TYPE OF CONSTRUCTION (per IBC Chapter 6):	
Construction Classification:	Type V-B
Is the Building Construction	
Protected or Unprotected	UNPROTECTED
Is the Building Construction of	
Combustible or Noncombustible Materials:	COM
Is the Building Provided with a	
Fire Protection Sprinkler System:	NO
LAND USE INFORMATION	
Municipality and/or County where	
project is located:	FLORENCE CO.
Is the Project in a Wetlands Area:	NO
SEISMIC DESIGN CRITERIA:	SEE STRUCTURAL DRAWINGS
WIND LOAD CRITERIA:	SEE STRUCTURAL DRAWINGS
WASTEWATER RETENTION:	SEE CIVIL DRAWINGS
NUMBER OF FLOORS:	1
BUILDING HEIGHT:	18'-5"

BUILDING ELEMENT	Rating as Designed	Rating as Required	Testing Agency & Design No.
STRUCTURAL FRAME (per IBC Table 601) Including columns, girders, trusses	0	0	
BEARING WALLS			
Exterior (per IBC Table 601 & 602)	0	0	
Interior (per IBC Table 601)	0	0	
NONBEARING WALLS & PARTITIONS			
Exterior (per IBC Table 602)	0	0	
Interior (per IBC Section 602)	0	0	
FLOOR CONSTRUCTION (per IBC Table 601) Including supporting beams & joists	0	0	
ROOF CONSTRUCTION (per IBC Table 601) Including supporting beams & joists	0	0	
FIREWALLS (per IBC Section 706)	N/A	0	
FIRE BARRIERS (per IBC Section 706)	N/A	N/A	
Separation of Occupancies	N/A	0	
Vertical Exit Enclosures	N/A	N/A	
Incidental Use Areas (per IBC Table 508.2 - Storage Rooms over 100 sq ft)	N/A	-	
SHAFT ENCLOSURES (per IBC Section 712)	N/A	1	
FIRE PARTITIONS (per IBC Sections 420.2 & 708)	N/A	30 MIN	
SMOKE BARRIERS (per IBC Section 709)	N/A	N/A	

FIRE ALARM

MANUAL FIRE EXTINGUISHERS

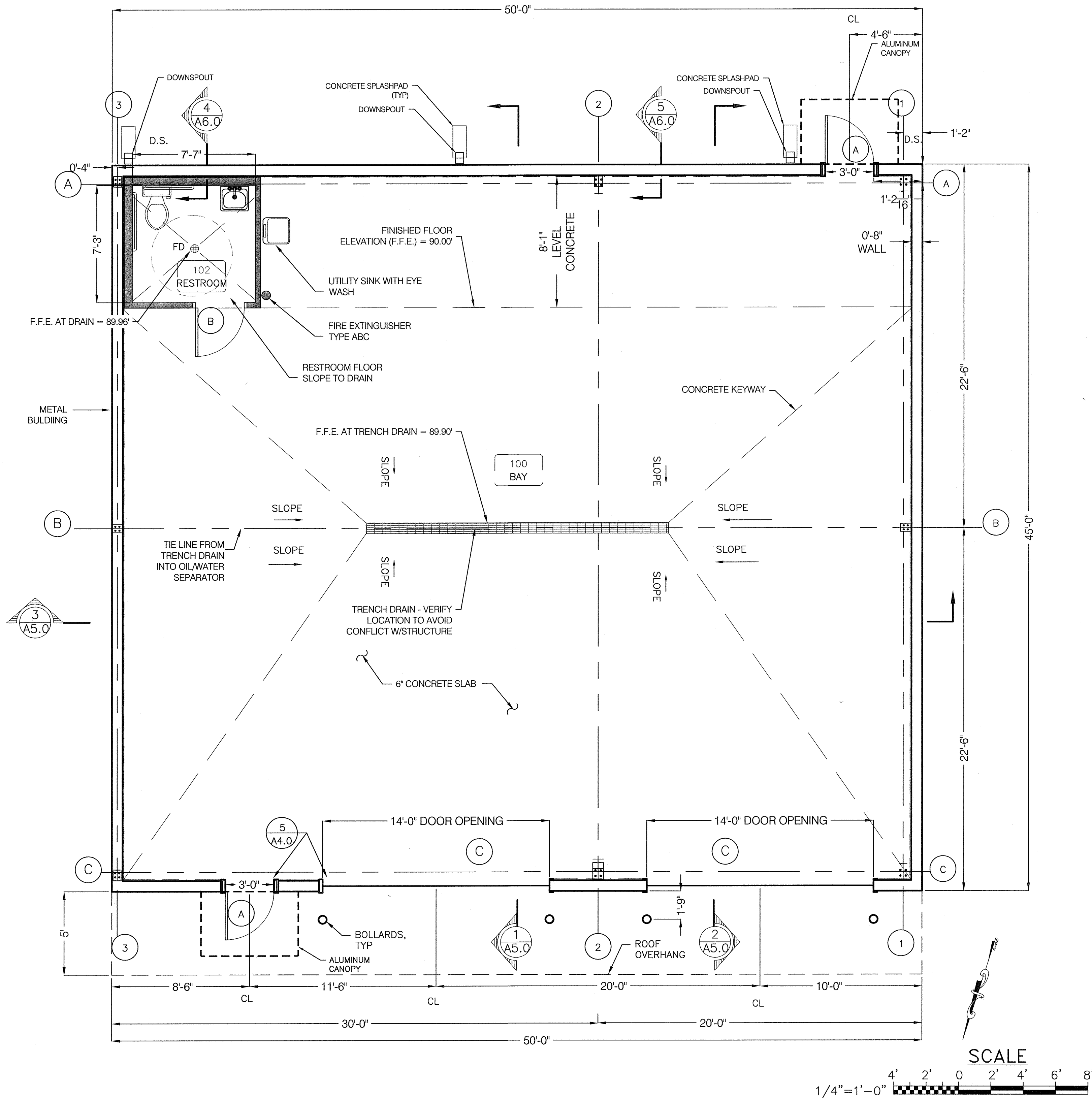
EXIT SIGNS

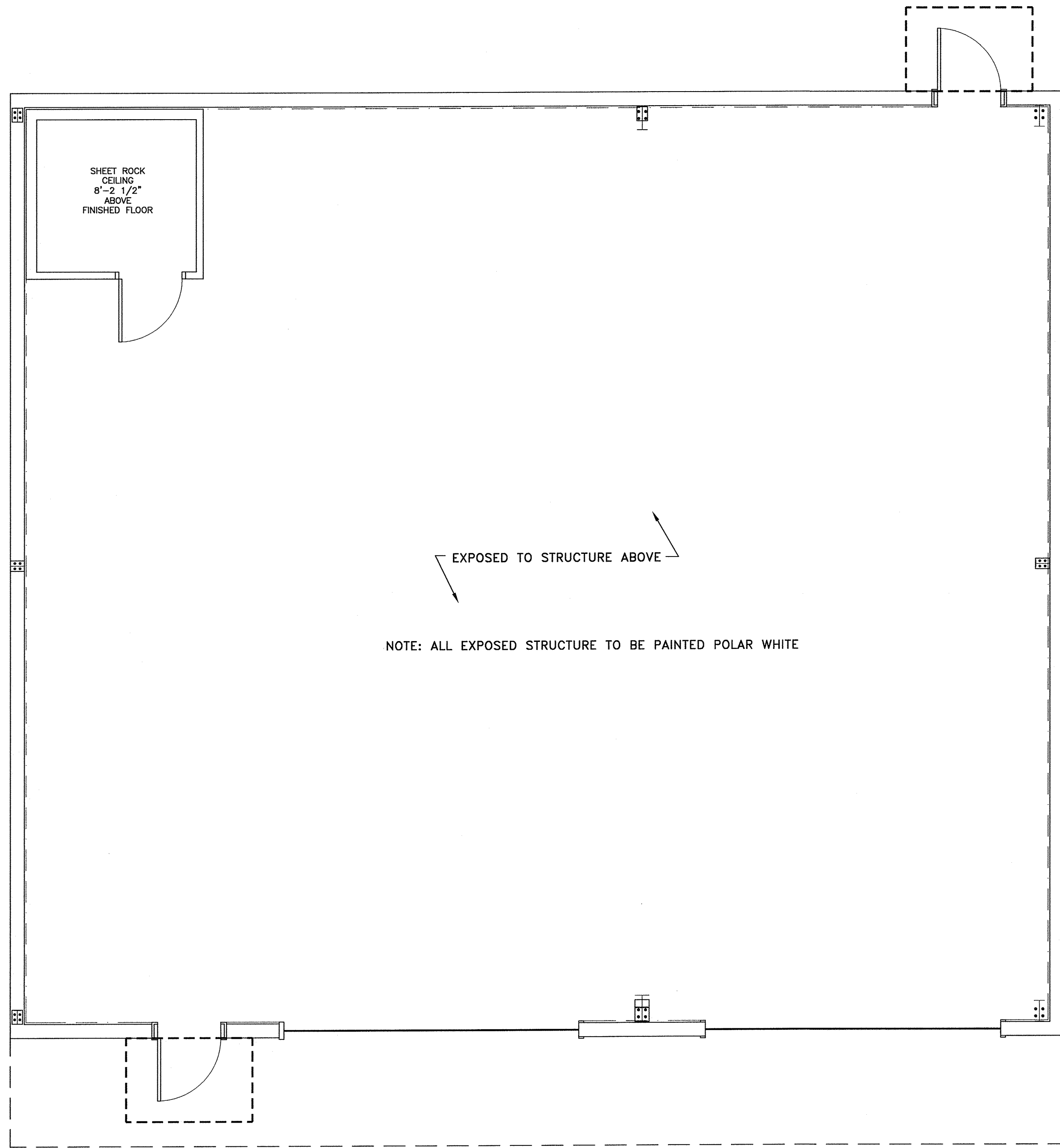
EMERGENCY / MEANS-OF-EGRESS LIGHTING

MINIMUM NO. OF PLUMBING FIXTURES REQUIRED (per IBC Table 2902.1)					
<u>WATER CLOSETS:</u>	Required (S-2):	1	Male: 0	Female: 0	Unisex: 1 (Per IBC 2902.2, Exception 2)
	Provided (S-2):	1	Male: 0	Female: 0	Unisex: 1 (Per IBC 2902.2, Exception 2)
<u>LAVATORIES:</u>	Required (S-2):	1	Male: 0	Female: 0	Unisex: 1 (Per IBC 2902.2, Exception 2)
	Provided (S-2):	1	Male: 0	Female: 0	Unisex: 1 (Per IBC 2902.2, Exception 2)
<u>DRINKING FOUNTAINS:</u>	Required (S-2):	0	(Per IBC 2902.1, Note "F")		
	Provided (S-2):	0			
<u>SERVICE SINK:</u>	Required (S-2):	1			
	Provided (S-2):	1			

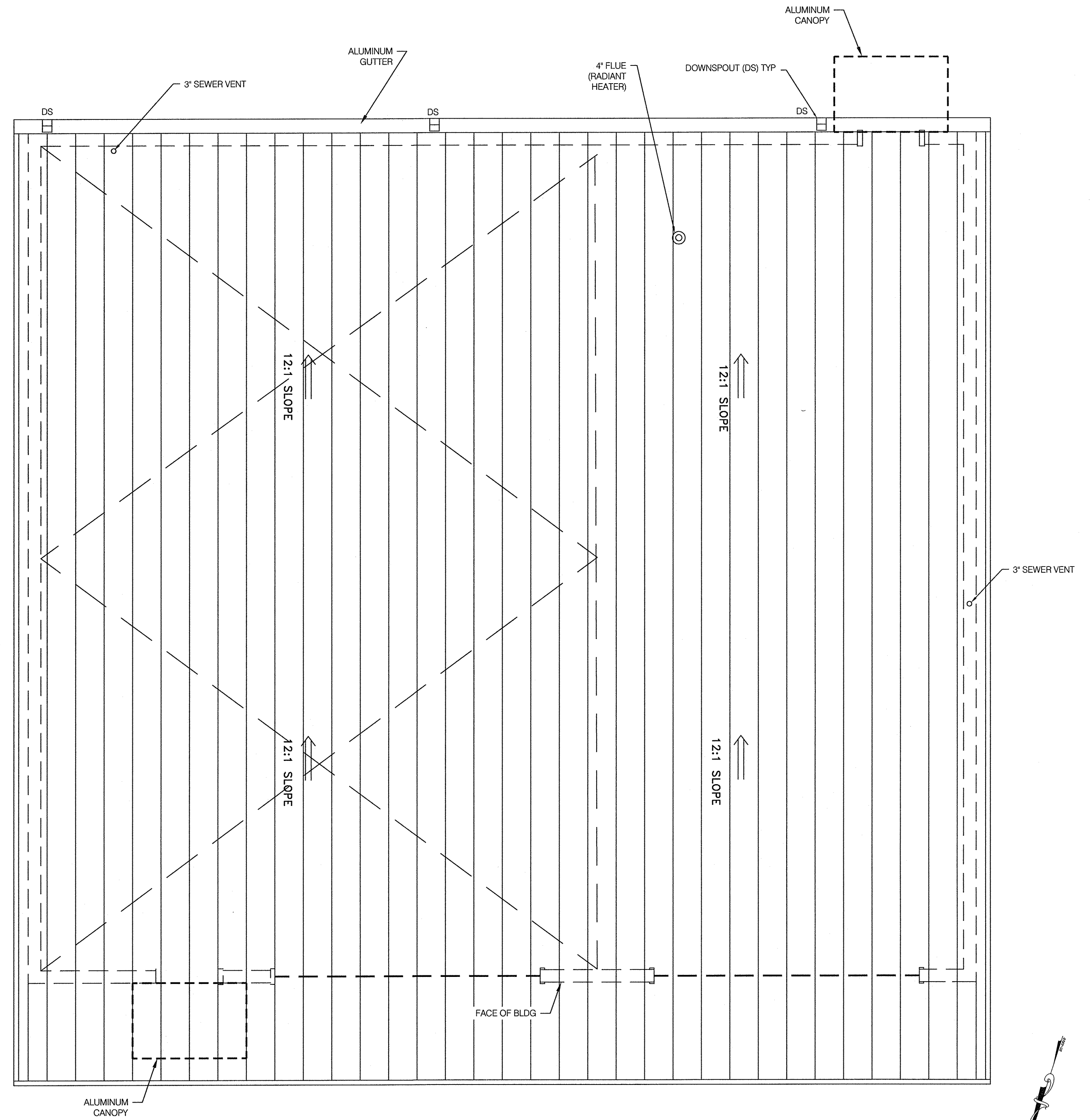
	Square Footage (As Designed)	Square Footage as Allowed by IBC			
Floor or Level	Total Design Area	Without Increase (IBC Table 503)	Frontage Increase (IBC Table 506.2)	Sprinkler Increase (IBC Table 506.3)	Total Allowable Area (IBC 506.1)
1st Floor	2,250 SF	13,500 SF	NA	NA	13,500 SF
Total Floor Area					

	Column Identification	A	B	C	D
Floor or Level	Occupancy Type	Occupancy Floor Area	Occupant Load Factor (Floor Area in SF/Occupant)	Occupants on floor for this Occupancy	Design Occupant Load
1st Floor	Storage (S-2)	2,250 SF	300 Gross	7.5	7.5

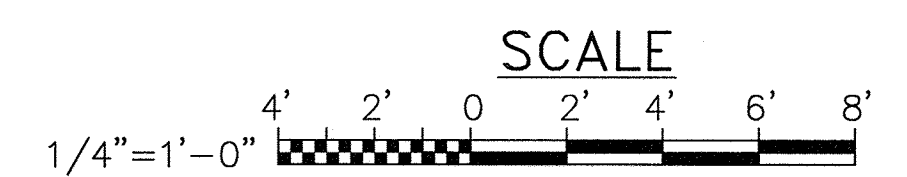




REFLECTED CEILING PLAN
SCALE: 1/4"=1'-0"



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

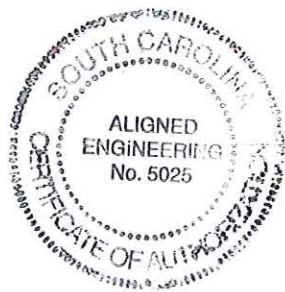


DESIGNED BY: MJP		DATE	NO.	BY
CHECKED BY: MJP				
APPROVED BY: MJP				
DATE: May 04, 2016				
SCALE: 1/4" = 1'-0"				
PROJECT: FLORENCE				
COUNTY: FLORENCE				
PROJECT #				
DIV. #				
CAD: #AE055 des 050516 arch 05				
A2.0				
SOUTH CAROLINA PROFESSIONAL ENGINEERING BOARD				
No. 20872				
5/4/16				
SOUTH CAROLINA PROFESSIONAL ENGINEERING BOARD				
ALIGNED ENGINEERING				
No. 5025				
STATE OF ALABAMA				
THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION USE OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.				
AE				
HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT				
NEW STATION AT FRIENDFIELD				
REFLEC. CEILING & ROOF PLAN				
DESCRIPTION: REFLEC. CEILING & ROOF PLAN				
PLAN SET: DESIGN				
DATE: May 04, 2016				
PROJECT: AE055				
SHEET: A2.0				

**Technical Specifications
for**

**New Station at Friendfield
Hyman Road, Florence County
Hannah-Pamplico-Friendfield Fire District
AE-055**

May 9, 2016



Prepared by



Aligned Engineering, LLC
P.O. Box 4167 - Florence, SC 29502
843/662-2142 (office)
843/618-8869 (mobile)
Martin@AlignedEngineering.com

INDEX

CIVIL SPECIFICATIONS

SECTION 01 - GENERAL REQUIREMENTS

01-30-00 General Conditions

01-30-10 Special Conditions

01-33-00 Submittal Procedures

01-60-00 Product Requirements

SECTION 03—CONCRETE

03-30-00 Cast-In-Place Concrete

03-30-10 Curbs Gutters and Sidewalks

SECTION 31—EARTHWORK

31-05-13 Soils for Earthwork

31-05-16 Aggregates for Earthwork

31-10-00 Site Clearing

31-22-13 Grading

31-23-16 Excavation

31-23-23 Fill

31-25-00 Erosion and Sedimentation Controls

31-37-00 Riprap

SECTION 32—EXTERIOR IMPROVEMENTS

32-11-23 Aggregate Base Courses

32-13-13 Concrete Paving

32-75-00 Flagpoles

32-92-19 Seeding and Stabilization

SECTION 33-UTILITIES

33-12-13 Water Utility Distribution Piping

33-13-00 Disinfecting of Water Utility Distribution

33-13-10 Testing of Water Utility Distribution

33-21-00 Water Supply Wells

33-31-00 Sanitary Utility Sewerage Piping

33-36-00 Utility Septic Tanks

33-42-13 Pipe Culverts

END OF SECTION

SECTION 01 30 00 – GENERAL CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Definitions.
2. Schedules, Reports and Records.
3. Drawings and Specifications.
4. Shop Drawings.
5. Materials, Services and Facilities.
6. Inspection and Testing.
7. Substitutions.
8. Patents.
9. Surveys, Permits, Regulations.
10. Protection of Work, Property, and Persons.
11. Supervision by Contractor.
12. Changes in the Work.
13. Changes in Contract Price.
14. Correction of Work.
15. Subsurface Conditions.
16. Suspension of Work, Determination, and Delay.
17. Payments to Contractor.
18. Acceptance of Final Payment As Release.
19. Insurance.
20. Contract Security.
21. Assignments.
22. Indemnification.
23. Separate Contracts.
24. Subcontracting.
25. Engineer's Authority.
26. Land and Rights-of-way.
27. Guaranty.
28. Arbitration.
29. Taxes.

1.2 DEFINITIONS

- A. Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

Addenda -- Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, drawings and Specifications, by additions, deletions, clarifications or corrections.

Bid --The offer or proposal of the Bidder submitted on the prescribed form, setting forth the prices for the work to be performed.

Bidder -- Any person, firm or corporation submitting a Bid for the work.

Bonds -- Bid, Performance, and Payment Bonds are instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.

Change Order -- A written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time.

Contract Documents -- The contract, including Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Order, Drawings, Specifications, and Addenda.

Contract Price -- The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

Contract Time -- The number of calendar days stated in the Contract Documents for the completion of the work.

Contractor -- The person, firm, or corporation with whom the Owner has executed the Agreement.

Drawings -- The part of the Contract Documents which show the characteristics and scope of the Work to be performed and which have been prepared or approved by the Engineer.

Engineer -- The person, firm or corporation named as such in the Contract Documents.

Field Order -- A written order effecting a change in the Work not involving an adjustment in the Contract Price or an extension of the Contract Time, issued by the Engineer to the Contractor during construction.

Notice of Award -- The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

Notice to Proceed -- Written communication issued by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

Owner -- A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the Work is to be performed.

Project -- The under taking to be performed as provided in the Contract Documents.

Resident Project Representative -- The authorized representative of the Owner who is assigned to the Project site or any part thereof.

Shop Drawings -- All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrate how specific portions of the Work shall be fabricated or installed.

Specifications -- A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

Subcontractor -- An individual, firm or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion -- That date, as certified by the Engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it is intended.

Supplemental General Conditions -- Modifications to General Conditions required by a Federal agency for participation in the Project and approved by the agency in writing prior to inclusion in the Contract Documents or such requirements that maybe imposed by applicable state laws.

Supplier -- Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

Work -- All labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the Project.

Written Notice -- Any notice to any party of this Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work.

1.3 SCHEDULES, REPORTS AND RECORDS

- A. The Contractor shall submit to the owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the Contract Documents for the work to be performed.
- B. Prior to the first partial payment estimate, the Contractor shall submit construction progress schedules showing the order in which he proposes to carry on the Work, including dates at which he will start the various parts of the Work, estimated date of completion of each part and, as applicable:
 - 1. The dates at which special detail drawings will be required, and
 - 2. Respective dates for submission of Shop Drawings, the beginning of manufacturer, the testing and the installation of materials, supplies and equipment.
- C. The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

1.4 DRAWINGS AND SPECIFICATIONS

- A. The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the work in accordance with the Contract documents and all incidental work necessary to complete the project in an acceptable manner, ready for use, occupancy or operation by the Owner.
- B. In case of conflict between the Drawings and Specifications, the Drawings shall govern. Figure dimensions on Drawings shall govern over scale dimensions in detail drawings shall govern over general drawings.
- C. Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately

reported in writing to the Engineer, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

1.5 SHOP DRAWINGS

- A. The Contractor shall provide Shop Drawings as may be necessary for the prosecution of the work as required by the Contract Documents. The Engineer shall promptly review all Shop Drawings. The Engineer's approval of any Shop Drawing shall not release the Contractor from responsibility for deviations from the Contract Documents. A Change Order shall evidence the approval of any Shop Drawing of which substantially deviates from the requirement of the Contract Documents.
- B. When submitted for the Engineers review, Shop Drawings shall bear the Contractor's certification that he has reviewed, checked and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents.
- C. Portions of the work requiring a Shop Drawing or sample submission shall not begin until the Engineer has approved the Shop Drawing or submission. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

1.6 MATERIALS, SERVICES AND FACILITIES

- A. it is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature and all other services and facilities of any nature whatsoever necessary to execute, complete, and delivered the Work within the specified time.
- B. Materials and equipment shall be so stored as to ensure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection.
- C. Manufactured articles, materials and equipment shall be applied, installed, connected, directed, used, cleaned and conditioned as directed by the manufacturer.
- D. Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.
- E. Materials, supplies, or equipment to be incorporated into the Work shall not be purchased by the Contractor or the Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which interest is retained by the seller.

1.7 INSPECTION AND TESTING

- A. All materials and equipment used in the construction of the Project shall be subject to adequate inspection and testing in accordance with generally accepted standards, has required and defined in the Contract Documents.
- B. The Owner shall provide all inspection and testing services not required by the Contract Documents.

- C. The Contractor shall provide at his expense, the testing and inspection services required by the Contract Documents.
- D. If the Contract Documents, laws, ordinances, rules, regulations or order of any public authority having jurisdiction, require any Work to specifically be inspected, tested, or approved by someone other than the Contractor, the Contractor shall give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer the required certificates of inspection, testing or approval.
- E. Inspections, tests or approvals by the Engineer or others shall not relieve the Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.
- F. The Engineer and his representatives will, at all times have access to the Work. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection or testing thereof.
- G. If any Work is covered contrary to the written instructions of the Engineer, if requested by the Engineer, it must be uncovered for his observation and replaced at the Contractor's expense.
- H. If the Engineer considers it necessary or advisable that covered Work be inspected or tested by others, the Contractor, at the Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such Work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing of satisfactory reconstruction. If, however, such Work is not found to be defective, the Contractor will be allowed an increase in the Contract Price or extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and inappropriate Change Order shall be issued.
- I. Any costs associated with location or inspection of utility lines other than those being installed as part of this project will be at the expense of the Contractor, and no separate payment will be made for these expenses.

1.8 SUBSTITUTIONS

- A. Whenever a material, article or piece of equipment is identified on the Drawings or Specifications by reference to brand name or catalogue number, it shall be understood that this is reference for the purpose of defining the performance of other salient requirements and that other products of equal capacities, quality and material, article, or piece of equipment of equal substance and function for these referred to in the Contract Documents by reference to brand name or catalogue number and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may approve its substitution and use by the Contractor. Any cost differential shall be deductible from the Contract price and the Contract documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutes are approved, no major changes in the function or general design of the project will result.

Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract price or Contract time.

1.9 PATENTS

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

1.10 SURVEYS, PERMITS, AND REGULATIONS

- A. The Owner shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the Work together with a suitable number of bench marks adjacent to the Work as shown in the Contract Documents. From the information provided by the Owner, unless otherwise specified in the Contract Documents, the Contractor shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stake for pile locations and other working points, lines, elevations and cut sheets.
- B. The Contractor shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.
- C. Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor unless otherwise stated in the Supplemental General Conditions. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified. If the Contractor observes that the Contract Documents are at variance therewith, he shall promptly notify the Engineer in writing and any necessary changes shall be adjusted as provided in Section 13, Changes in the Work.

1.11 PROTECTION OF WORK, PROPERTY AND PERSONS

- A. The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- B. The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor will remedy all damage, injury or loss to any property caused, directly or

indirectly, in whole or in part, by the Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault of negligence by the Contractor.

- C. In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. He will give the Engineer prompt WRITTEN NOTICE of any significant changes in the Work or deviations from the Contract Documents caused thereby and a Change Order shall there upon be issued covering the changes and deviations involved.

1.12 SUPERVISION BY CONTRACTOR

- A. The Contractor will supervise and direct the Work. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor will employ and maintain on the Work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The supervisor shall have full authority to act on behalf of the Contractor and all communications given to the Supervisor shall be as binding as if given to the Contractor. The Supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

1.13 CHANGES IN THE WORK

- A. The Owner may, at any time as the need arises, order changes within the scope of the Work without invalidating the Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, Change Order shall authorize an equitable adjustment.
- B. The Engineer also may, at any time, by issuing a Field Order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Engineer unless the Contractor believes that such Field Order entitles him to a change in the Contract Price or Time or both, in which event he shall give the Engineer WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the Contractor shall document the basis for the change in Contract Price or Time within thirty (30) days. The Contractor shall not execute such changes pending the receipt of any executed Change Order or further instruction from the Owner.

1.14 CHANGES IN CONTRACT PRICE

- A. The Contract Price may be changed only by a Change Order. The value of any Work covered by a Change Order or of any claim for increase or decrease in the Contract Price shall be determined by one or more of the following methods in the order of precedence listed below:
1. Unit prices previously approved
 2. An agreed upon sum
 3. The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the work.

In addition there shall be added an amount to be agreed upon but not to exceed fifteen (15%) percent of the actual cost of the Work to cover the cost of general overhead and profit.

1.15 CORRECTION OF WORK

- A. The Contractor shall promptly remove from the premises all Work rejected by the Engineer for failure to comply with the Contract Documents, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the Owner and shall bear the expense of making good all Work of other Contractors destroyed or damaged by such removal or replacement.
- B. All removal and replacement Work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected Work within ten (10) days after receipt of WRITTEN NOTICE, the Owner may remove such Work and store the materials at the expense of the Contractor.

1.16 SUBSURFACE CONDITIONS

- A. Should the contractor encounter subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents; or
 - 1. Unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work of the contractor provided for in the Contract Documents.
 - 2. The Contractor shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the Owner by WRITTEN NOTICE of:
- B. The Owner shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for performance of the Work, an equitable adjustment shall be made and the Contract Documents shall be modified by a Change Order. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the Owner may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

1.17 SUSPENSION OF WORK, TERMINATION AND DELAY

- A. Owner may suspend the Work or any portion thereof for a period of not more than ninety (90) days or such further time as agreed upon by the Contractor, by WRITTEN NOTICE to the Contractor and the Engineer, which notice shall fix the date on which work shall be resumed. The Contractor will resume that work on the date so fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension.
- B. If the Contractor is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment or if he repeatedly fails to make prompt payments to Subcontractors or for labor, materials, or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having

jurisdiction of the Work or if he disregards the authority of the Engineer, or if he otherwise violates any provision of the Contract Documents, then the Owner may, without prejudice to any other right or remedy, and after giving the Contractor and his surety a minimum of ten (10) days from delivery of the WRITTEN NOTICE, terminate the services of the Contractor and take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and finish the Work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor will pay the difference to the Owner. Such costs incurred by the Owner will be determined by the Engineer and incorporated in a Change Order.

- C. Where the Contractor's services have been so terminated by the Owner, said termination shall not affect any right of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies due the Contractor by the Owner will not release the Contractor from compliance with the Contract Documents.
- D. After ten (10) days from delivery of a WRITTEN NOTICE to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all work executed and any expense sustained plus reasonable profit.
- E. If, through no act or fault of the Contractor, the work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after it is submitted, or the Owner fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after ten (10) days from delivery of a WRITTEN NOTICE to the Owner and the Engineer, terminate the Contract and recover from the Owner payment for all work executed and all expenses sustained. In addition, and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment, or if the Owner has failed to make any payment as aforesaid, the Contractor may, upon ten (10) days WRITTEN NOTICE to the Owner and the Engineer, stop the work until he has been paid all amounts then due, in which event and upon resumption of the work, Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time, or both to compensate for the costs and delays attributable to the stoppage of the work.
- F. If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of a failure of the Owner or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the Owner or Engineer.

1.18 PAYMENTS TO CONTRACTOR

- A. At least ten (10) days before each progress payment falls due (but not more often than once a month), the Contractor will submit to the Engineer a Partial Payment Estimate filled out and signed by the Contractor covering the work performed during the period covered by the Partial Payment Estimate and supported by such data as the Engineer may reasonably

require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Owner, as will establish the Owner's title to the material and equipment and protect his interest therein, including applicable insurance. The Engineer will, within ten (10) days after receipt of each Partial Payment Estimate, either indicate in writing his approval of payment and present the Partial Payment Estimate to the Owner, or return the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Partial Payment Estimate. The Owner will, within ten (10) days of presentation to him of an approved Partial Payment Estimate, pay the Contractor a Progress payment on the basis of the approved Partial Payment Estimate. The Owner shall retain ten percent (10%) of the amount of each payment until final completion and acceptance of all work covered by the Contract Documents. The Owner however, at any time after fifty percent (50%) of the work has been completed, if he finds that satisfactory progress is being made, may reduce retainage to five percent (5%) on the current and remaining estimates. When the work is substantially complete (operational or beneficial for occupancy), the retained amount may be further reduced below five percent (5%) to only that amount necessary to assure completion. On completion and acceptance of a part of the work on which the price is stated separately in the Contract Documents, payment may payment may be made in full, including retained percentages, less authorized deductions.

- B. The request for payment may also include an allowance for the cost of such major materials and equipment, which are suitably stored either at or near the site.
- C. Prior to substantial completion, the Owner, with the approval of the Engineer and with the concurrence of the Contractor, may use any completed or substantially completed portions of the work. Such use shall not constitute an acceptance of such portions of the work.
- D. The Owner shall have the right to enter the premises for the purpose of doing work not covered by the Contract Documents. This provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the work, or the restoration of any damaged work except such as may be caused by agents or employees of the Owner.
- E. Upon completion and acceptance of the Work, the Engineer shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Owner, shall be paid to the Contractor within thirty (30) days of completion and acceptance of the work.
- F. The Contractor will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and arts thereof, equipment, tools, and all supplies incurred in the furtherance of the performance of the work. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the Contractor fails to do so, the Owner may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation, a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions

of this sentence be construed to impose any obligations upon the Owner to either the Contractor, his Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Owner shall be considered as a payment made under the Contract Documents by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

- G. If the Owner fails to make payment thirty (30) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment, interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

1.19 ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- A. The acceptance by the Contractor of final payment shall be and shall operate a release to the Owner of all claims and all liability to the Contractor other than claims in stated amounts as may be specifically excepted by the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of this work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bonds.

1.20 INSURANCE

- A. The Contractor shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of, or result from the Contractor's execution of the work, whether such execution be by himself or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
1. Claims under workmen's compensation, disability benefit and other similar employee benefit acts;
 2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;
 3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;
 4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and
 5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.
 - a. Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the work. The Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the Owner.
- B. The Contractor shall procure and maintain, at his own expense, during the Contract Time, liability insurance as hereinafter specified.
1. Contractor's General Public Liability and Property Damage Insurance, including vehicle coverage, issued to the Contractor and protecting him from all claims for personal injury including death and all claims for destruction of, or damage to property arising out of, or in connection with any operations under the Contract Documents, whether such operations be by himself or by any subcontractor under

him or anyone directly or indirectly employed by the Contractor or by a subcontractor under him. Insurance shall be written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting there from, sustained by anyone person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.

2. The Contractor shall acquire and maintain, if applicable, Fire and Extended Coverage Insurance upon the project to the full insurable value thereof for the benefit of the Owner, the contractor, and subcontractors as their interest may appear. This provision shall in no way release the Contractor or Contractor's surety from obligations under the Contract Documents to fully complete the project.
- C. The Contractor shall procure and maintain, at his own expense during the Contract Time, in accordance with the provisions of the laws of the state in which the work is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the project and in case any work is sublet, the Contractor shall require such subcontractor similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in hazardous work under this contract at the site of the project is not protected under Workmen's Compensation statute, the Contractor shall provide, and shall cause each subcontractor to provide adequate and suitable insurance for the protection of his employees not otherwise protected.
- D. The Contractor shall secure, if applicable, "All Risk" type Builder's Risk Insurance for work to be performed. Unless specifically authorized by the Owner, the amount of such insurance shall not be less than Contract Price totaled in the Bid. The policy shall cover not less than the losses due to fire, explosion, hail, lightening, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the Contract Time, and until the work is accepted by the Owner. The policy shall name as the insured, the Contractor, the Engineer, and the Owner.

1.21 CONTRACT SECURITY

- A. The Contractor shall, within ten (10) days after the receipt of the Notice of Award, furnish the Owner with a Performance Bond and a Payment Bond in penal sums equal to the amount of the Contract Price, conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the Work provided by the Contract Documents. Such bonds shall be executed by the Contractor and a corporate bonding company licensed to transact such business in the state in which the work is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor. If, at any time, a surety on any such bond is declared a bankrupt or loses its right to do business in the state in which the work is to be performed or is removed from the list of Surety Companies accepted on Federal bonds, Contractor shall, within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The

premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond to the Owner.

1.22 ASSIGNMENTS

- A. Neither the Contractor nor the Owner shall sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of his right, title or interest therein, or his obligations there under, without written consent of the other party.

1.23 INDEMNIFICATION

- A. The Contractor will indemnify and hold harmless the Owner and the Engineer 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, damage, loss or destruction of tangible property, including the loss of use resulting there from; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and subcontractor or any one directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.
- B. In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, any subcontractor, 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 by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workmen's compensation acts, disability benefit acts or other employee benefits acts.
- C. The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

1.24 SEPARATE CONTRACTS

- A. The Owner reserves the right to let other contracts in connection with this project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs. If the proper execution or results of any part of the Contractor's work depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that renders it unsuitable for such proper execution and results.
- B. The Owner may perform additional work related to the project by himself or he may let other contracts containing provisions similar to these. The Contractor will afford the other contractors who are parties to such contracts (or the Owner, if he is performing the additional work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate his work with theirs.
- C. If the performance of additional work by other contractors or the owner is not noted in the Contract Documents prior to the execution of the Contract, WRITTEN NOTICE thereof shall be given to the Contractor prior to starting any such additional work. If the Contractor believes that the performance of such additional work by the Owner or others involves him

in additional expense or entitles him to an extension of the Contract Time, he may make a claim therefore as provided in Section 14 and 15.

1.25 SUBCONTRACTING

- A. The Contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors.
- B. The Contractor shall not award the subcontractor(s), in excess of fifty percent (50%) of the Contract Price without prior written approval of the Owner.
- C. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- D. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

1.26 ENGINEER'S AUTHORITY

- A. The Engineer shall act as the Owner's representative during the construction period. He shall decide questions, which may arise as to quality and acceptability of materials furnished and work performed. He shall interpret the intent of the Contract Documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the work is proceeding in accordance with the Contract Documents.
- B. The Contractor will be held strictly to the intent of the Contract Documents in regard to the quality of materials, workmanship and execution of the work. Inspections may be made at the factory or fabrication plant of the source of material supply.
- C. The Engineer will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.
- D. The Engineer shall promptly make decisions relative to interpretation of the Contract Documents.

1.27 LAND AND RIGHTS-OF-WAY

- A. Prior to issuance of NOTICE TO PROCEED, the Owner shall obtain all land and rights of way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents unless otherwise mutually agreed.
- B. The Owner shall provide to the Contractor information, which delineates and describes the lands owned and rights of way acquired.

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

1.28 GUARANTY

- A. The Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of substantial completion. The Contractor warrants and guarantees for a period of one (1) year from the date of substantial completion of the system, that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

1.29 ARBITRATION

- A. All claims, disputes and other matters in question and arising out of, or relating to the Contract Documents or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.
- B. Notice of the Demand for Arbitration shall be filed in writing with the other party to the Contract Documents and with the American Arbitration Association, and a copy shall be filed with the Engineer. Demand for Arbitration shall in no event be made on any claim, dispute or other matter in question, which would be barred by the applicable statute of limitations.
- C. The Contractor will carry on the work and maintain the progress schedule during any arbitration proceedings unless otherwise mutually agreed in writing.

1.30 TAXES

- A. The Contractor will pay all sales, consumer, use and other similar taxes required by the law of the place where the work is performed.

END OF SECTION

SECTION 01 30 10 – SPECIAL CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. General.
2. Classification of Earthwork.
3. Special Provisions.
4. Special Attention for Bidders.
5. Work on Highway Right-of-Way
6. SC DHEC Stabilization Requirements

1.2 GENERAL

A. Work covered by the Contract Documents consists of improvements as described in the BID Schedule, and as specified herein.

B. All Bids shall include labor, materials, transportation, equipment, services, applicable taxes and other items necessary for a complete and acceptable job in compliance with the Drawings and Specifications.

1.3 CLASSIFICATION OF EARTHWORK

A. All excavation and grading shall be unclassified.

1.4 SPECIAL PROVISIONS

A. The following Special Provisions shall be part of this Contract.

B. Any areas on or adjacent to the work site disturbed during the course of construction shall be restored to present or better condition.

C. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymers, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in conformance with instructions and these specifications.

D. Safety and Health Regulations: The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

E. Protection of Property: The operations of the Contractor shall be conducted with full consideration of all the proper and legal rights of the Owner, and of adjacent property owners and the public, and with the least possible amount of inconvenience to them. Contractor shall coordinate all construction activities and schedules with Owner.

F. Construction Staking: Contractor shall perform or provide all construction layout survey and grade staking. Survey control points if required are in place and identified on the plans.

- G. Siltation and Erosion Control: Erosion of soil shall be minimized during construction, and any areas on or adjacent to the work site disturbed during construction operations shall be restored to present or better condition. Contractor shall erect silt fences of sufficient strength to prevent silt erosion into main drainage channels and storm drainage structures.
- H. Underground Utilities: Sewer and water mains/services, telephone lines, power lines and cables may be encountered and should be anticipated along roadways and rights-of-ways. The Contractor shall contact representatives of all utilities to determine the exact locations of all existing facilities and underground utilities and shall make every effort to avoid damage to such. Any overhead utility lines and power poles, guys, etc., obstructing construction shall be protected from damage or moved by utility company, as necessary.
- I. Codes and Standards: Wherever reference is made to codes, standard specifications and regulations, on the Drawings or in these specifications, included but not limited to National Electric codes, Federal Specifications, ASTM, AWWA, ANSI specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda and revisions in effect on the date of these Contract Documents.
- J. Work Schedule: The Contractor shall submit to the Owner a construction schedule of proposed work sequence, target dates and activities, completely coordinated with the State Department of Transportation officials prior to submittal.

1.5 SPECIAL ATTENTION FOR BIDDERS

- A. Taxes: It is to be noted that all applicable taxes are to be included in the Contract prices for all work and equipment.
- B. Intent of Specifications: These Specifications specify and show materials deemed most suitable for the service anticipated. However, this is not done to eliminate other products equally as good and efficient. The Contractor shall prepare his bid on the basis of the particular materials specified. The awarding of the contract shall constitute a contractual obligation to furnish the specified materials or approved equal materials.

1.6 WORK ON HIGHWAY RIGHT-OF-WAY

- A. The Contractor shall not begin work on any property of the State Department of Transportation until he has secured necessary permits. He shall conform to all requirements of the Highway Department, or its authorized representatives in the prosecution of this portion of the work. It shall be the responsibility of each Bidder to contact the local highway representative and to determine the requirements for work to be done. Requirements shall include, but are not limited to the following:
1. The Contractor shall erect adequate warning signs and where necessary, place flagmen with appropriate red flags, to control traffic at construction site. The Contractor for each part of the work and all subcontractors will provide adequate barricades to properly protect the work and to warn all pedestrians and drivers as to the construction. From sundown to sun-up, adequate lighting will be provided to mark all construction and hazards at night. The Engineer and his construction observer shall have the right to require such barricades and lighting as they feel is required if the Contractor fails to provide same. Signs and flagman shall be placed at sufficient distances from the work site so that ample warning is given to approaching traffic.

2. Construction equipment such as loaders, tractors, cranes and trucks shall be operated in a manner to provide a safe condition and usable area for two-way traffic.

1.7 SC DHEC STABILIZATION REQUIREMENTS

- A. The *NPDES General Permit For Stormwater Discharges From Construction Activities*, dated January 1, 2013, expires December 31, 2017, (AKA the "General Permit") lists out the requirements for stabilization:

*"Section 3.2.10.B **Soil Stabilization**. Permittees are required to initiate stabilization measures as soon as practicable whenever any clearing, grading, excavating, or other earth disturbing activities have permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed as soon as practicable. For areas where initiating stabilization measures is infeasible (e.g. where snow cover, frozen ground, or drought conditions preclude stabilization), initiate vegetative or non-vegetative stabilization measures as soon as practicable."*

The summary is that ***if any land is disturbed, it must be grassed*** or otherwise stabilized before closeout. This includes all disturbed areas such as lots, lawns, easements, shoulders, etc.).

"Section 5: Termination of Coverage

5.1 REQUIREMENTS

- A. *You may only submit a Notice of Termination (NOT) after one or more of the following conditions have been met:*
 - I. *Final stabilization has been achieved on all portions of the construction site for which you are responsible;...."*

From *Appendix A: Definitions*,

"Final Stabilization" means that all land-disturbing activities at the construction site have been completed and that all areas not covered by permanent structures, either (1) ***a uniform (e.g. evenly distributed, without large bare areas) vegetative cover with a density of 70 percent of the natural background vegetative cover has been established*** excluding areas where no natural background vegetative cover is possible (e.g., on a beach), or (2) equivalent permanent stabilization measures (such as the use of landscaping mulch, rip-rap, pavement and gravel) have been implemented to provide effective cover for exposed portions of the construction site not stabilized with vegetation."

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Submittal procedures.
 - 2. Proposed product list.
 - 3. Product data.
 - 4. Use of electronic CAD files of Project Drawings.
 - 5. Shop Drawings.
 - 6. Other submittals.
 - 7. Design data.
 - 8. Test reports.
 - 9. Certificates.
 - 10. Manufacturer's instructions.
 - 11. Manufacturer's field reports.
 - 12. Contractor review.
 - 13. Engineer review.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with cover sheet. Identify: Project, Contractor, Subcontractor and supplier. If necessary, include pertinent Drawing and detail number and/or Specification Section number appropriate to submittal.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.
- C. Coordinate submission of related items.
- D. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- E. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- F. Allow space on submittals for Contractor and Engineer review stamps.
- G. When revised for resubmission, identify changes made since previous submission.
- H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- I. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.3 PROPOSED PRODUCT LIST

- A. Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.4 PRODUCT DATA

- A. Submit number of copies Contractor requires, plus two copies Engineer will retain.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
 - 1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
 - 2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
 - 3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
 - 4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
 - 5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
 - 6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit electronic submittals via email as PDF electronic files.

1.7 OTHER SUBMITTALS

- A. Closeout Submittals: Comply with Section 01 70 00 - Execution and Closeout Requirements.
- B. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.
- C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.8 TEST REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.9 CERTIFICATES

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.10 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner only if requested.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.

- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.11 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit report within 5 days of observation to Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.
- B. Contractor: Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences, and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.13 ENGINEER REVIEW

- A. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. "Mass submittals" are defined as six or more submittals or items in one day or 20 or more submittals or items in one week. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.
- B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order, or a Construction Change Directive by either the Owner or Engineer.



PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products according to manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.
- E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.

- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 33 00 - Submittal Procedures.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Slabs on grade.
 - 2. Equipment pads.
- B. Related Sections:
 - 1. Section 03 30 10 - Sidewalks, Curbs and Gutters.
- C. Site Conditions:
 - 1. The Contractor shall, prior to beginning work on any cast-in-place concrete structure, consult with the Owner and determine that all rights-of-way and necessary permits have been obtained. He shall familiarize himself with all conditions and/or limitations of such rights-of-way and permits and shall fully comply with all requirements. All work and any encroachment beyond these limits shall be the Contractor's liability.
 - 2. The Contractor shall be responsible for all survey work for lines and grades.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Concrete - Slab-on-fill or grade:
 - 1. Basis of Measurement: By the cubic foot.
 - 2. Basis of Payment: Includes concrete, placement accessories, consolidating and leveling, troweling, curing.
- B. Concrete - Grouting:
 - 1. Basis of Measurement: By the cubic yard.
 - 2. Basis of Payment: Includes preparation of substrate, grout, placement, consolidating, troweling, curing.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 2. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 4. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

5. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
6. STM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
7. ASTM C33 - Standard Specification for Concrete Aggregates.
8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
9. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
10. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
11. ASTM C150 - Standard Specification for Portland Cement.
12. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
13. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
15. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
16. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
18. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
19. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
20. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
21. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
22. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
23. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
24. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

C. Concrete Reinforcing Steel Institute:

1. CRSI – Manual of Standard Practice.
2. CRSI – Placing Reinforcing Bars.

1.4 SUBMITTALS

A. Product Data: Submit data on joint devices, attachment accessories and admixtures.

B. Design Data:

1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
2. Identify mix ingredients and proportions, including admixtures.
3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

4. Identify concrete curing method and any required backup data such as compounds, surface additives, etc.
 - C. Shop Drawings in accordance with CRSI shall be submitted to the Engineer for all reinforcing steel. Written approval of these shop drawings shall be obtained from the Engineer before fabrication.
 - D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.
- 1.5 CLOSEOUT SUBMITTALS
- A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction. Contractor is responsible for any survey work entailed in the as-builts.
- 1.6 QUALITY ASSURANCE
- A. Perform Work in accordance with ACI 301 for outdoor equipment slabs, curbs, and underground non-habitable structures.
 - B. Conform to ACI 305 when concreting during hot weather.
 - C. Conform to ACI 306.1 when concreting during cold weather.
 - D. Acquire cement and aggregate from one source for Work.
 - E. Perform Work in accordance Florence County, SC, standards.
- 1.7 COORDINATION
- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. All poured in place concrete shall be plant mixed in accordance with ASTM C94 unless otherwise approved in writing by the Engineer.
- B. Cement: ASTM C150, Type I - American Portland Cement.
- C. Concrete strength rating = 4000 psi at 28 days, or as specified in the construction plans.
- D. Air entraining concrete shall conform to ASTM C173/C173M.
- E. Normal Weight Aggregates: ASTM C33.
 1. Coarse Aggregate: well-graded crushed stone or washed gravel.
 - a. Maximum Size: In accordance with ACI 318.

2. Fine Aggregate: washed inert natural sand.

- F. Water: ACI 318; potable water free of oil, acid, alkali, salts, chlorides (except for those attributable to drinking water), organic matter or other deleterious substances.

2.2 ADMIXTURES

- A. Furnish materials according to state and local standards.
- B. Air Entrainment: ASTM C260.
- C. Water Reducing and Retarding admixtures: ASTM C494/C494M, Type D.
- D. Other chemical admixtures: ASTM C494/C494M.
- E. Fly Ash: per ASTM C618.

2.3 ACCESSORIES

- A. Cement Grout: Portland cement, sand and water mixture with stiff consistency to suit intended purpose.
- B. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- C. Vapor Retarder/Vapor Barrier: ASTM E1745; 6 mil thick clear polyethylene film or fabric reinforced plastic film; type recommended for below grade application. Furnish joint tape recommended by manufacturer. Use vapor barrier only if specified on drawings.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.
- B. Premolded Joint Filler: Self-expanding cork, ASTM D1752 type III; 1 inch thick.
- C. Sealant: ASTM D6690, Type I.

2.5 CONCRETE MIX

- A. Select proportions for concrete in accordance with ACI 318 field experience.
- B. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.
- C. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

2.6 REINFORCEMENT

- A. Concrete Reinforcing Fibers (if specified on plans): ASTM C1116, high strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete. 1/2 or 3/4 inch long monofilament polymer fibers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Preparation of subgrade:
 - 1. Thoroughly compact the subgrade and finish to a smooth, firmly compacted surface, which is moist at the time the concrete is placed.
 - 2. In areas where it is impractical to use standard type rollers, accomplish compaction by vibratory hand compactors.
- B. Use wood or metal forms of a depth equal to the thickness of the concrete course. Make certain they are free from warp and are of sufficient strength when staked, to hold the alignment during the concrete placing and finishing operations.
- C. Verify requirements for concrete cover over reinforcement.
- D. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates. Clean and oil the forms.
- D. Remove water from areas receiving concrete before concrete is placed.
- E. Install vapor barrier if specified on Drawings.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, and formed expansion and contraction joints are not disturbed during concrete placement.

- D. The contractor shall use conveyor, chutes, tremies, buckets, etc., for the efficient placement of the concrete but in no case will a placement system be allowed that causes undue segregation of aggregate. All concrete shall be consolidated by vibrating or rodding. The Contractor will be responsible for having adequate back up vibrators, screeds, etc., to prevent interruption during a pour.
- E. No concrete will be placed during periods of rain, sleet, or other precipitation.
- F. Cold weather placement:
 - 1. No concrete shall be placed when the atmospheric temperature is below 35 degrees F or when the temperature threatens to drop below 25 degrees F within 48 hours, except upon written permission of the Engineer, and such permission will not be granted until satisfactory provisions have been made to protect the work.
 - 2. Should the temperature drop below 30 degrees F while concrete is being placed or before it has hardened sufficiently to prevent injury from cold, the Contractor shall provide sufficient housing and heating apparatus to enclose and protect the structure in such a way that the air surrounding the fresh concrete can be kept at a temperature above 50 degrees F for a period of three days after the concrete is placed.
- G. During hot weather adequate means shall be taken to protect fresh concrete from heating to temperatures exceeding 90 degrees F.
- H. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- I. Consolidate concrete.
- J. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- K. Place concrete continuously between predetermined expansion, control, and construction joints.
- L. Place floor slabs in checkerboard or saw cut pattern as indicated on the construction drawings. If no pattern is shown, an expansion joint (saw cut unless otherwise specified) must be placed at 15-foot maximum intervals.
- M. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- N. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft, or as shown on the construction plans.
- O. All freshly poured concrete must be kept moist for a minimum of four days to allow for thorough curing. A curing compound, acceptable to the state or local authorities, may be used in lieu of wet curing with the Engineer's permission. Note that curbs and sidewalks on SC DOT rights of ways require the approval of SC DOT.

3.4 CONCRETE FINISHING

- A. As soon as the concrete has set sufficiently, remove the forms from the exposed surfaces. Float and trowel the concrete on the face and top as necessary to provide a smooth uniform finish. Leave joint templates in place a minimal length of time to prevent bonding or distortion at the joint.
- B. Ordinary Finish: An ordinary finish shall be given to all exposed concrete as follows:
 - 1. After the forms are removed, all depressions resulting from the removal of metal ties and all other holes and rough places shall be carefully pointed with a mortar of sand and cement. The surface of all such pointed surfaces shall be made flush with the adjacent surface by means of a wooden float before settling occurs.
- C. Broomed finish: After the surface has been properly shaped and prepared and the water sheen has disappeared, produce the final finish by brooming. Where applicable, apply brooming transverse to the line of traffic.
- D. Make certain that joints are clean and corners well-rounded. Edge corners and conform to the typical cross-section. Eliminate all tool marks in final finish.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot nominal, or as indicated on drawings.

3.5 BACKFILLING

- A. After the concrete has set sufficiently and the forms had been removed, backfill the spaces on both sides to the required elevation with suitable material that is firmly compacted and neatly graded.

3.6 FIELD QUALITY CONTROL

- A. Field testing of concrete will be performed by a testing laboratory approved by the Engineer.
 - 1. Field testing shall be in accordance with ACI 318.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work.
- D. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- E. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. The Contractor will be responsible for sampling, making and curing test cylinders for each pour. He will also be responsible for timely delivery to the approved laboratory.
 - 3. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cure.

4. Sample concrete and make one set of four cylinders for every 100 cu yds of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls. There shall be not less than one test sample for each day's concreting.
5. Two cylinders shall be tested at 7 days and the remaining two at 28 days.
6. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
7. Make one additional cylinder during cold weather concreting, and field cure.
8. Additional cylinders may be required for field curing in order to justify removal of form work.

F. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

G. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with ACI 318.
3. Test two cylinders at 7 days.
4. Test two cylinders at 28 days.
5. Dispose remaining cylinders when testing is not required.

3.7 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 318.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. As soon as the forms are removed from all concrete shapes, fill honeycombed spaces and other minor defects with a mortar composed of one part Portland cement into parts sand. Plastering is not allowed.
- C. Replace sections with visible cracks at no expense to the owner.
- D. Repair or replacement of major defects will be determined by Engineer.

END OF SECTION

SECTION 03 30 10 – CURBS, GUTTERS AND SIDWALKS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Sidewalks.
 - 2. Equipment pads.
- B. Related Sections:
 - 1. Section 03 30 00 – Cast-in-Place Concrete.
- C. Site Conditions:
 - 1. The Contractor shall, prior to beginning work on any cast-in-place concrete structure, consult with the Owner and determine that all rights-of-way and necessary permits have been obtained. He shall familiarize himself with all conditions and/or limitations of such rights-of-way and permits and shall fully comply with all requirements. All work and any encroachment beyond these limits shall be the Contractor's liability.
 - 2. The Contractor shall be responsible for all survey work for lines and grades.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Concrete - Slab-on-fill or grade (Equipment Pads):
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes concrete, placement accessories, consolidating and leveling, troweling, curing.
- B. Concrete - Sidewalks:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes concrete, placement accessories, consolidating and leveling, troweling, curing.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 2. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 4. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

5. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
6. STM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
7. ASTM C33 - Standard Specification for Concrete Aggregates.
8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
9. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
10. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
11. ASTM C150 - Standard Specification for Portland Cement.
12. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
13. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
15. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
16. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pkcozzolan for Use as a Mineral Admixture in Concrete.
18. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
19. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
20. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
21. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
22. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

C. Concrete Reinforcing Steel Institute:

1. CRSI – Manual of Standard Practice.
2. CRSI – Placing Reinforcing Bars.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction. Contractor is responsible for any survey work entailed in the as-builts.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.

- E. Perform Work in accordance with state and local standards. If state and local ordinances conflict, contact Engineer for resolution.

1.6 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. All poured in place concrete shall be plant mixed in accordance with ASTM C94 unless otherwise approved in writing by the Engineer.
- B. Cement: ASTM C150, Type I - American Portland Cement.
- C. Concrete strength rating = 4000 psi at 28 days, or as specified in the construction plans.
- D. Air entraining concrete shall conform to ASTM C173/C173M.
- E. Normal Weight Aggregates: ASTM C33.
 - 1. Coarse Aggregate: well-graded crushed stone or washed gravel.
 - a. Maximum Size: In accordance with ACI 318.
 - 2. Fine Aggregate: washed inert natural sand.
- F. Water: ACI 318; potable water free of oil, acid, alkali, salts, chlorides (except for those attributable to drinking water), organic matter or other deleterious substances.

2.2 ADMIXTURES

- A. Furnish materials according to State and local standards.
- B. Air Entrainment: ASTM C260.
- C. Water Reducing and Retarding admixtures: ASTM C494/C494M, Type D.
- D. Other chemical admixtures: ASTM C494/C494M.
- E. Fly Ash: per ASTM C618.

2.3 ACCESSORIES

- A. Cement Grout: Portland cement, sand and water mixture with stiff consistency to suit intended purpose.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.

B. Premolded Joint Filler: Self-expanding cork, ASTM D1752 type III; 3/4 inch thick.

C. Sealant: ASTM D6690, Type I.

2.5 CONCRETE MIX

A. Select proportions for concrete in accordance with ACI 318 field experience.

B. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.

C. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 EXECUTION

3.1 EXAMINATION

A. Preparation of subgrade:

1. Thoroughly compact the subgrade and finish to a smooth, firmly compacted surface, which is moist at the time the concrete is placed.
2. In areas where it is impractical to use standard type rollers, accomplish compaction by vibratory hand compactors.

B. Use wood or metal forms of a depth equal to the thickness of the concrete course. Make certain they are free from warp and are of sufficient strength when staked, to hold the alignment during the concrete placing and finishing operations.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. Remove debris and ice from formwork, reinforcement, and concrete substrates. Clean and oil the forms.

C. Remove water from areas receiving concrete before concrete is placed.

D. Where a portion of an existing sidewalk or driveway is reconstructed, cut the existing section to a minimum depth of 2 inches with a suitable saw at the location designated by the Engineer and remove the entire section to be reconstructed. Join the new sidewalk or driveway with the old work at this line.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 318.

B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.

C. Deposit concrete in the forms so that the forms do not displace out of grade or alignment. During the placing operations, spade or vibrate the concrete throughout the entire mass and especially against the forms and joints.

- D. The contractor shall use conveyor, chutes, tremies, buckets, etc., for the efficient placement of the concrete but in no case will a placement system be allowed that causes undue segregation of aggregate. All concrete shall be consolidated by vibrating or rodding. The Contractor will be responsible for having adequate back up vibrators, screeds, etc., to prevent interruption during a pour.
- E. No concrete will be placed during periods of rain, sleet, or other precipitation.
- F. Cold weather placement:
 - 1. No concrete shall be placed when the atmospheric temperature is below 35 degrees F or when the temperature threatens to drop below 25 degrees F within 48 hours, except upon written permission of the Engineer, and such permission will not be granted until satisfactory provisions have been made to protect the work.
 - 2. Should the temperature drop below 30 degrees F while concrete is being placed or before it has hardened sufficiently to prevent injury from cold, the Contractor shall provide sufficient housing and heating apparatus to enclose and protect the structure in such a way that the air surrounding the fresh concrete can be kept at a temperature above 50 degrees F for a period of three days after the concrete is placed.
- G. During hot weather adequate means shall be taken to protect fresh concrete from heating to temperatures exceeding 90 degrees F.
- H. Place concrete in continuous operation for each panel or section determined by predetermined joints. Unless otherwise indicated on the plans, construct concrete curbs and concrete gutters in uniform 10 foot sections, except where shorter sections are necessary for closures; but ensure that no section is less than 4 feet in length. Separate the sections by sheet steel templates or dividing plates set normal to the face and top of the curb. Carefully set the plates during the placing of the concrete and keep in place until the concrete has set sufficiently to hold its shape. Remove the plates while the forms are still in place.
- I. Consolidate concrete.
- J. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- K. Place floor slabs in checkerboard or saw cut pattern as indicated on the construction drawings. If no pattern is shown, an expansion joint (saw cut unless otherwise specified) must be placed at 15-foot maximum intervals.

3.4 EXPANSION JOINTS

- A. Ensure that the pre-formed expansion joints are three-quarter inch thick and extend the full depth of the concrete. Construct joints at the locations indicated on the plans and at the following locations:
 - 1. Wherever a sidewalk is constructed between an adjoining substantial structure on one side and curbing on the other side, form an expansion joint adjacent to the curbing.
 - 2. Place an expansion joint between the sidewalk and the radius curbing at street intersections.

3. Where concrete sidewalks or medians are constructed adjacent to existing or new concrete pavement or structures, place a transverse expansion joint in the sidewalk or median opposite such joints in the concrete pavement or structure.
4. Where existing structures such as light standards, poles, fire hydrants, etc., are within the limits of the sidewalk or median area, surround them with an expansion joint.
5. Place transverse expansion joints at intervals of not more than 100 feet in all concrete shapes.

3.5 CONTRACTION JOINTS

- A. Divide the concrete slabs in sidewalks between expansion joints into blocks 10 feet in length, by scoring transversely after floating operations are completed. Where the sidewalk slabs are more than 10 feet in width, score them longitudinally in the center. Extend the transverse and longitudinal scoring for a depth of 1 inch and not less than $\frac{1}{4}$ inch or more than $\frac{1}{2}$ inch in width. Edge and finished joints smooth and true to line.
- B. In concrete medians, locate transverse contraction joints, formed as described above, at intervals of not more than 25 feet and extends not less than a quarter of the median depth.

3.6 CONCRETE FINISHING

- A. As soon as the concrete has set sufficiently, remove the forms from the exposed surfaces. Float and trowel the concrete on the curb face and top as necessary to provide a smooth uniform finish. Leave joint templates in place a minimal length of time to prevent bonding or distortion at the joint.
- B. Broomed finish: After the surface has been properly shaped and prepared and the water sheen has disappeared, produce the final finish by brooming. Apply brooming transverse to the line of traffic.
- C. Ensure that joints are in a vertical plane perpendicular to the curb face. Make certain that joints are clean and corners well-rounded. Edge corners and conform to the typical cross-section. Eliminate all tool marks in final finish.
- D. Remove mortar or aggregate particles that spill onto the pavement.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at $\frac{1}{4}$ inch per foot nominal, or as indicated on drawings.

3.7 BACKFILLING

- A. After the concrete has set sufficiently and the forms had been removed, backfill the spaces on both sides to the required elevation with suitable material that is firmly compacted and neatly graded.
- B. Backfill concrete gutter so that the earth materials are a minimum of 1 inch above the concrete. Maintain an earth roll on each side as necessary to prevent undermining of curb and gutter.

3.8 FIELD QUALITY CONTROL

- A. Field testing of concrete will be performed by a testing laboratory approved by the Engineer.
 - 1. Field testing shall be in accordance with ACI 318.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work.
- D. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- E. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. The Contractor will be responsible for sampling, making and curing test cylinders for each pour. He will also be responsible for timely delivery to the approved laboratory.
 - 3. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cure.
 - 4. Sample concrete and make one set of four cylinders for every 100 cu yds of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls. There shall be not less than one test sample for each day's concreting.
 - 5. Two cylinders shall be tested at 7 days and the remaining two at 28 days.
 - 6. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 7. Make one additional cylinder during cold weather concreting, and field cure.
 - 8. Additional cylinders may be required for field curing in order to justify removal of form work.
- F. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- G. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39/C39M.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Test two cylinders at 7 days.
 - 4. Test two cylinders at 28 days.
 - 5. Dispose remaining cylinders when testing is not required.

3.9 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 318.

3.10 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. As soon as the forms are removed from all concrete shapes, fill honeycombed spaces and other minor defects with a mortar composed of one part Portland cement into parts sand. Plastering is not allowed.
- C. Replace sections with visible cracks at no expense to the owner.
- D. Repair or replacement of major defects will be determined by Engineer.

END OF SECTION

SECTION 31 05 13 - SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.
3. Unsuitable materials.

B. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork.
2. Section 31 22 13 - Grading.
3. Section 31 23 16 - Excavation.
4. Section 31 23 23 - Fill.
5. Section 31 25 00 - Erosion and Sedimentation Control.
6. Section 31 37 00 - Riprap.
7. Geotechnical report; bore hole locations and findings of subsurface materials.

1.2 UNIT PRICES - MEASUREMENT AND PAYMENT

A. Subsoil:

1. Per Sections 31 22 13 - Grading and 31 23 23 - Fill.

B. Topsoil:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes supplying topsoil materials, stockpiling on site.
3. Note that topsoil is covered under Section 31 22 13 - Grading and that this category only refers to topsoil imported from off site.

C. Unsuitable Soils:

1. Per Sections 31 22 13 - Grading and 31 22 13 - Excavation.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. South Carolina Department of Transportation (SC DOT):

1. SCDOT 2007 Standard Specifications For Highway Construction, Sections 203 *Roadway and Drainage Excavation*, and 208 *Subgrade*.

C. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.4 SUBMITTALS – Not Used

1.5 QUALITY ASSURANCE

- A. Furnish each fill/ topsoil material from single source throughout the Work.
- B. Perform Work in accordance with SC DOT (South Carolina Department of Transportation) standards.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

- A. Subsoil Type: General.
 1. Soil material used as fill, backfill, subgrade for structures or pavement embankments, or site grading shall consist of suitable material as found available on-site until such supply of on-site material is depleted.
- B. Subsoil Type: General.
 1. Excavated and re-used material, or local borrow.
 2. Graded.
 3. Free of organic material, debris, or deleterious substances.
 4. Not more than 15% of the lumps or rocks larger than 2 – 1/2 inches in their greatest dimension.
 5. Do not permit rocks having a dimension greater than 1 inch in the upper 6 inches of fill or embankment.
- C. Select materials may be provided from on-site if acceptable material as approved by the Engineer is available on-site. Otherwise approved select material shall be provided by the Contractor from an off-site source.

2.2 TOPSOIL MATERIALS

- A. Stockpile topsoil separate from other excavated material.
- B. Topsoil Type: General.
 1. Excavated and reused material. Unclassified.
 2. Graded.
 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
 - a. Screening: Single screened.
 4. Use topsoil consisting of material removed from the top 3" to 6" of existing on-site soils.
- C. Topsoil Type: Imported from off-site.
 1. Imported borrow.
 2. Friable loam.

3. Reasonably free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
 - a. Screening: Single screened.
4. Acidity range (pH) of 5.5 to 7.5.
5. Containing minimum of 4 percent and maximum of 25 percent inorganic matter.

2.3 UNSUITABLE SOILS (MUCK)

- A. Unsuitable Material: Unsuitable Material is defined as earth material unsatisfactory for its intended use and is classified by the soils technicians. In addition to organic matter, sod, muck, roots, and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.
- B. Muck: materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be moved by dragline, dredge, or other special equipment, are designated as muck. No extra payment will be made for muck removal.

2.4 SOURCE QUALITY CONTROL

- A. Testing and analysis of subsoil and topsoil materials shall be per the Geotechnical Report and/or the Soils Engineer contracted to perform soil tests on site.
- B. When tests indicate materials do not meet specified requirements, change material and retest.
- C. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Strip topsoil to full depth of topsoil in designated areas. Stockpile topsoil separately from fill in order to re-use it for grassing at the end of the project. Place a line of silt fencing on the downstream side of the stockpile.
- B. Excavate subsoil from areas designated. Place a line of silt fencing on the downstream side of the stockpile.
- C. Do not excavate wet topsoil.
- D. Remove excess excavated materials, subsoil or topsoil not intended for reuse, from site.
- E. Remove excavated materials not meeting requirements for subsoil materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations indicated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.

- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8 feet high maximum.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
Place a line of silt fence along the downhill side of the stockpile per SC DHEC Best Management Practices.
- G. Stockpile unsuitable or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.
- B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.4 PLACING TOPSOIL

- A. Upon completion of site grading and other related site work, topsoil shall be uniformly spread over the graded or improved areas. Topsoil shall be evenly distributed to conform to final grade elevations shown on the plans.
- B. Place, level and lightly compact topsoil to a depth of not less than 3 inches.
- C. Maintain topsoil free of roots, rocks, debris, clods of soil and any other objectionable material which might hinder subsequence grassing or mowing operations.
- D. Any surplus materials shall be disposed of in approved areas on the site.

END OF SECTION

SECTION 31 05 16 - AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coarse aggregate materials.
2. Fine aggregate materials.

B. Related Sections:

1. Section 31 05 13 - Soils for Earthwork.
2. Section 31 22 13 - Grading.
3. Section 31 23 23 - Fill.
4. Section 31 37 00 - Riprap.
5. Section 33 31 00 - Sanitary Utility Sewerage Piping.
6. Geotechnical report; bore hole locations and findings of subsurface materials.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Aggregate:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes supplying aggregate materials, stockpiling.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. South Carolina Department of Transportation (SC DOT):

1. SCDOT 2007 Standard Specifications For Highway Construction, Section 305 *Graded Aggregate Base*.

C. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS – Not Used

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with State of South Carolina DOT standards.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

- A. Aggregate Type: **GABC** (Graded Aggregate Base Course).
 - 1. Conforms to SCDOT 2007 Standard Specifications For Highway Construction, Section 305 *Graded Aggregate Base* (Macadam Base Course).
 - 2. Macadam Base Course mixture (per SC DOT) is as follows:

Sieve Size	Percent Passing
2 inches	100
1 1/2 inches	95 to 100
1 inch	70 to 100
1/2 inch	48 to 75
No. 4	30 to 60
No. 30	11 to 30
No. 200	0 to 12
Liquid Limit	25 max
Plasticity Index	6 max

- B. Aggregate Type: **57 Stone**.
 - 1. Natural stone; angular, washed, free of clay, shale, and organic matter; graded in accordance with ASTM C136 to the following limits:
 - 2. Minimum Size: 1/4 inch.
 - 3. Maximum Size: 3/4 inch.
- C. Aggregate Type: **Pea Gravel**.
 - 1. Natural stone with rounded edges; washed, free of clay, shale, organic matter; graded in accordance with ASTM C136 to the following limits:
 - 2. Minimum Size: 1/4 inch.
 - 3. Maximum Size: 3/8 inch.

2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate: **Sand**.
 - 1. Washed inert natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136; within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0 to 10

2.3 SOURCE QUALITY CONTROL

- A. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- B. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- C. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.
 - 2. Removing designated trees, shrubs, and other plant life.
 - 3. Removing abandoned utilities.
 - 4. Stabilization
- B. Related Sections:
 - 1. Section 31 05 13 – Soils for Earthwork.
 - 2. Section 31 22 13 - Grading.
 - 3. Section 32-92-19 – Seeding and Stabilization.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Site Clearing:
 - 1. Basis of Measurement: By acre.
 - 2. Basis of Payment: Includes clearing site, loading and removing waste materials from site.

1.3 SUBMITTALS - Not Used

1.4 QUALITY ASSURANCE

- A. Conform to applicable State and local codes for disposal of debris, including provisions for burning debris on site.
- B. Perform Work in accordance with State of South Carolina standards.

PART 2 PRODUCTS

2.1 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work, looking specifically for the following:
 - 1. Limits of clearing.
 - 2. Wetlands.
 - 3. Easements or off-site access.
 - 4. Property lines, particularly SC DOT boundaries.

- B. Where trees or brush exist at the work site, the construction area shall be cleared and stumps grubbed. Only those trees that seriously interfere with construction shall be cut. Care shall be exercised in protecting the entire construction area.
- C. Verify existing plant life designated to remain is tagged or identified. Consult with owner if selective clearing is specified on the plans to determine which plant life is to remain.
- D. Where wetlands appear on the drawings, verify their locations. Wetlands are typically delineated with pink survey marking tape. Unless otherwise specified on the plans, stay a minimum of ten feet from the wetland boundary.
- E. Identify waste area for placing removed materials.

3.2 PREPARATION

- A. Call Local Utility Line Information service at 811 (South Carolina) not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. The Contractor shall consult with the Owner and Engineer prior to starting clearing and a full understanding is to be reached as to procedure. Contractor's operations shall be conducted with full consideration of all proper and legal rights of the Owner, adjacent property owners, and the public and with the least amount of inconvenience to them.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain (referred to as "Grand Trees" or "Protected Trees" on the Drawings).
- C. Identify wetland areas if delineated on the Drawings. Delineated wetland boundaries are usually marked by pink survey tape on the trees and undergrowth.
- D. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work as necessary. Typically this means removal of topsoil, depending on site conditions.
- B. Areas to be cut or filled. Remove trees and shrubs in areas indicated. Remove stumps, main root ball, and surface rock. Remove topsoil and stockpile per Section 31 05 13 – Soils for Earthwork.
- C. Areas within Limits of Disturbance without direct cut or fill. Clear undergrowth and deadwood, without disturbing subsoil.

- D. Selective clearing, where indicated, shall be done in areas designated by the Engineer. Selective clearing shall consist of removing vegetation, brush, stumps, etc., from the area. Selected trees shall be left standing and care shall be taken not to damage remaining trees. Grubbing will not be required in areas designated for selective clearing.
- E. Minor structures within right-of-way limits and which interfere with construction shall be removed and disposed of, replaced or relocated as directed by the Engineer.

3.5 REMOVAL

- A. All stumps, laps, logs and brush resulting from clearing operations shall be completely burned or otherwise disposed of to the Engineers satisfaction.
- B. Remove debris, rock, and extracted plant life from site.
- C. Remove paving, curbs, and concrete as indicated on the drawings.
- D. Burning of cleared material, where allowed, shall be accomplished in strict accordance with all applicable local, state, and federal regulations pertaining to open burning and smoke abatement. Permits shall be secured by the Contractor prior to burning any materials.
- E. Where drawings indicate partial removal of paving, curbs, and concrete, neatly saw cut edges at right angle to surface.
- F. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- G. Continuously clean-up and remove waste materials from site to an approved landfill. Do not allow materials to accumulate on site.
- H. Do not bury materials on site. Leave site in clean condition.

3.6 STABILIZATION

- A. The *NPDES General Permit For Stormwater Discharges From Construction Activities*, dated January 1, 2013, expires December 31, 2017, (AKA the "General Permit") states that:

*"Section 3.2.10.B **Soil Stabilization**. Permittees are required to initiate stabilization measures as soon as practicable whenever any clearing, grading, excavating, or other earth disturbing activities have permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed as soon as practicable. For areas where initiating stabilization measures is infeasible (e.g. where snow cover, frozen ground, or drought conditions preclude stabilization), initiate vegetative or non-vegetative stabilization measures as soon as practicable."*

The summary is that **if any land is disturbed, it must be grassed** or otherwise stabilized before closeout. This includes all areas where roots have been disturbed or ground cover has been grubbed. See Section 32-92-19 Seeding and Stabilization for more details.

END OF SECTION

SECTION 31 22 13 - GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating topsoil.
2. Excavating subsoil.
3. Cutting, grading, filling, rough contouring, and compacting site for site structures, building pads, drainage structures, roads, infrastructure and slopes.

B. Related Sections:

1. Section 31 05 13 - Soils for Earthwork.
2. Section 31 05 16 - Aggregates for Earthwork.
3. Section 31 10 00 - Site Clearing.
4. Section 31 23 16 - Excavation.
5. Section 31 23 23 - Fill.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. The category "Grading" overlaps in part with Sections 31 23 16 – Excavation, 31 23 23 – Fill, and 31 05 13 – Soils for Earthwork. Please refer to these Sections for specific descriptions of the categories used for unit prices.

1. In general, "Grading" refers to earth moved between two locations within the site boundaries for purposes of establishing the required elevations and slopes.
2. "Excavation" and "Fill" refer to cubic yard volumes of dirt being brought into, or removed from, the site.

B. Rough Grading (Building Pads):

1. Basis of Measurement: By square yard.
2. Basis of Payment: Includes removal of existing topsoil and placement in a stockpile on site, and grading area to building pad elevations (by excavation or fill) to a tolerance of +/-1/2 inch. Includes loading, placing, and compacting soil. Structural fill not available on site that must be imported falls under the category of "Fill". Unsuitable soils that cannot be disposed of on site and must be removed fall under the category of "Excavation".

C. Rough Grading (Roads, Lots & Drives):

1. Basis of Measurement: By square yard.
2. Basis of Payment: Includes removal of existing topsoil and placement in a stockpile on site, grading to subgrade elevations (by excavation or fill) to a tolerance of +/-1 inch. Includes loading, placing, and compacting soil. Structural fill not available on site that must be imported falls under the category of "Fill". Unsuitable soils that cannot be disposed of on site and must be removed fall under the category of "Excavation".

D. Grading (Pond Excavation):

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes removal of existing topsoil to a stockpile on site, excavation of pond, placement of excess soil on site (including loading, transport

and compaction) and/or removal of excess soil from site. Includes pond berm, banks and earth spillways as well as all areas where excess soil may have been placed. Includes fine grading of pond to a distance of 20 feet beyond the rim in all directions by placement of topsoil to achieve final pond elevations to a tolerance of +/-4 inches.

E. Rough Grading (General):

1. Basis of Measurement: By square yard.
2. Definition: This category includes any area not covered under items 1.2B, C or D above. It includes residential lots, ditches, swales, easements, banks, road shoulders and landscaped areas. It excludes areas filled by pond spoil unless additional fill is required to achieve the necessary elevations.
3. Basis of Payment: Includes removal of existing topsoil and placement in a stockpile on site, and grading to final elevations (by excavation or fill) to a tolerance of +/-4 inches. Includes loading, placing, and compacting soil.

F. Fine Grading:

1. Basis of Measurement: By square yard.
2. Definition: This category includes any area not supporting a structure (road, parking lot, driveway or building pad) that has been rough graded to within a tolerance of +/- 3 inches per items 1.2D & E above.
3. Basis of Payment: Includes breaking dirt clots, placing topsoil, raking, blending grades and fine grading areas to remove low spots and generally drain the area away from structures and toward drainage structures. Prepare area for stabilization per Section 32-92-19 – Seeding and Stabilization.
4. Tolerances: Final grades shall be +/- 2 inches for seeded areas, and +/- 1/2 inch for inverts of ditches, swales and spillways.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS – Not Used

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.
- B. Perform Work in accordance with State of South Carolina DOT standard.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Soil material shall consist of suitable material as found available on-site until such supply of on-site material is depleted. The Owner shall retain the services of a testing laboratory to perform all required soils testing. Where on-site soils are questionable, the soils engineer shall make appropriate tests to ensure that the soil is suitable for fill. These tests will be made at no cost to contractor.
- B. Topsoil: as specified in Section 31 05 13.
- C. Subsoil Fill: as specified in Section 31 05 13.
- D. Structural Fill: Type as specified in Section 31 23 23.
- E. Granular Fill: Type as specified in Section 31 23 23.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Site grading shall conform to the grades indicated by the finished contours and spot elevations shown on the drawings the Engineer will provide control points and CAD files. The contractor will be responsible for staking of right-of-way and any elevation hubs required.
- C. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call Local Utility Line Information service at 811 (South Carolina) not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove or relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

- A. Excavation shall be made to the exact elevations, slopes and limits called for in the Drawings.
- B. Per Section 31 05 13 – Soils for Earthwork.

3.4 SUBSOIL EXCAVATION

- A. Excavation shall be made to the exact elevations, slopes and limits called for in the Drawings.
- B. Per Section 31 05 13 – Soils for Earthwork.

3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials. Refer to Section 31 23 23 – Fill for fill requirements.
- B. Fills shall be constructed of material that is reasonably free from grass, roots, rock or other objectionable material. Where natural slopes exceed 3:1, horizontal benches shall be cut to receive fill material. Slopes of less than 3:1 and other areas shall be scarified prior to placing fill material.
- C. Fills shall be constructed of acceptable material approved by the Engineer and placed in successive layers of not over 8 inches loose thickness for the full width of section, where practical.
- D. Where rock is excavated along with other material, it shall be incorporated in fill sections which are not to support pavement or structures and which do not form dikes. Rock shall be evenly distributed.
- E. No organic materials will be allowed in fill.
- F. Material for fills shall be spread evenly and the grading equipment routed over the work to obtain uniform compaction. Fills shall be compacted by approved equipment to the following

percentages of Standard Proctor (ASTM D-698 or AASHTO T99) maximum dry density at optimum moisture content:

1. Entire depth of fill the needs all structures - 100%
2. Top 2 feet of fill beneath all roadways - 98%
3. All other structural fill for embankments - 95%

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Where topsoil, pavement or other items are shown, the rough grade shall be finished to such depth below finished grade as is necessary to accommodate these items.

3.6 FINE GRADING

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.
- C. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.
- D. Repair or replace items indicated to remain, that were damaged by excavation or filling.
- E. Backfill around structures shall be performed upon completion of the structure, above finished grade, and after all piping has been properly installed and tested.
- F. Scarify subsoil to depth of 3 inches in areas where vehicles or construction equipment has compacted sub-soil.
- G. Spread topsoil to minimum depth of 4 inches over area to be seeded. Rake until smooth.

3.7 TOLERANCES

- A. Rough Grading (as measured at the top surface of subgrade):
 1. Subgrades beneath roads, parking lots or driveways: +/- 1 inch from required elevation.
 2. Building Pads: +/- 1/2 inch from required elevation.
 3. Yards, road shoulders, banks of ditches, ponds or swales, easements and landscaped areas: +/- 4 inches.
- B. Fine Grading (as measured at the top surface of grade):
 1. Yards, road shoulders, banks of ditches, ponds or swales, easements and landscaped areas: +/- 2 inch.
 2. Inverts of ditches, spillways or swales: +/- 1/2 inch.

3.8 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D698 or AASHTO T180.
- B. Perform in place compaction tests in accordance with the following:
 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.

2. Moisture Tests: ASTM D3017.
- C. The Owner will retain the services of a testing laboratory to perform all required soils sampling and testing. These tests will be made at no cost to the Contractor. Areas in which testing reveals compaction below the specified density shall be reworked by the Contractor until specified compaction is attained.
- D. Frequency of Tests: per local codes.

END OF SECTION

SECTION 31 23 16 - EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil densification.
 - 2. Excavating for building foundations.
 - 3. Excavating for paving, roads, and parking areas.
 - 4. Excavating for slabs-on-grade.
 - 5. Excavating for site structures.
 - 6. Excavating for landscaping.
 - 7. Excavating for drainage structures.
- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 05 16 - Aggregates for Earthwork.
 - 3. Section 31 22 13 - Grading.
 - 4. Section 31 23 23 - Fill.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. The category "Excavation" overlaps in part with Sections 31 22 13 – Grading and 31 23 23 – Fill. Please refer to these Sections for specific descriptions of the categories used for Unit Pricing.
 - 1. Note that for utilities such as water, sewer, and manhole installation, excavation is included in the price of installing these materials.
- B. Excavating Soil Materials:
 - 1. Basis of Measurement: By cubic yard.
 - 2. Basis of Payment: Includes general excavating to required elevations, loading and placing materials in stockpile and/or removing from site.
 - 3. Over Excavating: Payment will not be made for over excavated work nor for replacement materials.
- C. Muck & Fill:
 - 1. Basis of Measurement: By cubic yard.
 - 2. Basis of Payment: Includes the removal of unsuitable soil (muck) from below the subgrade elevation of roads, parking lots, driveways or structures. Mucking will be done at the request of the Engineer or Soils Engineer only. The unit price includes loading and placing materials in stockpile and/or removing from site, supplying suitable fill material, placing fill where required, and compacting.

1.3 REFERENCES

- A. Local utility standards when working within 24 inches of utility lines.

1.4 SUBMITTALS – Not Used.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SC DOT (South Carolina Department of Transportation) standards.

1.6 PRODUCTS – Not Used

PART 2 EXECUTION

2.1 PREPARATION

- A. Call Local Utility Line Information service at 811 (South Carolina) not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove or relocate utilities. Note that this is also covered under Section 31 22 13 – Rough Grading.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

2.2 EXCAVATION

- A. Contractor shall treat all water for removal of silt and debris. The treated water shall be directed to the treatment facility (typically a sediment trap or pond) identified by the Engineer.
- B. Underpin adjacent structures which may be damaged by excavation work.
- C. Excavate subsoil to accommodate building foundations, slabs-on-grade paving and site structures, and construction operations. Excavate soil and debris to the limits necessary to achieve the required finished excavation elevations as shown in the drawings. Excavation beyond these limits will require approval of the Engineer.
- D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 31 22 13 – Rough Grading.
- E. Slope banks with machine to angle of repose or less until shored.
- F. Do not interfere with 45 degree bearing splay of foundations.

- G. Grade top perimeter of excavation to prevent surface water from draining into excavation. Final side slopes shall be 4:1 slope unless otherwise indicated on the drawings (maximum allowed slope = 3:1).
- H. Trim excavation. Remove loose matter.
- I. Remove lumped subsoil, boulders, and rock greater than 6" in greatest dimension. Allowable fill shall not contain more than 15% of the rocks or lumps larger than 2 ½ inches in their greatest dimension.
- J. Notify Engineer of unexpected subsurface conditions.
- K. Correct areas over excavated with structural fill.
- L. Remove excess and unsuitable material from site.
- M. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- N. Repair or replace items indicated to remain damaged by excavation.

2.3 FIELD QUALITY CONTROL

- A. Request inspection of excavation and controlled fill operations in accordance with applicable local County code.
- B. Request visual inspection of bearing surfaces by Engineer before installing subsequent work.

2.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 31 23 23 - FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backfilling building perimeter to subgrade elevations.
 - 2. Backfilling site structures to subgrade elevations.
 - 3. Fill under slabs-on-grade.
 - 4. Fill under paving.
 - 5. Fill for over-excavation.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 31 05 13 - Soils for Earthwork.
 - 3. Section 31 05 16 - Aggregates for Earthwork.
 - 4. Section 31 22 13 - Grading.
 - 5. Section 31 23 16 - Excavation.
 - 6. Section 31 37 00 - Riprap.
 - 7. Geotechnical report; bore hole locations and findings of subsurface materials.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. The category "Fill" overlaps in part with Sections 31 22 13 – Grading and 31 23 16 – Excavation. Please refer to these Sections for specific descriptions of the categories used for Unit Pricing.
 - 1. Note that for utilities such as water, sewer, and manhole installation, fill is included in the price of installing these materials.
- B. Structural Fill (unclassified):
 - 1. Basis of Measurement: By cubic yard, compacted, in place.
 - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. South Carolina Department of Transportation (SC DOT):
 - 1. SCDOT 2007 Standard Specifications For Highway Construction, Sections 203 *Roadway and Drainage Excavation*, and 208 *Subgrade*.
- C. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS – Not Used

1.5 QUALITY ASSURANCE

- A. The Owner shall retain the services of a testing laboratory to perform all required soils testing. Where on-site soils are questionable, the soils engineer shall make appropriate tests to ensure that the soil is suitable for fill. These tests will be made at no cost to contractor.
- B. Perform Work in accordance with SC DOT requirements for fill.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Soil material used as fill, backfill or subgrade for structures shall consist of suitable material or common fill.
 1. Fill shall conform to SCDOT 2007 Standard Specifications For Highway Construction, Section 203, *Roadway and Drainage Excavation*.
 2. Soil material shall consist of suitable material as found available on-site until such supply of on-site material is depleted.
 3. Suitable material or common fill shall consist of granular soil free from organic material, topsoil, debris, frozen soil or other deleterious substances containing no rocks or lumps over 6" in greatest dimension, with not more than 60% of material passing the number 200 sieve and with not more than 15% of the rocks or lumps larger than 2 ½ " in their greatest dimension.
 4. Do not permit rocks having a dimension greater than 1" in the upper 6" of fill or subgrade.
- B. Where select material or structural fill is indicated on the drawings or specified, it should consist of a mineral soil free of organic material, loam, debris, frozen soil or other deleterious material which may be compressible or which cannot be properly compacted. Material used as select material or structural fill should conform to the following gradation requirements:

US Standard Sieve Size	Percent Passing by Weight
3 inches	100
No. 4	20 to 70
No. 40	5 to 75
No. 200	0 to 40

- C. Select fill or structural fill should have a maximum liquid limit of 40% and maximum plasticity index of 10%.
- D. Select fill or structural fill should have a maximum dry density of not less than 100 lbs/cubic foot at optimum moisture when tested in accordance with SC-T-29. Do not use any soil for embankment with optimum moisture content greater than 25% as defined in accordance with SC-T-29.

PART 3 EXECUTION

3.1 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with granular fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of one inch.
- D. Proof roll per state or local requirements to identify soft spots; fill and compact to density equal to or greater than these requirements for subsequent fill material.

3.2 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place geotextile fabric over subgrade and between lifts, if specified in the Drawings.
- D. Place and compact material in continuous 8 inch lifts.
- E. Employ placement method that does not disturb or damage other work.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- H. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.
- I. Make gradual grade changes. Blend slope into level areas.
- J. Remove surplus backfill materials from site.

3.3 TOLERANCES

- A. Top Surface of Backfilling Within Building Areas: Plus or minus 1 inch from required elevations.

- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.4 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557.
- B. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.5 PROTECTION OF FINISHED WORK

- A. Section 31 25 00 – Erosion and Sediment Controls.
- B. Reshape and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Diversion Ditches or Channels.
2. Rock Energy Dissipater (aprons).
3. Rock Barriers (check dams).
4. Silt Fence.
5. Catch Basin Inlet Protection.
6. Construction Entrances.
7. Silt Fence.

B. Related Sections:

1. Section 31 05 13 - Soils for Earthwork.
2. Section 31 05 16 - Aggregates for Earthwork.
3. Section 31 10 00 - Site Clearing.
4. Section 31 23 16 - Excavation.
5. Section 31 23 23 - Fill.
6. Section 31 37 00 - Riprap.
7. Section 32 92 19 - Seeding and Stabilization.
8. Section 33 42 13 - Pipe Culverts.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Erosion and Sediment Control is bid as a lump sum and encompasses all items shown on the construction plans. This includes seeding, stabilization, sediment control structures, erosion control blankets, silt fence, and any other required sediment control materials or items. This lump sum also includes maintenance and replacement, if necessary, due to normal wear and tear.

B. Construction Entrance:

1. Basis of Measurement: By each unit.
2. Basis of Payment: Includes labor and materials for a complete installed construction entrance.

C. The items listed below are for changes or additions not shown on the construction plans and not considered part of the regular maintenance.

D. Diversion Channel:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavating, windrowing, compacting, seeding, mulching, and maintenance.

E. Rock Energy Dissipator:

1. Basis of Measurement: By each unit.

2. Basis of Payment: Includes cleaning, excavating, backfilling, placing embankment, placing geotextile fabric, placing rock, required grouting, and maintenance.
- F. Rock Barrier (check dam):
1. Basis of Measurement: By cubic yard of rip rap.
 2. Basis of Payment: Includes placing rock, coarse aggregate filter blanket, and maintenance.
- G. Silt Fence:
1. Basis of Measurement: By linear foot.
 2. Basis of Payment: Includes materials, installation and maintenance.

1.3 REFERENCES

- A. South Carolina DHEC (Department of Health and Environmental Control) documents:
1. NPDES General Permit for Stormwater Discharges Form Construction Activities, issued January 1, 2013.
 2. SC DHEC BMP (Best Management Practices) Handbook, August 2005.
- B. American Association of State Highway and Transportation Officials:
1. AASHTO T88 - Standard Specification for Particle Size Analysis of Soils.
 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- C. ASTM International:
1. ASTM C127 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Product Data: Submit data on geotextile fabric and Erosion Control Blankets.

1.5 CLOSEOUT SUBMITTALS

- A. Per the SC DHEC Stormwater Permit, permanent structures must be surveyed to show final locations, contours and inverts.
- B. Removal of temporary erosion and sediment control structures must be approved by SC DHEC or the SWPPP preparer; see Notice of Termination (NOT) requirements.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with State and County requirements as documented on the construction plans and in the approved SWPPP (Storm Water Pollution Prevention Plan).
- B. Maintain one copy of the approved SWPPP, the SC DHEC Stormwater Permit, approved stamped construction plans, and inspection reports on site.

1.7 PRE-INSTALLATION MEETINGS

- A. Per SC DHEC requirements.

PART 2 PRODUCTS

2.1 ROCK AND GEOTEXTILE MATERIALS

- A. Furnish materials in accordance with State of South Carolina Department of Transportation (DOT) standards.
- B. Furnish each aggregate material from single source throughout the Work.
- C. Rock: As specified in Section 31 37 00 - Riprap.
- D. Rock for construction entrances, Aggregate Type: 2" Roadrock
 - 1. Natural stone; angular, washed, free of clay, shale, and organic matter; graded in accordance with ASTM C136 to the following limits:
 - 2. Minimum Size: 2 inch.
 - 3. Maximum Size: 3 inch.
- E. Aggregates: As specified in Section 31 05 16 - Aggregates for Earthwork.
- F. Backfill: As specified in Section 31 23 23 - Fill.
- G. Geotextile Fabric for beneath riprap:
 - 1. Non-biodegradable, non-woven filter fabric.
 - 2. Flow rate (ASTM D4491): 140 gal/min/sq ft minimum.
 - 3. Manufacturer: Mirafi Construction Products.
 - 4. Model: Mirafi N-Series 140NL.
 - 5. Substitutions: Permitted, must be equivalent.

2.2 SILT FENCE

- A. Product Description: Silt Fence Fabric.
 - 1. Fabric to be composed of long chain synthetic polymers.
 - 2. Free of treatments or coatings which might adversely alter its physical properties after installation.
 - 3. Free of defects or flaws that significantly affect its physical and/or filtering properties.
 - 4. Minimum width: 36 inches.

5. Flow rate (ASTM D4491): 10 gal/min/sq ft minimum.
6. Manufacturer: Mirafi Construction Products.
7. Model: Mirafi X-Series 100X.
8. Substitutions: Permitted, must be equivalent.

B. Product Description: Silt Fence Support Posts.

1. Configuration: standard "T" section steel posts with metal soil stabilization plate.
2. Minimum Length: 48 inches.
3. Material: high strength steel with minimum yield strength of 50,000 PSI.
4. Weight: 1.25 pounds per foot.

2.3 EROSION CONTROL MATERIALS

A. Product Description: Erosion Control Blanket (ECB) – 12 month.

1. Single net excelsior erosion control matting.
2. Netting: lightweight photodegradable woven net.
3. Matrix: 100% uniform wood excelsior, 80% eight-inch or longer fiber lengths, 0.90 lbs per square minimum.
4. Thread: photodegradable, 2.0" stitch spacing.
5. Functional longevity: approximately 12 months.
6. Manufacturer: Kale Enterprises, Inc., Mooresville, NC.
7. Model XCEL R-1 ECB
8. Substitutions: permitted, must be equivalent.

B. Product Description: Weighted Sediment Tube.

1. Size: 24 inch minimum diameter.
2. Length: Channel width plus minimum 24 inches.
3. Matrix: excelsior or coconut fiber.
4. Manufacturer: Filtrexx International, LLC, Grafton OH.
5. Model 24" filtrexx Soxx.
6. Substitutions: permitted, must be equivalent.

2.4 PLANTING MATERIALS

- A. As specified in Section 32 92 19 – Seeding and Stabilization.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations of base or foundation for other work are correct.

3.2 DIVERSION CHANNELS

- A. Temporary Diversion Channels

1. For temporary diversion of storm water runoff, 21 days or less.
2. Install temporary channel per State and County standards.
3. Side slopes should be 2:1 or greater wherever possible.
4. Depth: should be less than 36" where possible. Where diversion ditches are greater than 36" in depth, side slopes cannot be less than 3:1 (H:V)
5. Install rock check dams or weighted sediment tubes unless diversion channel drains to a sediment trap. Cost for these items shall be incorporated into the cost for the channel.

B. Permanent or Long-Term Diversion Channels

1. Install as per Temporary Diversion Channels, above. If channel is to remain in place for 21 days or more, the following applies:
 - a. Side slopes cannot be less than 3:1 (H:V).
 - b. The channel banks must be grassed or otherwise stabilized.
2. Stabilize banks with seeding per Section 32 92 19 – Seeding and Stabilization.
3. If banks are sloped at greater than 4:1, reinforce with Erosion Control Blankets.

3.3 ROCK ENERGY DISSIPATOR (APRONS)

- A. Excavate to indicated depth of rock lining or nominal placement thickness as indicated on the construction plans. Remove loose, unsuitable material below bottom of rock lining, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
- B. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope. Provide a minimum overlap of two feet. Offset adjacent roll ends a minimum of four feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than 4 weeks.
- C. Carefully place rock on geotextile fabric to produce an even distribution of pieces, with minimum of voids and without tearing geotextile.
- D. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and to avoid displacement of underlying material. Arrange individual rocks for uniform distribution.
- E. Install sediment stake as indicated on plans. Sediment stake is a 48" long timber stake, 2" x 2" minimum, with permanent markings at 12", 18" and 24" height, used to measure accumulation of sediment. Stake must be buried at least 18". Place stake at end of apron, near the pipe outlet, or on upstream side of dissipater.
- F. Clean out sediment when it reaches the 12" depth marker.

3.4 ROCK BARRIER (CHECK DAM)

- A. Determine length required for ditch or depression slope and excavate, compact and foundation area to firm, even surface.

- B. Produce an even distribution of rock pieces, with minimum voids to the indicated shape, height and slope.
- C. Construct coarse aggregate filter blanket against upstream face of rock barrier to the indicated thickness.
- D. Install sediment stake as indicated on plans. Sediment stake is a 48" long timber stake, 2" x 2" minimum, with permanent markings at 12", 18" and 24" height, used to measure accumulation of sediment. Stake must be buried at least 18". Place stake on upstream side of check dam.
- E. Clean out sediment when it reaches the 12" depth marker.

3.5 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.
- B. Stockpile and waste pile heights shall not exceed 8 feet. Slope stockpile sides at 2: 1 or flatter and place a line of silt fencing along the base on the downstream side. If stockpile is to remain for over 14 days without use, the silt fence shall surround the entire pile..
- C. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
 - 1. During non-germinating periods, apply mulch at recommended rates.
 - 2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 92 19 (temporary stabilization).
 - 3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 92 19 permanent seeding specifications.
- D. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.6 FIELD QUALITY CONTROL

- A. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

3.7 CLEANING

- A. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, or if sediment stake indicates that 12" of sediment has accumulated, remove and dispose of sediment.
- B. Do not damage structure or device during cleaning operations.
- C. Do not permit sediment to erode into construction or site areas or natural waterways.

END OF SECTION

SECTION 31 37 00 - RIPRAP

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Riprap placed loose.
- B. Related Sections:
 - 1. Section 31 05 16 - Aggregates for Earthwork.
 - 2. Section 31 22 13 - Grading.
 - 3. Section 31 23 23 - Fill.
 - 4. Section 33 42 13 - Pipe Culverts.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Riprap:
 - 1. Basis of Measurement: By ton of riprap.
 - 2. Basis of Payment: Includes supply and placing riprap and geotextile fabric underlay.

1.3 SUBMITTALS – Not Used

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with SC DOT standards.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Aggregate: Riprap.
 - 1. Granite type; irregular shaped rock; solid and nonfriable; 8 inch minimum size.
 - 2. Weighs a minimum of 25 lbs to a maximum of 125 lbs.
 - 3. Shall have at least 60% of stone weighing more than 60 lbs.
- B. Geotextile Fabric: Non-biodegradable, non-woven filter fabric.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not place riprap over frozen or spongy subgrade surfaces.

3.2 PLACEMENT

- A. Place geotextile fabric over substrate, lap edges and ends.
- B. Place riprap as indicated on Drawings.
- C. Hand place rock evenly and carefully into position, keying rock together in a staggered pattern to minimize voids. Place rock in one consistent operation to preclude disturbance or displacement of substrate.
- D. Installed Thickness: As indicated on Drawings.

END OF SECTION

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate base course.
- B. Related Sections:
 - 1. Section 31 05 16 – Aggregates for Earthwork.
 - 2. Section 31 22 13 - Grading.
 - 3. Section 31 23 23 - Fill.
 - 4. Section 31 37 00 - Riprap.
 - 5. Section 32 13 13 - Concrete Paving.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Aggregate Base Course:
 - 1. Basis of Measurement: By the square yard to elevations indicated on Drawings.
 - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
- B. South Carolina Department of Transportation (SC DOT):
 - 1. SCDOT 2007 Standard Specifications For Highway Construction, Section 305 *Graded Aggregate Base*.
- C. ASTM International:
 - 1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 2. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
 - 5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS – Not Used

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

- B. Perform Work in accordance with State of South Carolina DOT standards.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Coarse Aggregate: Type **GABC** as specified in Section 32 05 16, Aggregates for Earthwork.

2.2 ACCESSORIES

- A. Geotextile Fabric: AASHTO M288; non-woven, non-biodegradable polypropylene.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
 - 1. Proof roll substrate with per County and local standards to identify soft spots.
 - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 23 23.
- C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Install geotextile fabric over subgrade in accordance with manufacturer's instructions.
 - 1. Lap ends and edges minimum 6 inches.
 - 2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Place aggregate equal thickness layers to total compacted thickness indicated on Drawings.
 - 1. Maximum Layer Compacted Thickness: 8 inches.
 - 2. Minimum Layer Compacted Thickness: 4 inches.
- C. Roller compact aggregate to density indicated on Drawings.
- D. Level and contour surfaces to elevations, profiles, and gradients indicated.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.
- B. Maximum Variation From Thickness: 1/4 inch.
- C. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with State, local and County requirements.
- B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests: Per local requirements.

3.6 COMPACTION

- A. Compact materials to 98 percent of maximum density as determined from test strip, in accordance with ASTM D2940. Testing frequency is per local requirements.
- B. Verify compaction with a proof roll test per State or Local requirements.

END OF SECTION

SECTION 32 13 13 – CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete paving for the following:

1. Concrete Drives.
2. Concrete Parking.

B. Related Sections:

1. Section 03 30 00 – Cast-In-Place Concrete
2. Section 03 30 10 - Curbs Gutters and Sidewalks
3. Section 31 22 13 – Grading
4. Section 31 23 23 – Fill
5. Section 32 11 23 - Aggregate Base Courses

C. Site Conditions:

1. The Contractor shall, prior to beginning work on any cast-in-place concrete structure, consult with the Owner and determine that all rights-of-way and necessary permits have been obtained. He shall familiarize himself with all conditions and/or limitations of such rights-of-way and permits and shall fully comply with all requirements. All work and any encroachment beyond these limits shall be the Contractor's liability.
2. The Contractor shall be responsible for all survey work for lines and grades.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Concrete Pavement:

1. Basis of Measurement: By the cubic yard.
2. Basis of Payment: Includes concrete, placement accessories, forms, reinforcing, placing, finishing, curing and testing.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

B. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 305 - Hot Weather Concreting.
3. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
4. ACI 306.1 - Standard Specification for Cold Weather Concreting.
5. ACI 318 - Building Code Requirements for Structural Concrete.

C. ASTM International:

2. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
4. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
5. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
6. STM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
7. ASTM C33 - Standard Specification for Concrete Aggregates.
8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
9. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
10. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
11. ASTM C150 - Standard Specification for Portland Cement.
12. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
13. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
15. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
16. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
18. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
19. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
20. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
21. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
22. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
23. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
24. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

D. Concrete Reinforcing Steel Institute:

1. CRSI – Manual of Standard Practice.
2. CRSI – Placing Reinforcing Bars.

1.4 DESIGN CRITERIA

- A. Drive aisles: Design for movement of trucks up to 75,000 lbs.
- B. Parking: Design for parking and movement of light-duty commercial vehicles.

1.5 SUBMITTALS

- A. Product Data: Submit data on joint devices, attachment accessories and admixtures.
- B. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 - 2. Identify mix ingredients and proportions, including admixtures.
 - 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
 - 4. Identify concrete curing method and any required backup data such as compounds, surface additives, etc.
- C. Shop Drawings in accordance with CRSI shall be submitted to the Engineer for all reinforcing steel. Written approval of these shop drawings shall be obtained from the Engineer before fabrication.
- D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction. Contractor is responsible for any survey work entailed in the as-builts.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 for outdoor equipment slabs, curbs, and underground non-habitable structures.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Perform Work in accordance Florence County, SC, standards.

1.8 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS**2.1 CONCRETE MATERIALS**

- A. Aggregate Base Course: per Section 32-11-23 - Aggregate Base Courses.
- B. Concrete materials: per Section 03 30 00 – Cast-In-Place Concrete.
- C. Normal Weight Aggregates: ASTM C33.
 - 1. Coarse Aggregate: well-graded crushed stone or washed gravel.
 - a. Maximum Size: In accordance with ACI 318.
 - 2. Fine Aggregate: washed inert natural sand.
- D. Water: ACI 318; potable water free of oil, acid, alkali, salts, chlorides (except for those attributable to drinking water), organic matter or other deleterious substances.

2.2 ADMIXTURES & ACCESSORIES

- A. Furnish materials according to state and local standards.
- B. Admixtures: per Section 03 30 00 – Cast-In-Place Concrete.
- C. Accessories: per Section 03 30 00 – Cast-In-Place Concrete.
- D. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.3 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.
- B. Premolded Joint Filler: Self-expanding cork, ASTM D1752 type III; 1 inch thick.
- C. Sealant: ASTM D6690, Type I.

2.4 REINFORCEMENT

- A. Concrete Reinforcing Fibers (if specified on plans): ASTM C1116, high strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete. 1/2 or 3/4 inch long monofilament polymer fibers.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Preparation of subgrade:
 - 1. Thoroughly compact the subgrade and finish to a smooth, firmly compacted surface, which is moist at the time the concrete is placed.

2. In areas where it is impractical to use standard type rollers, accomplish compaction by vibratory hand compactors.
- B. Use wood or metal forms of a depth equal to the thickness of the concrete course. Make certain they are free from warp and are of sufficient strength when staked, to hold the alignment during the concrete placing and finishing operations.
- C. Verify requirements for concrete cover over reinforcement.
- D. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates. Clean and oil the forms.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, and formed expansion and contraction joints are not disturbed during concrete placement.
- D. The contractor shall use conveyor, chutes, tremies, buckets, etc., for the efficient placement of the concrete but in no case will a placement system be allowed that causes undue segregation of aggregate. All concrete shall be consolidated by vibrating or rodding. The Contractor will be responsible for having adequate back up vibrators, screeds, etc., to prevent interruption during a pour.
- E. No concrete will be placed during periods of rain, sleet, or other precipitation.
- F. Cold weather placement:
 1. No concrete shall be placed when the atmospheric temperature is below 35 degrees F or when the temperature threatens to drop below 25 degrees F within 48 hours, except upon written permission of the Engineer, and such permission will not be granted until satisfactory provisions have been made to protect the work.
 2. Should the temperature drop below 30 degrees F while concrete is being placed or before it has hardened sufficiently to prevent injury from cold, the Contractor shall provide sufficient housing and heating apparatus to enclose and protect the structure in such a way that the air surrounding the fresh concrete can be kept at a

temperature above 50 degrees F for a period of three days after the concrete is placed.

- G. During hot weather adequate means shall be taken to protect fresh concrete from heating to temperatures exceeding 90 degrees F.
- H. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- I. Consolidate concrete.
- J. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- K. Place concrete continuously between predetermined expansion, control, and construction joints.
- L. Place floor slabs in checkerboard or saw cut pattern as indicated on the construction drawings. If no pattern is shown, an expansion joint (saw cut unless otherwise specified) must be placed at 15-foot maximum intervals.
- M. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- N. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft, or as shown on the construction plans.
- O. All freshly poured concrete must be kept moist for a minimum of four days to allow for thorough curing. A curing compound, acceptable to the state or local authorities, may be used in lieu of wet curing with the Engineer's permission. Note that curbs and sidewalks on SC DOT rights of ways require the approval of SC DOT.

3.4 CONCRETE FINISHING

- A. As soon as the concrete has set sufficiently, remove the forms from the exposed surfaces. Float and trowel the concrete on the face and top as necessary to provide a smooth uniform finish. Leave joint templates in place a minimal length of time to prevent bonding or distortion at the joint.
- B. Ordinary Finish: An ordinary finish shall be given to all exposed concrete as follows:
 - 1. After the forms are removed, all depressions resulting from the removal of metal ties and all other holes and rough places shall be carefully pointed with a mortar of sand and cement. The surface of all such pointed surfaces shall be made flush with the adjacent surface by means of a wooden float before settling occurs.
- C. Make certain that joints are clean and corners well-rounded. Edge corners and conform to the typical cross-section. Eliminate all tool marks in final finish.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot nominal, or as indicated on drawings.

3.5 BACKFILLING

- A. After the concrete has set sufficiently and the forms had been removed, backfill the spaces on both sides to the required elevation with suitable material that is firmly compacted and neatly graded.

3.6 FIELD QUALITY CONTROL

- A. Field testing of concrete will be performed by a testing laboratory approved by the Engineer.
 - 1. Field testing shall be in accordance with ACI 318.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work.
- D. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- E. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. The Contractor will be responsible for sampling, making and curing test cylinders for each pour. He will also be responsible for timely delivery to the approved laboratory.
 - 3. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cure.
 - 4. Sample concrete and make one set of four cylinders for every 100 cu yds of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls. There shall be not less than one test sample for each day's concreting.
 - 5. Two cylinders shall be tested at 7 days and the remaining two at 28 days.
 - 6. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 7. Make one additional cylinder during cold weather concreting, and field cure.
 - 8. Additional cylinders may be required for field curing in order to justify removal of form work.
- F. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- G. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39/C39M.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Test two cylinders at 7 days.
 - 4. Test two cylinders at 28 days.

5. Dispose remaining cylinders when testing is not required.

H. Core Compressive Strength Testing:

1. Sampling and Testing Procedures: ASTM C42/C42M.
2. Test Acceptance: In accordance with ACI 318.
3. Drill three cores for each failed strength test from concrete represented by failed strength test.

3.7 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 318.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. As soon as the forms are removed from all concrete shapes, fill honeycombed spaces and other minor defects with a mortar composed of one part Portland cement into parts sand. Plastering is not allowed.
- C. Replace sections with visible cracks at no expense to the owner.
- D. Repair or replacement of major defects will be determined by Engineer.

END OF SECTION

SECTION 32 75 00 - FLAGPOLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flagpoles and accessories.
- B. Related Sections:
 - 1. 03-30-00 Cast-In-Place Concrete.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Flagpole:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Includes supply and placing flagpole, accessories, and all components necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to NAAMM FP 1001-07, "Guide Specifications for Design of Metal Flagpoles", or to specified wind speed, whichever is more stringent.
- B. Flagpole Design: Base design on maximum standard size nylon flag suitable for use with pole or flag size indicated, whichever is more stringent

1.4 SUBMITTALS

- A. For each type of flagpole required, submit manufacturer's technical data and standard installation instructions.
- B. Shop Drawings: Show general layout, jointing, anchorage, support systems, and accessories.
- C. Samples: Finish samples for each finished metal used on flagpoles, as may be required.

1.5 QUALITY ASSURANCE

- A. Source: Obtain each flagpole as a complete unit from American Flagpole, including fittings, accessories, bases, and anchorage devices

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with a heavy Kraft paper or other lightweight wrapping and enclose in a hard fiber tube or other protective means.
- B. Store bare flagpoles in a dry location, protected from the weather and moisture, as recommended by the manufacturer.

- C. Shipping: Ship to project site in one piece or as specified. If more than one piece is necessary, provide snug fitting precision joints with self-aligning, internal splicing sleeve arrangements for weather tight, hairline field joints.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturer, subject to compliance with requirements, shall be:
American Flagpole, 26252 Hillman Highway
Abingdon, VA 24210
1.855.530.4078 (telephone)
<http://www.americanflagpole.com>

2.2 FLAGPOLE TYPE AND CONSTRUCTION

- A. Aluminum Flagpole Construction: Fabricate from seamless, extruded tubing complying with ASTM B 221, alloy 6063-T6, having a tensile strength not less than 30,000 psi with a yield point of 25,000 psi. Heat treat after fabrication to comply with ASTM B 597, temper T6.
- B. Provide cone-tapered flagpoles, per manufacturer's standard rate of taper. Assembly Construction: Internal Revolving with Cam Cleat - Rope Halyard - Ground Set Foundation. See Specification Drawing for Mounting Height, Set Depth, Wall Thickness, Butt Diameter, Shaft Pieces, Maximum Wind Speeds, and Maximum Flag Size Specifications.
- C. Foundation Tube: Galvanized corrugated steel foundation tube, .0635"-16 Gauge (1.6 mm) minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16" (4.8 mm) steel bottom plate and steel centering wedges. Furnish with 3/16" (4.8mm) support plate, 3/4" (19 mm) diameter x 18" long steel ground lightning spike. Foundation tube will consist of all welded construction.

2.3 FITTINGS

- A. Finial (Ornament): Finial sized as indicated or, if not indicated, to match pole butt diameter. See Specification Drawing for Type and Size of Finial Specified.
- B. Internal Revolving Truck Assembly: Cast aluminum two-piece enclosed body, revolving, non-fouling design, single aluminum pulley mounted inside hood, stainless steel roller bearings, nylon exit bushing for rope halyard, and threaded aluminum spindle for attachment to top of pole. Poles 50' and over will have sealed bearings.
- C. Internal Halyard Cam Cleat System: Provide one (1) complete internal halyard cam cleat rope assembly with plastic coated counterweight and beaded sling assembly. A manually operated cam cleat mechanism will be installed inside the flagpole behind a flush access door having a cylinder lock.
- D. Halyard Flag Snaps: Provide four (4) stainless steel swivel snap hooks with neoprene covers. Flash Collar: Provide Spun Aluminum Collar to match flagpole. See Specification Drawing for Collar Specification.

2.4 FINISHES

- A. Metal Finishes, General: Comply with National Association of Architectural Manufacturers' (NAAMM) "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish Specifications. Note: Aluminum Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
 - 1. Natural Satin Finish: Provide directional-sanded satin finish (AA-M33); buff complying with AA-M20.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.

3.2 PREPARATION

- A. Excavation: For foundations, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Foundation: Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade.
- B. Secure forms and galvanized steel ground sleeve foundation tube in position, braced to prevent displacement during concreting.
- C. Place concrete immediately after mixing. Compact concrete in place using vibrators. Moist-cure exposed concrete for not less than 7 days or use a non-staining curing compound.
- D. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

3.3 PLACEMENT

- A. General: Install flagpoles where shown and according to shop drawings and manufacturer's written instructions.
- B. Foundation Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place.
- C. Place and compact sand in foundation tube to within 2" of the top of tube. Remove hardwood wedges and seal top of foundation tube with a 2-inch (50 mm) layer of elastomeric sealant or cement and cover with flashing collar.

END OF SECTION

SECTION 32 92 19 – SEEDING AND STABILIZATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Soil Preparation.
 2. Fertilizing.
 3. Seeding.
 4. Hydroseeding.
 5. Sod installation.
 6. Mulching.
 7. Maintenance.
- B. Related Sections:
1. Section 31 22 13 - Grading.
 2. Section 31 23 17 - Trenching.
 3. Section 31 25 00 – Erosion and Sediment Control.
 4. Section 32 05 13 - Soils for Earthwork.
 5. Section 32 93 00 – Plants and Trees.
- C. Regulatory Authority:
1. The *NPDES General Permit For Stormwater Discharges From Construction Activities*, dated January 1, 2013, expires December 31, 2017, (AKA the "General Permit") lists out the requirements for stabilization:

*"Section 3.2.10.B **Soil Stabilization**. Permittees are required to initiate stabilization measures as soon as practicable whenever any clearing, grading, excavating, or other earth disturbing activities have permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed as soon as practicable. For areas where initiating stabilization measures is infeasible (e.g. where snow cover, frozen ground, or drought conditions preclude stabilization), initiate vegetative or non-vegetative stabilization measures as soon as practicable."*

The summary is that ***if any land is disturbed, it must be grassed*** or otherwise stabilized before closeout. This includes all disturbed areas such as lots, lawns, easements, shoulders, etc.).

"Section 5: Termination of Coverage

5.1 REQUIREMENTS

- A. You may only submit a Notice of Termination (NOT) after one or more of the following conditions have been met:*
- I. Final stabilization has been achieved on all portions of the construction site for which you are responsible;...."*

From *Appendix A: Definitions*,

"Final Stabilization" means that all land-disturbing activities at the construction site have been completed and that all areas not covered by

permanent structures, either (1) a uniform (e.g. evenly distributed, without large bare areas) vegetative cover with a density of 70 percent of the natural background vegetative cover has been established excluding areas where no natural background vegetative cover is possible (e.g., on a beach), or (2) equivalent permanent stabilization measures (such as the use of landscaping mulch, rip-rap, pavement and gravel) have been implemented to provide effective cover for exposed portions of the construction site not stabilized with vegetation."

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Erosion and Sediment Control (Section 31 25 0) is bid as a lump sum and encompasses all stabilization items (excluding paving) shown on the construction plans. This includes seeding, stabilization, sediment control structures, erosion control blankets, silt fence, and any other required sediment control materials or items. This lump sum also includes maintenance and replacement, if necessary, due to normal wear and tear.
- B. The items listed below are for changes or additions not shown on the construction plans and not considered part of the regular maintenance.
- C. Grassed Areas (Seed or Hydroseeding):
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes preparation of topsoil, seeding, watering and maintenance to specified time limit.
- D. Sodded Areas:
 - 1. Basis of Measurement: By square yard.
 - 2. Basis of Payment: Includes preparation of topsoil, sodding, watering and maintenance to specified time limit.

1.3 REFERENCES

- A. South Carolina DHEC (Department of Health and Environmental Control) documents:
 - 1. NPDES General Permit for Stormwater Discharges Form Construction Activities, issued October 15, 2012.
 - 2. SC DHEC BMP (Best Management Practices) Handbook, August 2005.
- B. ASTM International:
 - 1. ASTM C602 - Standard Specification for Agricultural Liming Materials.
- C. Turfgrass Producers International:
 - 1. TPI - Guideline Specifications to Turfgrass Sodding

1.4 DEFINITIONS

- A. Weeds: Vegetative species other than specified species to be established in given area.

1.5 SUBMITTALS

- A. If sod is to be used, submit to Owner the following information:
 - 1. Sod producer's company name and contact information.

2. Type of sod (grass mixture) and fertilizers used or included.

1.6 CLOSEOUT SUBMITTALS

- A. Per the SC DHEC Stormwater Permit, permanent structures must be surveyed to show final locations, contours and inverts.
- B. Removal of temporary erosion and sediment control structures must be approved by SC DHEC or the SWPPP preparer; see Notice of Termination (NOT) requirements.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with State and County requirements as documented on the construction plans and in the approved SWPPP (Storm Water Pollution Prevention Plan).
- B. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- C. Sod: Root development capable of supporting its own weight without tearing, when suspended vertically by holding upper two corners.

1.8 QUALIFICATIONS

- A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years' experience.
- B. Sod Producer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- D. Sod: Deliver sod on pallets or rolls. Protect exposed roots from dehydration.
- E. Sod: Do not deliver more sod than can be laid within 48 hours.

1.10 MAINTENANCE SERVICE

- A. Maintain seeded areas for three months from Date of Substantial Completion.
- B. Maintain sodded areas immediately after placement until grass is well established and exhibits vigorous growing condition.

PART 2 PRODUCTS**2.1 SEED MIXTURE**

- A. Furnish materials in accordance with State of South Carolina Department of Health and Environmental Control (SC DHEC).
- B. Grass seeding mixtures and requirements are on the construction plans, in the SWPPP (Storm Water Pollution Prevention Plan) on site, and are also available at the SC DHEC web site. Seed mixtures vary by season and geographical location within South Carolina.

2.2 SOD

- A. Sod: TPI defined approved grade; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft.
- B. Machine cut sod and load on pallets in accordance with TPI.
- C. Cut sod in area not exceeding 1 sq yd, with minimum 1/2 inch and maximum 1 inch topsoil base.

2.3 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil, as indicated in analysis.
- C. Lime: ASTM C602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.
- E. Erosion Fabric: per Section 31 25 00 – Erosion and Sediment Control.
- F. Stakes: Softwood lumber, chisel pointed.
- G. String: Inorganic fiber.

2.4 SOURCE QUALITY CONTROL

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.

- C. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.

3.2 PREPARATION OF SUBSOIL

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.
- C. Scarify subsoil to depth of 3 inches in areas where vehicles or construction equipment has compacted sub-soil.
- D. Spread topsoil to minimum depth of 4 inches over area to be seeded. Rake until smooth.
- E. Place topsoil during dry weather and on dry unfrozen subgrade.

3.3 FERTILIZING

- A. Apply lime at application rate recommended by soil analysis. Work lime into top 6 inches of soil.
- B. Apply fertilizer at application rate recommended by soil analysis.
- C. Apply after smooth raking of topsoil.
- D. Do not apply fertilizer at same time or with same machine used to apply seed.
- E. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

3.4 SEEDING

- A. Apply evenly in two intersecting directions. Rake in lightly. Permanent seeding mixes and rates are available on the SC DHEC web site. Some approved mixes for the Pee Dee Area are:
 - 1. Browntop Millet (10 lb/acre) and Bahia grass (40 lb/acre)
 - 2. Rye, Grain or oats (10 lb/acre), Bahia grass (40 lb/acre) and Crimson Clover (5 lb/acre)
 - 3. Browntop Millet (10 lb/acre), common Bermuda (10 lb/acre) and Sericea Lespedeza (40 lb/acre)
 - 4. Ryegrass (50 lb/acre)

- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.
- D. Immediately following seeding, apply mulch to thickness of 1/8 inches. Maintain clear of shrubs and trees.
- E. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.5 HYDROSEEDING

- A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at a rate of approximately 50 lbs of seed per acre evenly in one pass.
- B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels two to four inches.

3.6 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod within 48 hours after harvesting to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Align with adjoining grass areas where applicable.
- E. Place top elevation of sod 1/2 inch below adjoining edging, paving, or curbs.
- F. On slopes exceeding 3:1 (H:V), lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. When using "big roll", lay sod parallel to slope. Drive pegs flush with soil portion of sod.
- G. Do not place sod when temperature is lower than 32 degrees F.
- H. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- I. After sod and soil have dried, roll sodded areas to bond sod to soil and to remove minor depressions and irregularities.
- J. Roll before first watering.

3.7 SEED PROTECTION

- A. Cover seeded slopes where grade is sloped at 3:1 (H:V) or greater with erosion fabric per Section 31 25 00. Roll fabric onto slopes without stretching or pulling.
- B. Lay fabric and stake per manufacturer's recommendations.

- C. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- D. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.8 MAINTENANCE

- A. Water to prevent grass and soil from drying out.
- B. Reseed areas showing bare spots.
- C. Repair washouts or gullies.

END OF SECTION

SECTION 33 11 16 - WATER UTILITY DISTRIBUTION PIPING**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Pipe and fittings for potable water line
 - 2. Gate valves and boxes.
 - 3. Underground pipe markers.
 - 4. Bedding and cover materials.
- B. Related Requirements:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 05 16 - Aggregates for Earthwork.
 - 3. Section 31 23 16 - Excavation.
 - 4. Section 31 23 17 - Trenching.
 - 5. Section 31 23 23 - Fill.
 - 6. Section 33 13 00 - Disinfecting of Water Utility Distribution.
 - 7. Section 33 13 10 - Testing of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe:
 - 1. Basis of Measurement: By the linear foot.
 - 2. Basis of Payment: Includes hand-trimming excavation, pipe and fittings, bedding, connection and tap to building service piping (if applicable), testing, and connection and tap to municipal utility water source.
- B. Fittings:
 - 1. Basis of Measurement: By the pound.
 - 2. Basis of Payment: Contractors estimate of fitting costs for the water distribution system per the construction drawings.
- C. Valves:
 - 1. Basis of Measurement: Each.
 - 2. Basis of Payment: Includes valve, testing, backfill, boxes and accessories.

1.3 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM International:
 - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 3. ASTM A123 - Standard Specification for Zinc-Hot-Dip Galvanized Coatings on Iron and Steel Products.
 - 5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 6. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

7. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 8. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- C. American Water Works Association:
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
 3. AWWA C111/A21.11-00 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 4. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 5. AWWA C150/A21.50-02 - American National Standard for Thickness Design of Ductile-Iron Pipe.
 6. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast.
 7. AWWA C153 - Ductile-Iron Compact Fittings.
 8. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
 9. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
 10. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
 11. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
 12. AWWA C605 - Underground Installation of PVC and PVC-O Pressure Pipe and Fittings.
 13. AWWA C606/A21.10 - Grooved and Shouldered Joints.
 14. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
 15. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm).
- D. Manufacturer's Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joint between Tapping Sleeves and Tapping Valves.
- E. National Fire Protection Agency:
1. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.
- F. National Sanitation Foundation:
1. NSF 61 - Drinking Water System Components - Health Effects

1.4 SUBMITTALS

- A. Design Data: Submit manufacturer's latest published literature. Include illustrations, installation instructions, maintenance instructions and parts lists.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
1. Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Valves: Mark valve body with manufacturer's name and pressure rating.
- B. Perform Work according to State, county and local standards.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.
- B. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.
- C. Deliver and store valves in shipping containers with manufacturer's labeling in place.
- D. Block individual and stockpiled pipe lengths to prevent moving.
- E. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- F. Store polyethylene and PVC materials out of sunlight.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.9 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

- 2.1 All material and appurtenances shall meet the following minimum standard requirements. It shall be each manufacturer's responsibility to check the proposed installation and to furnish material that will be fully capable of performing its intended function.
- 2.2 All pipes furnished for the project shall be of one type and fabricated by the same manufacturer. The age of the pipe shall not exceed 12 months when installed unless approved in writing by the owner.
- 2.3 All pipe & valve material, solder and flux shall be "lead free".
 - A. "Lead Free" refers to the Federal Reduction of Lead in Drinking Water Act, effective January 4, 2014, where,
 - 1. The wetted surface of pipe, fittings, and fixtures in potable water systems must have a weighted average lead content of less than 0.25%.
 - 2. The percent lead in solders and flux must be less than 0.20%.

3. Reference the Safe Drinking Water Act (Sec. 1417) amended 01/04/2011 and other equivalent state regulations.

2.4 WATER PIPING

- A. Ductile Iron Pipe: 60-42-10 ductile cast iron, AWWA C150, AWWA C151.
 1. To be used when cover over pipe is less than 36", or where specified on drawings.
 2. Pipe less than 30" shall be thickness class 53, pressure rating of 150 psi unless otherwise specified.
 3. All pipe shall have standard cement-lined interior and 2-mil thick bituminous exterior coating.
 4. Fittings: Ductile iron grade 70-50-05.
 5. Joints: Push-on or mechanical joint ends, AWWA C111, rubber gasket joint devices.
 6. Flanges: AWWA C606, Class 125 except where Class 250 is specifically noted. Drilling and facing shall conform to ASME/ANSI B16.1-1998 – Cast Iron Pipe Flanges and Flanged Fittings.
 7. All pipe shall be smooth and free of cracks or other imperfections.
 8. All pipe shall be clearly marked with the following information:
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. Pressure class.
 - d. Material designation.
 - e. National Sanitation Foundation Seal of Approval for Potable Water.
- B. PVC Pipe: Rigid polyvinyl chloride, AWWA C900 and AWWA C905, **Class 235**, Blue.
 1. All PVC pipe must have 36" or more of cover; otherwise Ductile Iron Pipe (DIP) shall be used.
 2. Pipe 14" through 24" diameter: AWWA C-905, **DR 18**.
 3. Pipe 4" through 12" diameter: AWWA C-900, **DR 18**.
 4. Pipe less than 4" in diameter: Must be specified as ASTM D1785 or ASTM D2241, **DR 18, Class 235**.
 5. Solvent weld PVC pipe and fittings shall not be used in water mains three (3) inches and larger.
 6. Nominal laying lengths shall be a minimum of 18 feet.
 7. All pipe shall be smooth and free of cracks or other imperfections.
 8. All pipe shall be clearly marked with the following information:
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. DR class number.
 - d. ASTM designation.
 - e. Material designation.
 - f. National Sanitation Foundation Seal of Approval for Potable Water.
 - g. Manufactured date.
 9. Fittings: 3" and greater, AWWA C900; AWWA C905, ductile iron with mechanical joint.
 10. Fittings: Less than 3" pipe diameter, schedule 40 PVC with solvent weld.
 11. Joints: ASTM D3139, integrally formed, factory fabricated bells, or twice gasketed couplings with flexible elastomeric seals. Solvent-cement couplings are not permitted.
- C. Polyethylene Pipe: AWWA C901, ASTM D3350-12e1.
 1. To be used in directional bores only.

2. Pipe Materials: Virgin resins exhibiting a cell classification of PE 345444C as defined in ASTM D3350 with an established hydrostatic-design-basis of 1600 psi for water at 73 degrees F. The resin shall be listed by the PPI (Plastic Pipe Institute) in its pipe-grade registry Technical Report (TR) 4, "Listing of Plastic Pipe Compounds".
3. Pipe greater than 2" diameter: DR 11, Class 160.
4. Pipe 2" diameter or less: ASTM D2239-12a, SDR 15, 100 psi.
5. Fittings: AWWA C901, molded.
6. Joints: Heat fusion, flanges, or other mechanical joint systems proven for HDPE pipes.
7. All pipe shall be smooth and free of cracks or other imperfections.
8. All pipe shall be clearly marked with the following information:
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. Pressure class.
 - d. Material designation.
 - e. National Sanitation Foundation Seal of Approval for Potable Water.

2.5 JOINT MATERIAL

- A. gaskets for pipe fittings shall be of an elastomeric material which will not support microbiological growth. Gaskets shall conform to the requirements of the applicable AWWA specification for the type of pipe used.
- B. Gasket lubricant shall be in soluble in cold water, non-toxic, shall not support microbiological growth and shall not impart taste or odor to the water. Use of hydrogenated vegetable oil or vegetable shortening is prohibited.

2.6 UNDERGROUND PIPE MARKERS

- A. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- B. Trace Wire: Magnetic detectable conductor, or #12 gauge copper wire, continuous blue insulated plastic covering.
 1. Tracer wire shall terminate at each valve or meter to prevent interference to operating valve or meter.
 2. Terminations shall be arranged to allow the connection of standard pipe tracking equipment.
 3. Tracer wire shall be approved for direct burial by the manufacturer.
 4. All terminals shall be taped for protection from corrosion and other underground deterioration.
 5. Tracer wire shall be detectable within three (3) feet with electronic locating equipment.
6. Where splicing is required, standard underground-type electrical wire connectors shall be used.

2.7 MATERIALS

- A. Bedding: Fine aggregate per Section 31 05 16 – Aggregates for Earthwork.
- B. Cover/Backfill: per Section 31 23 23 - Fill.

2.8 FINISHES

- A. Steel: Galvanizing, ASTM A123; hot-dip galvanize after fabrication.

2.9 VALVE MARKERS

- A. Valve markers shall be as shown on the Drawings.
 - 1. Material: Reinforced concrete.
 - 2. Markings: Recessed letters "MV" (Main Valve), "AV" (Air Valve) or "BO" (Blowoff).

2.10 ACCESSORIES

- A. Joint Restraint:
 - 1. MegaLug joint restraint
 - 2. Threaded Steel Rods, Bolt, Lugs, and Brackets: ASTM A36 or ASTM A307, Grade A carbon steel.
- B. Protective Coating: Bituminous coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that existing utility water main size, location, and invert are as indicated on Drawings.
- C. Determine exact location and size of valves from Drawings; obtain clarification and directions from Engineer prior to execution of work.

3.2 PREPARATION

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws is not permitted. Grind edges smooth with beveled end for push-on connections.
- D. Remove scale and dirt on inside and outside before assembly.
- E. Prepare pipe connections to equipment with flanges or unions.

3.3 BEDDING

- A. Excavate pipe trench as specified in Section 31 23 17 - Trenching for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

- B. A 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 to adequately support and protect the pipe. Stones, other than crushed bedding, shall not come into contact with, or be located within six (6) inches of the pipe.
- C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- D. Provide sheeting and shoring as specified in Section 31 23 17 - Trenching.
- E. Place bedding material per the Drawings and Section 31 23 17 - Trenching.

3.4 SPECIAL CONDITIONS

- A. Potable Water Supply Interconnections. There shall be no physical connections between the public or private potable water supply system and a sewer, or appurtenance thereto, which may permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any Part of a sewer manhole.
- B. Horizontal and Vertical Separation from Potable Water Mains. Potable water lines shall be laid at least ten (10) feet horizontally from any existing or proposed sewer mains. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, the Department may allow deviation on a case by case basis, if supported by data from the design engineer.

Such deviation may allow installation of the water line closer to a sewer main, provided that the potable water main is in a separate trench or on in undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the potable water main is at least 18 inches above the top of the sewer.

- C. Crossings. Potable water lines crossing sewer mains shall be laid to provide a minimum vertical separation of 18 inches between the outside of the potable water main and the outside of the sewer. This shall be the case where the possible water main is either above or below the sewer. Whenever possible, the potable water main shall be located above the sewer main.

Where a new sewer line crosses a new potable water main, a full-length of pipe shall be used for both the sewer line and potable water main and the crossing shall be arranged so that the joints of each line shall be as far as possible from the point of crossing and each other. Where a possible water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the potable water main while maintaining line and grade.

3.5 INSTALLATION

- A. Pipe:
 - 1. Install pipe according to AWWA C600 and AWWA C605.
 - 2. Handle and assemble pipe according to manufacturer's instructions and as indicated on Drawings.
 - 3. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.

4. Install ductile-iron piping and fittings according to AWWA C600, or grooved and shouldered pipe joints according to AWWA C606, as appropriate.
 5. Route pipe in straight line. Relay pipe that is out of alignment or grade.
 6. Install pipe with no high points. If unforeseen field conditions arise that necessitate high points, install air release valves as directed by Engineer.
 7. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.
 8. Prevent foreign material from entering pipe during placement.
 9. Install pipe to allow for expansion and contraction without stressing pipe or joints.
 10. Close pipe openings with watertight plugs during Work stoppages.
 11. Install access fittings to permit disinfection of water system performed under Section 33 13 00 - Disinfecting of Water Utility Distribution.
 12. Establish elevations of buried piping with not less than three feet of cover. Measure depth of cover from final surface grade to top of pipe barrel.
 13. Install plastic ribbon tape continuous over top of pipe, above pipe line; as specified below.
- B. Trace wire:
1. Install plastic ribbon tape continuous over top of pipe, buried 18 inches below finish grade, above pipe line; coordinate with Section 31 23 23.
 2. For non-metallic pipe, Install trace wire continuous over top of pipe, located 6 inches above pipe line; coordinate with Section 31 23 23.

3.6 THRUST RESTRAINTS

- A. Install tie rods, clamps, setscrew retainer glands, or restrained joints. Protect metal-restrained joint components against corrosion by applying a bituminous coating or by concrete mortar encasement of metal area. Do not encase pipe and fitting joints to flanges.
- B. Install thrust blocks, tie rods, and joint restraint at dead ends of water main.

3.7 SERVICE CONNECTIONS

- A. Install service connections as specified in Section 33 12 13 - Water Service Connections.

3.8 BACKFILLING

- A. Backfill around sides and to top of pipe as specified in Section 31 23 17 - Trenching.
- B. Maintain optimum moisture content of bedding material to attain required compaction density.
- C. All water mains shall be provided with a minimum thirty six (36) inches of cover. Where this is not possible, pipe shall be steel, concrete, ductile iron, or any other approved material and method approved by the Department.
- D. In instances where a pipe is buried with less than thirty (30) inches of cover, it may be necessary to insulate the pipe to prevent freezing. Refer to the Construction Drawings.



3.9 DISINFECTION OF POTABLE WATER PIPING SYSTEM

- A. Flush and disinfect system as specified in Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.10 FIELD QUALITY CONTROL

- A. Perform pressure test on domestic Site water distribution system according to Section 33 13 10 – Testing of Water Utility Distribution.
- B. Compaction Testing for Bedding: According Section 31 23 17 - Trenching.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION

SECTION 33 13 00 - DISINFECTING OF WATER UTILITY DISTRIBUTION**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes disinfection of potable water distribution system; testing the system and reporting results.
- B. Related Sections:
 - 1. Section 33 11 16 - Water Utility Distribution Piping.
 - 2. Section 33 13 10 – Testing of Water Distribution Piping.

1.2 REFERENCES

- A. American Water Works Association:
 - 1. AWWA B300 - Hypochlorites.
 - 2. AWWA B302 - Ammonium Sulfate.
 - 3. AWWA B303 - Sodium Chlorite.
 - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 5. AWWA C651 - Disinfecting Water Mains.
- B. State of South Carolina Department of Health and Environmental Control (SC DHEC).
 - 1. R.61-58.7E(15) – State Primary Drinking Water Regulation

1.3 SUBMITTALS

- A. Disinfection Procedure: Submit procedure description including type of disinfectant to and calculations indicating quantities of disinfectants required to produce specified chlorine concentration in accordance with AWWA C651.
- B. Test Reports: Indicate results of bacteriological and residual chlorine laboratory test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Disinfection Report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Name of person collecting samples.
 - 5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 6. Date and time of flushing start and completion.
 - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.

2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certify water conforms, or fails to conform, to bacterial standards of SC DHEC.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina Department of Health and Environmental Control standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store disinfectants in cool, dry place away from combustibles such as wood, rags, oils and grease.
- B. Handle disinfectants with caution; protect skin and eyes from contact; avoid breathing vapors; wear gloves, aprons, goggles, and vapor masks.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Furnish personnel working inside tank during disinfection with equipment to comply with Federal and State regulations for work conducted in hazardous atmosphere.
- B. Neutralize disinfectant solution before disposal.
- C. Legally dispose of disinfection solution off Project site.

1.8 QUALIFICATIONS

- A. Testing Firm: Company specializing in testing potable water systems, approved by the State of South Carolina.
- B. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.1 CONTRACTOR RESPONSIBILITY

- A. The contractor shall furnish all necessary testing equipment including hose, temporary piping, force pump, pressure gauges, approved pipe plugs, tank trucks and flow measurement facilities.
- B. The contractor shall notify the engineer 24 hours in advance of the testing to allow sufficient time for the engineer to arrange to witness the tests.
- C. The pressure lines shall be tested for their full length. The contractor will have the option of testing the full-length at one time or testing in separate length increments.

2.2 DISINFECTION CHEMICALS

- A. Chemicals: Chlorine Forms in accordance with AWWA C651.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Coordinate scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.2 PREPARATION

- A. Provide and attach required equipment to perform the Work of this section. The contractor shall be responsible for furnishing all required equipment and chemicals.
- B. Notify the Engineer 24 hours in advance of the disinfecting.
- C. Protect aquatic life and vegetation from damage from disinfectant solution purged from tank.

3.3 DISINFECTING

- A. Disinfect pipeline installation in accordance with AWWA C651. Use of liquid chlorine is not permitted.
- B. Inject treatment disinfectant into the piping system. The sterilizing solution shall be introduced at one end of the main as water is being withdrawn from the other end, in such proportion as to give 50 ppm of free chlorine throughout the main.
- C. Maintain disinfectant in the system for 24 hours, at which time it shall have a residual chlorine concentration of at least 25 ppm, throughout the main, or the process shall be repeated.
- D. Flush, circulate, and clean with the municipal domestic water until the chlorine residual is equal to that of the existing water mains.
- E. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
- F. Replace permanent system devices removed for disinfection.

3.4 TESTING

- A. After final flushing and before pipeline is connected to existing system, or placed in service, a minimum of two (2) samples from each site shall be taken at least 24 hours apart and the chlorine residual recorded when the samples are taken. These samples shall be delivered to

a state approved independent laboratory and tested for total coliform. Both samples shall show a negative bacteriological results with the process shall be repeated.

- B. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must be reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) millimeters, the sample result is invalid and must be repeated.
- C. Furnish written reports of test results to engineer with both chlorine residual and bacteriological results.
- D. The number of sampling sites depends on the amount of new construction but must include all dead and lines and be representative of the water in the newly constructed mains. The engineer will determine number of sampling sites. Samples shall be taken at a minimum of every 1,200 linear feet of water main. All samples shall be analyzed by a state approved laboratory. The results will be submitted with the registered professional engineer's letter of certification.
- E. Water for testing and sterilizing will be furnished by the Owner at no cost to the contractor. The contractor shall furnish all necessary pipe or hose extensions or transportation to the point of use and shall exercise care in the use of water. The contractor shall bear all costs of bacteriological testing.

3.5 FIELD QUALITY CONTROL

- A. Collect samples of water from filled tank for bacteriological analysis in accordance with AWWA C651.
- B. Test water samples for bacterial contamination, and residual chlorine in accordance with State Health Standards for potable water.
- C. When water samples fail to meet State Health Standards for potable water perform the following corrective measures until water quality conforms to State Health Standards:
 - 1. Eliminate source of contamination, repeat disinfection, and retest water quality.

3.6 CLEANUP

- A. Final cleanup will meet the approval of the Engineer, the Owner, and the property owner where applicable, with all defects in ditch settlement, pavement patches or other deficiencies being promptly corrected.

END OF SECTION

SECTION 33 13 10 – TESTING OF WATER UTILITY DISTRIBUTION**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Pressure Testing of Piping.
- B. Related Sections:
 - 1. Section 33 11 16 – Water Utility Distribution Piping.
 - 2. Section 33 13 00 – Disinfecting of Water Utility Distribution.

1.2 REFERENCES

- A. American Water Works Association:
 - 1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- B. National Sanitation Foundation:
 - 1. NSF 61 - Drinking Water System Components - Health Effects

1.3 SUBMITTALS

- A. Test Reports: Furnish written reports of test results to Engineer.

PART 2 PRODUCTS

- 2.1 The contractor is responsible for furnishing all necessary testing equipment including hose, temporary piping, force pump, pressure gauges, approved pipe plugs, mandrels, lamps, tank trucks and flow measurement facilities.
 - A. Pressure gauge requirements: Provide a gauge calibrated to 0.1 psi with increments no greater than 0.5 psi.
 - B. Flow meter requirements: Provide a flow meter calibrated to 0.1 gpm with increments no greater than 0.5 gpm.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Verify all piping is ready for testing.
- B. Verify trenches are backfilled.

3.2 PIPING PREPARATION

- A. The contractor shall furnish all necessary testing equipment and have it on site prior to the arrival of the witnesses to the test (Engineer and/or City/County representative).

- B. Notify the Engineer 24 hours in advance of the testing to allow sufficient time for the Engineer to arrange to witness the tests
- C. Flushing Lines:
 - 1. On completion of the pipe installation, the contractor shall flush all lines and remove any sediment. On large lines if flushing does not remove foreign material, the contractor shall use a vacuum truck or other acceptable means to clean the line to the satisfaction of the Owner and Engineer.
- D. Plug outlets, close valves to isolate system; brace plugs to resist test pressures.

3.3 TESTING

- A. The pressure lines shall be tested for their full length. The contractor will have the option of testing the full-length at one time or testing in separate length increments.
- B. Pressure Test:
 - 1. Pressure test system in accordance with AWWA C600 and the following:
 - 2. Test Pressure: One hundred fifty percent (150%) of the pipe's working pressure, but not less than 150 psig.
 - 3. Conduct hydrostatic test for at least two-hour duration.
 - 4. Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.
 - 5. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.
 - 6. Correct visible deficiencies and continue testing at same test pressure for additional 2 hours to determine leakage rate. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
 - 7. Compute maximum allowable leakage by the following formulae:

$L = (SD\sqrt{P})/C$
L = testing allowance, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during hydrostatic test, in psig
C = 148,000
When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

- 8. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

END OF SECTION

SECTION 33 21 00 - WATER SUPPLY WELLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Drilling and casing water well.
 - 2. Pump and controller.
 - 3. Water and system testing and certification.
- B. Related Sections:
 - 1. Section 33 11 16 - Site Water Utility Distribution Piping.
 - 2. Section 33 13 00 - Disinfecting of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. For bidding purposes, see *System Description* under Section 1.4 below.
- B. Water Well:
 - 1. Basis of Measurement: By vertical foot of well depth.
 - 2. Basis of Payment: Includes drilling, casing, backfilling, pump test, and water quantity and quality tests.
- C. Grouting:
 - 1. Basis of Measurement: By cubic foot.
 - 2. Basis of Payment: Includes materials and placement of grout.
- D. Pump:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Includes pump controller, motor drive, fittings, sensor, and accessories; conduit, wire, pipe and pipe fittings from well to building service line; accessories and pump.

1.3 REFERENCES

- A. South Carolina Department of Health and Environmental Control (SC DHEC)
 - 1. R.61-71 South Carolina Well Standards, effective date April 26, 2002.
- B. American Society of Mechanical Engineers:
 - 1. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
- C. ASTM International:
 - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. American Water Works Association:
 - 1. AWWA A100 - Standard for Water Wells.
 - 2. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.

- E. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
 - 2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 SYSTEM DESCRIPTION

- A. The final well configuration will be **performance driven** and therefore lengths and depths will change. Ultimately, the anticipated well will be a 4" well with a submersible pump capable of producing potable water at a rate of *33 gallons per minute at a pressure of 30 psi*.
- B. For purposes of bidding, assume the following well characteristics:
 - 1. Upper Drill Hole: 9 inch diameter, 20 feet deep.
 - 2. Lower Drill Hole: 9 inch diameter, 130 feet deep.
 - 3. Casing Size: 4 inch inside diameter, 150 feet deep.
 - 4. Grout Seal: 65 feet deep.
 - 5. Screen: 4 inch inside diameter, 50 feet in length.
 - 6. Total Well Depth: 150 feet.
 - 7. Pump Depth: 60 feet.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Include data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Manufacturer's Installation Instructions: Indicate rigging, assembly, and installation instructions.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of well, depth, subsoil strata, and drilling difficulties encountered.
- B. Submit signed copy of driller's log book statements.
- C. Submit executed certification of well pump after performance testing.
- D. Submit documents required by authority having jurisdiction.
- E. Provide certificate of compliance from authority having jurisdiction indicating suitability of water for human consumption.
- F. Operation and Maintenance Data: Submit equipment manuals.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA A100.
- B. Perform Work in accordance with SC DHEC standards.

1.8 QUALIFICATIONS

- A. Drilling Firm: Company specializing in performing Work of this section with minimum 3 years documented experience and in State of South Carolina.

1.9 SEQUENCING

- A. Sequence Work to occur before placement of water service piping to building.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Well Casing (PVC): AWWA C900 PVC 4 inch internal diameter pipe, with ventilated well cap.
- B. Grout: Portland cement type, with bentonite admixture.

2.2 PUMP

- A. Goulds Water Technology "GS" Series residential water well, Model 33GS10 (six stage) or approved equal.
- B. Type: Vertical shaft, multiple stage, close coupled, for insertion 4 inch diameter pipe.
- C. Casing: Bronze casting with stainless steel housing and intake screen, check valve with stainless steel stem and valve seat with rubber seal built into discharge casting.
- D. Impellers and Diffusers: Bronze.
- E. Shaft: Stainless steel with stainless steel shaft sleeve.
- F. Motor: NEMA MG 1, submersible type:
 - 1. Characteristics: 1.0 hp; 120 volt, single phase 60 Hertz.
- G. Pump: Submersible type for deep well pump, water lubricated:
 - 1. Operating Performance: 33 gpm flow capacity, 120 feet total dynamic head, 1.0 hp motor.
 - 2. Pump Capacity (Base Bid Criteria): 33 gpm.
- H. Pump Controller: NEMA 250 Type **3R** enclosure with main disconnect interlocked with door, containing across-the-line electric motor starter with starting relay; circuit breaker, control transformer, hand-off-automatic selector switches, pilot light.
- I. Disconnect: NEMA 250 Type **3R** enclosure.
- J. Pressure Sensing Switch: Low voltage relay type, adjustable settings to start at 30 psig and shut-off at 50 psig with low pressure cutoff set at 20 psig.
- K. Control Voltage: **120 VAC.**

- L. Pump Lift Cable: Stainless steel, multi-stranded aircraft cable, high tensile strength; cable ends fitted with closed loop fittings; length of cable equals depth of shaft plus 20 feet.
- M. Screens: Stainless steel.
- N. Discharge: 2" NPT

2.3 TANK

- A. Tank: pressurized diaphragm type, 50 gallon capacity.
 - 1. Galvanized steel, tested and stamped in accordance with ASME Section VIII.
 - 2. integral floor stand
 - 3. tapping for installation of piping and accessories:
 - 4. Tank Volume: 50 gallons.

2.4 WELL HOUSING

- A. Insulated rain tight protective cover (rock style) on a 6 x 6 foot, 4" thick concrete slab.

2.5 Well House Appurtenances

- A. Per the SC DHEC Bureau of Water document *Guidelines For Small Water Systems* dated October 2000, the well house must have the following appurtenances (listed in order from wellhead to distribution):
 - 1. Bushing, from well to 1" PVC coupling
 - 2. Check valve (1" dia brass) with reducers as needed
 - 3. Pressure relief valve (on 1" PVC tee with applicable bushings; set to 50 psi)
 - 4. Sample tap (on 1" PVC tee; threadless 1/2" sample cock with applicable bushings)
 - 5. Gate valve with blow-off pipe (1" brass valve bushed off of a 1" PVC tee)
 - 6. Gate valve (1" brass valve for isolating the well from the distribution system)
 - 7. Hose bibb
 - 8. Bushing, 1" to 1.5" (service line to building)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions are capable of supporting equipment for performing drilling operations.

3.2 PREPARATION

- A. Protect structures near well from damage.

3.3 DRILLING

- A. Drill concentric well shaft to diameters and depths **required to meet performance criteria.**
- B. Place well casing immediately after drilling. Set firmly in place.
- C. Clean shaft bottom of loose material.

- D. Allow inspection of casing prior to placement of grout.
- E. Place grout tight to surrounding work in accordance with regulatory requirements.
- F. Maintain well opening and casing free of contaminating materials.
- G. Cut off shaft top 24 inches above grade. Do not permit metal cuttings to enter casing.
- H. Disinfect well.

3.4 INSTALLATION - PUMP

- A. Electrical Connections: Refer to Electrical Specifications.

3.5 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: In accordance with ANSI/AWWA A100.
- B. Maximum Offset From Indicated Position: 1 inch.

3.6 PERFORMANCE TESTING

- A. Notify authority having jurisdiction 3 days prior to flow rate testing.
- B. Test flow rate and certify.

END OF SECTION

SECTION 33 31 00 - SANITARY UTILITY SEWERAGE PIPING**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Sanitary sewerage pipe (Sewer Services).
- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 05 16 - Aggregates for Earthwork.
 - 3. Section 31 23 16 - Excavation.
 - 4. Section 31 23 17 - Trenching.
 - 5. Section 31 23 23 - Fill.
 - 6. Section 33 01 30 – Sewer Distribution System Testing.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Sanitary Sewer Services (Pipe and Fittings 6" or smaller, tie-in to building or lot):
 - 1. Basis of Measurement: By the unit.
 - 2. Basis of Payment: Includes hand trimming, excavation, bedding, pipe and fittings, cleanouts, testing and connection to building sewer (5 feet outside of building footprint, or cleanout at property line of undeveloped residential lot).

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society of Mechanical Engineers:
 - 1. ASME/ANSI B16.1-1998 – Cast Iron Pipe Flanges and Flanged Fittings.
- C. ASTM International:
 - 1. ASTM A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 5. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - 6. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 7. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - 8. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

9. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
10. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
11. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
13. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
14. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
16. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

D. American Water Works Association:

1. AWWA C111/A21.11-00 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
2. AWWA C150/A21.50-02 – American National Standard for Thickness Design of Ductile-Iron Pipe.
3. AWWA C151/A21.51 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
4. AWWA C606-11/A21.10 – Grooved and Shouldered Joints.

E. State Standards:

1. South Carolina Department of Health and Environmental Control (SC DHEC).

1.4 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit data indicating pipe material used, pipe accessories, and fittings.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina Department of Health and Environmental Control (SC DHEC) standards.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements and elevations are as indicated on the Plans.

1.9 COORDINATION

- A. Coordinate the Work with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, roadway construction, and trenching. Note that the roadway contractor is not to pave the road or parking lot until verification that the sewer has been installed in that area.

PART 2 PRODUCTS

2.1 SANITARY SEWAGE PIPE (SEWER SERVICES)

- A. Plastic Pipe: ASTM D2751, SDR 35, Acrylonitrile-Butadiene-Styrene (ABS) material; inside nominal diameter of 4 or 6 inches, bell and spigot style solvent sealed ends.
 - 1. Fittings: ABS.
 - 2. Joints: ASTM D2235, solvent weld.
- B. Plastic Pipe: ASTM D1785, Schedule 40, Poly (Vinyl Chloride) (PVC) material; inside nominal diameter of 4 or 6 inches, bell and spigot style solvent sealed joint ends.
 - 1. Fittings: ASTM D2466, PVC.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

2.2 BEDDING AND COVER MATERIALS

- A. Bedding: Fine aggregate per Section 31 05 16 – Aggregates for Earthwork.
- B. Cover/Backfill: per Section 31 23 23 - Fill.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

- A. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 SPECIAL CONDITIONS

- A. Potable Water Supply Interconnections. There shall be no physical connections between the public or private potable water supply system and a sewer, or appurtenance thereto, which may permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any Part of a sewer manhole.
- B. Horizontal and Vertical Separation from Potable Water Mains. Sewers shall be laid at least ten (10) feet horizontally from any existing or proposed potable water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, the Department may allow deviation on a case by case basis, if supported by data from the design engineer.

Such deviation may allow installation of the sewer closer to a potable water main, provided that the potable water main is in a separate trench or on in undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the potable water main is at least 18 inches above the top of the sewer.

- C. Crossings. Sewers crossing potable water lines shall be laid to provide a minimum vertical separation of 18 inches between the outside of the potable water main and the outside of the sewer. This shall be the case where the possible water main is either above or below the sewer. Whenever possible, the potable water main shall be located above the sewer main.

Where a new sewer line crosses and new potable water main, a full-length of pipe shall be used for both the sewer line and potable water main and the crossing shall be arranged so that the joints of each line shall be as far as possible from the point of crossing and each other. Where a possible water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the potable water main while maintaining line and grade.

3.4 BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 17 - Trenching.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 8 inches.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.5 INSTALLATION - PIPE

- A. Pipe Installation:
 - 1. Distribute the pipe and appurtenances neatly along the trench prior to laying. Handle the pipe carefully handled to prevent damage; use mechanical hoists or other approved methods when necessary.
 - 2. Keep pipe and appurtenances clean and plug open ends securely when not actively laying pipe. Inspect and clean the inside of pipe, bell and spigots thoroughly prior to lowering into the ditch.
 - 3. Each section of pipe shall be laid uniformly to the line or grade shown on the drawings, working in the upstream direction with the bell end laid upgrade. Ductile iron pipe shall be installed when minimum available cover is less than 3 feet and as shown on the drawings.

4. Seat spigots fully in the bells. Bed the pipe uniformly along and do the bottom of the trench for its entire length with bells lying in previously-dug bell holes sufficiently large to allow proper bedding and jointing. Take care when bedding and backfilling to prevent excessive deflection.
5. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
6. Lay pipe to slope gradients noted on drawings. For service connections, minimum grade shall be $\frac{1}{4}$ " per foot.
7. Install bedding if indicated on Drawings.
8. Depth of cover shall not be less than 3'0" to the top of pipe except where shown differently on a profile or specifically authorized by the Engineer.
9. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.
10. Make all necessary pipe connections. For sewer services, wye branches will be used for services on new sewer mains. On existing mains, a saddle secured with two stainless steel clamps will be utilized. No threaded connections will be allowed except for cleanout plug. Adapters for gasketed to solvent-weld pipe shall be furnished as recommended by pipe manufacturer.
11. Install plastic ribbon tape continuous over top of pipe, buried 18 inches below finish grade, above pipe line; coordinate with Section 31 23 23.
12. For non-metallic pipe, Install trace wire continuous over top of pipe, located 6 inches above pipe line; coordinate with Section 31 23 23.
13. Install site sanitary sewage system piping to 5 feet of building. For undeveloped residential lots, terminate at the property line.
14. Connect to building sanitary waste system. Service connections not designated for immediate use shall be plugged and covered and a 2"x4" wooden stake shall be driven near the plug to indicate location. Alternatively, the pipe can be turned upwards with a 90 degree fitting and capped above grade.
15. Repairs to damaged utilities shall be promptly made at the contractor's expense. The contractor shall use every effort to avoid damaging or breaking water, sewer, gas, power, telephone or other utility services. However, should damage occur, immediate action shall be initiated to affect satisfactory repairs. All repair work shall be satisfactory to the Engineer and owner of the damaged utility.
16. On completion of the pipe installation, the contractor shall flush all lines and remove any sediment. On large sewer lines if flushing does not remove foreign material, the contractor shall use a vacuum truck or other acceptable means to clean the line to the satisfaction of the Owner and Engineer.

3.6 OBSTRUCTION WORK

- A. Though every effort has been made to minimize conflicts with existing utilities, sometimes conflicts arise. The contractor shall be responsible for the satisfactory resolution of all conflicts between the construction project and existing utilities or other obstructions encountered in the area of the proposed sanitary sewer work except as specifically delineated herein, as shown on the drawings, or as specifically approved by the Engineer.
- B. Any water line relocation work shall be done using ductile or cast-iron pipe and fittings. All fittings, pipe, blocking, tiebacks and other accessories necessary for a complete and acceptable installation shall be provided.

3.7 FIELD QUALITY CONTROL

- A. Perform test on site sanitary sewage system in accordance with local codes.
- B. The Contractor shall furnish all necessary equipment including plugs and mandrel. The Contractor shall notify the Engineer 24 hours in advance of the testing to allow sufficient time for the Engineer to arrange to witness the test.
- C. Perform acceptance tests per Section 33 01 30 – Sewer and Manhole Testing.
- D. Services: sewer service connections shall be tested with main sewer line piping.
- E. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.8 PROTECTION OF FINISHED WORK

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 36 00 - UTILITY SEPTIC TANKS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Septic tank.
 - 2. Distribution box.
 - 3. Filter drainage field system.
 - 4. Interconnecting piping.
- B. Related Sections:
 - 1. Section 31 05 16 - Aggregates for Earthwork.
 - 2. Section 31 23 16 - Excavation.
 - 3. Section 31 23 17 - Trenching.
 - 4. Section 31 23 23 - Fill.
 - 5. Section 33 31 00 - Sanitary Sewerage Piping.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Septic Tank and Distribution Box:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Includes excavating, placing and connecting to piping, backfilling.
- B. Pipe and Fittings (From 5-foot outside of building to Filter Field):
 - 1. Basis of Measurement: By linear foot.
 - 2. Basis of Payment: Includes excavating, hand trimming, pipe and fittings, cleanouts, connections, connection to septic tank and filter field header, backfilling.
- C. Pipe and Fittings (Within Filter Field):
 - 1. Basis of Measurement: By square foot of field area, measured to outside of outer row and to end of pipe.
 - 2. Basis of Payment: Includes excavating, hand trimming, aggregate bed and cover, pipe and fittings, distribution pipe filter field header, backfilling.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
 - 2. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - 3. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

5. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
 6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 8. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- C. American Water Works Association:
1. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plan, location and inverts of filter field, inverts of connecting piping.
- C. Product Data: Submit data on tank, distribution box, piping and accessories.
- D. Manufacturer's Installation Instructions: Submit special procedures for septic tank installation.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations and inverts of buried pipe, components, and connections.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with State, County and local requirements.
- B. Maintain one copy of approved DHEC Septic permit and associated documentation on site.

1.7 COORDINATION

- A. Coordinate the Work with connections to building sanitary sewer piping outlet.

PART 2 PRODUCTS

2.1 SEPTIC TANK AND DISTRIBUTION BOX

- A. Product Description:
 1. Septic Tank: Reinforced precast concrete construction, 4000 psi, 28 day minimum strength, concrete partitioned chambers, concrete lid with lift rings, vent, inlet inspection hole, inlet turned down minimum 12 inches below effluent level.
 2. Tank Capacity: 1,000 gallon.
 3. Distribution Box: Reinforced concrete, single inlet, two outlets, gate, removable cover with lift ring.

2.2 CONNECTING PIPE MATERIALS

- A. Ductile Iron Pipe: ASTM A74 Service grade, plain end joint; nominal inside diameter of 4 or 6 inches.
 - 1. Joint Device: AWWA C111 ribbed rubber gasket for positive seal; stainless steel clamp ring, expanding sleeve.
- B. Plastic Pipe (ABS): ASTM D2751 SDR 35, nominal inside diameter of 4 or 6 inches, bell and spigot solvent sealed joints.
- C. Plastic Pipe: ASTM D3034, SDR 35 Poly (Vinyl Chloride) (PVC) material; inside nominal diameter of 4 or 6 inches, bell and spigot style rubber ring sealed gasket joint.
 - 1. Fittings: PVC.
 - 2. Joints: ASTM F477, elastomeric gaskets.
- D. Fittings: Same material as pipe, tee bends, elbows, cleanouts, reducers, ends to suit pipe joint.

2.3 FILTER FIELD PIPE MATERIALS

- A. Plastic Pipe (PVC): ASTM D2729; plain end, nominal inside diameter of 4 or 6 inches; refer to SC DHEC Permit.
- B. Use perforated pipe at filter field system; unperforated through sleeves and at junction with distribution box.

2.4 BEDDING MATERIALS

- A. Aggregate Bedding Material: Fill Type Pea Gravel as specified in Section 31 05 16.
- B. Sand Bedding Materials: Fill Type Sand as specified in Section 31 05 16.

2.5 FILTER AGGREGATE

- A. Aggregate Bedding Material: Fill Type Pea Gravel as specified in Section 31 05 16.
- B. Filter Sand Materials: Fill Type 57 Stone as specified in Section 31 05 16.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify building sanitary sewer connection, size, location and invert are as indicated on Drawings.

3.2 PREPARATION

- A. Ream pipe ends and remove burrs.
- B. Remove scale and dirt from components before assembly.
- C. Establish invert elevations for each component in system.

- D. Hand trim excavation to suit septic tank, distribution box and field tile arrangement. Remove stones, roots or other obstructions.

3.3 TANK AND TANK BEDDING

- A. Excavate in accordance with Section 31 23 16 for work of this Section. Hand trim excavation for accurate placement of tank to elevations indicated.
- B. Place bedding material level in one continuous layer not exceeding 8 inches compacted depth, compact to 98 percent.
- C. Backfill around sides of tank, tamped in place and compacted to 98 percent.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.
- E. Install septic tank and distribution box and related components on bedding.

3.4 CONNECTING PIPING

- A. Connect outlet between building sanitary piping and septic tank, between septic tank and distribution box, between distribution box and filter field.
- B. Place pipe and fittings on clean excavated subsoil.
- C. Slope piping to each successive component, minimum of 1/4 inch / foot.
- D. Cover pipe with 57 stone, sides and top, per Section 31 05 16, Aggregates for Earthwork.

3.5 INSTALLATION - FILTER FIELD

- A. Install per SC DHEC Septic Permit. If there are discrepancies, the DHEC-approved permit shall prevail.
- B. Place field pipe at constant elevation.
- C. Place aggregate bed 18 inch thick, tamp compact firm. Establish slope of bed to suit established invert elevations.
- D. Place pipe sloping away from header minimum of 1/16 inch / foot, with perforations facing down.
- E. Wrap pipe joints with geotextile fabric, cover with aggregate, sides and top. Place geotextile fabric over cover prior to backfilling.
- F. Cover entire field with 12 inches of aggregate and lightly compact. Level prior to placement of subsoil cover as specified in Section 31 23 16.

3.6 FIELD QUALITY CONTROL

- A. Request inspection by Architect/Engineer prior to placing aggregate cover over piping.
- B. Compaction Testing: In accordance with ANSI/ASTM D1557.

- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.7 PROTECTION OF FINISHED WORK

- A. Do not permit vehicular traffic over drainage field.

END OF SECTION

SECTION 33 42 13 - PIPE CULVERTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe culverts.
2. Accessories.
3. Underground pipe markers.
4. Drainage structures.
5. Bedding and cover materials.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 31 05 16 - Aggregates for Earthwork.
3. Section 31 23 23 - Fill.
4. Section 31 23 16 - Excavation.
5. Section 31 25 00 - Erosion and Sedimentation Controls.
6. Section 31 37 00 - Riprap.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Pipe Culvert:

1. Basis of Measurement: By the linear foot (including tapered ends if specified), from edge of structure to edge of structure.
2. Basis of Payment: Includes excavating; removing soft subsoil, bedding fill, compacting; pipe, fittings and accessories assembled; repair of damaged coating.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M86 - Concrete, Sewer, Storm Drain, and Culvert Pipe.
2. AASHTO M170 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
3. AASHTO M198 - Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.
4. AASHTO M207 - Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
5. AASHTO M252 - Corrugated Polyethylene Drainage Tubing.
6. AASHTO M259 - Precast Concrete Box Sections for Culverts, Storm Drains, and Sewers.
7. AASHTO M273 - Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less than 2 ft of Cover Subject to Highway Loadings.
8. AASHTO M288 - Geotextiles.
9. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 305- to 915-mm (12- to 36-In.) Diameter.
10. AASHTO M315 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
11. AASHTO T99 - Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 in.) Drop.

12. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. South Carolina Department of Transportation (SC DOT):
 1. SCDOT 2007 Standard Specifications For Highway Construction, SC-M-714 (08/09) *Permanent Pipe Culverts*.
- C. ASTM International:
 1. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 3. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 4. ASTM C478 – 12a – Standard Specification for Precast Reinforced Concrete Manhole Sections.
 5. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
 6. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 7. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Box Section for Culverts, Storm Drains, and Sewers.
 8. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 9. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 10. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 11. ASTM F2737-11 – Standard Specification for Corrugated High Density Polyethylene (HDPE) Water Quality Units.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pipe, fittings and accessories.
- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 1. Accurately record actual locations of pipe runs, connections, and invert elevations.
 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with State and County standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing work of this section, licensed to work in South Carolina.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV sensitive materials out of direct sunlight.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate the Work with pond or outfall grading, trenching, and underground utilities.
- C. Coordinate unrecorded or variations in site conditions, and corresponding adjustments to construction requirements.

PART 2 PRODUCTS

2.1 PIPE CULVERT

- A. Reinforced Circular Concrete Pipe: ASTM C76, Class III.
 - 1. Furnish materials in accordance with SC DOT Standards.
 - 2. Bell and spigot joints.
 - 3. Shape: Circular with nominal diameter of 15 through 60 inches. Typically 18" diameter is used as a minimum unless design constraints or available space force a smaller storm drain size.
 - 4. Concrete pipe tees and elbows shall conform to all applicable requirements for AASHTO M-170 for the class of pipe or elbow specified.
 - 5. RCP in or adjacent to roadways shall be capable of an H-20 traffic loading.
- B. HDPE pipe: ASTM F2737-11
 - 1. Furnish materials in accordance with SC DOT and SC DHEC standards.
 - 2. Double-wall corrugated exterior, smooth interior.
 - 3. Bell and spigot, soil tight joints.

4. Shape: Circular with nominal diameter of 15 through 60 inches. Typically 18" diameter is used as a minimum unless design constraints or available space force a smaller storm drain size.
5. Manufacturer: ADS, product N-12 ST IB or approved equivalent.

2.2 ACCESSORIES

A. Geotextile Fabric: AASHTO M288

1. Non-biodegradable, non-woven filter fabric.
2. Flow rate (ASTM D4491): 140 gal/min/sq ft minimum.
3. Manufacturer: Mirafi Construction Products.
4. Model: Mirafi N-Series 140NL.
5. Substitutions: Permitted, must be equivalent.

B. Fill at Pipe Ends: Riprap as specified in Section 31 37 00, where indicated on Drawings.

C. Rubber Gasket Joint Material (RCP bell & Spigot joints): AASHTO M315 and ASTM C443, rubber compression gasket joint per SC DOT SC-M-714.

D. Preformed Flexible Joint Sealant (RCP bell & Spigot joints): conform to AASHTO M198. Use Ram-Nek or approved equal per SC DOT SC-M-714.

2.3 BEDDING AND COVER MATERIALS

A. Bedding (if required – see Drawings): fine to coarse aggregate as specified in Section 31 05 16 – Aggregates for Earthwork.

B. Cover: as specified in Section 31 05 13 – Soils for Earthwork, or 31 23 23 - Fill.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify that trench cut or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings. Verify tie-in invert elevation and notify Engineer of any discrepancies.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard or organic matter capable of damaging piping or impeding consistent backfilling or compacting.
- C. Clearing along pipe lines shall be done prior to pipe installation. If required, clearing of trees and brush along pipe lines shall be carefully done so that no damage will occur outside of right-of-way limits.

- D. Contractor shall haul pipe and appurtenances to the worksite and distribute them neatly along the trench prior to laying. Pipe shall be carefully handled to prevent damage by using mechanical hoists or other approved methods. All damaged pipe and appurtenances shall be rejected and removed from the worksite.

3.3 EXCAVATION

- A. The contractor shall perform all excavation of every description and of whatever substance encountered in the depth shown on the plans are specified for all pipe, appurtenances, and structures.
- B. The top portion of trenches may be excavated with sloping or vertical sides to any width which will not cause damage to adjoining structures, roadways, pavements, utilities or private property.
- C. The bottom of all trenches, except as otherwise specified shall be rounded to conform to the bottom of the pipe so as to afford full bearing on the pipe barrel. The depth and width required for such shaping shall be directed by the Engineer.
- D. Excavate culvert trench in accordance with Section 31 23 17 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

3.4 INSTALLATION - PIPE

- A. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
- B. Shore pipe to required position; retain in place until after compaction of adjacent fills. Ensure pipe remains in correct position and to required slope. Cradle bottom 20 percent of pipe diameter to avoid point load.
- C. Do not displace or damage pipe when compacting.
- D. At joints, the pipe ends shall be thoroughly cleaned and sealed with pre-formed sealant such as Ram-Nek or approved equal.
- E. Precast catch basin or junction box base sections shall be installed on a firm, stabilized foundation so prepared to prevent settlement and misalignment. Pipe openings shall be exactly aligned to that of the pipe entering and leaving the junction boxes.

3.5 BACKFILLING - PIPE

- A. All trenches and excavation shall be backfilled immediately after the pipes are laid therein, unless other protection of the pipeline is directed. The backfilling materials shall be selected and deposited with special reference to the future safety of the pipes. Except where special methods of bedding and tapping or provided for, cleaned earth, sand or rock dust shall be solidly tamped about the pipe up to a level at least two (2) feet above the top of the pipes, it shall be carefully deposited in uniform layers, each layer solidly tamped or ramped with proper tools so as not to injure or disturb the pipeline. The remainder of the backfilling of the trench shall be carried on simultaneously on both sides of the pipes in such a manner that injurious side pressures to not occur.

- B. Minimum cover for RCP (round or elliptical) shall be 12" unless approved by the Engineer.
Minimum cover for HDPE double wall pipe shall be 24" or as specified by the manufacturer.
- C. After placing the backfill up to a level slightly below the natural ground surface, surplus excavation shall be windrowed and maintained in a suitable manner to concentrate and pond surface runoff from rains over the trench. After sufficient settlement has been obtained, in the opinion of the Engineer, the Contractor shall complete the dressing, removal of surplus materials and surface cleanup in accordance with the specifications.
- D. All backfilling of excavated portions requiring pavement shall be mechanically tamped in 6 inch layers using heavy-duty tampers such as pneumatic jackhammers with tamping foot attachment. Each layer shall be thoroughly tamped to a density equivalent to at least 95% of a AASHTO-T-99-49 Proctor Curve. Settlement in trenches shall be refilled with crushed stone or gravel and such maintenance shall continue until pavement is authorized by the engineer.
- E. Walking or working on the complete pipe sewer, except as may be necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to height of at least two (2) feet over the top of the pipes.
- F. Whenever the trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the surface of the ground. Backfilling shall be carefully performed and the original surface restored to the full satisfaction of the Engineer.
- G. Backfill of open trenches across sidewalks and in roadways shall be made as above specified, except that fill above pipes shall be deposited in layers not to exceed 6 inches and thoroughly compacted as provided in Section 31 23 17. Surplus materials shall be disposed of as directed by the Engineer.
- H. Thoroughly clean out entire length of newly installed pipe culverts. No additional payment will be made for the cleaning out of newly installed pipe culverts. Pipes must be clean and accessible for inspection and acceptance.

3.6 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Lay pipe to alignment and slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Maximum Variation From Intended Elevation of Culvert Invert: 1/2 inch.
- D. Maximum Offset of Pipe From Indicated Alignment: 1 inch.
- E. Maximum Variation in Slope of Pipe: 0.01 percent.

3.7 FIELD QUALITY CONTROL

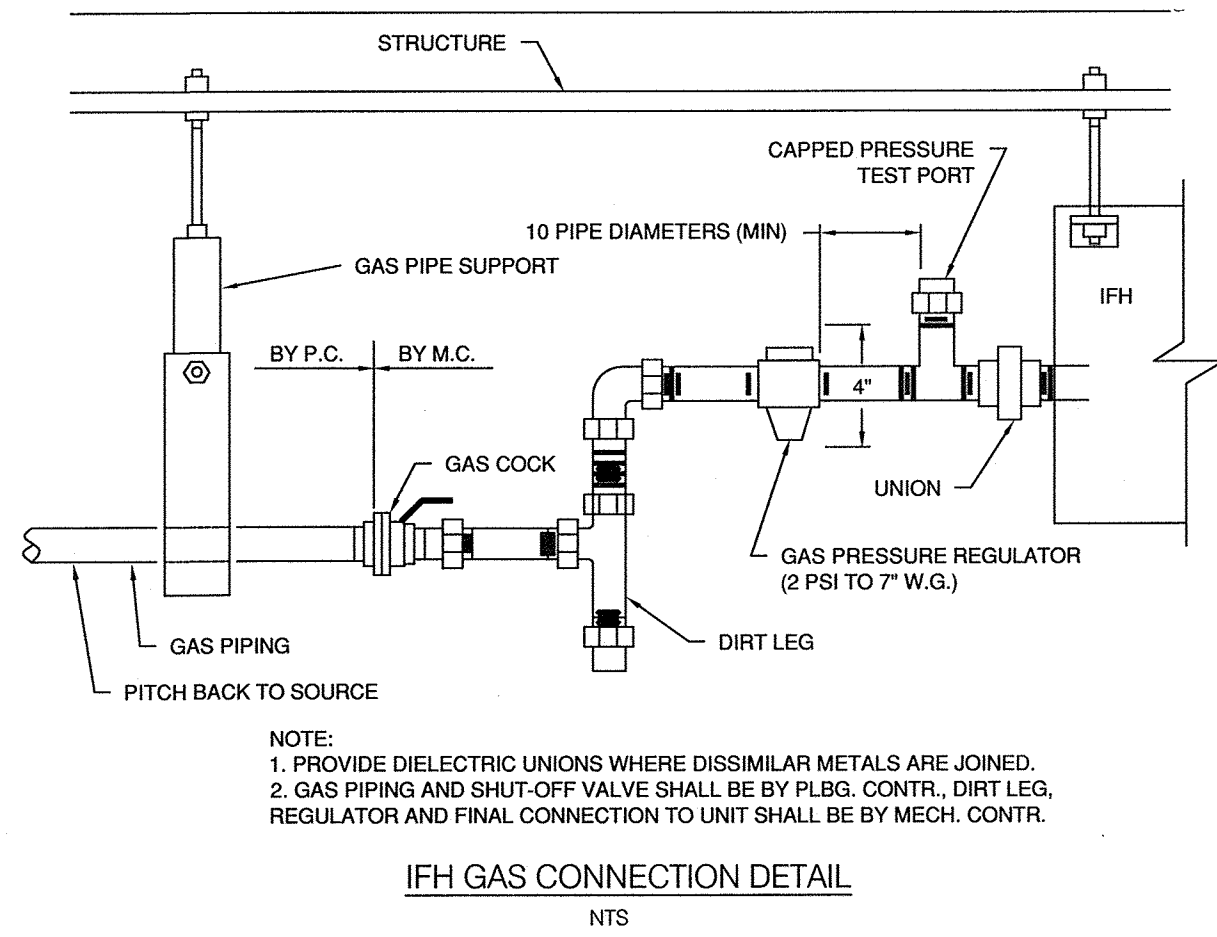
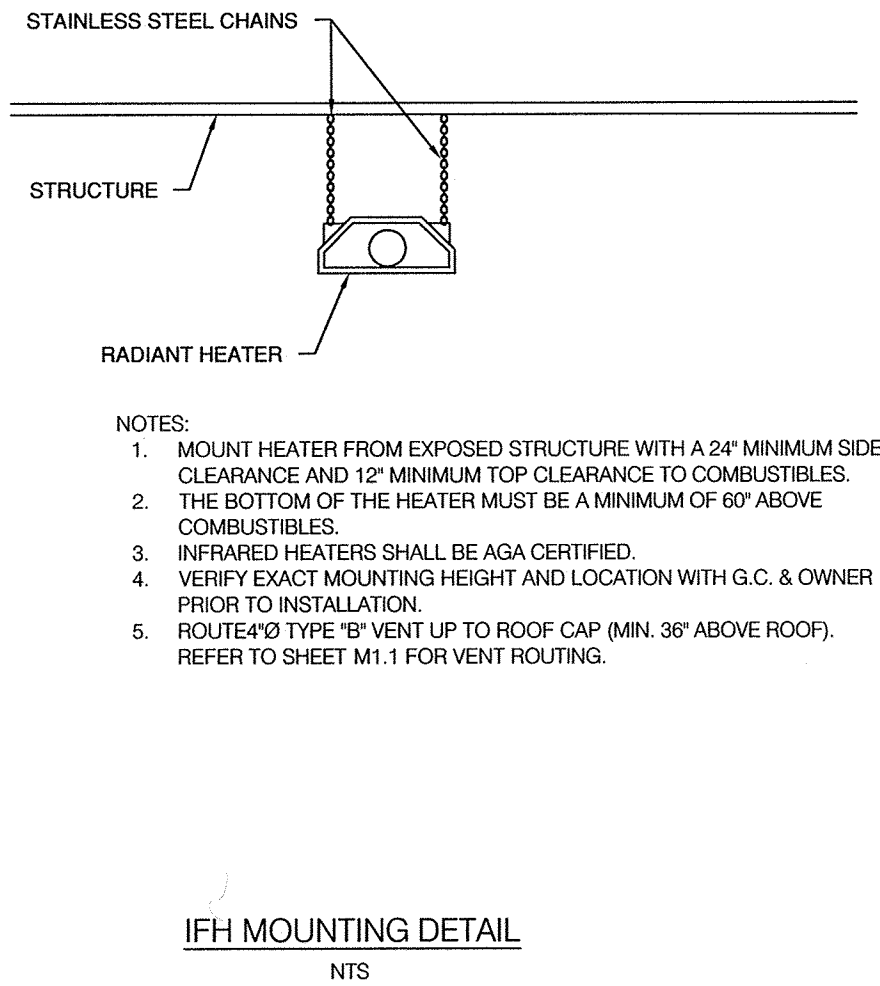
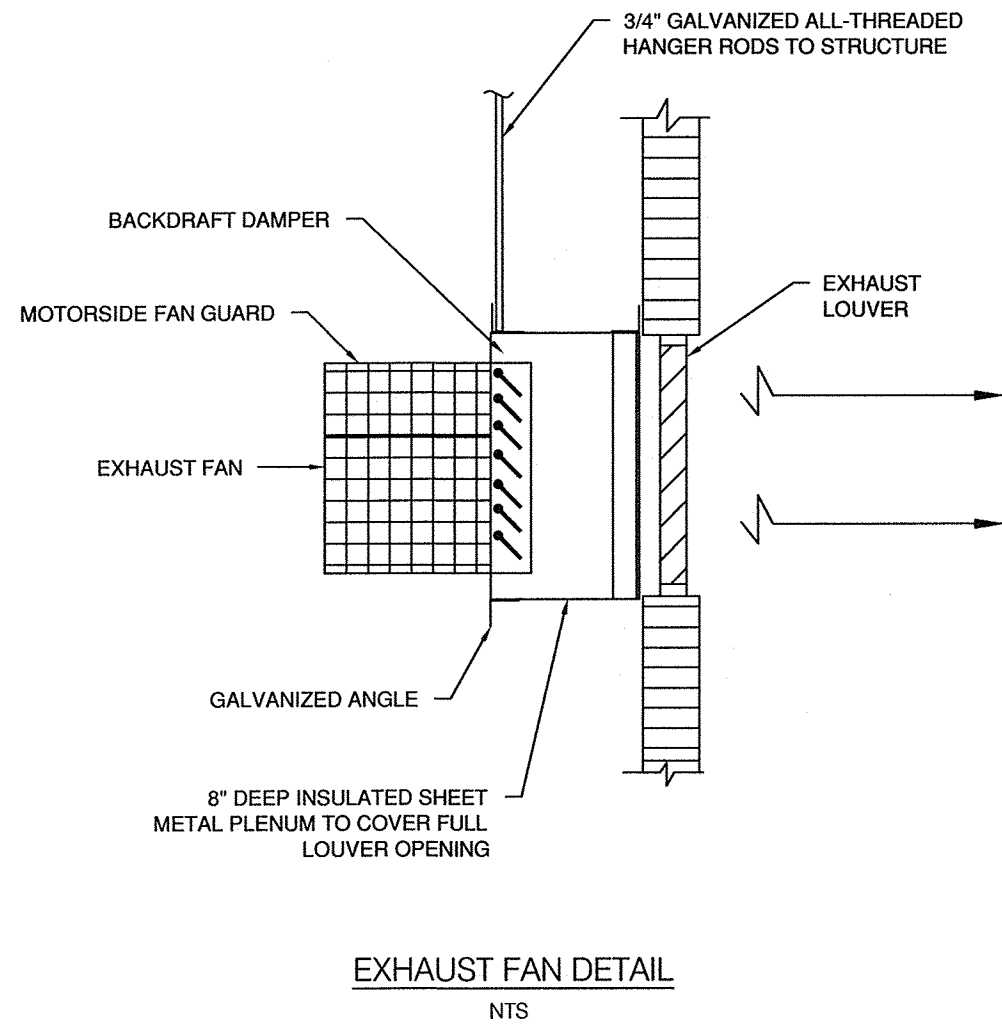
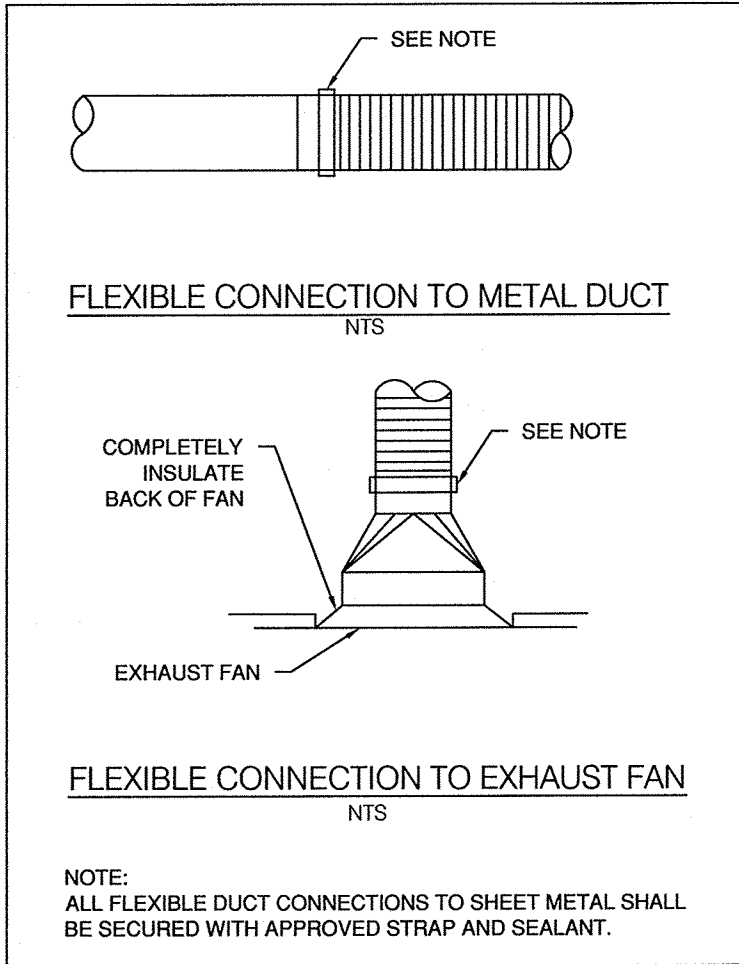
- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Visually inspect 100% of pipe for fractures, cracks, spalling, chips, and breaks during all phases of the installation process. Inspect joints, including tongues and groups. Chipped pipe ends that prevent the full bond between joint sealant/gasket in both pipes may only be installed in drainage structures at the ends of pipe runs where they will be grouted over. Inspect installed joints for missing, damaged, or improperly installed joint sealant or gasket. Verify lined and grade in accordance with the frequencies detailed in the Construction Manual.
- C. When improper installation or damage is noted during the construction inspection of the pipe, repairs must be made to the satisfaction of the Engineer. Additional inspections may be performed until confidence is restored that the installation has been performed in accordance with these specifications.
- D. Request inspection prior to placing aggregate cover over pipe.
- E. Compaction Testing: In accordance with ASTM D1557, ASTM D2922, or ASTM D3017.
- F. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- G. Frequency of Tests: per local requirements.
- H. The contractor will collect survey data for 100% of installed pipe. Survey data will be collected electronically to establish a pipe inventory. Survey data will include station offset elevation and coordinates of the flow line for each pipe end. Survey data collected will also include at a minimum pipe diameter, pipe material, and description of survey data for drainage structures and end treatments.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Protect pipe and bedding from damage or displacement until backfilling operation is complete.

END OF SECTION



DESIGNED BY: M.E.	DESIGNED BY: M.E.	DATE	NO.	REVISION	BY
DRAWN BY: J.C.S.	DRAWN BY: J.C.S.				
CHECKED BY: M.F.	CHECKED BY: M.F.				
APPROVED BY: M.F.	APPROVED BY: M.F.				
DATE: May 04, 2016	DATE: May 04, 2016				
CITY: NEW YORK	CITY: NEW YORK				
COUNTY: FREDERICK	COUNTY: FREDERICK				
PROJECT #	PROJECT #				
DWG. #	DWG. #				
CAD: ASSES. JPL 6/25/16	CAD: ASSES. JPL 6/25/16				
<div><div><div>STATE OF SOUTH CAROLINA</div><div>REGISTERED PROFESSIONAL ENGINEER</div><div>No. 20872</div><div>MIN. IN R.O.</div><div>5/16</div></div><div><div>STATE OF SOUTH CAROLINA</div><div>REGISTERED PROFESSIONAL ENGINEER</div><div>No. 5025</div><div>MIN. IN R.O.</div><div>5/16</div></div></div>					
<div><div><div>AE</div><div>ALIGNED ENGINEERING</div></div><div>THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. ANY REUSE OR REPRODUCTION OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.</div></div>					
CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT	CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT	DESCRIPTION: MECHANICAL DETAILS			
PLAN SET: NEW STATION AT FRIENDFIELD	PLAN SET: NEW STATION AT FRIENDFIELD	PLAN SET: DESIGN			
DESC: MECHANICAL DETAILS	DESC: MECHANICAL DETAILS	DATE: May 04, 2016			
		PROJECT: AE055			
		SHEET: M3.0			

ELECTRICAL (TELECOMMUNICATIONS) LEGEND

- TELEPHONE OUTLET
- TELEPHONE OUTLET MOUNTED ABOVE COUNTER BACKSPLASH, OR AT HEIGHT NOTED.
- TELEDATA OUTLET.
- TELEDATA OUTLET MOUNTED ABOVE COUNTER BACKSPLASH, OR AT HEIGHT NOTED.

TELECOMMUNICATIONS (ET) NOTES

- ET-1 FURNISH A COMPLETE TELEPHONE CONDUIT SYSTEM AS INDICATED ON THE DRAWINGS.
- ET-2 TELECOMMUNICATION OUTLETS (TELEPHONE OR TELEDATA) SHALL CONSIST OF A 4" SQUARE DEEP BOX WITH SINGLE GANG PLASTER RING.
- ET-3 PROVIDE MINIMUM 1" RACEWAY, UNLESS OTHERWISE NOTED, FROM EACH BOX TO ABOVE NEAREST ACCESSIBLE CEILING SPACE OR CABLE TRAY AS APPLICABLE. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
- ET-4 PROVIDE RACEWAYS FOR ALL EXTERIOR AND/OR EXPOSED LOCATIONS.
- ET-5 PROVIDE GROUNDING FOR ALL TELEPHONE/DATA SYSTEMS AND EQUIPMENT PER REQUIREMENTS AND SPECIFICATIONS PROVIDED BY THE OWNERS DESIGNATED VENDOR.
- ET-6 ALL LOW-VOLTAGE CABLING SHALL BE PLENUM-RATED.
- ET-7 ALL OUTLET BOXES (INCLUDING TELEPHONE, CABLE TV, AND COMPUTER) SHALL HAVE COVER PLATES, BLANK IF NOT USED.

MECHANICAL / ELECTRICAL LEGEND

MECHANICAL/ELECTRICAL DISCONNECTS

- NON-FUSED HEAVY DUTY DISCONNECT SWITCH; NUMERALS INDICATE SWITCH RATING.
- FUSED HEAVY DUTY DISCONNECT SWITCH; NUMERALS INDICATE SWITCH RATING.
- BAY DOW MOTOR CONTROL, MOUNT +48" AFF. CONTROLS SHALL BE UP, DOWN, AND STOP, MOUNTED ON 4" SQUARE BOX (FLUSH BOX)
- CONNECTION TO MOTOR, STARTER PROVIDED BY OTHERS UNLESS OTHERWISE NOTED

MECHANICAL/ELECTRICAL DISCONNECT (EM) NOTES

- EM-1 DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE IN NEMA 1 ENCLOSURES, UNLESS OTHERWISE NOTED.
- EM-2 DISCONNECTS SHALL BE FUSED OR NON-FUSED AS INDICATED ON PLANS. SWITCHES WILL HAVE REJECTION-TYPE FUSE CLIPS.
- EM-3 APPROVED MANUFACTURERS: EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL.
- EM-4 FUSES SHALL BE CLASS RK-5,DUAL-ELEMENT, TIME-DELAY WITH INDICATION.
- EM-5 A SET OF THREE FUSES OF EACH SIZE AND TYPE SHALL BE FURNISHED TO THE OWNER.

MECHANICAL/ELECTRICAL COORDINATION (MEC) NOTES

- MEC-01 ELECTRICAL CONTRACTOR SHALL CONNECT AND/OR PROVIDE FINAL CONNECTIONS TO ALL PLUMBING AND MECHANICAL EQUIPMENT.
- MEC-02 ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH - IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.
- MEC-03 THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL STARTER SWITCHES, DISCONNECT SWITCHES, RECEPTORS, ETC. TO MECHANICAL/PLUMBING EQUIPMENT. ALL STARTERS (OTHER THAN MANUAL STARTER SWITCHES) SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY ELECTRICAL CONTRACTOR.
- MEC-04 ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO INSTALLATION. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF OR LACK OF COORDINATION WILL BE REMOVED AND INSTALLED CORRECTLY AT THE ELECTRICAL CONTRACTORS EXPENSE.
- MEC-05 ELECTRICAL CONTRACTOR SHALL INSTALL ALL STARTERS PROVIDED BY OTHER TRADES.
- MEC-06 THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT RUNS & LIGHT FIXTURE LOCATIONS ABOVE THE CEILING WITH OTHER TRADES PRIOR TO INSTALLATION.

ELECTRICAL (E) NOTES

CONDUIT (EC) NOTES

- EC-1 CONDUIT SHALL BE MANUFACTURED BY ALLIED, WHEATLAND, REPUBLIC CONDUIT, WESTERN TUBE, OR APPROVED EQUIVALENT.
- EC-2 MINIMUM CONDUIT SIZE SHALL BE 3/4" FOR INTERIOR WORK, 1" FOR EXTERIOR WORK.
- EC-3 FOR INTERIOR WORK, CONDUIT SHALL BE ZINC COATED EMT EXCEPT WHERE NOT PERMITTED BY CODE. USE SCHEDULE 40 PVC BELOW CONCRETE SLAB AND FOR EXTERIOR WORK WHERE NOT SUBJECT TO DAMAGE. USE IMC WHERE SUBJECT TO PHYSICAL DAMAGE.
- EC-4 PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
- EC-5 EMT FITTINGS SHALL BE COMPRESSION GLAND TYPE, OF MALLEABLE STEEL. CONNECTORS SHALL HAVE INSULATED THROATS. CAST, SET SCREW, OR INDENTARY TYPE FITTINGS ARE NOT ACCEPTABLE. ALL FITTINGS FOR EMT SHALL BE MADE OF STEEL.
- EC-6 ALL CONDUIT/RACEWAY SHALL BE RUN CONCEALED, UNLESS OTHERWISE NOTED. FISH ALL NEW OUTLETS IN EXISTING WALLS, WHERE POSSIBLE.
- EC-7 ALL RUNS SHALL BE NEAT AND SQUARE; ALL CONDUIT SHALL BE RUN PARALLEL, OR PERPENDICULAR TO BUILDING LINES, WHETHER EXPOSED OR NOT.
- EC-8 SUPPORT ALL CONDUIT WITH STRAPS AND CLAMPS. ALL CONDUIT SHALL BE SUPPORTED FROM STRUCTURE AND PROPERLY SECURED.
- EC-9 WHERE CONDUITS PASS THROUGH A BUILDING EXPANSION JOINTS, PROVIDE GALVANIZED EXPANSION FITTINGS WITH BONDING JUMPERS.
- EC-10 RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE-RATED WALLS SHALL BE FILLED WITH IMPERVIOUS, NON-SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, WATER, AND DUST. ROOF PENETRATIONS SHALL BE WITHIN THE EQUIPMENT ROOF CURB.
- EC-11 LOW VOLTAGE CABLING NOT SPECIFIED TO BE INSTALLED IN CONDUIT, SHALL BE INSTALLED IN A CABLE TRAY SYSTEM OR J-HOOK SYSTEM CONSISTING OF MINIMUM 2" DIAMETER HOOKS LOCATED ON 3'-0" CENTERS IN ALL ACCESSIBLE CEILINGS, WHERE THERE ARE INACCESSIBLE CEILINGS, PROVIDE CONDUIT FOR ENTIRE LENGTH OF INACCESSIBILITY.
- EC-12 RACEWAYS USED FOR LOW VOLTAGE SYSTEMS SUCH AS TELECOMMUNICATIONS, FIRE ALARM, SECURITY, CCTV, CONTROLS, AND SIGNAL CONDUITS ABOVE THE CEILING AND BACKBOARDS SHALL BE PROVIDED WITH INSULATED THROAT BUSHINGS AT EACH CONDUIT TERMINATION. THESE BUSHINGS SHALL BE INSTALLED PRIOR TO PULLING LOW-VOLTAGE CABLES.
- EC-13 LIQUID-TIGHT METAL CONDUIT SHALL ONLY BE USED FOR FINAL CONNECTIONS TO EQUIPMENT AND ALL OTHER ROTATING AND VIBRATING EQUIPMENT, MAXIMUM LENGTH OF 3'-0".
- EC-14 FLEXIBLE METAL CONDUIT, MINIMUM SIZE 3/8", SHALL ONLY BE USED FOR FINAL CONNECTION TO LIGHTING FIXTURES, MAXIMUM LENGTH OF 6'-0".
- EC-15 PROVIDE PULL BOXES, SUCH THAT NO SINGLE CONDUIT RUN HAS BENDS IN EXCESS OF 360. PULL BOXES SHALL BE SUITABLE AND APPROVED FOR THE INTENDED USE, WHERE CONDUITS PASS UNDER PAVED AREAS, THEY SHALL BE RGS.
- EC-16 ALL CONDUIT BENDS/ELBOWS EMERGING FROM UNDERGROUND SHALL BE IMC AND SHALL EXTEND A MINIMUM OF 18" BELOW GRADE.
- EC-17 ALL UNDERGROUND RACEWAYS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM BITUMASTIC.
- EC-18 ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATER-TIGHT BY USE OF POLYETHYLENE FLUORIDE TAPE.
- EC-19 THE USE OF AC OR NM CABLE IS NOT PERMITTED.

ELECTRICAL LEGEND

ELECTRICAL DEVICES AND PATHWAYS

- WIRING SYSTEM CONCEALED IN WALL OR CEILING, WHEN SHOWN, CROSS LINES INDICATE NUMBER OF WIRES, (GROUND WIRES ARE NOT SHOWN)
- WIRING SYSTEM CONCEALED IN OR UNDER SLAB OR UNDERGROUND.
- WIRING SYSTEM EXPOSED.
- CONDUIT TURNED UP TO FLOOR ABOVE.
- CONDUIT TURNED DOWN TO FLOOR BELOW
- BRANCH CIRCUIT HOMERUN TO PANEL.
- JUNCTION BOX WITH CONNECTION TO EQUIPMENT SERVED.
- 4" SQUARE BOX WITH A SINGLE-GANG OPENING AND PLASTER RING.
- SHORE CONNECTION (CEILING MOUNTED): WHITE CORD REEL WITH 50' CABLE AND OUTLETS. CONDUCTUC INSUL 8 PART #121120305016 RB-5-20R, OR REELCRAFT EQUAL.
- SINGLE RECEPTACLE, 20 AMP, 120 VOLT HUBBELL 5352, OR EQUAL.
- DUPLEX RECEPTACLE, 20 AMP, 120 VOLT (USE 20 AMP FOR SINGLE RECEPTACLE ON A CIRCUIT.) HUBBELL 5352, OR EQUAL.
- DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER BACKSPLASH, OR AT HEIGHT NOTED.
- GROUND FAULT RECEPTACLE, NEMA 5-20R DUPLEX. ALL RECEPTACLES INSTALLED OUTSIDE, WITHIN 3' OF A SINK OR IN A KITCHEN SHALL BE GFCI.

ELECTRICAL OUTLET BOX (EO) NOTES

- EO-1 JUNCTION AND PULL BOXES SHALL BE CODE GAUGE GALVANIZED STEEL. ACCEPTED MANUFACTURERS SHALL BE STEEL CITY (THOMAS & BETTS), RACO, CROUSE-HINDS, APPLETON (EMERSON), OR APPROVED EQUIVALENT.
- EO-2 OUTLET BOXES SHALL NOT BE MOUNTED BACK TO BACK IN COMMON WALLS.
- EO-3 ATTACH EMT WITH CONNECTORS HAVING INSULATED THROAT.
- EO-4 ATTACH BOXES TO STUD WORK USING CADDY BAR STRAPS THAT CONNECT TO TWO ADJACENT STUDS TO PREVENT TWISTING OF BOX IN WALL.
- EO-5 ALL OUTLET BOXES (INCLUDING TELEPHONE, CABLE TV, AND COMPUTER) SHALL HAVE COVER PLATES, BLANK IF NOT USED.
- EO-6 ALL EXTERIOR BOXES SHALL BE WATER-TIGHT.

ELECTRICAL WIRING DEVICE (ED) NOTES

- ED-1 WIRING DEVICES SHALL BE SPECIFICATION GRADE, MINIMUM, EQUAL TO COOPER QUALITY INDICATED BELOW OR AS MANUFACTURED BY HUBBELL, LEGRAND-PASS & SEYMOUR, LEVITON, OR APPROVED EQUAL, UNLESS OTHERWISE NOTED:
SWITCHES (120/277V) SHALL BE AS FOLLOWS:
SINGLE-POLE 20 AMP COOPER AH1221
DOUBLE-POLE 30 AMP COOPER AH1222
THREE-WAY 20 AMP COOPER AH 1223
FOUR-WAY 20 AMP COOPER AH 1224
DUPLEX RECEPTACLES SHALL HAVE A NYLON FACE AND SHALL BE AS FOLLOWS:
15 AMP DUPLEX COOPER 5352
20 AMP DUPLEX COOPER 5352
15 AMP DUPLEX GFCI COOPER VGF15F
20 AMP DUPLEX GFCI COOPER VGF20F
THE PART NUMBERS ABOVE ARE FOR WIRING DEVICE TYPE ONLY. SEE ARCHITECTURAL SPECIFICATIONS FOR WIRING DEVICE COLOR AND PLATE MATERIAL/COLOR.
- ED-2 SEE MOUNTING HEIGHT ELEVATION DETAIL FOR STANDARD MOUNTING HEIGHTS OF ALL DEVICES, UNLESS OTHERWISE NOTED.
- ED-3 EACH DUPLEX RECEPTACLE INDICATED TO BE ON A DEDICATED CIRCUIT SHALL BE 20 AMP TYPE.
- ED-4 ADJACENT DEVICES SHALL HAVE A COMMON WALL TYPE.
- ED-5 WEATHER-PROOF COVERS SHALL BE "WHILE-IN-USE" SO PLUGS MAY BE INSTALLED WITHOUT COMPROMISING THE WP FUNCTION. COOPER #WU-2 DOUBLE-GANG WITH CLEAR COVER OR APPROVED EQUAL.
- ED-6 A MAXIMUM OF 10 GENERAL PURPOSE RECEPTACLES SHALL BE ON EACH BRANCH CIRCUIT
- ED-7 ALL WALL MOUNTED OCCUPANCY/VACANCY SENSORS/SWITCHES SHALL BE INSTALLED WITH AN EQUIPMENT WITH AN EQUIPMENT GROUNDING CONDUCTOR.
- ED-8 GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED IN ALL LOCATIONS PER NEC 210.8. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.

ELECTRICAL (E) NOTES

PANELBOARDS (EP)

- EP-1 PANELBOARDS SHALL BE PROVIDED AS MANUFACTURED BY EATON, SQUARE-D, GENERAL ELECTRIC OR APPROVED EQUAL. ALL NEW EQUIPMENT FOR THE PROJECT SHALL BE OF THE SAME MANUFACTURER.
- EP-2 PANELS SHALL BE FULLY RATED (AIC), NO SERIES AIC RATINGS ARE ALLOWED.
- EP-3 PANELS SHALL HAVE FULL SIZE EQUIPMENT GROUNDING BARS AND NEUTRAL BARS, EXCEPT WHERE INDICATED TO BE 200%.
- EP-4 ALL BUSING, INCLUDING NEUTRAL AND GROUND, SHALL BE COPPER.
- EP-5 ALL BREAKERS SHALL BE AUTOMATIC THERMAL-MAGNETIC TYPE, MOLDED CASE BOLT-ON TYPE, CALIBRATED FOR 40 DEGREE C, OR AMBIENT COMPENSATION, UNLESS OTHERWISE NOTED.
- EP-6 ALL PANELBOARD AND BREAKER LUGS SHALL BE SIZED AND RATED PER THE CONDUCTOR SIZE AND MATERIAL.
- EP-7 LIGHTING AND APPLIANCE PANELS (100A TO 600A) SHALL HAVE FRONT ACCESSIBLE HINGED DOOR-IN-DOOR COVERS WITH DEAD FRONT, SHALL BE 20" WIDE MINIMUM WITH 4" WIDE MINIMUM WIRING GUTTERS.
- EP-8 DISTRIBUTION PANELS (600A TO 1200A) SHALL HAVE FRONT ACCESSIBLE DEAD FRONT COVERS.
- EP-9 PROVIDE HANDLE LOCK-ON DEVICES FOR ALL CIRCUIT BREAKERS CONNECTED TO EMERGENCY, EXIT, NIGHT LIGHTING, FIRE ALARM, TELEPHONE BOARDS, AND SECURITY SYSTEMS.
- EP-10 BREAKERS USED FOR SWITCHING SHALL BE SWITCHING DUTY (SWD) RATED.
- EP-11 BREAKERS USED FOR HEATING, AIR CONDITIONING AND/OR REFRIGERATION SHALL BE HACR RATED.
- EP-12 GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED IN ALL LOCATIONS PER NEC 210.8. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.
- EP-13 BREAKERS WITH ARC-FAULT CIRCUIT-INTERRUPTER (AFCI) PROTECTION SHALL BE INSTALLED FOR ALL 120V, 15A AND 20A BRANCH CIRCUITS IN DWELLING UNITS AS DEFINED BY THE NEC. THIS EXCLUDES KITCHENS, BATHROOMS, UNFINISHED BASEMENTS, GARAGES AND OUTDOOR LOCATIONS. GUEST ROOMS/SUITES WITH PERMANENT PROVISIONS FOR COOKING SHALL BE CONSIDERED A DWELLING UNIT. STUDENT HOUSING UNITS SHALL BE CONSIDERED A DWELLING UNIT.
- EP-14 ALL OVERCURRENT DEVICES WHICH COMPRISE THE EMERGENCY SYSTEM SHALL BE SELECTIVELY COORDINATED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE MANUFACTURER DOCUMENTATION INDICATING COMPLIANCE WITH THE SELECTIVE COORDINATION REQUIREMENTS PER THE NEC.

ELECTRICAL (E) NOTES

LIGHTING (EL)

GENERAL

- EL-1 MOUNT ALL FIXTURES PLUMB AND SQUARE WITH ROWS ALIGNED.
- EL-2 SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF FIXTURES.
- EL-3 ALL FIXTURES SHALL BE UL LISTED AND LABELED.
- EL-4 ALL FIXTURES SHALL BE THERMALLY PROTECTED PER THE NEC.
- EL-5 SURFACE-MOUNTED FLUORESCENT FIXTURES INSTALLED ON COMBUSTIBLE MATERIAL SHALL BE MOUNTED AT LEAST 1/4" FROM THE SURFACE OF THE MATERIAL, EXCEPT FOR FIXTURES THAT ARE PLAINLY MARKED AS UL APPROVED FOR MOUNTING DIRECTLY TO SUCH SURFACES.
- EL-6 ALL FIXTURES SHALL BE GROUNDED PER THE NEC.
- EL-7 FIXTURES CONNECTED WITH FLEX TO THE RIGID RACEWAY PORTION OF THE WIRING SYSTEM SHALL CARRY A GREEN BONDING JUMPER WITHIN THE FLEX. THE JUMPER SHALL BE FASTENED TO BOTH THE FIXTURE AND THE RACEWAY SYSTEM WITH A STEEL CITY "Q" CLIP OR APPROVED EQUIVALENT. PHASE AND GROUND CONDUCTORS RUN IN FLEX SHALL BE #12 AWG MINIMUM. MAXIMUM FLEX LENGTH SHALL BE 6'-0".
- EL-8 FLUORESCENT LUMINAIRES THAT UTILIZE DOUBLE-ENDED LAMPS AND CONTAIN BALLAST(S) THAT CAN BE SERVICED IN PLACE SHALL HAVE A DISCONNECTING MEANS (WHETHER INTEGRAL OR EXTERNAL) TO EACH LUMINAIRE PER NEC 410.130(9).
- EL-9 ALL FIXTURES SHALL BE PROVIDED FOR PROPER VOLTAGE BASED ON THE CIRCUIT ASSIGNMENT INDICATED ON THE PLANS.

FIXTURE/EQUIPMENT SCHEDULES

- EL-10 FIXTURE TYPES ARE AS SCHEDULED ON THE PLANS. EQUIVALENT FIXTURES MAY BE SUBMITTED AS INDICATED ON THE FIXTURE SCHEDULE, SUBJECT TO THE ENGINEERS APPROVAL.
- EL-11 ALL COST ASSOCIATED WITH SUBSTITUTED FIXTURES TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING TRIM, ACCESS, MOUNTING, LAMPS, ETC., SHALL BE INCLUDED IN THE ORIGINAL, BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED FIXTURES WILL BE ACCEPTED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. THIS INCLUDES ANY ADJUSTMENTS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURERS INSTALLATION INSTRUCTIONS.
- EL-12 CATALOG NUMBERS ARE FOR GENERAL IDENTIFICATION OF FIXTURES ONLY. ALL RELATED PARTS, SUCH AS JUNCTION BOXES, PLASTER RINGS, LOUVERS, MOUNTING EQUIPMENT, CONNECTORS, STRAPS, OR OTHER HARDWARE OR ACCESSORIES TO FIT THE FIXTURE PROPERLY TO THE STRUCTURE, SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ANY APPLICANCES FOR MOUNTING OR TRIM TO CEILING OR WALL TYPE AS SPECIFIED IN THE ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF THE CATALOG NUMBER GIVEN.
- EL-13 ALL LIGHTING FIXTURES SHALL COME EQUIPPED WITH LAMPS. ACCEPTABLE LAMP MANUFACTURERS ARE GENERAL ELECTRIC, PHILIPS, OR SYLVANIA UNLESS OTHERWISE NOTED ON THE FIXTURE SCHEDULE.

LIGHTING CONTROLS

- EL-14 TIME CONTROLLER, FURNISH AND INSTALL WHERE INDICATED AN ELECTRONIC TIME CONTROLLER AS MANUFACTURED BY TORK (NS), PARAGON, INTERMATIC, OR APPROVED EQUAL. CONTROLLER SHALL HAVE THE FOLLOWING CHARACTERISTICS:
A. CONTACTS: SPST, OR AS INDICATED
B. RATED 120/277V AT 20A BALLAST LOAD
C. MINIMUM 30K SWITCHING CYCLES
D. MINIMUM 2 CHANNELS, AS INDICATED, OR AS REQUIRED TO MEET THE INTENT OF THE DRAWINGS
E. EACH CHANNEL SHALL BE INDIVIDUALLY PROGRAMMABLE WITH:
1. 12H ON/OFF OPERATIONS PER WEEK
2. FOUR SEASONAL SCHEDULES TO MODIFY THE BASE PROGRAM
3. A HOLIDAY SCHEDULE THAT OVERRIDES THE WEEKLY OPERATION
F. PHOTOELECTRIC SENSOR
G. ASTRONOMIC DIAL
H. BATTERY BACKUP
I. NON-VOLITILE MEMORY FOR SCHEDULES AND TIME CLOCK

- EL-15 CONTACTORS, LIGHTING CONTACTORS SHALL SWITCH LOADS AT THE VOLTAGE AND AMPERE RATINGS INDICATED AND SHALL HAVE THE NUMBER OF POLES INDICATED ON THE DRAWINGS, OR AS REQUIRED. THE CONTRACTOR AND CONTACTOR SHALL BE RESPONSIBLY RATED FOR THE LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH-INRUSH BALLAST LOADS.
- EL-16 ALL LIGHTING CONTACTORS SHALL BE ELECTRONICALLY HELD AND BE INSTALLED IN A NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED.

ELECTRICAL (E) NOTES

WIRING/CONDUCTOR (EW)

- EW-1 ALL CONDUCTORS SHALL BE IN CONDUIT.
- EW-2 ALL CONDUCTORS SHALL BE COPPER, RATED 75 C WET/DRY EXCEPT WHERE OTHERWISE NOTED OR REQUIRED BY UL, OR OTHER CODES.
- EW-3 CONDUCTORS SHALL BE MANUFACTURED BY SOUTHWIRE (SIMPULL), ENCORE (SUPERBUCK), UNITED COPPER (SLK), CERRO (SLP), OR APPROVED EQUAL, "PRE-LUBRICATED" BY THE MANUFACTURER.
- EW-4 ALL CONDUCTORS SHALL BE SINGLE INSULATED CONDUCTOR, THHN/THWN-2, SIZES #10 AWG AND SMALLER SHALL BE SOLID, SIZES #8 AWG AND LARGER SHALL BE STRANDED.
- EW-5 BRANCH CIRCUITS SHALL NOT BE SMALLER THAN #12 AWG. CONTROL WIRING MAY BE #14 AWG.
- EW-6 CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208V VOLT SYSTEMS AND BROWN/ORANGE/YELLOW FOR 277/480 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 VOLT SYSTEMS AND NATURAL GRAY FOR 277/480 VOLT SYSTEMS/ GROUND CONDUCTOR SHALL BE GREEN ON ALL SYSTEMS. ALL CONDUCTOR SIZES SHALL HAVE COLOR-CODED INSULATION, THE USE OF COLORED TAPE ON LARGER WIRE SIZES SHALL NOT BE ALLOWED.
- EW-7 INSULATION SHALL BE DUAL RATED TYPE THHN/THWN-2 FOR FEEDERS AND BRANCH CIRCUITS. FIXTURE TAPS SHALL BE #12 THHN/THWN-2 IN FLEX WITH GREEN #12 AWG GROUNDING CONDUCTOR.
- EW-8 WIRING TO LIGHTING FIXTURES SHALL BE AS REQUIRED BY UL LABEL.
- EW-9 MULTI-WIRE BRANCH CIRCUITS SHALL NOT BE ALLOWED.
- EW-10 JOINTS IN #10 AWG AND SMALLER SHALL BE MADE UP WITH CRIMPED CONNECTORS WITH INSULATING CAPS (NO TAPS) OR WRENUTS (MAXIMUM OF 3 CONDUCTORS UNDER ANY CONNECTOR OR WRENUT). LARGER WIRE SHALL USE SPLIT BOLTS OR BOLTED CLAMPS.
- EW-11 ALL WIRING LUGS THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO, BREAKERS, PANELBOARD/SWITCHBOARD LUGS, SAFETY SWITCH LUGS, MOTOR STARTER LUGS, TRANSFORMERS LUGS, WIRING DEVICE TERMINALS AND ALL EQUIPMENT LUGS/TERMINALS SHALL BE RATED FOR USE WITH 75 DEGREE INSULATED CONDUCTORS AT THEIR 75 DEGREE AMPACITY AND SHALL BE SIZED TO MATCH THE CONDUCTOR SIZE.
- EW-12 CIRCUIT JOINTS SHALL NOT BE MADE ON DEVICE TERMINALS.
- EW-13 WIRE WITHIN PANEL BOARDS SHALL BE NEATLY TRAINED, SQUARED, BUNCHED, AND TAGGED.
- EW-14 ALL SYSTEM FURNITURE CONNECTIONS SHALL COMPLY WITH NEC 605.
- EW-15 GROUND ALL EQUIPMENT PER NEC ARTICLE 250. BOND WHERE CONDUITS ENTER ENCLOSURES THROUGH CONCENTRIC KNOCKOUTS, ALL FLEX, INCLUDING FIXTURE TAPS, SHALL INCLUDE GREEN GROUNDING CONDUCTOR, #12 AWG MINIMUM. PROVIDE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT, SIZED PER NEC 250-127.
- EW-16 ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300-19.
- EW-17 THE ELECTRICAL CONTRACTOR SHALL FOLLOW AND APPLY THE TABLE BELOW, REGARDLESS OF WHAT THE PANEL SCHEDULE INDICATES, FOR SIZING ALL 120V & 277V, 20 AMP BRANCH CIRCUITS (COPPER CONDUCTORS) TO ALLOW A MAXIMUM OF 3% VOLTAGE DROP FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE ON THE BRANCH CIRCUIT AND ACHIEVE A MAXIMUM OF 5% VOLTAGE DROP ACROSS THE ENTIRE BRANCH CIRCUIT.

VOLTAGE	CONDUCTOR LENGTH**	BRANCH CIRCUIT
120	0-50'	#12
120	51-90'	#10
120	91-140'	#8
120	141-225'	#6

* - THE LENGTH IS MEASURED FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE WHICH THE BRANCH CIRCUIT SERVES. WHERE THE DISTANCE EXCEEDS ABOVE, CONSULT WITH THE ENGINEER.

ELECTRICAL (E) NOTES

GENERAL (EG)

- EG-1 THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS, AND SUPPLIES AS NECESSARY FOR THE COMPLETE AND SATISFACTORY OPERATING ELECTRICAL SYSTEMS AS SHOWN ON THE PLANS.
- EG-2 ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, NFPA, STATE BUILDING CODE, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY. CONTRACTOR SHALL PAY FOR ALL REQUIRED PERMITS, FEES, INSPECTIONS, ETC.
- EG-3 CONTRACTOR SHALL OBTAIN AND PAY FOR ALL ELECTRICAL PERMITS AND INSPECTION FEES.
- EG-4 ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY THE UNDERWRITERS LABORATORIES, INC. OR BY A STATE APPROVED THIRD PARTY TESTING AGENCY FOR THE USE INTENDED WHERE A STANDARD FOR SUCH MATERIALS AND USE EXISTS. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL AND OF THE SAME MANUFACTURER.
- EG-5 CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CATALOG DATA IN ELECTRONIC FORMAT (PDF) FOR ALL ELECTRICAL ITEMS IN THE SCOPE OF WORK, INCLUDING, BUT NOT LIMITED TO, RACEWAYS, BOXES, FITTINGS, CONDUCTORS, LUMINAIRES, LAMPS, BALLASTS, WIRING DEVICES, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, FIRE ALARM, TELECOMMUNICATIONS, ETC. FOR APPROVAL AS APPLICABLE FOR THE PROJECT. ONE COMPLETE SET OF APPROVED SUBMITTALS SHALL BE MAINTAINED AT THE JOB SITE.
- EG-6 ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH THE BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, CONDUIT, WIRING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, METHODS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COSTS ASSOCIATE WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED AFTER BIDS HAVE BEEN ACCEPTED AND ALL COSTS WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. CREDITS SHALL BE GIVEN TO THE OWNER WHERE SUCH EQUIPMENT AND METHODS RESULT IN LESS EXPENSE TO THE CONTRACTOR.
- EG-7 ONE COMPLETE SET OF THE LATEST CONSTRUCTION PLANS OF ALL TRADES SHALL BE MAINTAINED AT THE JOB SITE. IN ADDITION, ALL ADDENDUMS, BULLETINS, AND/OR SKETCHES SHALL BE INCORPORATED INTO THE ON-SITE CONSTRUCTION PLANS AS THE JOB PROGRESSES.
- EG-8 COMPLETE ADEQUATE HOUSING SHALL BE PROVIDED FOR ALL MATERIALS STORED ON JOB SITE. ONLY CONDUIT MAY BE STORED OUTSIDE, BUT NOT IN CONTACT WITH THE GROUND.
- EG-9 THE CONDUIT AND NEUTRAL SYSTEM SHALL BE GROUNDED AT THE MAIN SERVICE EQUIPMENT. GROUNDING ELECTRODE SYSTEM SHALL BE INSTALLED PER NEC 250.
- EG-10 PROVIDE AN INTER-SYSTEM BONDING TERMINATION DEVICE AT THE MAIN ELECTRICAL SERVICE PER NEC 250.94.
- EG-11 WIRING SHALL BE TESTED FOR CONTINUITY AND GROUNDS BEFORE BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER.
- EG-12 PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF WORK AND REPAIR ANY DAMAGE.
- EG-13 THE ELECTRICAL CONTRACTOR SHALL CONNECT ALL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (UNLESS OTHERWISE NOTED), EXCEPT FOR CONTROL WIRING FOR EQUIPMENT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR. CONTROL WIRING FOR SUCH EQUIPMENT SHALL BE PROVIDED BY THE RESPECTIVE DISCIPLINE.
- EG-14 ALL ELECTRICAL JUNCTION BOXES, SWITCHGEAR, CABLING, VOICE/DATA OUTLETS, LOW VOLTAGE CABINETS, EMERGENCY RECEPTACLES, ETC. SHALL BE LABELED ACCORDING TO PANEL/TAP/CK AND CIRCUIT NUMBER.
- EG-15 UPON COMPLETION OF WORK, CONTRACTOR SHALL PRESENT ENGINEER WITH CERTIFICATE OF APPROVAL, FROM LOCAL INSPECTOR AND/OR AUTHORITY HAVING JURISDICTION BEFORE WORK WILL BE APPROVED FOR FINAL PAYMENT.
- EG-16 CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR A PERIOD OF ONE YEAR EFFECTIVE THE DATE THE PROJECT IS ACCEPTED BY THE OWNER. ANY IMPERFECT MATERIALS OR WORKMANSHIP SHALL BE REPLACED WITHOUT ADDED COST TO THE PROJECT.
- EG-17 IT IS NOT THE INTENT OF ISSUED PLANS AND/OR SPECIFICATIONS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE ELECTRICAL CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL NECESSARY ITEMS FOR A COMPLETE AND OPERATING SYSTEM.
- EG-18 THE WORD "PROVIDE" MEANS THAT THIS CONTRACTOR SHALL FURNISH, FABRICATE, ERECT, CONNECT, AND COMPLETELY INSTALL SYSTEMS IN PROPER OPERATING CONDITION. ALL LABOR, PRODUCT OPTIONS, ACCESSORIES AND INCIDENTAL MATERIALS REQUIRED SHALL BE INCLUDED AS PART OF THIS WORK TO COMPLETE THE INSTALLATION.
- EG-19 THE WORD "CONNECT" MEANS THAT THIS CONTRACTOR SHALL PROVIDE (SEE DEFINITION ABOVE) ALL DISCONNECTING MEANS, OVERCURRENT PROTECTION AND WIRING REQUIRED TO PLACE THE EQUIPMENT AND SYSTEMS IN PROPER OPERATING CONDITION AND TO COMPLY WITH CODE REQUIREMENTS.
- EG-20 CONTRACTOR SHALL COORDINATE THE ROUGH-IN OF ALL OUTLET LOCATIONS WITH ARCHITECTURAL FLOOR PLANS, ELEVATIONS, AND MILL/WORK SHOP DRAWINGS PRIOR TO ROUGH-IN.
- EG-21 ELECTRICAL CONTRACTOR SHALL NOT SCALE PLANS. CONTRACTOR SHALL REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS FOR EXACT LOCATIONS OF ALL EQUIPMENT, UNLESS OTHERWISE NOTED.
- EG-22 CONTRACTOR SHALL TEST ALL "LIFE SAFETY" EQUIPMENT AND SYSTEMS FOR PROPER FUNCTION AND OPERATION. UPON SUCCESSFUL COMPLETION OF TESTS, CONFIRMATION SHALL BE SENT TO THE ENGINEER OF RECORD IN THE FORM OF A LETTER STATING THE TESTS PERFORMED, THE RESULTS, AND THE DATE TESTS WERE SUCCESSFULLY COMPLETE. "LIFE SAFETY" EQUIPMENT AND SYSTEMS CONSIST OF THOSE AS SPECIFIED IN THE STATE BUILDING CODE, THE NATIONAL ELECTRICAL CODE (NEC), NFPA 101, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
- EG-23 IF DURING THE COURSE OF WORK, THE CONTRACTOR DISCOVERS A PROBLEM WITH THE PERFORMANCE OF THE INSTALLATION RELATIVE TO THE PLANS AND SPECIFICATIONS, THE NEC, OR OTHER CODES OR REQUIREMENTS, THE CONTRACTOR SHALL IMMEDIATELY WORK THE PROBLEM TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK.
- EG-24 WHERE THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL BRING THE ISSUE TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK OR ORDERING ANY MATERIALS. NO ADDITIONAL COSTS SHALL BE WARRANTED WITHOUT A CHANGE TO THE PROJECT SCOPE.
- EG-25 NAILS OR POWDER ACTUATED FASTENERS SHALL NOT BE USED.
- EG-26 EMT/MC/RGS SUPPORTS SHALL BE A MAXIMUM OF 8'-0" APART AND A MINIMUM OF 3'-0" FROM BOXES.
- EG-27 LIGHTING FIXTURES MOUNTED IN OR ON CEILINGS SHALL BE SUPPORTED FROM STRUCTURE VIA 12 GAUGE STEEL WIRE. PROVIDE A MINIMUM OF FOUR WIRES, ONE ATTACHED TO EACH CORNER OF LAY-IN FIXTURES. RECESSED DOWNLIGHT FIXTURES SHALL BE SUPPORTED THE SAME. DO NOT SUPPORT RACEWAY OR FIXTURES FROM CEILING OR DUCT WORK. USE UL LISTED GRID CLIPS ON ALL LAY-IN FIXTURES.

SUPPORTS

- EG-28 ALL EQUIPMENT SHALL BE ADEQUATELY SUPPORTED FROM STRUCTURE.
- EG-29 NAILS OR POWDER ACTUATED FASTENERS SHALL NOT BE USED.
- EG-30 EMT/MC/RGS SUPPORTS SHALL BE A MAXIMUM OF 8'-0" APART AND A MINIMUM OF 3'-0" FROM BOXES.

PAINTING

- EG-32 SUITABLE FINISH COAT SHALL BE PROVIDED FOR ALL EQUIPMENT. PANEL TUBS, COVERS, ETC. SHALL BE PRIMED AND ENAMELED TO BLEND WITH ADJACENT SURFACES, OR SHALL BE MANUFACTURERS STANDARD COLOR BAKED ENAMEL FINISH, OR AS DIRECTED BY THE ARCHITECT.

EQUIPMENT IDENTIFICATION (EI)

- EI-1 PROVIDE ENGRAVED PHENOLIC NAMEPLATES FOR ALL ELECTRICAL EQUIPMENT SUPPLIED FOR THE PROJECT, INCLUDING BUT NOT LIMITED TO, WIRING TROUGHS, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, ETC. PROVIDE NAMEPLATES FOR CIRCUIT BREAKERS IN SWITCHGEAR, SWITCHBOARDS AND DISTRIBUTION PANELS. EACH NAMEPLATE SHALL INDICATE THE FOLLOWING:
 - DEVICE NAME
 - SYSTEM VOLTAGE (VOLTAGE/PHASE/WIRE)
 - UPSTREAM DEVICE & CIRCUIT
- EI-2 NAMEPLATE COLORS SHALL BE AS FOLLOWS:

TYPE	SURFACE COLOR	CORE COLOR
120/208V EQUIPMENT	BLUE	WHITE
277/480V EQUIPMENT	BLACK	WHITE
EMERGENCY	GREEN	WHITE
FIRE ALARM	BRIGHT RED	WHITE
SECURITY	BURGUNDY	WHITE
TELEPHONE	ORANGE	WHITE
DATA	BROWN	WHITE
TV	PURPLE	WHITE
PAGING	WHITE	BLACK
- EI-3 PLATE THICKNESS: NAMEPLATES UP TO 8 SQUARE INCHES = NOT LESS THAN 1/16" THICK NAMEPLATES OVER 8 SQUARE INCHES = NOT LESS THAN 1/8" THICK
- EI-4 LETTERING HEIGHT = 1/2" MINIMUM
- EI-5 NAMEPLATES SHALL BE ATTACHED WITH SELF-DRILLING / SELF-TAPPING SCREWS, EXCEPT RIVETS SHALL BE USED WHERE THE END OF SCREW IS NOT PROTECTED MINIMUM NUMBER OF SCREWS:

UP TO 5 SQUARE INCHES	= 2 SCREWS
5 TO 12 SQUARE INCHES	= 4 SCREWS
OVER 12 SQUARE INCHES	= 6 SCREWS

ELECTRICAL SPECIFICATIONS:

FIRE ALARM SYSTEM

- A. SYSTEM SHALL BE A CENTRALIZED, ANALOG, ADDRESSABLE, FULLY ELECTRONICALLY SUPERVISED (INCLUDING AUXILIARY SYSTEMS INTERCONNECT) SYSTEM LISTED BY UL IN COMPLIANCE WITH ALL APPLICABLE NFPA 72 AND OTHER STANDARDS AS WELL AS THE AMERICANS WITH DISABILITIES ACT (ADA). ALL FINAL CONNECTIONS, TESTING AND ADJUSTMENTS SHALL BE PERFORMED BY OR UNDER DIRECT SUPERVISION OF AN AUTHORIZED FACTORY REPRESENTATIVE. SYSTEM SHALL BE SIMPLE, NOTIFIER, SIEMENS, OR APPROVED EQUAL AS ACCEPTED BY THE ENGINEER. SYSTEM SHALL HAVE A24 HR MINIMUM BATTERY BACKUP.
- B. INITIATION DEVICE ACTIVATION SHALL CAUSE OPERATION OF THE PROPER ALARM CIRCUIT IN THE CONTROL PANEL, AND OPERATE ALL AUDIBLE AND VISUAL INDICATION ALARMS. ALL AIR HANDLING UNITS SHALL BE STOPPED UPON ANY ALARM INPUT. EACH AIR HANDLER UNIT SHALL BE PROVIDED WITH A SYSTEM CONTROLLED RELAY TO EFFECT SHUTDOWN. ALL ALARM DEVICES AND LAMPS SHALL CONTINUE TO OPERATE UNTIL THE INITATING DEVICE IS RESET. SUBSEQUENT ALARMS SHALL RESOUND THE SYSTEM. AN AUDIBLE AND VISUAL SIGNAL SHALL INDICATE SYSTEM TROUBLE. THE CONTROL PANEL SHALL PROVIDE FOR ACTIVATING A UL LISTED CENTRAL STATION SIGNAL FOR NOTIFYING THE FIRE DEPARTMENT.
- C. MANUAL STATIONS SHALL BE NON-CODED, WITH PULL LEVER AND GLASS ROD, SEMI-FLUSH MOUNTED. COMBINATION LIGHT AND HORN SIGNALS SHALL BE FLUSHED MOUNTED. WIRING SHALL BE IN CONDUIT AS PREVIOUSLY SPECIFIED, #14 AWG MINIMUM THHN. ALL J-BOXES USED FOR THE FIRE ALARM SYSTEM SHALL BE PAINTED RED.
- D. CONDUCTORS SHALL BE PLENUM-RATED ND INSTALLED IN CONDUIT AND INSTALLED IN COMPLIANCE WITH NFPA 70, ARTICLE 760, IN ADDITION TO WIRING METHODS 300.4.
- E. ALL FIRE ALARM WIRING SHALL BE CLASS B.
- F. PROVIDE ALL REQUIRED MODULES, POWER EXTENDERS, PROGRAMMING, ETC. FOR A COMPLETE AND OPERATIONAL SYSTEM.
- G. SUBMIT FIRE ALARM SHOP DRAWINGS CONSISTING OF PRODUCT DATA, TO THE ENGINEER AND FOR APPROVAL.
- H. FILL OUT NFPA 72 CERTIFICATION REPORT AND SUBMIT TO ENGINEER AND AUTHORITY HAVING JURISDICTION.
- I. WARRANTY - ALL WORK PERFORMED AND ALL MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE FREE FROM DEFECTS AND SHALL REMAIN SO FOR A PERIOD OF AT LEAST TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY THE PROFESSIONAL ENGINEER AND/OR OWNER. THE FULL COST OF MAINTENANCE, LABOR, AND MATERIALS REQUIRED TO CORRECT ANY DEFECT DURING THIS TWO-YEAR PERIOD SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL COST TO THE OWNER, ANY DEFECTS THAT RENDER THE SYSTEM INOPERATIVE SHALL BE REPAIRED WITHIN 24 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR. OTHER DEFECTS SHALL BE REPAIRED WITHIN 48 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR.

FIRE STOPPING:

- J. ALL PENETRATIONS OF RATED ASSEMBLIES SHALL BE SEALED WITH RATED MATERIALS MEETING ASTM E-814.
 - K. PROVIDE FIRE STOPPING DEVICES(S) OR SYSTEM(S) WHICH HAVE BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E-814. INSTALL THE DEVICE(S) OR SYSTEM(S) IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE THE APPROPRIATE DEVICE(S) OR SYSTEM(S) WITH AN "F" RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED.
 - L. DEVICE(S) AND/OR SYSTEM(S) SHALL BE BY HILTI, 3M OR EQUIVALENT.
- SEISMIC:
- M. THE ELECTRICAL CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR PROVIDING SEISMIC SUPPORT AND BRACING OF ELECTRICAL COMPONENTS TO RESIST THE EFFECTS OF EARTHQUAKES ON THE ELECTRICAL SYSTEM AS WELL AS ANY AS REQUIRED. THE SEISMIC RESTRAINTS AND SPECIAL INSPECTION SHALL MEET ALL APPLICABLE STATE AND LOCAL BUILDING CODE REQUIREMENTS AS WELL AS ASCE-7 REQUIREMENTS.

ELECTRICAL COORDINATION WITH OTHER TRADES:

- A. THE ELECTRICAL CONTRACTOR SHALL CONNECT AND /OR PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT SUPPLIED BY OTHERS APPLICABLE TO THE PROJECT, INCLUDING BUT NOT LIMITED TO, MECHANICAL, PLUMBING, FIRE PROTECTION AND SUPPRESSION, OWNER FURNISHED, KITCHEN, LABORATORY, ETC. UNLESS OTHERWISE NOTED.
- B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH-IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.
- C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL MOTOR STARTER SWITCHES, DISCONNECT SWITCHES, RECEPTACLES, ETC. TO MECHANICAL AND PLUMBING EQUIPMENT. ALL STARTERS, OTHER THAN MANUAL STARTER SWITCHES, SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY THE ELECTRICAL CONTRACTOR.
- D. ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO ORDERING/ROUGH INSTALLING. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF LACK OF COORDINATION WILL BE REMOVED AND INSTALLED CORRECTLY AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.
- E. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT RUNS AND LIGHT FIXTURE LOCATION S ABOVE THE CEILING WITH OTHER TRADES PRIOR TO INSTALLATION.
- F. ALL DUCT SMOKE DETECTORS SHALL BE PROVIDED AND CONNECTED BY THE ELECTRICAL CONTRACTOR, BUT INSTALLED BY THE MECHANICAL CONTRACTOR.
- G. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY OUTLETS FOR HEAT TAP CONNECTIONS FOR MECHANICAL SYSTEMS. PROVIDE CLASS B (30MA) GFCI PROTECTION ON THE BREAKER SUPPLYING THE HEAT TAPE.

--

LIGHT FIXTURE SCHEDULE						
SYMBOL	DESCRIPTION	LAMP DESCRIPTION	TOTAL FIXTURE WATTAGE	BALLASTS	VOLTAGE	MANUFACTURER/CATALOG NUMBER
HB1	FLUORESCENT HIGH BAY	4--LSF54/50W/835/HO/SS/ECO	216W	SYLVANIA QUICKTRONIC 2--QHE2X54T5HO/UNV PSN--HT	UNIV	METALUX HB451T5M--WGUNV--UPL--FH1
OA	WALLPACK	MCP70/U/MED/830PB	77W	QTP1X70MH/UNV PULSE START METAL HALIDE	UNIV	LITHONIA TWP--70M--120--DWH--LP1--PE
OB	GROUND MOUNTED FLOODLIGHT	MCP70/U/MED/830PB	77W	QTP1X70MH/UNV PULSE START METAL HALIDE	UNIV	LITHONIA ASF1--70M--MDF--120--PE --DDBT--LP1
OC	LED EXTERIOR EMERGENCY EGRESS LIGHT	5.4W INCANDESCENT LAMP	11W	NONE	UNIV	CHLORIDE SYSTEMS VW2RHP LITHONIA ELAT6CSWPM12
X	LED EXIT SIGN	LED	2.5W/FACE	NONE	UNIV	CHLORIDE SYSTEMS SYMMETRY SERIES #SN1RW LITHONIA LQM SW3 120/277 ELN
EL	EMERGENCY LIGHT	2--20W MR16 FLOOD	40W	NONE	UNIV	CHLORIDE SYSTEMS #S250NH20FW LITHONIA ELMLT W LP06V5
B	FLUSH MOUNT CEILING FIXTURE	CIRCLINE T9	40W	120V 60HZ ELECTRONIC BALLAST	UNIV	LITHONIA FM72 ACLS LP R4

LIGHT FIXTURE NOTES

- LIGHTING FIXTURES, AS SPECIFIED, HAVE BEEN SELECTED TO ACHIEVE REQUIRED/DESIRED FOOT CANDLE LEVELS OF ILLUMINATION IN THEIR RESPECTIVE AREA, HENCE SPECIFIC FIXTURE CHARACTERISTICS WHICH MAY CREATE PARTICULAR ILLUMINATION RESULTS ARE ESSENTIAL ANY DEVIATIONS FROM SPECIFIED FIXTURES SHALL DEEM THE SUBMITTING AGENT AND CONTRACTOR RESPONSIBLE IN PROVING SUCH DEVIATION WILL PROVIDE THE EXACT LIGHTING RESULT IN DUPLICATION TO THE DESIGN HEREIN.
- SUBSTITUTIONS APPROVED BY THE ENGINEER PREVIOUS TO BID ARE ACCEPTABLE AS LONG AS THEY ARE EQUAL TO SPECIFIED. THIS INCLUDES LENS, COLORS, REFLECTORS, PHOTOMETRIC, HOUSING MATERIALS, FINISHES, ETC. ANY SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER WITH COMPLETE CUT SHEETS FOR APPROVAL 10 WORKING DAYS PRIOR TO BID. SUBSTITUTE FIXTURES SHALL BE PRICED WITH THE SPECIFIED FIXTURE AND LISTED SEPARATELY FOR THE ENGINEER AND OWNER TO MAKE AN INFORMED DECISION.
- CONTRACTOR SHALL PROVIDE SUITABLE TRIM AND APPURTENANCES TO MOUNT FIXTURES IN TYPE OF CEILING OR WALL AS SPECIFIED IN ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF CATALOG NUMBER GIVEN. CONTRACTOR SHALL VERIFY TYPE OF CEILING OR WALL BY REVIEWING ARCHITECTURAL FINISH SCHEDULES PRIOR TO ORDERING FIXTURES.
- ALL 3 AND 4 LAMP RECESSED TROFFER TYPE FIXTURES SHALL BE EQUIPPED WITH MORE THAN ONE BALLAST TO ALLOW FOR SEPARATE SWITCHING OF INBOARD AND OUTBOARD LAMPS WITHIN THE SAME FIXTURE. TANDEM WIRING BETWEEN FIXTURES IS ALLOWED TO ACCOMPLISH THE SAME RESULT. TANDEM WIRING MAY ALSO BE USED TO CONTROL A SINGLE LAMP IN A TWO LAMP FIXTURE WHERE MULT--LEVEL CONTROLS ARE ASSOCIATED WITH 2 LAMP FIXTURES.
- CONFIRM FINAL FIXTURE LOCATION WITH ARCHITECTURAL REFLECTED CEILING PLANS AND ELEVATIONS.
- ELECTRONIC BALLAST FOR T5 LAMPS SHALL HAVE END OF LIFE SHUTDOWN CAPABILITY AS STATED IN SPECIFICATIONS.
- PROVIDE LOW TEMPERATURE (0° F) BALLAST FOR ANY FIXTURE INSTALLED ON EXTERIOR OR OTHER AREAS SUBJECT TO LOW TEMPERATURES.
- FLUORESCENT FIXTURES EQUIPPED WITH EMERGENCY BATTERY PACKS SHALL BE SUPPLIED WITH 1100 LUMEN INVERTERS AND DUAL INPUT TYPE INVERTERS WHERE SO INDICATED ON PLANS AND FED AHEAD OF SWITCHED CIRCUITS FOR THAT DESIGNATED AREA. EMERGENCY BALLAST SHALL BE INSTALLED BY THE FIXTURE MANUFACTURER.
- FLUORESCENT BALLAST THAT CAN BE SERVICED IN PLACE WALL HAVE A DISCONNECT MEANS COMPLIANT WITH NEC 410.130G.
- DURING THE BIDDING PROCESS, THE CONTRACTOR SHALL INFORM ARCHITECT AND ENGINEER OF ANY DELIVERY OR SCHEDULING ISSUES THAT MAY IMPACT THE PROJECT CRITICAL PATH SCHEDULING.
- NO FIXTURE SUBSTITUTIONS WILL BE CONSIDERED DUE TO LACK OF COORDINATION OF DELIVERY DATES AND CONSTRUCTION SCHEDULE AFTER TIME OF BID.
- ALL MATERIAL EXPEDITING EXPENSES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- ANY FIXTURES BEING BEING INSTALLED IN CEILING, INDICATED BY THE ARCHITECT AS HAVING INSULATION IN CONTACT WITH THE CEILING SURFACE, SHALL BE IC RATED AND LABELED SUCH FROM THE MANUFACTURER.
- ACCEPTABLE BALLAST MANUFACTURERS FOR SUBMISSION ARE ARE OSRAM/SYLVANIA, ADVANCE, GE, PHILLIPS OR UNIVERSAL TRIAD PROVIDED THEY MEET INTENDED CRITERIA AS LISTED IN THIS SCHEDULE AND PROJECT SPECIFICATIONS.
- ALL FIXTURES SHALL BE MADE IN AMERICA IN AS MUCH AS POSSIBLE.
- ALL INCANDESCENT LIGHT FIXTURES SHALL BEAR A U.L. LABEL INDICATING THE MAXIMUM ALLOWABLE LAMP WATTAGE IN THAT FIXTURE.
- INSTALL ALL FLUORESCENT DOWN--LIGHT FIXTURES SO THAT ALL LAMPS ARE ALIGNED IN THE SAME DIRECTION.
- SUPPORT RECESSED TROFFERS AT ALL FOUR CORNERS FROM STRUCTURE.
- ALL METAL HALIDE LAMPS AND BALLAST SHALL MEET OR EXCEED THE ENERGY INDEPENDENCE AND SECURITY ACT 2001 (EISA) REQUIREMENTS.
- FLUORESCENT LAMP AND BALLAST WARRANTY SHALL BE COMPLETED BY THE ELECTRICAL CONTRACTOR AND SUBMITTED WITH A COPY TO THE OWNER UPON PROJECT CLOSE OUT.
- ALL LINEAR FLUORESCENT LAMPS SHALL BE 3500K UNLESS OTHERWISE INDICATED ON SCHEDULE.
- ALL LED SITE LIGHTING FIXTURES SHALL HAVE SURGE PROTECTION BUILT IN INTEGRAL TO THE FIXTURE.
- ALL ELECTRONIC BALLAST SERVING LINEAR FLUORESCENT LAMPS SHALL BE PROGRAM START.
- COMPLETELY EXAMINE LIGHTING PLANS TO COORDINATE SWITCHING, DIMMING AND ANY SPECIAL BALLAST CONTROLS THAT MAY BE PART OF THE DESIGN INTENT.
- EMERGENCY EGRESS FIXTURES SHALL BE IDENTIFIED WITH A 1/2" DIAMETER RED DOT ON FRAME, VISIBLE FROM THE FLOOR.
- COORDINATE CLOSELY FIXTURES CONTROLLED VIA AUTOMATIC OR DIMMING CONTROLS TO ASSURE FIXTURE APPENDAGES ARE ORDERED PROPERLY TO MEET DESIGN INTENT.
- CONTRACTOR SHALL FURNISH A COMPLETE SET OF PLANS TO HIS SUPPLIER TO ASSURE LIGHTING PACKAGE IS COMPLETE.
- ELECTRICAL VALUE ENGINEERING SHALL BE BILLED AT AN HOURLY RATE BY ENGINEERING BEFORE SUBMITTAL REVIEWS.
- EMERGENCY BALLASTS FOR LED FIXTURES MOUNTED IN UNCONDITIONED SPACES SHALL BE BODINE 'BSL10' SERIERIS OR EQUAL.

LIGHTING (SEE FIXTURE SCH.)

○

FLUORESCENT OR LED LIGHTING FIXTURE. SEE FIXTURE SCHEDULE. SUSPEND FOUR CORNERS WITH WIRE TO STRUCTURE. DO NOT ALLOW GRID ALONE TO SUPPORT FIXTURE.

○

FLUOR., LED OR H.I.D. LIGHTING FIXTURE.

⊖

WALL MOUNTED INCANDESCENT, FLUOR, LED OR H.I.D. LIGHTING FIXTURE.

FLUORESCENT FIXTURE WITH EMERGENCY BATTERY PACK. 1100 LUMEN INVERTER

EXIT LIGHT WITH ARROWS AND NUMBERS OF FACES AS INDICATED ON PLANS. 90 MIN. BATTERY BACKUP

EMERGENCY BATTERY PACK FIXTURE. 90 MIN. BATTERY BACK UP

EMERGENCY BATTERY PACK/EXIT COMBO FIXTURE. 90 MIN. BATTERY BACK UP

EXTERIOR EMERGENCY FIXTURE. 90 MIN. BATTERY BACK UP

FLOODLIGHT

S

SINGLE POLE SWITCH, 20 AMP, 120/277 VOLT, COOPER 1221, OR EQUAL.

S₃

THREE WAY SWITCH, 20 AMP, 120/277 VOLT, COOPER 1223, OR EQUAL.

CEILING MOUNTED VACANCY SENSOR, DUAL TECHNOLOGY. WATT STOPPER DT-300 OR EQUAL W/BZ SERIES POWER PACK

S_{OC}

WALL MOUNTED OCCUPANCY SENSOR AND SWITCH. INFRARED TECHNOLOGY, SENSOR SWITCH WSX PDT 2P 2VA OR EQUAL

S_{VS}

WALL MOUNTED VACANCY SENSOR AND SWITCH. INFRARED TECHNOLOGY, SENSOR SWITCH WSX PDT 2P 2VA OR EQUAL

PANEL A: FLEMING TOWN									
120/240VAC * 1 PHASE * 3 WIRE									
SURFACE MOUNT * INDOOR NEMA Type 1 * 24 CIRCUIT									
MAIN LUG ONLY									
POWER				PHASE LOADING				LIGHTING	
DESCRIPTION	WIRE	BRKR	CKT #	A	B	CKT #	BRKR	WIRE	DESCRIPTION
RESERVED (WELL BUILDING)	N/A	15	1	462		2	15	#8	EXTERIOR BUILDING LIGHTS
WELL PUMP	#6	25	3		3078	4	15	#10	HIGH BAY 1 & REST ROOM
WATER HEATER	#10	15	5	2400		6	15	#8	HIGH BAY 2
RECEPTACLES	#8	15	7		2460	8	15	#8	HIGH BAY 3
RECEPTACLES	#8	15	9	1671		10	15	#8	EXTERIOR FLOOD LIGHTS
IFH-1 (INFRARED HEATING UNIT)	#10	15	11		866	12	15	N/A	FUTURE
EXHAUST FAN FH-1	#8	20	13	1749		14	15	#10	ELECTRIC WALL HEATER EWH-1
INTAKE FAN FH-2	#10	20	15		249	16	15	N/A	RESERVED
FUTURE	N/A	15	17	1500		18	15	#10	ELECTRIC WALL HEATER EWH-2
FUTURE	N/A	15	19		360	20	15	#10	SHORE POWER
BAY DOOR MOTOR 1	#8	15	21	375		22	15	N/A	FUTURE
BAY DOOR MOTOR 2	#8	15	23		375	24	15	N/A	FUTURE
				8.2	7.4	TOTAL LOAD IN KWATTS PER PHASE			
				68.0	61.6	TOTAL LOAD IN AMPS PER PHASE			
				129.5 TOTAL AMPERAGE LOAD					
PANEL RATING = 150 AMP									

DESIGNED BY: MJC
DRAWN BY: MJC
CHECKED BY: MJC
DATE: May 04, 2016
SCALE: NOT TO SCALE
PROJECT #:
COUNTY: FLORENCE
DWG. # AE055
DATE: AE055.dwg 08/31/16 10:40:09 AM

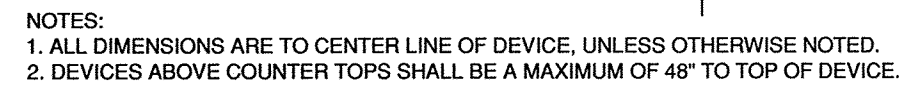
SEAL: SOUTH CAROLINA PROFESSIONAL ENGINEER No. 20872
1/16
SOUTH CAROLINA ALIGNED ENGINEERING No. 5025
DATE OF AUTHORIZATION

CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT
PLAN SET:
DESCRIPTION: ELECTRICAL NOTES & SCHEDULES

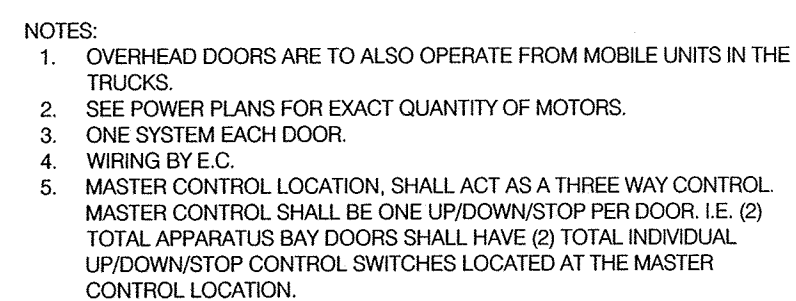
NEW STATION AT FRIENDFIELD
ELECTRICAL NOTES & SCHEDULES

DATE: May 04, 2016
PROJECT: AE055
SHEET: E2.0

REVISION
NO.
DATE
BY



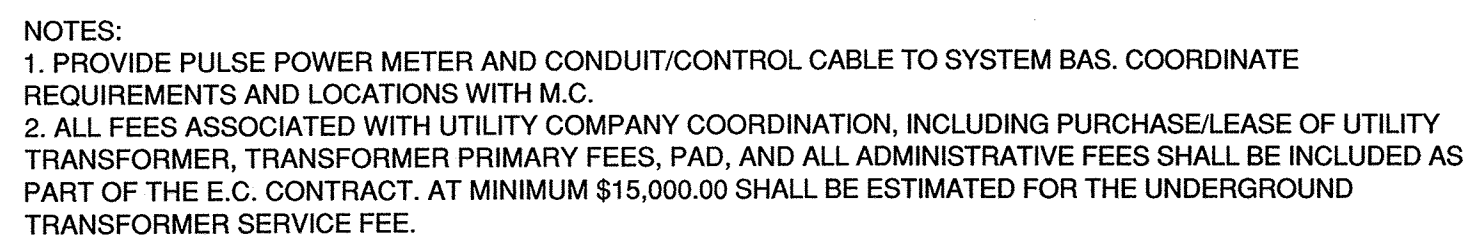
MOUNTING HEIGHTS OF DEVICES
NTS



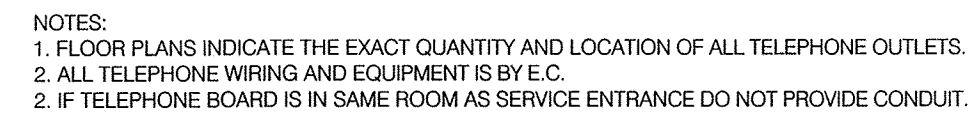
OVERHEAD BAY DOOR SCHEMATIC



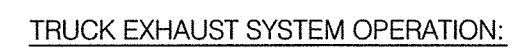
TYPICAL NAMEPLATES DIAGRAM
NTS



POWER RISER - BASE BID
NTS



TELEPHONE RISER DIAGRAM




- A. "ON" WHEN RESPECTIVE DOOR IS OPENING. LIMIT SWITCH ② CLOSED.
- B. "OFF" WHEN RESPECTIVE DOOR IS CLOSED. LIMIT SWITCH ② OPENED.
- C. "ON" WHEN RESPECTIVE DOOR IS CLOSED AND MANUAL OVERRIDE SWITCH ① IS ACTIVATED.
- D. "OFF" WHEN RESPECTIVE DOOR IS OPEN AND RESPECTIVE MANUAL OVERRIDE SWITCH ④ IS IN "OVERRIDE" POSITION.
- E. WHEN DETECTOR REACHES 25PSM. LOW VOLTAGE RELAY ③ AUTOMATICALLY OVERRIDES SYSTEM. IN CASE DOORS ARE OPEN AND MANUAL OVERRIDE IS ACTIVATED, EXHAUST/HEATER SYSTEMS WILL COME ON AUTOMATICALLY UPON ALARM. CO NOT CONNECTED TO F.A.
- F. SYSTEM WILL OPERATE VIA TIMER RELAY ⑤ FOR 10 MIN.

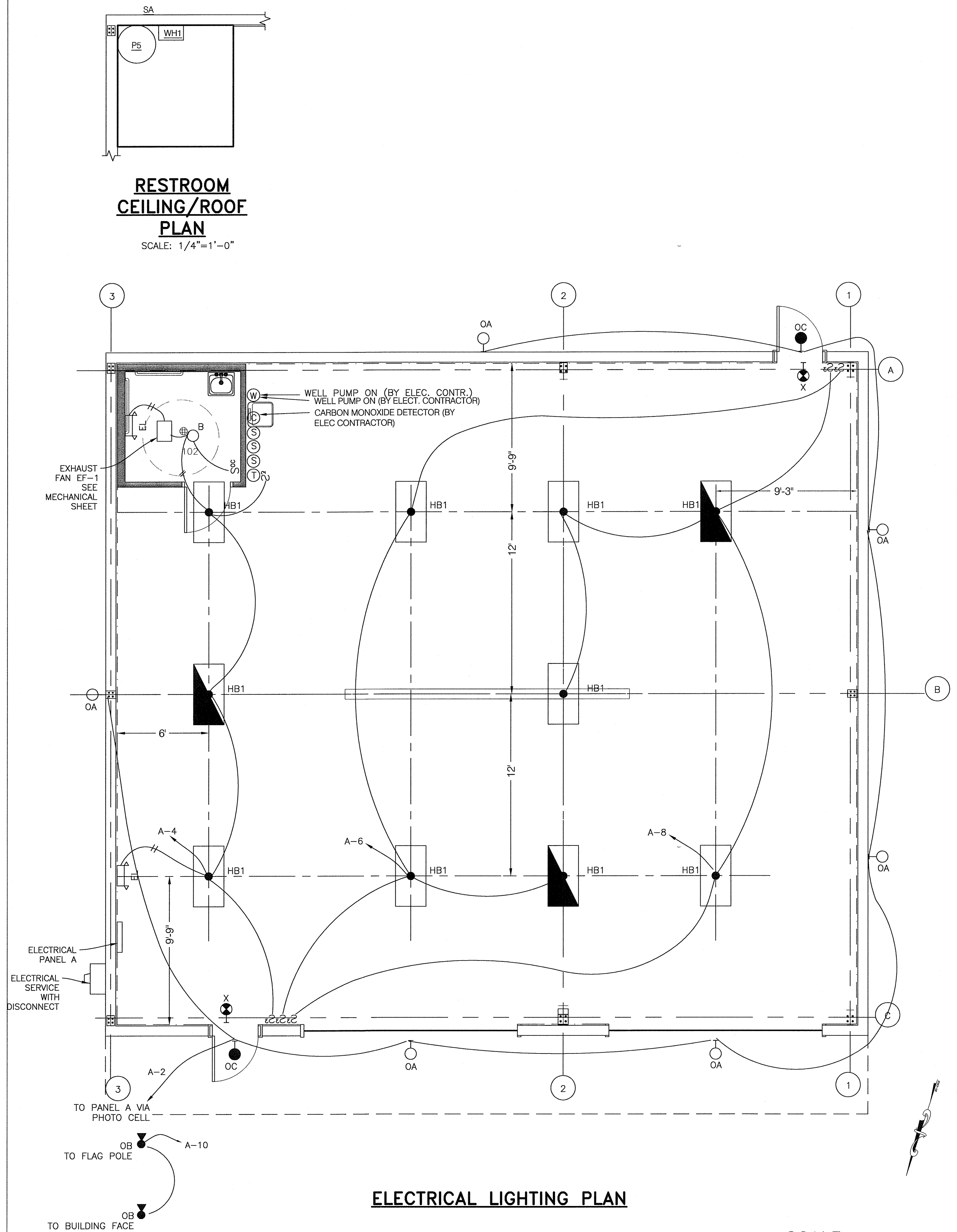
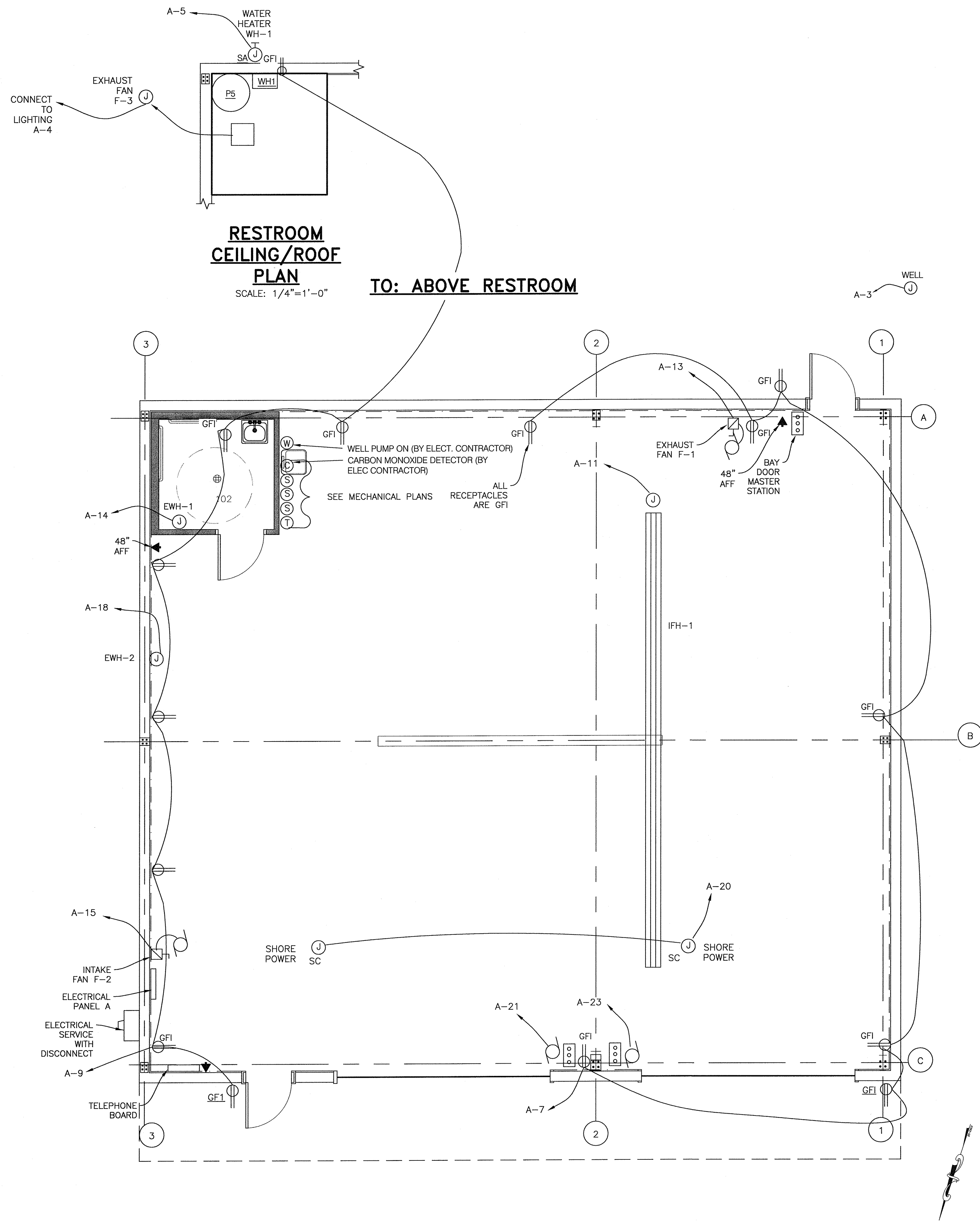
NOTES:

1. ALL LIMIT SWITCHES FURNISHED BY ELECTRICAL CONTRACTOR (E.C.).
2. ELECTRICAL CONTRACTOR SHALL WIRE EXHAUST/HEATER SYSTEM CONTROLS PER SCHEMATICS.
3. UNDER NORMAL CONDITIONS THE DOORS ARE CLOSED, THE HEATERS ARE ON AND THE FANS ARE OFF. WHEN DOORS OPEN THE HEATERS TURN OFF AND THE FANS TURN ON.

EXHAUST SYSTEM SCHEMATIC
NTS



	<p>THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, L.L.C. THE REPRODUCTION, USE, OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.</p>	
	<p>DATE: May 04, 2016</p>	
<p>PROJECT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT</p>	<p>PLAN SET: NEW STATION AT FRIENDFIELD</p>	<p>DATE: May 04, 2016</p>
<p>DESCRIPTION: ELECTRICAL DETAILS</p>	<p>DESIGN: E03.0</p>	<p>DATE: May 04, 2016</p>
<p>PROJECT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT</p>	<p>PLAN SET: NEW STATION AT FRIENDFIELD</p>	<p>DATE: May 04, 2016</p>
<p>DESCRIPTION: ELECTRICAL DETAILS</p>	<p>DESIGN: E03.0</p>	<p>DATE: May 04, 2016</p>



DESIGNED BY:	DATE:	NO.	BY
DRAWN BY:	DATE:	NO.	BY
CHECKED BY:	DATE:	NO.	BY
APPROVED BY:	DATE:	NO.	BY
PROJECT #	PROJECT #	PROJECT #	PROJECT #
COUNTY	COUNTY	COUNTY	COUNTY
CITY	CITY	CITY	CITY
STATE	STATE	STATE	STATE
CAD	CAD	CAD	CAD

CLIENT: HANNAH-SALEM FRIENDFIELD
FIRE DEPARTMENT

PLAN SET: NEW STATION AT FRIENDFIELD

DESC: ELECTRICAL PLANS

DESIGN: DESIGN

DATE: May 04, 2016

PROJECT: AE055

SHEET: E4.0

MECHANICAL (M) NOTES

GENERAL (MG)
MG-1 DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.

MG-2 ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT DURING CONSTRUCTION WILL BE ACCEPTED AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.

MG-3 UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION INCLUDING RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED) AND O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS.

MG-4 PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.

MG-5 THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING RESTRAINTS TO RESIST THE EARTHQUAKE EFFECTS ON THE MECHANICAL SYSTEMS. THE REQUIREMENTS FOR THOSE RESTRAINTS ARE FOUND IN THE LOCAL BUILDING CODE AND ASCE 7.

DUCTWORK (MD)
MD-1 ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS, DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE.

MD-2 ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE INTERNATIONAL MECHANICAL CODE. SEAL EXHAUST DUCTWORK FOR POSITIVE/NEGATIVE 2" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 12.

MD-3 ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.

MD-4 MECHANICAL CONTRACTOR SHALL VERIFY LOCATION OF ROOF PENETRATIONS WITH ARCHITECT & OWNER PRIOR TO INSTALLATION.

MD-5 MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 15'-0" FROM ANY OUTSIDE AIR INTAKE.

MD-6 ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.

EQUIPMENT (ME)
ME-1 PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.

ME-2 ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.

ME-3 INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION.

ME-4 PROVIDE UNIONS, FLANGES OR COUPLINGS AT CONNECTION TO ALL VALVES AND EQUIPMENT. DO NOT USE DIRECT WELDED OR THREADED CONNECTIONS TO VALVES, EQUIPMENT, OR OTHER APPARATUS.

ME-5 PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.

ME-6 EQUIPMENT OPERATED DURING CONSTRUCTION SHALL USE FILTERED MEDIA TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING COILS, DUCTWORK SYSTEMS, AIR TERMINALS ETC. AT COMPLETION OF CONSTRUCTION, MECHANICAL CONTRACTOR SHALL CLEAN ALL SYSTEMS WITH ALL CONTROL DEVICES WIDE OPEN AND REMOVE ANY REMAINING DEBRIS PRIOR TO TEST AND BALANCING. MECHANICAL CONTRACTOR SHALL REPLACE ALL FILTRATION WITH NEW FILTERS AT COMPLETION OF CONSTRUCTION. ANY DUCTWORK, AIR TERMINALS, AND/OR OTHER EQUIPMENT UPSTREAM OF FILTRATION SHALL BE CLEANED THOROUGHLY OF CONSTRUCTION DEBRIS BEFORE HANDING OVER TO OWNER.

NATURAL GAS (NG) PIPING NOTES

NG-1 GAS PIPING AND FITTINGS ABOVE GRADE: SCH. 40 BLACK STEEL PIPING, TYPE S, SEAMLESS, GRADE B (ASTM A 53) AND 150 PSI MALLEABLE BLACK IRON FITTINGS, GRADE 32510, (ASTM B 16.3) OR FORGED STEEL WELDING TYPE FITTINGS (ASTM A234), PROVIDE THREADED JOINTS FOR PIPE 2" AND SMALLER. PROVIDE WELDED JOINTS (ASME B31.9) FOR PIPE 2- 3/4" AND LARGER.

NG-2 GAS PIPING AND FITTINGS OUTSIDE BELOW GRADE: SCH. 40 BLACK STEEL, TYPE S, SEAMLESS, GRADE B (ASTM A 53) AND FORGED STEEL WELDING TYPE FITTINGS (ASTM A234) WITH (AWWA C105) POLYETHYLENE JACKET OR DOUBLE LAYER, HALF LAPPED 10 MIL POLYETHYLENE TAPE. PROVIDE WELDED JOINTS (ASME B31.9) FOR ALL UNDERGROUND PIPE.

NG-3 MINIMUM GAS PIPING SIZE SHALL BE 3/4".

NG-4 PROVIDE UNIONS, FLANGES OR COUPLINGS AT CONNECTION TO ALL VALVES AND EQUIPMENT. DO NOT USE DIRECT WELDED OR THREADED CONNECTIONS TO VALVES, EQUIPMENT, OR OTHER APPARATUS.

NG-5 PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.

NG-6 PAINT ALL GAS PIPING WITH 2 COATS OF YELLOW ENAMEL PAINT APPLIED WITH A BRUSH (2 MIL THICKNESS MINIMUM). STENCIL "GAS" ON PIPE AT 12'-0" CENTERS FOR ALL LOW PRESSURE PIPING (0.5 PSI). STENCIL "2-PSI GAS" ON PIPE AT 6'-0" CENTERS FOR 2 PSI GAS PIPING.

NG-7 GAS PIPING SHALL BE INSTALLED TO THE REQUIREMENTS OF THE STATE BUILDING CODE AND NFPA STANDARD NO. 54. ALL PIPING TO BE SUPPORTED BY CLEVIS HANGERS WITH GALVANIZED ROD HANGERS IN THE PIPE RUN 12" OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE PER THE STATE BUILDING CODE AND ASCE 7.

NG-8 SPACE GAS PIPING HANGER RODS 7'-0" ON CENTER MAXIMUM AND SPACE TRANSVERSE BRACING 20'-0" ON CENTER MAXIMUM. TRANSVERSE BRACING FOR ONE SECTION MAY ACT AS LONGITUDINAL BRACING FOR THE PIPE SECTION CONNECTED TO IT IF THE BRACING IS INSTALLED WITHIN 24" OF THE ELBOW OR TEE. COORDINATE HANGER LOCATIONS WITH STRUCTURAL DRAWING DETAILS.

NG-9 MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 15'-0" FROM ANY OUTSIDE AIR INTAKE.

NG-10 GAS PIPING SHALL BE TESTED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN NFPA NO 54. ANY OTHER TEST AS REQUIRED BY THE LOCAL GAS INSPECTION DEPARTMENT OR GAS COMPANY SHALL ALSO BE PERFORMED.

NG-11 PROVIDE A G.A. CERTIFIED SHUT-OFF VALVES MINIMUM, 125 PSI, NON - LUBRICATED PLUG TYPE WITH BRONZE BODY AND BRONZE PLUG, STRAINERS AND REGULATORS (AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER) FOR ALL EQUIPMENT CONNECTED TO THE NATURAL GAS SYSTEM.

NG-12 GAS PRESSURE REGULATORS SHALL COMPLY WITH ANSI Z21.80. REGULATORS SHALL BE CAST IRON OR DIE-CAST ALUMINUM CONSTRUCTION WITH INTERCHANGEABLE ZINC-PLATED STEEL SPRINGS, ZINC-PLATED STEEL DIAPHRAGM PLATE, NITRILE RUBBER SEAT DISC, INTERCHANGEABLE ALUMINUM ORIFICE, AND ULTRAVIOLET-STABILIZED MINERAL FILLED NYLON SEAL PLUG. REGULATOR SHALL BE SINGLE-PORT SELF-CONTAINED WITH ORIFICE NO LARGER THAN REQUIRED AT MAXIMUM PRESSURE INLET AND NO PRESSURE SENSING PIPING EXTERNAL TO THE REGULATOR. PRESSURE REGULATOR SHALL MAINTAIN DISCHARGE PRESSURE SETTING DOWNSTREAM AND NOT EXCEED 150 PERCENT OF DESIGN DISCHARGE PRESSURE AT SHUT-OFF. OVERPRESSURE PROTECTION DEVICE SHALL BE FACTORY MOUNTED ON REGULATOR. WHEN USING VENTLESS REGULATORS, MOUNT REGULATOR IN A HORIZONTAL UPRIGHT POSITION. IF VENTED TYPE REGULATORS ARE USED, INSTALL VENT PIPING (FULL SIZE OPENING) FROM GAS PRESSURE REGULATORS TO OUTDOORS AND TERMINATE IN WEATHERPROOF HOOD.

MECHANICAL/ELECTRICAL COORDINATION (MEC) NOTES

MEC-01 ELECTRICAL CONTRACTOR SHALL CONNECT AND/OR PROVIDE FINAL CONNECTIONS TO ALL PLUMBING AND MECHANICAL EQUIPMENT.

MEC-02 ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH - IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.

MEC-03 THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL STARTER SWITCHES, DISCONNECT SWITCHES, RECEPTORS, ETC. TO MECHANICAL/PLUMBING EQUIPMENT. ALL STARTERS (OTHER THAN MANUAL STARTER SWITCHES) SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY ELECTRICAL CONTRACTOR.

MEC-04 ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO INSTALLATION. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF OR LACK OF COORDINATION WILL BE REMOVED AND INSTALLED CORRECTLY AT THE ELECTRICAL CONTRACTORS EXPENSE.

MEC-05 ELECTRICAL CONTRACTOR SHALL INSTALL ALL STARTERS PROVIDED BY OTHER TRADES.

FAN SCHEDULE

SYMBOL	LOCATION	TYPE	CFM	APPROX. S.P.	DRIVE	FAN RPM	ELECTRICAL DATA			MANUFACTURER
							WATTS	H.P.	VOLTAGE	GREENHECK
F-1	APP. BAY	SUPPLY	4,000	0.25"	BELT	983	-	1/3	120V-1Ø	SBS-1H24
F-2	APP. BAY	EXHAUST	4,000	0.25"	BELT	983	-	1/3	120V-1Ø	SBE-1H24
F-3	RESTROOM	EXHAUST	250	0.25"	DIRECT	1000	83	-	120V-1Ø	SP-A150

ACCESSORIES

A. DISCONNECT SWITCH
B. GRAVITY BACKDRAFT DAMPER
C. BIRDSCREEN
D. HANGING BRACKETS WITH VIBRATION ISOLATION
E. WL. WALL LOUVER DISCHARGE
F. WALL MOUNTING COLLAR

G. SIDEWALL PROPELLER FANS SHALL HAVE MOTOR FACTORY MOUNTED & ACCESSIBLE BETWEEN OCCUPIED SPACE AND FAN BLADES FOR BOTH SUPPLY AND EXHAUST ARRANGEMENTS.
H. MOTORSIDE FAN GUARD
I. EXHAUST GRILLE

NOTES:

- ALL FANS SHALL BE U.L. LISTED AND LABELED AND SHALL BE AMAC CERTIFIED FOR SOUND AND AIR FLOW. ALL FANS INSTALLED INSIDE, ABOVE, OR ADJACENT TO OCCUPIED SPACES SHALL HAVE A MAXIMUM 9.0 INLET SONE LEVEL.
- ALL FANS SHALL BE SUPPLIED BY ONE MANUFACTURER UNLESS NOTED OTHERWISE.
- MECHANICAL CONTRACTOR SHALL PROVIDE MAGNETIC STARTER WITH AUXILIARY CONTACTS AS REQUIRED.
- PROVIDE ALL DIRECT DRIVE FANS WITH SPEED CONTROLLERS.
- FANS F-1 AND F-2 SHALL HAVE INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IN ANY ROOM SERVED BY FAN), AND WALL MOUNTED MUSHROOM PUSH BUTTON SWITCH/STARTER WITH IDENTIFICATION LABEL (VERIFY STARTER REQUIREMENTS WITH E.C.) INTERLOCK ASSOCIATED SUPPLY AND EXHAUST FANS; OVERIDDEN BY CO SENSOR HIGH READING.
- FANS F-1 AND F-2 ACCESSORIES: A, B, C, D, F, G, H.
- FAN F-3 SHALL INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IN ANY ROOM SERVED BY FAN)
- FAN F-3 ACCESSORIES: A, B, D, E, I.

INFRARED RADIANT HEATER SCHEDULE

SYMBOL	GAS INPUT (MBH)	MOUNTING ANGLE	TUBE LENGTH	FLUE SIZE	ELECTRICAL DATA FLA. VOLTAGE	MANUFACTURER SPACE RAY MODEL
IFH-1	60.000	0°	30'	4Ø	2.6 120V-1Ø	LTS60-30

NOTES:

- INFRARED HEATERS SHALL BE AGA CERTIFIED.
- UNITS SHALL BE SUPPLIED WITH: GLO-BAR OR OTHER NON-PILOT IGNITION, 24V THERMOSTAT RELAY KIT, 24V THERMOSTAT, PROPANE CONVERSION KIT.
- PROVIDE THERMOSTAT AS INDICATED ON PLANS.
- PROVIDE 2 PSI - 0.5 PSI REGULATOR FOR THE HEATER.
- COORDINATE EXACT MOUNTING HEIGHT WITH GC & OWNER PRIOR TO INSTALLATION. EQUIPMENT SHALL BE SUPPORTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

INTERNATIONAL ENERGY CONSERVATION CODE

IECC 2006 SECTION 501.1
COMPLIANCE WITH ASHRAE 90.1
MECHANICAL SUMMARY

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT METHOD OF COMPLIANCE:

PREScriptive ☒ PERFORMANCE ☐ ENERY COST BUDGET ☐

CLIMATE ZONE: 3A- FLORENCE COUNTY, SC

EXTERIOR DESIGN CONDITIONS

WINTER DRY BULB 27° F.
SUMMER DRY BULB 96° F.

INTERIOR DESIGN CONDITIONS

WINTER DRY BULB 70° F.
SUMMER DRY BULB N/A - NO COOLING
RELATIVE HUMIDITY N/A - NO HUMIDITY CONTROL

BUILDING HEATING LOAD 85,380 BTUH

BUILDING COOLING LOAD N/A

MECHANICAL SPACING CONDITIONING SYSTEM

UNITARY

DESCRIPTION OF UNIT INFRARED AND ELECTRIC HEATERS
HEATING EFFICIENCY SEE EQUIPMENT SCHEDULE
COOLING EFFICIENCY N/A
HEAT OUTPUT OF UNIT SEE EQUIPMENT SCHEDULE
COOLING OUTPUT OF UNIT N/A

BOILER

TOTAL BOILER OUTPUT OF UNIT N/A

CHILLER

TOTAL CHILLER CAPACITY N/A

LIST EQUIPMENT EFFICIENCIES

EQUIPMENT SCHEDULES WITH MOTORS (MECHANICAL SYSTEMS)

MOTOR HORSEPOWER N/A
NUMBER OF PHASES N/A
MINIMUM EFFICIENCY N/A
MOTOR TYPE N/A
OF POLES N/A

SIGNED:

NAME: MARTIN FOX, P.E.
TITLE: MECHANICAL ENGINEER

VENTILATION CALCULATIONS (IMC 2012, SECT 403):

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
REPAIR GARAGES, ENCLOSED, PARKING GARAGES	0	0.000000	0	0.750000	2,250	0	0	0	1,688
						BUILDING TOTAL EXHAUST AIR REQUIRED (CFM)		1,688	
						BUILDING TOTAL EXHAUST AIR REQUIRED (CFM)		4,000	

EQUIVALENT MANUFACTURERS LISTING

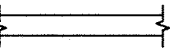
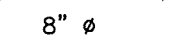
LISTING OF MANUFACTURER'S NAME DOES NOT GUARANTEE APPROVAL. ALL EQUIPMENT MUST MEET OR EXCEED QUALITY AND CAPACITIES OF SPECIFIED EQUIPMENT. FINAL APPROVAL WILL BE BASED ON EQUIPMENT SUBMITTALS. ANY MANUFACTURER NOT LISTED BUT WISHING TO BID THIS PROJECT SHALL SUBMIT A WRITTEN REQUEST A MINIMUM OF 7 DAYS PRIOR TO BID DATE OR AS INDICATED IN THE SPECIFICATIONS. PRIOR APPROVAL IS REQUIRED FOR ALL MANUFACTURERS NOT LISTED.

(ALPHABETICAL ORDER)

FANS: COOK, GREENHECK, PENN
LOUVER: AIR BALANCE, INC., GREEN HECK, RUSKIN, SAFE-AIR
ELECTRIC UNIT HEATERS: REZNOR, MARKEL, MODINE
RADIANT HEATERS: SPACE RAY, RE-VERBER-RAY, ROBERTS GORDON

NOTE:
ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID.
NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
①	THERMOSTAT/TEMP SENSOR (4'-0" AFF TO TOP)
②	SWITCH (4'-0" AFF TO TOP)
③	CARBON MONOXIDE SENSOR (4'-0" AFF TO TOP) (SENSOR BY EC)
☒	EXHAUST AIR GRILLE
	DOUBLE LINE DUCTWORK
	8" DIAMETER ROUND DUCT

DESIGNED BY: M.E. JCS
DRAWN BY: JCS
CHECKED BY: M.E. JCS
DATE: May 04, 2016
SCALE: NOT TO SCALE
PROJECT #:
COUNTY: FLORENCE
STATE: ALABAMA
DIV. #
CAD: AES55.dwg, 050516, sm-dwg

STATE OF ALABAMA
SOUTH CAROLINA
ENGINEERING
No. 20872
5/4/16
ALIGNED ENGINEERING
No. 5025
STATE OF ALABAMA

AE
ALIGNED ENGINEERING

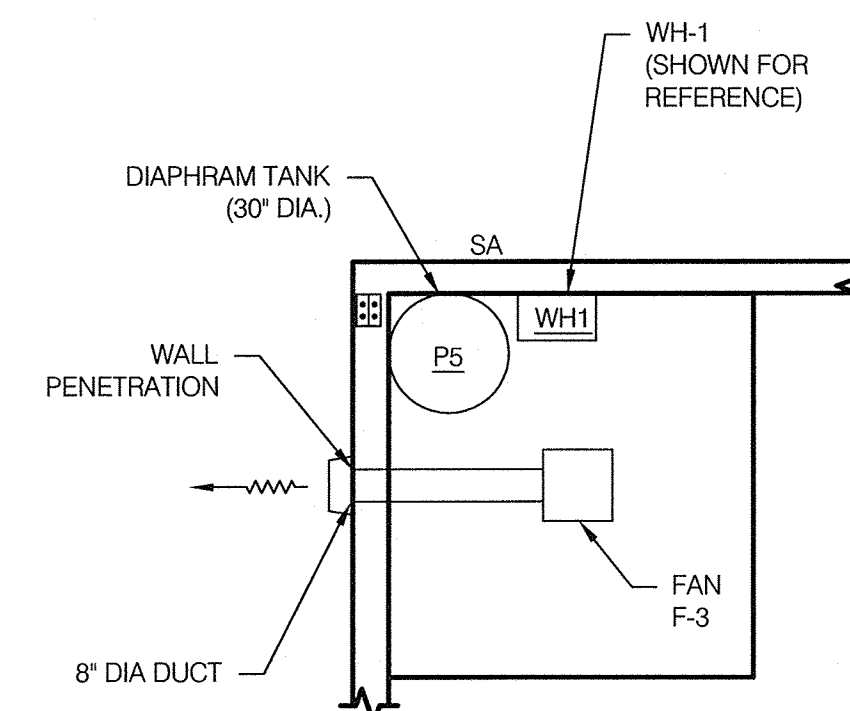
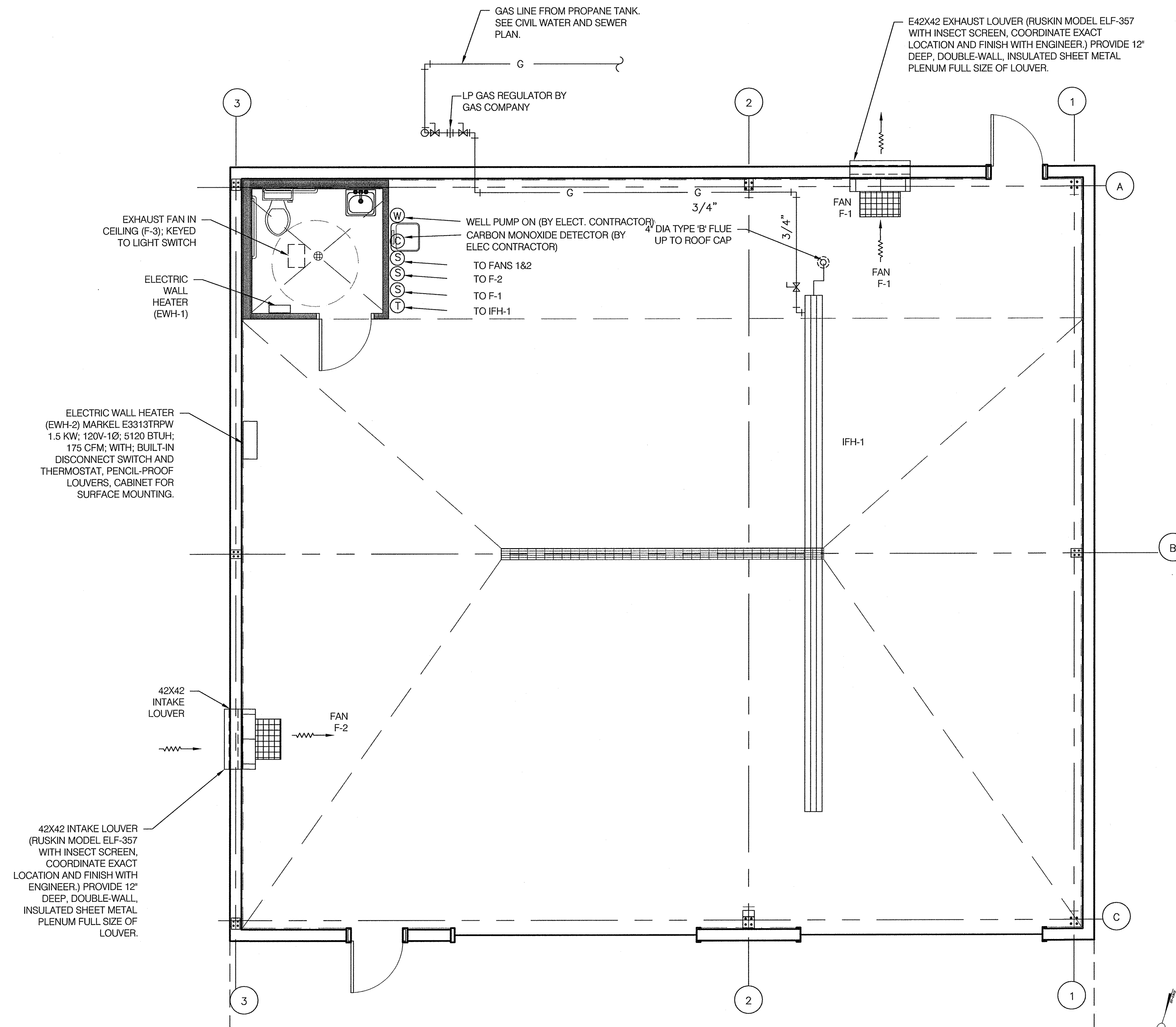
THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING, LLC. THE REPRODUCTION, USE, OR COPYING OF THIS DRAWING WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.

CLIENT: HANNAH-SALEM FRIENDFIELD
FIRE DEPARTMENT
PLAN SET:
DESC:

NEW STATION AT FRIENDFIELD
MECHANICAL NOTES

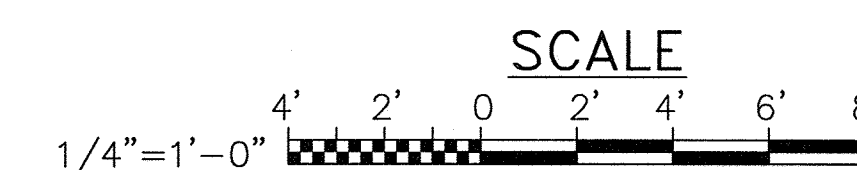
DESCRIPTION:
MECHANICAL NOTES

PLAN SET: DESIGN
DATE: May 04, 2016
PROJECT: AE055
SHEET: M1.0



**RESTROOM
CEILING/ROOF
PLAN**
SCALE: 1/4"=1'-0"

MECHANICAL LEGEND	
SYMBOL	DESCRIPTION
①	THERMOSTAT/TEMP SENSOR (4'-0" AFF TO TOP)
②	SWITCH (4'-0" AFF TO TOP)
③	CARBON MONOXIDE SENSOR (4'-0" AFF TO TOP) (SENSOR BY EC)
④	EXHAUST AIR GRILLE
⑤	DOUBLE LINE DUCTWORK
⑥	8" DIAMETER ROUND DUCT



DESIGNED BY: M.J.F.	CHECKED BY: J.C.S.	APPROVED BY: M.J.F.	DATE: May 04, 2016	PROJECT #	CITY: FRIENDFIELD	COUNTY: ALABAMA	STATE: ALABAMA	DATE	NO.	REVISION	BY
<p>THIS DRAWING & DESIGN THEREON ARE THE PROPERTY OF ALIGNED ENGINEERING. NO PART OF THIS DRAWING OR DESIGN THEREON MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THEIR WRITTEN CONSENT IS PROHIBITED.</p>											
<p>CLIENT: HANNAH-SALEM FRIENDFIELD FIRE DEPARTMENT</p> <p>PLAN SET: NEW STATION AT FRIENDFIELD</p> <p>DESC: MECHANICAL FLOOR PLANS</p>											
<p>DESCRIPTION: MECHANICAL FLOOR PLANS</p> <p>PLAN SET: DESIGN</p> <p>DATE: May 04, 2016</p> <p>PROJECT: AE055</p> <p>SHEET: M2.0</p>											