



# CITY OF HANAHAN

## Request for Bid

### HANAHAN RECREATION COMPLEX

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|                          |                                     |
|--------------------------|-------------------------------------|
| Solicitation Number:     | <u>COH#-030521</u>                  |
| Solicitation Date:       | <u>March 11, 2021</u>               |
| Bid Submission Deadline: | <u>April 8, 2021</u> <u>2:00 pm</u> |
| Bid Award Date:          | <u>April 16, 2021</u>               |

*City of Hanahan  
Procurement Office  
1255 Yeamans Hall Road  
Hanahan, South Carolina 29410  
(843) 576-5254*



**CITY OF HANAHAN  
PROCUREMENT DEPARTMENT  
Kitty Farias: Purchasing Agent  
1255 Yeamans Hall Road  
Hanahan, S.C. 29410**

**REQUEST FOR BID(S)**

**GENERAL CONTRACTOR  
Hanahan Recreation Complex**

**BID TITLE:** HANAHAN RECREATION COMPLEX

**BID NUMBER:** COH#-030521

**CLOSING DATE AND TIME:** Thursday, April 8, 2021 at 2:00 p.m.

**BID SECURITY, PERFORMANCE OR PAYMENT BONDS: All are Required**

**CONTRACT: Project Only**

You are invited to submit a BID in accordance with the requirements of this solicitation, which are contained herein. It is requested that your proposal be submitted to the City of Hanahan Procurement Office not later than April 8, 2021 @ 2:00 P.M. EST (local time), at which time, depending on the nature of this BID, respondents request(s) may or may not be publicly identified. In the event of possible negotiation(s) with Bidders offers, prices may not be divulged at the time of an open announcement.

\*Questions regarding this bid and substitution requests, must be submitted by Monday, March 29, 2021 at 5:00 P.M EST. All questions shall be submitted in the form of an email to [kfarias@cityofhanahan.com](mailto:kfarias@cityofhanahan.com).

**CONTACT:**

*Kitty Farias*

*(843) 576-5254*

*EMAIL: [kfarias@cityofhanahan.com](mailto:kfarias@cityofhanahan.com)*

**PRE-BID CONFERENCE: A MANDATORY Pre-Bid Conference will be held on Thursday, March 18, 2021 at 2:00 P.M. EST at Hanahan City Hall, 1255 Yeamans Hall Road, in the City Council Chambers.**

An official authorized to bind the Bidder must sign the bid proposal and it shall contain a statement to the effect that the proposal shall remain valid for a period of at least (ninety) 90 calendar days from the closing date for submission of Bid. The bid submittal must be submitted in a sealed envelope showing

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the above proposal title, proposal number and closing date/time and Bidder’s business name and address. This Request for Bid (BID) does not commit City of Hanahan to award a contract, to pay any cost incurred in the preparation of a bid proposal or to procure or contract for the articles of goods or services. The City of Hanahan reserves the right to accept or reject any or all Bids received as a result of this request, to negotiate with all qualified Bidders, or to cancel in part or in its entirety this proposal if it is in the best interest of the City to do so.

**Bidders/Bidders can download a copy of the BID documents and any amendments from the City of Hanahan Web Site (preferred) or request by email to [kfarias@cityofhanahan.com](mailto:kfarias@cityofhanahan.com):**

WEB ADDRESS: <https://cityofhanahan.com/government/administration/purchasing/>

- GO TO:
- DEPARTMENTS
  - ADMINISTRATION
  - PURCHASING
  - SOLICITATIONS

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**SECTION 1**  
**GENERAL INFORMATION**

Bids will be considered as specified herein or attached hereto under the terms and conditions of this Request for Bids.

A proposal must 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 blue ink by a person duly authorized to legally bind the person, partnership, company, or corporation submitting the proposal.

Bidders are to include all applicable requested information and are encouraged to include any additional information they wish to be considered. Additional information shall be a separate section of the proposal and shall be identified as such.

Two (2) clearly identified originals of your bid are required. The proposal must be complete, clear and concise.

Bids will be received by City of Hanahan until April 8, 2021 at 2:00 P.M. on the closing date shown. Bids must be submitted to, or at the time, date and exact location specified to be considered. No late Bids, emailed, uploaded on City's website, mailed, telegraphic, or telephone Bids will be accepted.

**DIGITAL SUBMITTALS:**

WEB ADDRESS: <https://cityofhanahan.com/government/administration/purchasing/>

GO TO:

- DEPARTMENTS
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- PURCHASING
- SOLICITATIONS

**HAND CARRY/DELIVERY SERVICE TO:**

City of Hanahan Procurement Office  
ATTN: Kitty Farias  
1255 Yeamans Hall Road  
Hanahan, South Carolina  
29410

**Bidder is required** to have printed on the envelope or wrapping containing his Bid; Bidder's business name and address, the proposal title, proposal number and the proposal closing date and time. City of ***Hanahan shall not be responsible for unidentified Bids***. Failure to do so can result in a non-responsive bid.

Bids may be withdrawn by Bidder prior to, but not after, the time set for the closing. A telegraphic or (Email) request is acceptable provided it is received before the closing date and time.

All entries shall be entered in ink or type written and shall remain valid for a period of not less than ninety

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(90) calendar days. Mistakes may be crossed-out and corrections inserted adjacent thereto, and shall be initialed, in ink, by the person signing the proposal.

Offers, amendments thereto or withdrawal requests must be received by the time advertised for BID closing date and time to be timely filed. It is the Bidder's sole responsibility to ensure that the documents are received by the person (or office) at the time indicated in the solicitation document.

By submission of an offer, you are guaranteeing that all goods, workmanship and services meet the requirements of the solicitation during the contract period.

City of Hanahan reserves the right:

- To accept or reject any or all Bids received as a result of this solicitation, or to cancel in part or in its entirety this solicitation if it is in the best interest of the City to do so;
- To waive any or all informalities;
- To solicit additional information from the Bidders, or any one Bidder should City of Hanahan deem such information necessary;
- To consider modifications received at any time before the award is made, if such action is in the best interest of the City; and
- To negotiate contract terms, conditions and cost.

This contract will be awarded to the Bidder whose bid/proposal is within the competitive range and determined to be in the best interest of City of Hanahan.

The words "Contractor", "Vendor", "Bidder", "Bidder", "Consultant", "Proposer", Offeror, Contractor, are used interchangeably throughout this BID to define the companies submitting offers, and replace terms such as person(s), firm(s), or corporation(s).

The Bidder is responsible for clarifying any ambiguity, conflict, discrepancy; omission or other error in the BID, or it shall be deemed waived.

Failure to submit all required information may be determined as a non-responsive proposal.

This solicitation does not commit City of Hanahan to award a contract, to pay any cost incurred in the preparation of a proposal or to procure or contract for the articles of goods or services.

**ADDENDA:** If it becomes necessary to revise any part of this BID, an addendum will be posted on the Web Page at the address provided on the Cover Sheet. All addenda become part of the Request for Bids and are contractually binding **whether or not received by the Bidder.**

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**SECTION 2**  
**TERMS AND CONDITIONS**

**PROJECT TIME OF COMPLETION:**

Time of completion for this project shall be beginning upon execution of the Contract and issuance of a Notice to Proceed. Contract duration is **440** calendar days.

**TIME FOR CONTRACTOR'S PERFORMANCE: DELAYS**

The Contractor shall commence the performance of this Contract on the date set forth in the Notice to Proceed, issued by the Contracts and Procurement Director, and shall diligently continue its performance to and until Final Completion of the Project. The Contractor shall accomplish Substantial Completion of the Project no more than **440** Calendar Days following the issuance of a Notice to Proceed (sometimes hereinafter referred to as the "Contract Time"). By signing this Contract, the Contractor agrees that the Contract Time is a reasonable time for accomplishing Substantial Completion of the Project. There will be no monetary early completion incentive. The Contractor shall submit its initial progress schedule in accord with the Contract Documents.

The Parties agree it is impossible to determine the actual and consequential damages resulting from Contractor's delay in completion of the Work, so a liquidated damages provision is appropriate. The Parties intend for a sum certain of **\$1,000.00 per day** for each and every calendar day the completion of the Work is delayed beyond the calendar date in this Contract to be the predetermined measure of compensation for actual damages for a delay in completion of the Work. The Contractor agrees that if the Work, or any part thereof, is not completed within the time agreed upon in this Contract or any extension thereof, the Contractor or its sureties shall be liable to the Owner in the amount of **\$1,000.00 per day** for each and every calendar day the completion of the Work is delayed beyond the calendar date in this Contract, as fixed and agreed liquidated damages and not as a penalty; and the Owner shall have the right to deduct from and retain out of monies which may be then due or which may become due and payable to the Contractor, the amount of such liquidated damages; and if the amount so retained by the Owner is not sufficient to pay in full such liquidated damages, the Contractor shall pay to the Owner or its sureties the amount necessary to effect payment in full of such liquidated damages.

Liquidated Damages will not be assessed for any adjustment of the Contract Time for completion of the Work granted in accordance with the provisions of this Contract.

Permitting the Contractor to continue and finish the Work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way be deemed a waiver on the part of the Owner of any of its rights under this Contract.

Additional provisions concerning the Contractor's liability in certain specific events or circumstances are set forth throughout the Scope of Work. By signing this Contract, the Contractor expressly agrees to the terms thereof.

If the Contractor fails to achieve Final Completion of all punch list items within thirty (30) Calendar Days of the date of Substantial Completion, the Owner reserves the right to contract with other parties to complete the Work, or to use other forces, utilizing funds retained or collected under this Contract.

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In addition to other remedies of the Owner, actual damages may be withheld or collected for failure to meet the date for Final Completion, as set forth above.

Partial use or occupancy of the Project shall not result in the Project being deemed substantially complete, and such partial use or occupancy shall not be evidence of Substantial Completion.

All limitations of time set forth herein are material and are of the essence of this Contract.

The Contractor agrees to punctually and diligently perform all parts of the Work at the time scheduled. In this connection, the Contractor agrees that it will keep itself continually informed of the progress of the job and will, upon its own initiative, confer with the Owner so as to plan its work in coordinated sequence with the work of the Owner and of others and so as to be able to expeditiously undertake and perform its work at the time most beneficial to the entire Project. The Contractor will be liable for any loss, costs, or damages sustained by the Owner for delays in performing the Work hereunder, other than for excusable delays, as set forth below, for which the Contractor may be granted a reasonable extension of time.

If the Contractor is delayed at any time in the progress of the Work by any separate contractor employed by the Owner, or by changes in the Work, or by labor disputes, fire, unusual delay in transportation, unusually severe weather conditions, unavoidable casualties, delays specifically authorized by the Owner, or by causes beyond the Contractor's control, avoidance, or mitigation, and without the fault or negligence of the Contractor and/or subcontractor or supplier at any tier, then the Contract Time shall be extended by Change Order for such reasonable time, if any, as the Owner may determine that such event has delayed the progress of the Work, or overall completion of the Work if the Contractor complies with the notice and documentation requirements set forth below.

If the Contractor is delayed, obstructed, hindered or interrupted for a period of time exceeding seven (7) Calendar Days by any act or neglect of the Owner, an adjustment shall be made for any increase in the direct cost of performance of this Contract (excluding profit, extended home office overhead, incidental or consequential damages or disruption damages) and the Contract modified in writing accordingly. The Contractor must assert its right under this Article by giving written notice to the Architect/Engineer within ten (10) Calendar Days of the beginning of a delay, obstruction, hindrance or interruption by the Owner. No adjustment shall be made for any delay, obstruction, hindrance or interruption after Final Payment under this Contract or to the extent that performance would have been so delayed, obstructed, hindered or interrupted by any other cause, including, but not limited to concurrent cause or fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this Contract. The direct costs described above shall be limited to those direct costs attributable solely to this Project, and shall be subject to documentation and verification of costs as required by the Owner. If unit prices are established in the Contract Documents or subsequently agreed upon, they shall form the basis for cost calculations under any claims for delay.

Any claim for extension of time shall be made in writing to the Owner, not more than Ten (10) Business Days from the beginning of the delay. The notice shall indicate the cause of delay upon the progress of Work. If the cause of the delay is continuing, the Contractor must give such written notice every Ten (10) Business Days. Within Ten (10) Business Days after the elimination of any such delay, the Contractor shall submit further documentation of the delay and a formal Change Order request for an extension of time for such delay.

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The written request for a time extension shall state the cause of the delay, the number of Calendar Days extension requested, and such analysis and other documentation as is reasonably requested by the Owner to demonstrate a delay in the progress of the Work or the overall Project completion. If the Contractor does not comply with the above notice and documentation requirements, the claim for the delay shall be waived by the Contractor. The above notice and documentation requirements shall also be a condition precedent to the Contractor's entitlement to any extension of time.

Extensions of time will be the Contractor's primary remedy for any and all delays, obstructions, hindrances, or interference. Payment or compensation, for direct costs only (as set forth above), may be made to the Contractor for hindrances or delays solely caused by the Owner if such delays or hindrances are within the Owner's ability to control and are not partially caused by the Contractor or any of its agents, subcontractors or others for whom it is responsible. No payment or compensation will be made for interference, obstructions, hindrances or delays which are not solely caused by the Owner or which arise from the Owner's actions.

Without limitation, the Owner's exercise of its rights, regardless of the extent or number of such changes, or the Owner's exercise of any of its remedies or any requirement to correct or re-execute defective work, shall not under any circumstances be construed as delays, hindrances or interference compensable further than as described herein.

Weather delays are generally referred to as "rain days." Time for hot, cold, and/or windy conditions have been allowed for in the allocated date of completion. An average number of rain days has also been included in the completion date determination. This was determined by the following method: all Calendar Days in each month in which rainfall in any part of the day exceeded 0.10 inch has been calculated and averaged. These averages are as follows:

|     |         |         |         |         |         |     |         |         |         |         |         |
|-----|---------|---------|---------|---------|---------|-----|---------|---------|---------|---------|---------|
| Jan | Fe<br>b | Ma<br>r | Ap<br>r | Ma<br>y | Ju<br>n | Jul | Au<br>g | Se<br>p | Oc<br>t | No<br>v | De<br>c |
| 9   | 10      | 8       | 8       | 9       | 9       | 14  | 16      | 11      | 16      | 7       | 12      |

Rain delays, therefore, will only be considered when the number of Calendar Days in any month in which rainfall, as recorded by the Charleston National Weather Service at the Charleston International Airport location, as 0.10 inch or greater, exceeds the number of Calendar Days shown. In considering a claim for rain days, the actual conditions at the Work Site shall control. Notwithstanding the requirements pertaining to the filing of claims herein, the Contractor shall make a claim for a time extension due to rain delays no later than the tenth (10th) calendar day of the month following the release of the National Oceanic and Atmospheric Administration (NOAA) monthly report.

**CONTRACTOR LICENSE REQUIREMENT:**

The Contractor shall procure all permits and licenses and pay all charges and fees necessary and incidental to the lawful conduct of his business. He shall keep himself fully informed of existing and future Federal, State, and Local Laws, ordinances and regulations which in any manner affect the fulfillment of his contract and shall comply with the same.



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**INSURANCE:**

The successful bidder shall procure, maintain, and provide proof of, insurance coverage for injuries to persons and/or property damage as may arise from or in conjunction with, the work performed on behalf of the City by the bidder, his agents, representatives, employees or subcontractors. Proof of coverage as contained herein shall be submitted ten (10) days prior to the commencement of work and such coverage shall be maintained by the bidder for the duration of the contract period; for occurrence policies.

General Liability

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

Minimum Limits

General Liability:

|             |                                 |
|-------------|---------------------------------|
| \$1,000,000 | General Aggregate Limit         |
| \$1,000,000 | Products & Completed Operations |
| \$1,000,000 | Personal and Advertising Injury |
| \$1,000,000 | Each Occurrence Limit           |
| \$50,000    | Fire Damage Limit               |
| \$5,000     | Medical Expense Limit           |

Automobile Liability

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

Minimum Limits

Automobile Liability:

|             |                       |
|-------------|-----------------------|
| \$1,000,000 | Combined Single Limit |
| \$1,000,000 | Each Occurrence Limit |
| \$5,000     | Medical Expense Limit |

Workers' Compensation

Limits as required by the Workers' Compensation Act of SC. Employers Liability - \$1,000,000.

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Professional Liability

Minimum limits are \$1,000,000 per occurrence.

Coverage Provisions

1. All deductibles or self-insured retention shall appear on the certificate(s) and shall appear on the certificate(s) and be subject to approval by the City. At the option of the City, either; the insurer shall reduce or eliminate such deductible or self-insured retention; or the bidder shall be required to procure a bond guaranteeing payment of losses and related claims expenses.
2. Failure to comply with any reporting provisions of the policy(s) shall not affect coverage provided by the City, its officers/officials/assigns/employees or volunteers.
3. The insurer shall agree to waive all rights of subrogation against the City, its' officers/officials/assigns/agents, employees or volunteers for any act, omission or condition of premises which the parties may be held liable by reason of negligence.
4. The bidder shall furnish the City certificates of insurance including endorsement affecting coverage. The certificates are to be signed by a person authorized by the insurance company(s) to bind coverage on its' behalf, if executed by a broker, notarized copy of authorization to bind, or certify coverage must be attached.
5. The City of Hanahan, its' officers/officials, employees, agents and volunteers shall be added as "additional insured" as their interests may appear. This provision does not apply to Professional Liability or Workers' Compensation/Employers Liability.
6. The Offeror's insurance shall be primary over any applicable insurance or self-insurance maintained by the City.
7. Shall provide thirty (30) days written notice to the City before any cancellation, suspension, or void of coverage in whole or part, where such provision is reasonable.
8. All coverage for subcontractors of the bidder shall be subject to all of the requirements stated herein.
9. All insurance shall be placed with insurers maintaining A.M. Best rating of no less than an A.

**QUALITY ESTIMATES:**

City of Hanahan does not guarantee to purchase any amount under the contract to be awarded. Estimated quantities are for the purposes of submitting proposals only and are not to be construed as a guarantee to purchase any amount.

**SPECIFICATIONS:**

Any deviation from specifications **must** be clearly indicated by offeror, otherwise, it will be considered that the bid proposal is in strict noncompliance. Product substitutions will be considered on other makes, models or brands having comparable quality, style, workmanship and performance characteristics. All product substitution requests shall be submitted in writing prior to the March 29, 2021, 5:00 p.m. EST deadline for consideration. Alternate bid proposals offering lower quality or inferior performance will not be considered.

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**ACCEPTANCE OR REJECTION OF PROPOSALS:**

The City of Hanahan reserves the right to accept or reject any or all proposals or parts of proposals, and to waive informalities therein.

**TAXES:**

Proposal prices shall be exclusive of state sales and federal excise taxes. **Where the state or city government entities are not exempt from sales taxes on sales within their state**, the Contractor shall add the sales taxes on the billing invoice as a separate entry. **The City of Hanahan is not tax exempt.**

**MODIFICATION OR WITHDRAWAL OF PROPOSALS:**

Proposals may be modified or withdrawn prior to the time set for the opening of proposals. After the time set for the opening of proposals no proposal may be modified or withdrawn, unless done in response to a request for a “Best and Final Offer” from the City of Hanahan.

**PATENTS, COPYRIGHTS, ETC.:**

The Contractor shall release, indemnify and hold the City, its officers, agents and employees harmless from liability of any kind or nature, including the Contractor’s use of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in the performance of this contract.

**SECURITY REQUIRED:**

A. Bid Security

Each bid must be accompanied by a bid bond acceptable to the City. Bid bonds must be issued by a corporate surety registered and authorized to do business in the State of South Carolina. Bid bonds shall be payable to the City, shall be for at least five (5%) percent of the total amount of the bid, and shall serve as a guarantee deposit that the bid will be carried out to the complete satisfaction of the City. In lieu of a bond, Bidder may submit a certified check or cashier’s check in aforesaid amount payable in U.S. funds. Faxed bid bonds will not be acceptable.

B. Forfeiture of Bid Security

Nonperformance by the successful Bidder, or its failure to execute the Contract and meet performance and payment bond requirements and insurance requirements within Five (5) Business Days after issuance of Notice of Award, shall result in its bid security being forfeited as liquidated damages, and the Notice of Award and Contract will be rescinded and awarded to another Bidder. Withdrawal of a bid after the opening date and time but prior to final award after the opening date, may also result in forfeiture of bid security.

C. Return of Bid Security

Bid security will be returned to all bidders after the successful Bidder has executed the Contract and delivered all required bonds and insurance certificates and endorsements. Bidders will not be entitled to any interest earnings on returned funds, and in the case of bid security by check,

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such will be returned to bidder.

D. Payment and Performance Security

- (1) The successful Bidder shall provide performance and payment bonds, in a form satisfactory to the City, in the following amounts:

Payment Bond: 100% of the total amount of the Contract.

Performance Bond: 100% of the total amount of the Contract.

- (2) The aforesaid payment and performance bonds must be issued by a corporate surety, registered and authorized to do business in South Carolina, and must be counter-signed by a licensed, authorized South Carolina agent.
- (3) Attorneys-in-fact who sign bid bonds or performance bonds must file with each bond a certified and effective, dated copy of their power of attorney.

**AWARD:**

The City of Hanahan may award multiple contracts as the result of this solicitation. Awards shall be made to the responsible offeror(s) whose bid proposal is determined to be the most advantageous to the City of Hanahan, taking into consideration price and the other evaluation factors that may be set forth in this solicitation.

**NON-COLLUSION:**

By signing the proposal/bid the offeror certifies that the proposal submitted, has been arrived at independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other vendor of materials, supplies, equipment or services described in the Request for Bid, designed to limit independent bidding or competition. (See **Attached Statement of Non-Collusion**).

**CONTRACTOR PERSONNEL:** The Contractor shall enforce strict discipline and good order among the contractor's employees and other persons carrying out the contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

**ETHICS CERTIFICATE**

By submitting an offer, the offeror certifies that the offeror has and will comply with, and has not, and will not, induce a person to violate **Title 8, Chapter 13** of the South Carolina Code of Laws, as amended (ethics act). The following statutes require special attention: **Section 8-13-700**, regarding use of official position for financial gain; **Section 8-13-705**, regarding gifts to influence action of public official; **Section 8-13-720**, regarding offering money for advice or assistance of public official; Sections **8-13-755** and **8-13-760**, regarding restrictions on employment by former public official; **Section 8-13-775**, prohibiting public official with economic interests from acting on contracts; **Section 8-13-790**, regarding recovery of kickbacks; **Section 8-13-1150**, regarding statements to be filed by consultants; and **Section 8-13-1342**, regarding restrictions on contributions by Contractor to candidate who participated in awarding of contract.

The City may rescind any contract and recover all amounts expended as a result of any action taken

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in violation of this provision. If Contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders regarding a public contract, Contractor shall, if required by law to file such a statement, provide the statement required by **Section 8- 13-1150** to the procurement officer at the same time the law requires the statement to be filed. [02- 2A075-2]

**CANCELLATION:**

The City may cancel its participation upon thirty days (30) written notice, unless otherwise limited or stated in the terms and conditions of this solicitation. Cancellation may be in whole or in part. Any cancellation under this provision shall not affect the rights and obligations attending orders outstanding at the time of cancellation, including any right of and Purchasing Entity to indemnification by the contractor, rights of payment for goods/services delivered and accepted, and rights attending any warranty or default in performance in association with any order. Cancellation of the contract due to Contractor default may be immediate.

**DEFAULT AND REMEDIES:**

Any of the following events shall constitute cause for the City of Hanahan to declare Contractor in default of the contract: **1. Nonperformance of contractual requirements; 2. A material breach of any term or condition of this contract** the City of Hanahan shall issue a written notice of default providing a period in which Contractor shall have an opportunity to cure. Time allowed for cure shall not diminish or eliminate contractor's liability for liquidated or other damages. If the default remains, after Contractor has been provided the opportunity to cure, the City of Hanahan may do one or more of the following: **1. Exercise any remedy provided by law; 2. Terminate this contract and any related contracts or portions thereof; 3. Impose liquidated damages; 4. Suspend Contractor from receiving future proposal solicitations.**

**LAWS AND REGULATIONS:**

Any and all supplies, services and equipment offered and furnished shall comply fully with all applicable Federal, State and City laws and regulations.

**CONFLICT OF TERMS:**

In the event of any conflict between these standard terms and conditions and any special terms and conditions which follow; the special terms and conditions shall govern.

**HOLD HARMLESS:**

The Contractor shall release, protect, indemnify and hold the City of Hanahan and their respective, officers, agencies, employees, harmless from and against any damage, cost or liability, including reasonable attorney's fees for any or all injuries to persons, property or claims for money damages arising from acts or omissions of the contractor, his employees or subcontractors or volunteers.

**RISK OF LOSS:**

Contractor agrees to bear all risks of loss, injury or destruction of goods and materials ordered herein which occur prior to delivery and acceptance; and such loss, injury or destruction shall not release Contractor from any obligation hereunder.

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**JURISDICTION**

Contractor acknowledges that it is subject to the jurisdiction and process of the City of Hanahan as to all matters and disputes arising pursuant to the Agreement and the performance thereof, including any questions as to liability for taxes, licenses, or fees levied by the State or its political subdivisions. Contractor agrees to execute any and all agreements necessary to accomplish this provision.

**AMENDMENTS:**

The terms of this contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever without prior written approval of the designated City of Hanahan contract administrator.

**ASSIGNMENT/SUBCONTRACT:**

Contractor shall not assign, sell, transfer, subcontract or sublet rights, or delegate responsibilities under this contract, in whole or in part, **without the prior written approval** of the City of Hanahan designated contract administrator.

**NOTE:** If Contractor intends to hire subcontractors, they must be listed by the Contractor in the bid documents.

**NONDISCRIMINATION:**

The offeror agrees to abide by the provisions of Title VI and Title VII of the Civil Rights Act of 1964 (42 USC 2000e), which prohibit discrimination against any employee or applicant for employment, or any applicant or recipient of services, on the basis of race, religion, color, or national origin; and further agrees to abide by Executive Order No. 11246, as amended, which prohibits discrimination on basis of sex; 45 CFR 90 which prohibits discrimination on the basis of age, and **Section 504 of the Rehabilitation Act of 1973**, or the **Americans with Disabilities Act of 1990** which prohibits discrimination on the basis of disabilities. The offeror further agrees to furnish information and reports to requesting State(s), upon request, for the purpose of determining compliance with these statutes. Offeror agrees to comply with each individual state's certification requirements, if any, as stated in the special terms and conditions. This contract may be canceled if the offeror fails to comply with the provisions of these laws and regulations. The offeror must include this provision in every subcontract relating to purchases by the States to ensure that subcontractors and vendors are bound by this provision.

**ILLEGAL IMMIGRATION REFORM ACT COMPLIANCE:** By submitting an offer, Bidder certifies that it will comply with the applicable requirements of **Title 8, Chapter 14** of the South Carolina code of Laws (originally enacted as **Section 3** of The South Carolina Illegal Immigration act, 2008 S.C. Act No. 280) and agrees to provide upon request any documentation required to establish either: (a) the applicability of **Title 8, Chapter 14** to Bidder and any subcontractor or sub-subcontractors; or (b) the compliance with **Title 8, Chapter 14** by Bidder and any subcontractors or sub-subcontractors. Pursuant to **Section 8-14-60**, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both". Bidder agrees to include in any contracts with its subcontractors' language requiring the subcontractors to (a) comply with the applicable requirements of **Title 8, Chapter 14**, and (b) include in any contracts with the sub-subcontractor's language requiring the sub-subcontract to comply with the applicable requirements of **Title 8, Chapter 14**. In the event any contractor, subcontractor and/or sub-

**CITY OF HANAHAN REQUEST FOR BID**  
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subcontractor is found not to be in compliance with the **SC Immigration Reform Act [hereinafter "The Act"]**, the Contractor agrees to fully indemnify the City for any loss suffered by the City as a result of such contractor, subcontractor or sub-subcontractor's failure to comply with the Act.

**FEDERAL, STATE AND LOCAL LAWS:** The Contractor assumes full responsibility and liability for compliance with any and all local, state and federal laws and regulations applicable to Contractor and his employees including, but not limited to, compliance with the EEO guidelines, the **Occupational Safety and Health Act of 1970**, and minimum wage guidelines.

**SEVERABILITY:**

If any provision of this contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected; and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular provision held to be invalid.

**PAYMENT:**

Payment for completion of a contract is normally made within thirty (30) days following the date the entire order is delivered or the date a correct invoice is received, whichever is later. After forty-five (45) days the Contractor may assess overdue account charges up to a maximum rate of one percent per month on the outstanding balance. Payments will be remitted by mail. Payments may be made via a State or political subdivision "Purchasing Card."

**FORCE MAJEURE:**

Neither party to this contract shall be held responsible for delay or default caused by fire, riot, pandemic(s), acts of God and/or war which is beyond that party's reasonable control. CITY OF HANAHAN may terminate this contract after determining such delay or default will reasonably prevent successful performance of the contract.

**HAZARDOUS CHEMICAL INFORMATION:**

The Contractor will provide one set of the appropriate material safety data sheet(s) and container label(s) upon delivery of a hazardous material to the user agency. All safety data sheets and labels will be in accordance with each participating state's requirements, if applicable.

**FIRM PRICE:**

Unless otherwise stated in the special terms and conditions, for the purpose of award, offers made in accordance with this solicitation must be good and firm for a period of ninety (90) days from the date of proposal opening. Prices must remain firm for the full term of the contract.

**EXTENSION OF PRICES:**

In the case of error in the extension of prices in the proposal, the unit prices will govern.

**BID PROPOSAL PREPARATION COSTS:** The City of Hanahan is not liable for any costs incurred by the offeror in bid proposal preparation.

**CONFLICT OF INTEREST:**

The Contractor certifies that it has not offered or given any gift or compensation prohibited by the state laws of any the City of Hanahan participants to any officer or employee of the City of Hanahan to secure favorable treatment with respect to being awarded this contract.

**CITY OF HANAHAN REQUEST FOR BID**  
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**CONTRACTOR LIABILITY:** The Contractor assumes full responsibility for all injuries to, or death of any person and for all damage to property, including property and employees of the City and for all claims, losses or expense which may in any way arise out of the performance of the work, whether caused by negligence or otherwise; and the Contractor shall indemnify and save the City harmless from all claims, losses, expense, or suits for any such injuries, death or damages to property, and from all liens, losses, expenses, claims or causes of action of any sort which may arise out of the performance of the work, and shall defend, on behalf of the City and suit brought against the City for attorney's fees and for all other expenses incurred by the City in connection with or as a result of any such suit, claims, or loss. Under no circumstances and with no exception will City of Hanahan act as arbitrator between the Contractor and any subcontractor. The Contractor will be solely responsible for compliance with building code requirements, all dimensions, and all conditions relating to his work under this contract. Workmanship shall be first quality in every respect. All measures necessary to ensure a first-class job shall be taken.

**INDEPENDENT CONTRACTOR:**

The Contractor shall be an independent contractor, and as such shall have no authorization, express or implied to bind the City of Hanahan to any agreements, settlements, liability or understanding whatsoever, and agrees not to perform any acts as agent for City of Hanahan, except as expressly set forth herein.

**DEBARMENT:**

The Contractor certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction (contract) by any governmental department or agency. If the Contractor cannot certify this statement, attach a written explanation for review by City of Hanahan.

**GOVERNING LAW:**

This procurement and the resulting agreement shall be governed by and construed in accordance with the laws of the city and state sponsoring and administering the procurement. The construction and effect of any Participating Addendum or order against the contract(s) shall be governed by and construed in accordance with the laws of the Participating Entity's City and State. Venue for any claim, dispute or action concerning an order placed against the contract(s) or the effect of a Participating Addendum shall be in the Purchasing Entity's City and State.

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**CITY OF HANAHAN REQUEST FOR BID**  
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**ENTIRE AGREEMENT:**

This Agreement, and any attached exhibits hereto, and the solicitation documents, if any, constitute the entire Agreement between the parties and shall not be amended, altered or changed except after prior written approval from the City of Hanahan Procurement Office, in compliance with the S.C. Consolidated Procurement Code, and by written agreement, signed by the parties.

Accepted and executed the date stated above.

CONTRACTOR/VENDOR/OFFEROR:

BY: \_\_\_\_\_

ITS: \_\_\_\_\_

CITY:

BY: \_\_\_\_\_

ITS: \_\_\_\_\_

**CITY OF HANAHAN REQUEST FOR BID**  
**HANAHAN RECREATION COMPLEX**

**SECTION 3**  
**REQUIREMENTS –SOW**

**SCOPE OF WORK:**

The City of Hanahan plans to develop a 53.31-acre tract of land (46.89-acre upland) on Henry Brown Jr. Blvd. (formerly N. Rhett Blvd.) adjacent to the Bowens Corner Elementary School into a new city park and recreation complex. Site improvements will include; stormwater ponds, associated drainage infrastructure, site access roads, timber span bridge, parking lots, multipurpose athletic fields, a synthetic turf football/soccer field, hard surface tennis courts, a sand volleyball court, an outdoor basketball court, sports field lighting, a dog park, trail system, recreation building, restroom building, picnic pavilion, maintenance area with septic system, water and sewer utility extensions, irrigation system including pond recharge well, landscaping, and other site elements commonly associated with a park.

Access to the park/complex, including construction access, will be via the Bowens Corner Elementary School property; therefore, there are certain time restrictions for construction access through the school district's property. Refer to *Construction Traffic/Route Exhibit* included in the Bid Documents.

**ALLOWANCES (include in Base Bid)**

The following Allowances are included as described below and set forth on the Bid Form. Refer to Section 012100 – Allowances for additional information.

Allowance No. 1: Lump Sum Allowance: Include the sum of **\$50,000.00** for synthetic turf mid field logo (Owner selected) and football/soccer lines.

Allowance No. 2: Lump Sum Allowance: Include the sum of **\$15,000.00** for site selective clearing.

Allowance No. 3: Lump Sum Allowance: Include the sum of **\$30,000.00** for soil amendments.

**ALTERNATES**

The following Alternates are included as described below and set forth on the Bid Form. Refer to Section 012300 – Alternates for additional information.

Alternate No. 1: Electrical Sports Lighting - Musco.

**Owner-Furnished/Owner-Installed (OFOI) Products**

The successful Bidder shall be responsible for coordinating construction schedule and related tasks with the County's selected installer for these items.

- Maintenance Building
- Dog Pound Roof Structure
- Pole Barn and slab
- Outdoor Bleachers
- Playground equipment

**CITY OF HANAHAN REQUEST FOR BID**  
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For a site visit to view current site conditions, access, etc. before submitting a quote, please contact Randy Moneymaker – Information below.

***Contact Information:***

Randy Moneymaker  
3100 Mabeline Road  
Hanahan, South Carolina, 29410  
(843) 266-0723  
email: [rmoneymaker@cityofhanahan.com](mailto:rmoneymaker@cityofhanahan.com)

- **Please include any detailed explanation of services offered, as they relate to the City Requirements provided herein, and your recommended approach to addressing the City needs.**

**CITY OF HANAHAN REQUEST FOR BID**  
**HANAHAN RECREATION COMPLEX**

**License and Permits**

The Contractor must be bonded and obtain all applicable licenses, and promptly pay all taxes required by the State of South Carolina, and/or City of Hanahan. Contractor is required to be licensed as a General Contractor by the State of South Carolina and shall supply a copy of all licensing.

**Transmittal Letter**

The transmittal letter and attachments must include:

- Name of the firm responding, including mailing address, telephone number, fax number and email address.
- A statement that the offer submitted as a result of this solicitation is binding on the Bidder for ninety (90) calendar days following the BID due date.
- Signed by authorized person.
- Contractor's Licenses and Certificates held by you and/or your company and subcontractors
- Executed/Signed Terms and Conditions
- Proposal Transmittal Agreement
- Price Proposal - **Cost Sheet must be in a separate envelope**
- Bid Security
- Construction Schedule
- Subcontractor's List
- Statement of Non-Collusion
- Compliance with Illegal Immigration Act
- Equal Employment Opportunity Certification

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**CITY OF HANAHAN REQUEST FOR BID**  
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**SECTION 4**  
**PROPOSAL TRANSMITTAL AND AGREEMENT**

The undersigned, having fully familiarized himself with the information contained within this Request for Bids, (including the Instructions to Bidders, General Conditions, Special Conditions (if applicable), Requirements, Bid Sheets, Affidavits of Bidder, and subsequently received written Amendment as listed below), submit the attached proposal. I verify (to the best of my knowledge and belief) this proposal to be true and correct. All requirements of the Request for Bids are hereby incorporated into the bid/proposal submitted and shall be incorporated by reference into the purchase contract or Agreement.

Respectfully submitted by: \_\_\_\_\_  
(FIRM NAME)

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

Representative Name: \_\_\_\_\_

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

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

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

Telephone No: \_\_\_\_\_

Fax Number: \_\_\_\_\_

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

**CITY OF HANAHAN REQUEST FOR BID**  
**HANAHAN RECREATION COMPLEX**

**ATTACHMENT #1**  
**PRICE PROPOSAL**

**“HANAHAN RECREATION COMPLEX”**

Please provide sufficient detail to show all cost. *(Detail cost must be submitted in a separate sheet and envelope and attached with this Section Sheet).*

***Note:*** *The SOW is not a comprehensive list of all Work Materials or Labor that will be required. Contractor must visit site to ascertain materials and scope of work that may be in addition to what is listed in this bid document. See Exhibits A and B attached and incorporated into this solicitation.*

The undersigned acknowledges receipt of addenda numbered:

Addendum No. \_\_\_\_\_ Date: \_\_\_\_\_

Addendum No. \_\_\_\_\_ Date: \_\_\_\_\_

Addendum No. \_\_\_\_\_ Date: \_\_\_\_\_

The undersigned has examined the complete IFB and requirements contained in the solicitation for Construction of the HANAHAN RECREATION COMPLEX and is submitting this Bid in full compliance with those requirements.

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Representative/Title

\_\_\_\_\_  
Signature of Authorized Representative

**BASE BID**

Construction of HANAHAN RECREATION COMPLEX

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

**CITY OF HANAHAN REQUEST FOR BID**  
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**ALLOWANCES (include in Base Bid)**

Allowance No. 1: Lump Sum Allowance: Include the sum of **\$50,000.00** for synthetic turf mid field logo (Owner selected) and football/soccer lines.

Allowance No. 2: Lump Sum Allowance: Include the sum of **\$15,000.00** for site selective clearing.

Allowance No. 2: Lump Sum Allowance: Include the sum of **\$30,000.00** for soil amendments.

**ALTERNATES**

Alternate No. 1: Electrical Sports Lighting - Musco.

a. \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

**BID PROPOSAL SUMMARY WORKSHEET**

Attached to be included with Bid Form

**DOCUMENT EXCHANGE**

The successful Bidder shall include in their Base Bid the cost for a Submittal Exchange online software program for all submittals, RFIs, ASIs, construction schedules, and other documentation throughout the duration of construction.

**BID SECURITY:**

Amount Enclosed (5% of Bid) \$\_\_\_\_\_ (Bid Bond or Cashier's Check)

**BUSINESS LICENSE:**

Does your business have a valid City of Hanahan Business License?  No  Yes #\_\_\_\_\_

*Note: Work performed inside the corporate limits of a municipality will necessitate a business license for that municipality.*

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**CITY OF HANAHAN REQUEST FOR BID**  
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*Please submit one (1) original, one (1) copy, and one (1) CD or Flash Drive of the solicitation's "Procurement Forms".*

Respectfully submitted this \_\_\_\_\_ day of \_\_\_\_\_, 2020

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

By: \_\_\_\_\_  
Signature Print Name

Title: \_\_\_\_\_ (e.g. Owner, Partner, Corporate Officer, etc.)

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

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

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

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

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_ FEIN: \_\_\_\_\_

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

Vendor[Bidder] is a/an:  Sole Proprietorship  Partnership  LLC  Corporation – list the state of incorporation \_\_\_\_\_

SC Contractor's License No. \_\_\_\_\_

Contractor's Federal Tax I.D. No. \_\_\_\_\_



**CITY OF HANAHAN REQUEST FOR BID**  
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**ATTACHMENT #2**  
**NONCOLLUSION AFFIDAVIT OF BIDDER**

- (1) He is \_\_\_\_\_ (owner, partner, officer, representative or agent) of \_\_\_\_\_, the Bidder that has submitted the attached Proposal:
- (2) He is fully informed regarding the preparation and contents of the attached Proposal and of all pertinent circumstances regarding such Bids:
- (3) Such Proposal is genuine and is not a collusive or sham Proposal;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affidavit, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Proposal in connection with the Contract for which the attached Proposal has been submitted or to refrain from quoting in connection with such Contract, or has in any manner directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Proposal or of any other Bidder, or to fix any overhead, profit or cost element of the Proposal price or the Proposal price of any other Bidder or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Berkeley, South Carolina, or any person interested in the proposed contract; and
- (5) The price or prices quoted in the attached Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affidavit.

SIGNED: \_\_\_\_\_

TITLE: \_\_\_\_\_

**CITY OF HANAHAN REQUEST FOR BID**  
**HANAHAN RECREATION COMPLEX**

**EXHIBIT A - SPECIFICATIONS**

**CITY OF HANAHAN REQUEST FOR BID**  
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**FOR**  
**HANAHAN RECREATION COMPLEX**  
**CITY OF HANAHAN, SOUTH CAROLINA**

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**City of Hanahan Parks and Recreation Department**  
3100 Mabeline Road  
Hanahan, South Carolina, 29410  
(843) 266-0723

SWA Project #7867

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SECTION 011000 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Work covered by the Contract Documents.
  - 2. Work schedule.
  - 3. Work under other contracts.
  - 4. Owner-furnished products.
  - 5. Use of premises.
  - 6. Work restrictions.
  - 7. Specification formats and conventions.
  - 8. Regulatory Requirements

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Hanahan Recreation Complex
  - 1. Project Location: City of Hanahan, South Carolina
- B. Owner: City of Hanahan Parks and Recreation  
3100 Mabeline Road  
Hanahan, South Carolina 29410
  - 1. Owner's Representative: Randy Moneymaker (843.266.0723)
- C. Architect: Seamon, Whiteside & Associates, Inc.  
501 Wando Park Boulevard, Suite 200  
Mount Pleasant, South Carolina 29464
  - 1. Architect's Representative: Ms. Jennifer Palmer, P.E. (843.884.1667)
- D. Generally and without force or effect on the Contract requirements, the Work consists of the following:
  - 1. Construction includes stormwater ponds, associated drainage infrastructure, site access roads, timber span bridge, parking lots, multipurpose athletic fields, a synthetic turf football/soccer field, tennis courts, a sand volleyball court, a basketball court, a dog park, trail system, recreation building, restroom building, picnic pavilion, maintenance area, water and sewer utility extensions, and other site elements commonly associated with a park.

- E. Testing Agency: Contractual responsibilities for testing are identified in Division 1 Section "Quality Requirements". Specific testing requirements are identified in individual Sections as applicable.
- F. Construction Surveying: Contractor shall provide construction surveying and stakeout using personnel meeting the Land Surveyor Qualifications set forth in the Division 1 Section "Execution".
- G. Traffic Control Plan: Where required by authorities having jurisdiction, Contractor shall prepare, submit for approval and implement a traffic control plan as necessary for work in the vicinity of the existing roadways. This includes any work to be performed within the Henry Brown Blvd. Right-of-Way and the Bowen's Elementary School property so as not to affect normal daily school operations and traffic patterns.

#### 1.4 WORK SCHEDULE

- A. Before commencing Work, submit a schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

#### 1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

#### 1.1 OWNER-FURNISHED/OWNER-INSTALLED PRODUCTS

- A. This section includes items that will be Owner-Furnished/Owner-Installed (OFOI)
  - 1. Maintenance Building.
  - 2. Dog Pound Roof Structure
  - 3. Pole Barn and slab in maintenance area.
  - 4. Playground Equipment.
  - 5. Outdoor Bleachers

#### 1.2 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- C. Environmentally Sensitive Areas: Encroachment into saltwater marshes, freshwater wetlands, buffers, and other environmental sensitive areas is prohibited except in areas where specifically indicated and permitted by authorities having jurisdiction.

### 1.3 OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of the Project provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

### 1.4 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed Monday through Friday during normal business working hours of 7:00 a.m. to 7:00 p.m. and from 7:00a.m. to 5:00p.m. on Saturday. No work shall be permitted on Sundays or Holidays unless agreed to in advance by Owner.
- B. Construction Access Restrictions: No construction traffic is allowed through the Bowen's Corner Elementary School property Monday through Friday between the hours of 6:30 a.m. to 8:00 a.m. and 1:30 p.m. to 2:30 p.m. due to student drop off/pick up times. These times may change under certain circumstances for which the Owner will convey to the contractor.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two (2) days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

### 1.5 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections.
  - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
  - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
    - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.



1.6 REGULATORY REQUIREMENTS

- A. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
  - 2. Submit copies of all permits and licenses, required by governing authorities having jurisdiction, to Owner and Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## SECTION 012100 - ALLOWANCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
  - 2. Quantity allowances.

#### 1.3 SELECTION AND PURCHASE

- A. Advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. Obtain proposals for each allowance for use in making final selections including recommendations that are relevant to performing the Work.
- C. Purchase products and systems from the designated supplier as selected by Architect and/or Owner.

#### 1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### 1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP SUM AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials selected by Architect and/or Owner under allowance and shall include taxes, freight and material handling upon delivery to Project site.

1.7 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowances are listed on the Bid Proposal Worksheet.

END OF SECTION 012100

## SECTION 012200 - UNIT PRICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections:
  - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

#### 1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

#### 1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included on the Bid Proposal Worksheet.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

## SECTION 012300 - ALTERNATES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

#### 1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

#### 1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Bid Alternate #1: Replace BASE BID Sports Lighting with ALTERNATE Electrical Sports Lighting – Musco.

END OF SECTION 012300

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit request for consideration in PDF format electronically. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Requests should be submitted during the Bidding phase.
  - 2. Substitution Request Form: Use form provided in Project Manual.
  - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.

- f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Addenda, Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

#### 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

#### 1.7 SUBSTITUTIONS

- A. Substitutions for Convenience: Not allowed.



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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST FORM  
(During the Bidding Phase)

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Project: \_\_\_\_\_ Project Number: \_\_\_\_\_

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

To: \_\_\_\_\_ Re: \_\_\_\_\_

---

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_

Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

---

Proposed Substitution: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone #: \_\_\_\_\_

Trade Name: \_\_\_\_\_ Model #: \_\_\_\_\_

*Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. Attached data also includes a description of changes to the Contract Documents that the proposed, substitution will require for its proper installation.*

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*The Undersigned certifies:*

- *Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.*
  - *Same warranty will be furnished for proposed substitution as for specified product.*
  - *Same maintenance service and source of replacement parts, as applicable, is available.*
  - *Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.*
  - *Proposed substitution does not affect dimensions and functional clearances.*
  - *Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.*
- 

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

Signed by: \_\_\_\_\_

Firm: \_\_\_\_\_

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

Telephone: \_\_\_\_\_

---

**A / E REVIEW AND ACTION:**

- Substitution approved and will be included in next addendum.
- Substitution rejected – use specified materials.
- Substitution request received too late – use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

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Supporting Data Attached:  Drawings  Product Data  Samples  Tests  Reports  \_\_\_\_\_

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## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

#### 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within five (5) business days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
  - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - c. Include costs of labor and supervision directly attributable to the change.
  - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

#### 1.4 ALLOWANCES

- A. Allowance Adjustment: Change Order proposal shall be based on the difference between purchase amount and the allowance.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents.

#### 1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

## SECTION 012900 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

#### 1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

- 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

- a. Application for Payment forms with Continuation Sheets.
- b. Submittals Schedule.
- c. Contractor's Construction Schedule.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

- 1. Identification: Include the following Project identification on the Schedule of Values:

- a. Project name and location.
- b. Name of Architect.
- c. Architect's project number.
- d. Contractor's name and address.
- e. Date of submittal.

- 2. Submit draft of AIA Document G703 Continuation Sheets.

- 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

- 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

- 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
  - a. Include each Change Order or Construction Change Directive as a new line item on the Schedule of Values.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Schedule of Unit Prices.
  5. Submittals Schedule (preliminary if not final).
  6. List of Contractor's staff assignments.
  7. List of Contractor's principal consultants.
  8. Copies of building permits.
  9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  10. Initial progress report.
  11. Report of preconstruction conference.
  12. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."

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7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900



## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination.
  - 2. Administrative and supervisory personnel.
  - 3. Project meetings.
  - 4. Requests for Information (RFIs).

#### 1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

#### 1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts

and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Startup and adjustment of systems.
8. Project closeout activities.

D. Drawings: Prepare drawings in accordance with requirements of the Contract Documents.

E. Electronic Submittal Coordination

1. The Contractor shall process all shop drawings and product data via electronic submittal process; the Contractor shall establish an account with a vendor providing a comprehensive online system for exchanging, reviewing, and archiving construction submittals, RFIs, and other construction communications. Items requiring physical samples for review shall be submitted as described in individual specification sections.

F. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

## 1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

## 1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for RFIs.
    - g. Procedures for testing and inspecting.
    - h. Procedures for processing Applications for Payment.
    - i. Distribution of the Contract Documents.
    - j. Submittal procedures.
    - k. Preparation of Record Documents.
    - l. Use of the premises.
    - m. Work restrictions.
    - n. Owner's occupancy requirements.
    - o. Responsibility for temporary facilities and controls.
    - p. Construction waste management and recycling.
    - q. Parking availability.
    - r. Office, work, and storage areas.
    - s. Equipment deliveries and priorities.
    - t. First aid.
    - u. Security.
    - v. Progress cleaning.
    - w. Working hours.
  3. Minutes: Record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site where required by individual Specification Sections and before each construction activity that requires coordination with other construction.
1. Attendees:
    - a. Contractor's Project Supervisor.
    - b. Installer.
    - c. Representative of authority have jurisdiction (where required by authority).
    - d. Representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow (where necessary to assure proper installation).
  2. Advise Architect of scheduled meeting dates and invite attendance.
  3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. The Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.

- f. Deliveries.
  - g. Submittals.
  - h. Review of mockups.
  - i. Possible conflicts.
  - j. Compatibility problems.
  - k. Time schedules.
  - l. Weather limitations.
  - m. Manufacturer's written instructions.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Requirements of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
- 4. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 5. Reporting: Distribute minutes of the meeting to Architect, each party present, and to parties who should have been present.
  - 6. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.

- 4) Deliveries.
  - 5) Off-site fabrication.
  - 6) Access.
  - 7) Site utilization.
  - 8) Temporary facilities and controls.
  - 9) Work hours.
  - 10) Hazards and risks.
  - 11) Progress cleaning.
  - 12) Quality and work standards.
  - 13) Requirements of authorities having jurisdiction.
  - 14) Status of correction of deficient items.
  - 15) Field observations.
  - 16) RFIs.
  - 17) Status of proposal requests.
  - 18) Pending changes.
  - 19) Status of Change Orders.
  - 20) Pending claims and disputes.
  - 21) Documentation of information for payment requests.
  - 22) Closeout Procedures (where applicable).
3. Minutes: Record the meeting minutes.
  4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
    - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

#### 1.7 REQUESTS FOR INFORMATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
  1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  3. Insure that RFI's are not frivolous by carefully reviewing Contract Documents to confirm that the required information is not overlooked. Architect reserves the right to request compensation by Contractor for time spent responding to repeated submittals of RFI's for information clearly provided in the Contract Documents.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
  1. Project name.
  2. Date.
  3. Name of Contractor.
  4. Name of Architect.
  5. RFI number, numbered sequentially.
  6. Specification Section number and title and related paragraphs, as appropriate.
  7. Drawing number and detail references, as appropriate.
  8. Field dimensions and conditions, as appropriate.

9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  10. Contractor's signature.
  11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. RFI Forms: AIA Form G716.
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow 5 working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or RFIs with numerous errors.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 5 days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log after weekly or after each update, whichever is longer.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

## SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's Construction Schedule.
  - 2. Submittals Schedule.
  - 3. Field condition reports.

#### 1.3 SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF file.
- B. Startup construction schedule.
  - 1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Daily Construction Reports: Submit at monthly intervals.
- F. Material Location Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.
- H. Unusual Event Reports: Submit at time of unusual event.
- I. Qualification Data: For scheduling consultant.



#### 1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from parties involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- C. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

#### 2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

#### 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 15 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

## 2.4 REPORTS

- A. Daily Reports: Prepare a daily construction report outlining activities / operations at Project.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information on AIA Form G716. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

#### 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

#### 1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, subject to the following terms:
  - 1. The computer generated CAD Drawings are the property of Architect and are protected by copyright. Contractor is granted a license to use the CAD Drawings for his personal, noncommercial use only. Contractor shall not reproduce, sell, distribute, publish, circulate, commercially exploit, or modify the CAD Drawings, or any portion thereof, without the written permission of Architect.
  - 2. Architect makes the CAD Drawings available to Contractor "as is" and makes no warranty, expressed or implied, with regard to the CAD Drawings. All implied warranties including the warranties of the merchantability and fitness for a particular use are hereby excluded. In no event shall Architect be liable for any lost profits, lost savings, or other consequential, special, or indirect damages, even if Architect has been advised of such losses or damages. In any event, the liability of Architect arising out of any legal claim (whether tort, contract, or otherwise) in connection of the CAD Drawings will not exceed fifty dollars.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Format: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website, Submittal Exchange. Enter required data in web-based software site to fully identify submittal.
  - 2. Submittals shall be provided as a PDF incorporating information about the type of submittal, indicating its review by Contractor, and required action(s) by Architect with reference to Project.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 15 days for initial review of each submittal. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
- E. Identification: Place a permanent label or title block on each submittal for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
  - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
- F. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
- H. Resubmittals: Make resubmittals in same form as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked "Approved" or "Accepted".
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating "Accepted" or "Approved".

## PART 2 - PRODUCTS

### 2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Submit Product Data before or concurrent with Samples.
  
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
    - a. PDF Electronic file.
  
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of appropriate Specification Section.
  - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
  
- F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
  
- G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
  2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
  3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Architects and owners, and other information specified.
- D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- E. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- F. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- G. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- H. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- I. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- J. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- K. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- 2.3 DELEGATED-DESIGN SERVICES
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  1. No Exception Taken: Where submittals are marked "No Exception Taken", the Architect does not object to proceeding with that part of Work covered by the submittal provided it complies with requirements of Contract Documents; final acceptance will depend upon that compliance.
  2. Make Corrections Noted: When submittals are marked " Make Corrections Noted", the Architect does not object to proceeding with that part of Work covered by the submittal provided it complies with notations or corrections on submittal and requirements of Contract Documents; final acceptance will depend on that compliance.
  3. Revise and Resubmit: When submittal is marked "Revise and Resubmit," do not proceed with that part of Work covered by submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare new submittal in accordance with notations; resubmit without delay. Repeat if necessary to obtain different action mark.
  4. Rejected: When submittal is marked "Rejected," do not proceed with that part of Work covered by submittal, including purchasing, fabrication, delivery, or other activity. Submittal was deemed nonresponsive, unacceptable, or inadequate to the extent that notations or corrections were not practical. Contact Architect for further instructions.
  5. Submit Specified Item: When submittal is marked "Submit Specified Item," do not proceed with that part of Work covered by submittal, including purchasing, fabrication, delivery, or

other activity. Resubmit, without delay, with additional information in accordance with notations. Repeat if necessary to obtain different action mark.

- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300



## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

#### 1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
  2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies.
  3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

#### 1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

#### 1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting

requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.7 SUBMITTALS

- A. Test and Inspection Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.

- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- F. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- H. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- I. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation

of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size as directed by Architect. Composite exterior wall mockup is required by governing authorities. Architect will provide sketch of required mockup.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  6. Demolish and remove mockups when directed, unless otherwise indicated.

#### 1.9 QUALITY CONTROL

- A. Testing Responsibilities: Owner will engage a qualified testing agency to perform quality control services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
- B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting for construction that replaced Work that failed to comply with the Contract Documents.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following, as applicable:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.

6. Security and protection for samples and for testing and inspecting equipment at Project site.
- E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  6. Retesting and reinspecting corrected work.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Architect.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000



## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

#### 1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service: Pay water service use charges for water used by all entities for construction operations.
- C. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

#### 1.4 SUBMITTALS

- A. Site Plan: Submit site plan indicating location of temporary facilities including utility connections, driveways / parking areas, and applicable staging areas for the temporary facility.

#### 1.5 QUALITY ASSURANCE

- A. Access: Comply with ADA Guidelines.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary facility and temporary utility before use. Obtain required certifications and permits.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete bases for supporting posts.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities as necessary to remove effluent lawfully.

1. Where required, connect temporary sewers to existing system as directed by authorities having jurisdiction.
- C. Water Service: Provide temporary water supply as required for completion of the Work. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Electric Power Service: Provide temporary electric power service as required for completion of the Work.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  1. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas or coordinate with Owner to use designated areas of existing parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- F. Project Identification and Temporary Signs: Provide temporary directional signs as may be necessary to inform construction personnel and visitors seeking entrance to Project.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that

minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 31 Section "Site Clearing and Erosion Control."
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Comply with requirements specified in Division 31 Section "Site Clearing and Erosion Control."
- E. Site Enclosure Fence: Furnish and install site enclosure fence as required by Contractor in a manner that will prevent people and animals from easily entering site except by entrance gates.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
  1. Prohibit smoking in hazardous fire-exposure areas.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

### 3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate

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fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

## SECTION 016000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

#### 1.3 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- B. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality product shall be used.

#### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store cementitious products and materials on elevated platforms.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

#### 1.5 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

### PART 2 - PRODUCTS

#### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
  6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
  7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
  1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
  3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
  4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
  5. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

6. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
7. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
8. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

## 2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  2. Requested substitution does not require extensive revisions to the Contract Documents.
  3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  4. Substitution request is fully documented and properly submitted.
  5. Requested substitution will not adversely affect Contractor's Construction Schedule.
  6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  7. Requested substitution is compatible with other portions of the Work.
  8. Requested substitution has been coordinated with other portions of the Work.
  9. Requested substitution provides specified warranty.
  10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

## PART 3 - EXECUTION (Not Used)

END OF SECTION 016000



## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. General installation of products.
  - 4. Progress cleaning.
  - 5. Starting and adjusting.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.

#### 1.3 SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by land surveyor.

#### 1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, underground and other utilities, and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of site improvements, underground utilities and other utilities, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
  
- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
    - a. Description of the Work.
    - b. List of detrimental conditions, including substrates.
    - c. List of unacceptable installation tolerances.
    - d. Recommended corrections.
  - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
  
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 3. Inform installers of lines and levels to which they must comply.
  - 4. Check the location, level and plumb, of every major element as the Work progresses.
  - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, foundations, etc. including those required for mechanical and electrical work.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
  1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- F. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- G. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- H. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 RECYCLING

- A. Salvage and recycle waste materials where possible.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  2. Recycle paper and beverage containers used by on-site workers.
  3. Salvage or recycle waste or excess construction materials where possible.

### 3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

## SECTION 017329 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

#### 1.3 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce its aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

#### 1.4 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
  1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
  2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing operational services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

#### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.



4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
  5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  6. Proceed with patching only after all construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures
  - 2. Final Completion procedures
  - 3. Inspection procedures.
  - 4. Warranties.
  - 5. Final cleaning.
  - 6. Repair of work.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

#### 1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Where applicable, make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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

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

#### 1.7 FINAL COMPLETION PROCEDURES

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

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.

Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

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

- A. Preparation: Submit list in PDF format via electronic file. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or other approved form.
  1. Organize list of spaces in sequential order starting with exterior areas first.
  2. For interior items, organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.

#### 1.9 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  1. Submit by uploading to web-based project software site.
- E. Warranties in Paper Form:
  1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.
- G. Where required, provide warranties, bonds, and certifications to authorities having jurisdiction as necessary for their acceptance of the Work for operation and maintenance.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

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

- j. Remove labels that are not permanent.
  - k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
  - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency
  - p. Remove labels that are not permanent.
  - q. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - r. Wipe surfaces of equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - s. Replace parts subject to unusual operating conditions.
  - t. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- D. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

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3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals.

#### 1.3 SUBMITTALS

- A. Initial Submittal: Submit 2 draft copies including an electronic copy of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit one copy of each manual including an electronic copy in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual including an electronic copy within 15 days of receipt of Architect's comments.

#### 1.4 COORDINATION

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

### PART 2 - PRODUCTS

#### 2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system.

#### 2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:



1. System, subsystem, and equipment descriptions.
2. Operating standards.
3. Operating procedures.
4. Operating logs.
5. Wiring diagrams.
6. Control diagrams.
7. Piped system diagrams.
8. Precautions against improper use.
9. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.

4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.

7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty information, as described below.

- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard printed maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

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- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. As-Built Surveys.

#### 1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of marked-up Record Prints and distribute scanned Record Drawings (PDF).
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications and distribute scanned Record Specifications (PDF).
- C. Record Product Data: Submit one copy of each Product Data including an electronic copy (PDF).
  - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.
- D. As-Built Surveys: Comply with the following:
  - 1. Number of Copies: Submit one set of As-Built Surveys including distribution of an electronic copy of the As-Built Surveys (PDF and DWG Formats).

### PART 2 - PRODUCTS

#### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of prints of the Contract Drawings and Shop Drawings.
  - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data,

whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
  - b. Accurately record information in an understandable drawing technique.
  - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Depths of foundations.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to mechanical and electric components.
  - g. Actual equipment locations including applicable infrastructure.
  - h. Changes made by Change Order.
  - i. Changes made following Architect's written orders.
  - j. Details not on the original Contract Drawings.
  - k. Field records for variable and concealed conditions.
  - l. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

### 2.3 RECORD PRODUCT DATA

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

### 2.4 MISCELLANEOUS RECORD SUBMITTALS

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

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 017839



## SECTION 017900 - DEMONSTRATION AND TRAINING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.

#### 1.3 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

#### 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

#### 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

### PART 2 - PRODUCTS

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project Record Documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Control sequences.
    - f. Safety procedures.
    - g. Instructions on stopping.
    - h. Normal shutdown instructions.
    - i. Operating procedures for emergencies.
    - j. Operating procedures for system, subsystem, or equipment failure.
    - k. Seasonal and weekend operating instructions.
    - l. Required sequences for electric or electronic systems.
    - m. Special operating instructions and procedures.
  5. Adjustments: Include the following:
    - a. Alignments.
    - b. Checking adjustments.
    - c. Noise and vibration adjustments.

- d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

#### 3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed on times.
- C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

## SECTION 101453 – TRAFFIC SIGNAGE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Traffic signs.

#### 1.3 REGULATORY REQUIREMENTS

- A. Regulatory Performance: Provide traffic signs in accordance with requirements of current editions of the following government agency publications:
  - 1. "Manual on Uniform Traffic Control Devices" (MUTCD) published by the Federal Highway Administration (FHWA), U.S. Department of Transportation.
  - 2. "Standard Highway Signs" published by the Federal Highway Administration (FHWA), U.S. Department of Transportation.
  - 3. "Standard Specifications for Highway Construction" published by South Carolina Department of Transportation (SCDOT).

#### 1.4 SUBMITTALS

- A. Product Data: For each type of sign indicated, showing compliance with regulatory requirements.
- B. Sign Schedule: Use same designations indicated on Drawings.

#### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

## 1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit installation of signs to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6061-T6 5052-H38, or 5154-H38.
- B. Steel:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Grade 50, class 1; G90 coating, either commercial or forming steel.
  - 2. Steel Bars and Shapes, Carbon Rolled from "T" Rails: ASTM A 499, Grade 60 and conforming to chemical requirements of ASTM A 1.
  - 3. Bolts for Steel Framing: ASTM A 307 or ASTM A 325 as necessary for design loads and connection details.
  - 4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Chromate Conversion Coating: ASTM B 449, Class 2, 10 – 33 mg/sq.ft., with a median of 25 mg/sq.ft.
- D. Reflective Sheeting: AASHTO M 268, "Specifications for Retroreflective Sheeting for Traffic Control" (latest edition).
  - 1. Obtain sheeting from manufacturers prequalified in accordance with SCDOT Qualified Product Policy 20 and who appear in the current edition of SCDOT Qualified Products List 20.
  - 2. A minimum of Type III reflective sheeting (bead or microprismatic) is to be used on all highway signs except the following:
    - a. All orange background rigid signs are to be Type VIII or IX microprismatic fluorescent orange sheeting, including slow/stop paddles.
    - b. The following school, pedestrian, and bicycle warning signs are to be Type IX or XI microprismatic yellow-green fluorescent sheeting:
      - 1) School Crossing (S1-1)
      - 2) School Children Walking (S2-3)
      - 3) School Bus Stop Ahead (S3-1)
      - 4) School Bus Entering Highway (S3-8)
      - 5) Diagonal Arrow (W16-7p)\*
      - 6) Ahead (W16-9p)\*
      - 7) XXX Feet (W16-2p or W16-2ap)\*

- 8) School (S4-3p)
- 9) School Speed Limit XX When Flashing (S5-6, top portion only)
- 10) Overhead School Speed Limit (S5-6, top portion only)
- 11) Pedestrian Crossing (W11-2)
- 12) Deaf Child (W11-2.1p-24)
- 13) Blind Child (W11-2.2p-24)
- 14) Bicycle Crossing (W11-1)
- 15) Share the Road (R9-25-24, top portion only)
- 16) Handicapped (W11-9)
- 17) Playground (W15-1)
- 18) Student Loading Zone Alternate Merge (S20-1, top portion only)
- 19) Advisory Speed Plaque (W13-1p)\*
- 20) Pedestrians in Crosswalk When Flashing (OHW11-2.5-72)
- 21) Bicycle Slippery When Wet (symbol, W8-10)
- 22) State Law Yield to Pedestrians Within Crosswalk (R1-6)
- 23) State Law Stop for Pedestrians Within Crosswalk (R1-6a)
- 24) Bicycle/Pedestrian (W11-15)
- 25) Trail Crossing (W11-15a)
- 26) Train X-ing Plaque (W11-15p)

\* Use fluorescent yellow-green only when used with school, pedestrian, or bicycle signs.

- c. All overhead signs are to be Type IX or XI microprismatic sheeting.

## 2.2 TRAFFIC SIGNS

- A. Sign Panels: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
- B. Sign Panel Materials: In accordance with SCDOT "Standard Specifications for Highway Construction", Section 651.
  1. Aluminum Sheet: 0.080 inch thick for signs up to 48 inches wide; 0.100 inch thick for signs 48 inches or wider.
    - a. Panel Finish: Reflective sheeting.
    - b. Shape, Dimensions and Color: In accordance with FHWA "Standard Highway Signs".
- C. Posts: Fabricate posts to lengths required for mounting method indicated.
  1. Direct-Burial Method: Provide posts 36 inches longer than height of sign to permit direct embedment in concrete foundations.
- D. U-Section Steel Posts: In accordance with SCDOT "Standard Specifications for Highway Construction", Section 653.
  1. Post Weight: Provide posts of one of the following weights as appropriate for applications:
    - a. 2 lbs/lin.ft.
    - b. 3 lbs/lin.ft.

2. Post Fabrication: Punch standard 3/8-inch diameter holes in post prior to applying galvanized finish. Place holes as follows:
    - a. 2-lb. Posts: Minimum 58 holes, one inch o.c., beginning one inch from top of post.
    - b. 3-lb Posts: Holes one inch o.c., starting one inch from top and extending to within 6 feet from the bottom, and 2 inches o.c. for the remainder of post length.
  3. Finish: Hot-dip galvanize post assemblies after fabrication to comply with ASTM A 123/A 123M.
- E. Breakaway Square Tubing Post: In accordance with SCDOT "Standard Specifications for Highway Construction", Section 655. Provide tubing capable of telescoping when consecutive size tubes are used one inside the other, with free movement and without excess side movement, as approved by FHWA.
1. Post Gage: Provide posts of one of the following gages as appropriate for applications:
    - a. 12 gage (0.105 inch) thick.
    - b. 14 gage (0.083 inch) thick.
  2. Post Fabrication: Punch standard 7/16-inch diameter holes in post prior to applying galvanized finish. Place holes one inch o.c. along centerline of each of the 4 sides, beginning one inch from tube end, with vertical spacing accuracy of 1/8-inch in 20 feet of tube length.
  3. Finish: Hot-dip galvanize post assemblies after fabrication to comply with ASTM A 123/A 123M.

## 2.3 ACCESSORIES

- A. Anchors: Provide hot-dip galvanized anchors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Excavation: Excavate for sign to elevations and dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating a further 12 inches, backfilling with satisfactory soil, and compacting to original subgrade elevation.
  1. Excavate hole depths approximately 39 inches below finished grade.
- B. Locate signs where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

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1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install at heights and lateral offsets from the roadway that conform to guidelines established in Part 2 of the MUTCD published by the FHWA.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101453



## SECTION 265668 – SPORTS LIGHTING SYSTEM – ALTERNATE #1

### PART 1- GENERAL:

#### 1.1 SCOPE OF WORK:

- A. The purpose of these specifications is to define the lighting system performance and design standards of the exterior athletic field lighting system using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- B. The sports lighting system supplier shall provide a turnkey system comprised of poles, bases, foundations, light fixtures, fixture mounting components, internal wiring, controls, and all appurtenances. Foundation design and pole installation shall be the responsibility of the sports lighting system supplier. Underground wiring between poles and control panels shall be furnished and installed by the electrical contractor.

#### 1.2 CODE AND STANDARD COMPLIANCE:

- A. All electrical work shall be in accordance with the following codes and agencies:
  - 1. National Electric Code, Article 760
  - 2. Local and state building codes.
  - 3. All requirements of the local Authorities having jurisdiction.
- B. STRUCTURAL PARAMETERS
  - 1. Wind Loads: Wind loads shall be based on the 2018 International Building Code. Wind loads to be calculated using ASCE 7-16, an ultimate design wind speed of 150 MPH and exposure category C.
  - 2. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
  - 3. Foundation Design: The foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2018 IBC Table 1806.2.
  - 4. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

#### 1.3 LISTING REQUIREMENTS:

- A. DLC Approval & Minimum Fixture Efficacy: Proposed light fixture(s) must be DLC-approved and the meet DLC minimum requirement of 105 lumens per watt.
- B. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.

C. All system components shall be UL listed for the appropriate application.

1.4 QUALITY ASSURANCE:

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 years. These levels will be specifically stated as "guaranteed" on the illumination summary provided by the manufacturer.
2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

1.5 SUBMITTAL REQUIREMENTS:

A. Request for substitutions:

1. Refer to the "Basic Materials and Methods" specification for details and requirements.
2. All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. Submit checklist below with submittal.

| Yes / No | Tab      | Item                          | Description   |
|----------|----------|-------------------------------|---|
|          | <b>A</b> | Letter/ Checklist             | Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.   |
|          | <b>B</b> | Equipment Layout              | Drawing(s) showing field layouts with pole locations  |
|          | <b>C</b> | On Field Lighting Design      | Lighting design drawing(s) showing: <ul style="list-style-type: none"> <li>a. Field Name, date, file number, prepared by</li> <li>b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x &amp; y), Illuminance levels at grid spacing specified</li> <li>c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics</li> <li>d. Height of light test meter above field surface.</li> <li>e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaires, total kilowatts, average tilt factor; light loss factor.</li> </ul> |
|          | <b>D</b> | Photometric Report            | Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02.   |
|          | <b>E</b> | Performance Guarantee         | Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.  |
|          | <b>F</b> | Structural Calculations       | Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of South Carolina.   |
|          | <b>G</b> | Control & Monitoring System   | Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system. They will also provide ten (10) references of customers currently using proposed system in the state of SC.   |
|          | <b>H</b> | Electrical Distribution Plans | Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of SC.   |
|          | <b>I</b> | Warranty                      | Provide written warranty information including all terms and conditions.  |
|          | <b>J</b> | Project References            | Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of SC. Reference list will include project name, project city, installation date, and contact name and contact phone number.  |
|          | <b>K</b> | Product Information           | Complete bill of material and current brochures/cut sheets for all product being provided. All certifications, including UL and DLC, shall be shown on the technical cut sheets.  |
|          | <b>L</b> | Delivery                      | Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.  |
|          | <b>M</b> | Non-Compliance                | Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.  |

B. Product Submittals and shop drawings:

1. Refer to the "Basic Materials and Methods" specification for details and requirements.
2. Manufacturer shall submit a 25 year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

C. As-Built drawings:

1. Refer to the "Basic Materials and Methods" specification for details and requirements.

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.

1.7 BASIS OF DESIGN:

- A. Musco's Light-Structure System with TLC for LEDTM is the basis of design product.

PART 2 – PRODUCTS:

2.1 MANUFACTURERS:

- A. The equipment and service provider shall be a nationally recognized company specializing in exterior athletic field lighting. This provider shall employ factory trained installers. The following manufacturers are approved:

1. Musco
2. Other by prior approval.

2.2 STANDARD FEATURES:

- A. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.
- B. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall

be developed and field measurements taken on a 30' x 30' grid spacing (20' x 20' for tennis courts). Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

- C. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 65+.
- D. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as shown on the drawings. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

### 2.3 GENERAL:

- A. System Description: Lighting system shall consist of the following:
  - 1. Approved pole structures:
    - a. Galvanized steel poles and cross-arm assembly
    - b. Alternate: Concrete pole with a minimum of 8,000 psi and installed with concrete backfill will be an acceptable alternative provided building code, wind speed and foundation designs per specifications are adhered to
  - 2. Non-approved pole structures:
    - a. Square static cast concrete poles will not be accepted.
    - b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long-term performance concerns.

### 2.4 SYSTEM FUNCTIONAL OPERATION:

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided. Wireless communication from the main service entrance panel to fixtures shall not be permitted in lieu of contactor controls.
- C. Dimming: System shall provide for 3-stage dimming (high-medium-low). Dimming will be set via scheduling options (Website, app, phone, fax, email)
- D. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication

link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

- E. The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute "early off" commands by phone. Scheduling tool shall be capable of setting curfew limits.
- F. Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.
- G. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- H. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.
  - 1. Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.
    - a. Cumulative hours: shall be tracked to show the total hours used by the facility
    - b. Report hours saved by using early off and push buttons by users.
  - 2. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.
- I. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.

## 2.5 MATERIALS AND COMPONENTS:

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
  - 1. Lighting systems shall use concrete foundations.
    - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
    - b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or reinforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.

2. Manufacturer will supply all drivers and supporting electrical equipment
  - a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.
  - b. Alternate: Integral drivers mounted at the top of the pole will require a pole mounted enclosure approximately 10 feet above grade. The enclosure shall include a disconnect per circuit, individual luminaire fusing, and surge protection (40 kA+). The pole shall include steps, cables, and platforms for luminaire maintenance, if owner responsible for removal of faulty luminaires.
  - c. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2\_2002.
3. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
4. All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
5. Control cabinet to provide remote on-off control, monitoring, and entertainment features of the lighting system. See Section 2.3 for further details.
6. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
  - a. Integrated grounding via concrete encased electrode grounding system.
  - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

#### 2.6 OPTIONAL EQUIPMENT:

- A. Enhanced corrosion protection package: Due to the potentially corrosive environment for this project, manufacturers must provide documentation that their products meet the following enhanced requirements in addition to the standard durability protection specified above:
  1. Exposed carbon steel horizontal surfaces on the crossarm assembly shall be galvanized to no less than a five (5) mil average thickness.

2. Exposed die cast aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.
3. Exposed extruded aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.

### PART 3 - EXECUTION:

#### 3.1 DELIVERY, STORAGE, AND HANDLING:

- A. Transport, store, and handle poles as required by the manufacturer.
- B. Prior to unloading pole, shop drawings shall be reviewed to identify proper pick-up points for unloading, storage and erection procedures. A thru-hole shall be provided at proper pick-up point to facilitate pole erection. Lift and support precast members only at locations indicated by the manufacturer.
- C. Protect members to prevent staining, cracking, chipping, spalling, bowing and warping.
- D. Use equipment and methods for transportation, site handling and erection as directed by manufacturer.
- E. Storage: Store units off ground and in manner to prevent cracking, distortion, warping, staining or other physical damage.
- F. Provide temporary bracing of units for loads imposed during handling and installation. Leave bracing in place to prevent damage of poles.
- G. Do not store materials on poles, nor transport materials over poles in manner to load units or structure beyond design load. Provide
- H. Step bolts, safety cable and internal wiring may be installed while pole is in horizontal position on the ground. If service platform is to be attached prior to erection, the pole tip must be supported to prevent undesirable deflection.
- I. Delivery Timing Equipment On-Site: The equipment must be on-site 6-8 weeks from receipt of approved submittals and receipt of complete order information.

#### 3.2 SOIL QUALITY CONTROL:

- A. The pole shall be installed in an excavation as prescribed by the Broms standards for foundation design. Concrete backfill is recommended. If concrete backfill is not used, then the backfill between the pole base and the undisturbed earth shall be of a material which can achieve a compaction after installation of not less than 98% of standard Proctor using 3/4" to dust crushed rock or equivalent. If rock backfill is used, it shall be compacted in 6" lifts to the specified minimum compaction at each lift.
- B. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:



1. Providing engineered foundation embedment design by a registered engineer in the State of South Carolina for soils other than specified soil conditions;
2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

### 3.3 ELECTRICAL WIRING:

- A. The pole and the luminaries shall be designed such that all wiring remains underground before entering the base of the pole and that no wiring shall be exposed to sun or weather as it transitions through the pole and to the ballast and on to each lamp.

### 3.4 ERECTION

- A. General Requirements: Erect units without damage to shape or finish. Damage includes chips or cracks in exposed-to-view areas.
  1. Do not install damaged units, except as approved by Architect.
  2. Repair or replace damaged units.
  3. Lift members at points provided by manufacturer.
  4. Set units level, plumb, square and true within allowable tolerances.
- B. Erection Tolerances:
  1. Variation from Plumb: Do not exceed 1/4 inch in 10 feet.
- C. If units cannot be adjusted to conform to design or tolerance criteria, notify Architect before proceeding with Work.

### 3.5 FIELD QUALITY CONTROL

- A. Inspection by Contractor's Personnel:
  1. Perform erection under supervisory surveillance of licensed surveyor engaged by Contractor.
  2. Inspect erection of units to verify tolerances during construction.
  3. Check to ensure damaged or rejected units are not incorporated into Work.

### 3.6 WARRANTY:

- A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term.
- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance.

3.4 TRAINING:

- A. Manufacturer shall instruct Owner's representative in the proper use and testing of the system.
- B. Training shall be provided on site at a time arranged with the owner.

END OF SECTION 265668

## SECTION 265669 – SPORTS LIGHTING SYSTEM – BASE BID

### PART 1- GENERAL:

#### 1.1 SCOPE OF WORK:

- A. The purpose of these specifications is to define the lighting system performance and design standards of the exterior athletic field lighting system using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- B. The sports lighting system supplier shall provide a turnkey system comprised of poles, bases, foundations, light fixtures, fixture mounting components, internal wiring, controls, and all appurtenances. Foundation design and pole installation shall be the responsibility of the sports lighting system supplier. Underground wiring between poles and control panels shall be furnished and installed by the electrical contractor.

#### 1.2 CODE AND STANDARD COMPLIANCE:

- A. All electrical work shall be in accordance with the following codes and agencies:

- 1. National Electric Code, Article 760
- 2. Local and state building codes.
- 3. All requirements of the local Authorities having jurisdiction.

- B. STRUCTURAL PARAMETERS

- 1. Wind Loads: Wind loads shall be based on AASHTO 2013 Wind Code of 140 mph.. All luminaires, visors, and cross-arm assemblies shall withstand 140 mph winds and maintain luminaire aiming alignment.
- 2. Pole Structural Design: Poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
- 3. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2018 IBC Table 1806.2.
- 4. Foundation Drawings: Sports lighting pole base shall be designed by a Licensed Professional Engineer with South Carolina stamp and included in the sports lighting package. A stamped engineered design for pole bases shall be included in shop drawing submittals.
- 5. Lighting systems pole embedment depths shall use backfill and installation of poles per lighting manufacturer recommended SC Stamped Pole Foundation Designs.

#### 1.3 LISTING REQUIREMENTS:

- A. All system components shall be UL listed for the appropriate application.

#### 1.4 QUALITY ASSURANCE:

- A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- B. Field Light Level Accountability
  - 1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period. These levels will be specifically stated as "guaranteed" on the illumination summary provided by the manufacturer.
  - 2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
  - 3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.
  - 4. Color: The lighting system shall have a minimum color temperature of 5700K and a minimum CRI of 70.
  - 5. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described in the contract drawings.
- C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

#### 1.5 SUBMITTAL REQUIREMENTS:

- A. Request for substitutions:
  - 1. Refer to the "Basic Materials and Methods" specification for details and requirements.
  - 2. All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. Submit checklist below with submittal.

| Yes / No | Tab      | Item                     | Description   |
|----------|----------|--------------------------|---|
|          | <b>A</b> | Letter/ Checklist        | Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.   |
|          | <b>B</b> | Equipment Layout         | Drawing(s) showing field layouts with pole locations  |
|          | <b>C</b> | On Field Lighting Design | Lighting design drawing(s) showing: <ul style="list-style-type: none"> <li>a. Field Name, date, file number, prepared by</li> <li>b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x &amp; y), Illuminance levels at grid spacing specified</li> <li>c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics</li> <li>d. Height of light test meter above field surface.</li> <li>e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaires, total kilowatts, average tilt factor; light loss factor.</li> </ul> |
|          | <b>D</b> | Performance Guarantee    | Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.  |
|          | <b>E</b> | Structural Calculations  | Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of South Carolina. (May be supplied upon award).   |
|          | <b>F</b> | Control System           | Manufacturer of the lighting contactor cabinet and wireless controls shall provide written definition and schematics for the key switch lighting contactor cabinet. They will also provide five (5) references of customers currently using proposed system in the state of South Carolina.   |
|          | <b>G</b> | Warranty                 | Provide written warranty information including all terms and conditions. Provide five (5) references of customers currently under specified warranty in the state of South Carolina.  |
|          | <b>H</b> | Project References       | Manufacturer to provide a list of five (5) projects where the technology and specific fixture proposed for this project has been installed in the state of South Carolina. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.  |
|          | <b>I</b> | Product Information      | Complete bill of material and current brochures/cut sheets for all product being provided.  |
|          | <b>J</b> | Non-Compliance           | Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.  |

B. Product Submittals and shop drawings:

1. Refer to the "Basic Materials and Methods" specification for details and requirements.
2. Manufacturer shall submit a 10 year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

C. As-Built drawings:

1. Refer to the "Basic Materials and Methods" specification for details and requirements.

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields.

1.7 BASIS OF DESIGN:

- A. GeoSports Lighting System's Elite Stadium 1000w LED is the basis of design product.

PART 2 – PRODUCTS:

2.1 MANUFACTURERS:

- A. The equipment and service provider shall be a nationally recognized company specializing in exterior athletic field lighting. This provider shall employ factory trained installers. The following manufacturers are approved:

1. GeoSports
2. Other by prior approval.

2.2 STANDARD FEATURES:

- A. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing).
- B. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements shall be taken on a 30' x 30' grid spacing for football, baseball, or multipurpose fields and 10' x 10' grid spacing for basketball and

tennis courts. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15. Maintained Average Illuminance and shall be guaranteed for the full warranty period.

- C. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 65+.
- D. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as shown on the drawings. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

### 2.3 GENERAL:

- A. System Description: Lighting system shall consist of the following:

- 1. Approved pole structures:

- a. Galvanized direct embedded steel poles for pole 40' and lower.
- b. Direct burial concrete poles and cross-arm assembly with a minimum of 8,000 psi and installed with concrete backfill will be an acceptable alternative provided building code, wind speed and foundation designs per specifications are adhered to

- 2. Non-approved pole structures:

- a. Square static cast concrete poles will not be accepted.
- b. Wood poles.

### 2.4 SYSTEM FUNCTIONAL OPERATION:

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 galvanized powder coated steel, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Control Panels for sports lighting shall be furnished by the sports lighting manufacturer. The control system shall provide key restricted local control of the sports lighting on a per field level. The local control shall also provide remote access via cellular network. The electrical contractor shall provide an exterior mounting frame and terminate power wiring to control panels as direct by Geo Sport Lighting.

### 2.5 MATERIALS AND COMPONENTS:

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested. LED drivers must be integral to the fixture.

1. Lighting systems shall use concrete foundations.
  - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection; actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
  - b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or reinforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
2. Manufacturer will supply all drivers and supporting electrical equipment
  - a. Integrated drivers to each luminaire will be utilized. Supporting electrical equipment shall be mounted approximately 10 feet above grade in galvanized steel powder coated enclosures. The enclosures shall be touch-safe and include disconnect, surge protection and fusing. Remote driver systems are not required.
  - b. Manufacturer shall provide surge protection at the pole equal to or greater than 75 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2\_2002.
3. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
4. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
  - a. Integrated grounding via concrete encased electrode grounding system.
  - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

## 2.6 OPTIONAL EQUIPMENT:

- A. Enhanced corrosion protection package: Due to the potentially corrosive environment for this project, manufacturers must provide documentation that their products meet the following enhanced requirements in addition to the standard durability protection specified above:
  1. Exposed carbon steel horizontal surfaces on the crossarm assembly shall be galvanized to no less than a five (5) mil average thickness.
  2. Exposed die cast aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.



3. Exposed extruded aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.

### PART 3 - EXECUTION:

#### 3.1 DELIVERY, STORAGE, AND HANDLING:

- A. Transport, store, and handle poles as required by the manufacturer.
- B. Prior to unloading pole, shop drawings shall be reviewed to identify proper pick-up points for unloading, storage and erection procedures. A thru-hole shall be provided at proper pick-up point to facilitate pole erection. Lift and support precast members only at locations indicated by the manufacturer.
- C. Protect members to prevent staining, cracking, chipping, spalling, bowing and warping.
- D. Use equipment and methods for transportation, site handling and erection as directed by manufacturer.
- E. Storage: Store units off ground and in manner to prevent cracking, distortion, warping, staining or other physical damage.
- F. Provide temporary bracing of units for loads imposed during handling and installation. Leave bracing in place to prevent damage of poles.
- G. Do not store materials on poles, nor transport materials over poles in manner to load units or structure beyond design load. Provide
- H. Step bolts, safety cable and internal wiring may be installed while pole is in horizontal position on the ground. If service platform is to be attached prior to erection, the pole tip must be supported to prevent undesirable deflection.
- I. Delivery Timing Equipment On-Site: The equipment must be on-site 6-8 weeks from receipt of approved submittals and receipt of complete order information.

#### 3.2 SOIL QUALITY CONTROL:

- A. The pole shall be installed in an excavation as prescribed by the Broms standards for foundation design. Concrete backfill is recommended. If concrete backfill is not used, then the backfill between the pole base and the undisturbed earth shall be of a material which can achieve a compaction after installation of not less than 98% of standard Proctor using 3/4" to dust crushed rock or equivalent. If rock backfill is used, it shall be compacted in 6" lifts to the specified minimum compaction at each lift.
- B. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
  1. Providing engineered foundation embedment design by a registered engineer in the State of South Carolina for soils other than specified soil conditions;

2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

### 3.3 ELECTRICAL WIRING:

- A. The pole and the luminaries shall be designed such that all wiring remains underground before entering the base of the pole and that no wiring shall be exposed to sun or weather as it transitions through the pole and to the ballast and on to each lamp.
- B. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

### 3.4 ERECTION

- A. General Requirements: Erect units without damage to shape or finish. Damage includes chips or cracks in exposed-to-view areas.
  1. Do not install damaged units, except as approved by Architect.
  2. Repair or replace damaged units.
  3. Lift members at points provided by manufacturer.
  4. Set units level, plumb, square and true within allowable tolerances.
- B. Erection Tolerances:
  1. Variation from Plumb: Do not exceed 1/4 inch in 10 feet.
- C. If units cannot be adjusted to conform to design or tolerance criteria, notify Architect before proceeding with Work.

### 3.5 FIELD QUALITY CONTROL

- A. Inspection by Contractor's Personnel:
  1. Perform erection under supervisory surveillance of licensed surveyor engaged by Contractor.
  2. Inspect erection of units to verify tolerances during construction.
  3. Check to ensure damaged or rejected units are not incorporated into Work.

### 3.6 WARRANTY:

- A. 10 Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 10 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.
- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 10 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including

all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

3.4 TRAINING:

- A. Manufacturer shall instruct Owner's representative in the proper use and testing of the system.
- B. Training shall be provided on site at a time arranged with the owner.

END OF SECTION 265669

## SECTION 311000 - SITE CLEARING AND EROSION CONTROL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Protecting existing vegetation to remain.
  - 2. Removing existing vegetation.
  - 3. Clearing and grubbing.
  - 4. Stripping and stockpiling and removing excess topsoil.
  - 5. Temporary erosion and sedimentation control measures.

#### 1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### 1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil to be stockpiled on site or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.
- C. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- B. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Owner or Architect.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing. Do not proceed with operations until existing utilities are located and clearly marked.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- E. Suspend clearing operations during wet conditions unless otherwise directed by Architect.

PART 2 - PRODUCTS

2.1 EROSION CONTROL MATERIALS

- A. Silt Fence Geotextile: Woven geotextile fabric, manufactured for silt fence applications, made from polyolefins or polyesters; with elongation less than 20 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
  - 1. Grab Tensile Strength: 100 lbf; ASTM D 4632.
  - 2. Permittivity: 0.05 per second, minimum; ASTM D 4491.
  - 3. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.
- B. Silt Fence Post: Steel, either integrally manufactured with the silt fence as part of a complete system or separately provided. Where separately provided, the following shall apply:
  - 1. Steel posts: T or U cross-sectional shape. Minimum weight 1.3 pounds per foot. Minimum length 5 feet. Shall have projections to aid in fastening wire of fabric. Shall have

- a metal plate welded near the bottom such that, when driven to proper depth, it will be below ground and will aid stability.
  - 2. Fasteners: Galvanized wire or other fasteners as required for a secure installation.
  - 3. Maximum Spacing: 6 feet on center.
- C. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
- 1. Survivability: Class 2; SCDOT Standard Specs
  - 2. Grab Tensile Strength: 200 lbf; ASTM D 4632.
  - 3. Sewn Seam Strength: 180 lbf; ASTM D 4632.
  - 4. Puncture Strength: 80 lbf; ASTM D 4833.
  - 5. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
  - 6. Permittivity: 0.1 per second, minimum; ASTM D 4491.
  - 7. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- D. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
- 1. Survivability: Class 1; SCDOT Standard Specs
  - 2. Grab Tensile Strength: 90 lbf; ASTM D 4632.
  - 3. Sewn Seam Strength: 80 lbf; ASTM D 4632.
  - 4. Puncture Strength: 40 lbf; ASTM D 4833.
  - 5. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
  - 6. Permittivity: 0.2 per second, minimum; ASTM D 4491.
  - 7. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- E. Woven Wire Fabric: ASTM A 116, Class1, wire and opening sizes as indicated.
- F. Erosion Control Aggregate: Naturally or artificially graded mixture of crushed gravel or stone, in accordance with the gradation requirements indicated on the Drawings and the material requirements of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- 1. Material shall be free of shale, clay, friable material, debris, waste, frozen materials, vegetation, organic material, or other deleterious matter.
- G. Riprap: Broken, irregular size and shape, graded stone conforming to Section 804 of the South Carolina Department of Transportation Standard Specifications for Highway Construction
- 1. Gradation: Class B.
- 2.2 TREE PROTECTION MATERIALS
- A. Fence Material: As indicated. Orange polypropylene safety mesh, as indicated. Minimum weight 16 lbs per 4 foot x 100 foot roll.
- B. Wood Posts and Rails: As indicated. 2 inch x 4 inch framing lumber. Minimum post length 6 feet.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

#### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a Stormwater Pollution Prevention Plan (SWPPP), specific to the site, that complies with EPA 832/R-92-005 or the requirements of authorities having jurisdiction, whichever is more stringent.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. When directed by Architect, remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### 3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
  - 1. Do not store construction materials, debris, or excavated material within fenced area.
  - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
  - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
  - 1. Cover exposed roots with burlap and water regularly.
  - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
  - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Architect.

### 3.4 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  1. Notify Owner, Architect and operating utility not less than two days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without the permission of all of the parties noted above.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
  1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  3. Completely remove stumps and roots greater than 1" in diameter, obstructions, and debris extending to a depth of 24 inches below exposed subgrade.
  4. Use only hand methods for grubbing within tree protection zone.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated and is to be performed immediately. Do not leave depressions overnight.
  1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

### 3.6 SELECTIVE CLEARING

- A. Contractor shall cut, clear, grub, and remove the smallest and least desirable trees (up to six (6) inches in diameter), brush, shrubs, log, down timber saplings, other growth, and debris from the areas shown on the Construction Documents.
- B. Areas of selective clearing are to be reviewed by the Owner, Landscape Architect and Contractor prior to commencement of selective clearing activities.

### 3.7 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.



- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Dispose of topsoil as specified for surplus soil material in disposal article below.
- D. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Do not stockpile topsoil within tree protection zones.
  - 2. Dispose of excess topsoil as specified for surplus soil material in disposal article below.

### 3.8 SITE IMPROVEMENTS

- A. Remove existing above -grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

### 3.9 DISPOSAL

- A. Disposal: Remove surplus soil material, and unsuitable topsoil. Remove obstructions, demolished materials, and waste materials including trash and debris.
  - 1. Legally dispose of removed materials off Owner's property.
  - 2. All chipping operations shall be legally conducted so as to not adversely affect the project schedule.
  - 3. Chipping operations shall not be undertaken where noise is likely to disturb adjacent occupants and shall be suspended if complaints are received.
  - 4. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. A geotechnical report has been prepared for the site by ECS Southeast, LLC. and is dated September 10, 2019
  - 1. Copies of the geotechnical report are provided as part of the Construction Documents.
  - 2. All Work shall be performed in accordance with the recommendations of the report and any subsequent recommendations by geotechnical engineer.
  - 3. Where material or installation requirements differ from those of this specification, those of the report or subsequent recommendations by the geotechnical engineer shall govern.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
  - 2. Excavating and backfilling for structures.
  - 3. Base course for concrete pavements.
  - 4. Base course for asphalt paving.
  - 5. Subsurface drainage backfill for walls and trenches.
  - 6. Excavating and backfilling trenches and pits for buried utilities.

#### 1.3 UNIT PRICES

- A. Dimensions of excavations shall be established and accepted by Architect prior to initiation of Work. Quantity for payment shall be based on calculation of volume using accepted dimensions. Volumes documented by truck counts are not acceptable.
- B. Volumes shall be based on in-situ measure. Swell factors for expansion of excavated material will not be accepted.
- C. Payment shall not be made without prior acceptance of proposed work by the Architect, or for quantities in excess of the quantity accepted by the Architect.

#### 1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- B. Base Course: Course placed between the subgrade and paving materials
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
  - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Filter aggregate: Aggregate backfill material that acts as a filter medium in subdrainage systems.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subgrade: Soil surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base course, subbase, drainage fill, or topsoil materials, as applicable.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Geotextile.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
  - 3. Certification that Recycled Portland Cement Concrete Base Course (RPCCBC) meets the requirements of Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.
- D. Minutes of pre-excavation conference.

## 1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- C. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
    - a. For locations within areas of DOT jurisdiction, perform all work, testing, and inspections in accordance with applicable DOT standards and procedures.

## 1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
  - 3. Contact utility-locator service for area where Project is located before excavating. Retain paragraph and subparagraphs below when CABC and/or SGBC is used.
- B. Where Porous Gravel Surface Courses (PGSC) is indicated, plan construction to mitigate potential contamination with sediment from adjoining grounds and vehicular traffic.
  - 1. Where practicable, delay installation until as late as possible in the construction sequence to avoid potential for contamination.
  - 2. Implement and maintain protection measures, as indicated in the "Protection" article below, immediately after installation is complete.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
  - 1. For locations within areas of DOT jurisdiction, Satisfactory Soils shall be as defined by Standard Specifications for that DOT for the applicable work classification.

- a. For drainage pipe culverts located within areas of SCDOT jurisdiction, backfill shall only be sand or gravel meeting the requirements of Soil Classification Groups A-1, in accordance with Supplementary Technical Specification SC-M-714 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- C. Unsatisfactory Soils: ASTM D 2487 Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT, AASHTO M 145 Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 , or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not brought to within 2 percent of optimum moisture content at time of compaction. These soils are not eligible for compensation under any Unit Price provisions for removal of unsatisfactory soil.
- D. "Skinned" Clay for Ball Field Infields: Premixed and processed soil mixture, free of rock or gravel in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
  - 1. The mix shall consist of the following percentages:
    - a. 80% sand (SCDOT FA-10)
    - b. 20% clay
  - 2. A 1/4" depth of vitrified clay soil conditioner such as TurFace, Terra-Green, Pave' Rouge, or Diamond Pro will be applied and uniformly incorporated into surface after placement and fine grading is complete.
  - 3. Mixture shall be red in color.

2.2 AGGREGATE MATERIALS

- A. All sand and aggregate materials shall be free of shale, clay, friable material, debris, waste, frozen materials, vegetation, organic material, or other deleterious matter.
- B. Aggregate materials shall not be composed of marine limestone or slag unless specifically allowed in the individual paragraph(s) below.
- C. Graded Aggregate Base Course (GABC): Naturally or artificially graded crushed stone (macadam) or marine limestone in accordance with Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- D. Porous Gravel Surface Course (PGSC): Naturally or artificially graded mixture of sand and crushed gravel or stone, in accordance with the following gradation requirements:

| <u>Sieve</u> | <u>% Passing</u> |
|--------------|------------------|
| 1"           | 100              |
| 3/4"         | 90-100           |
| 3/8"         | 70-80            |
| #4           | 55-70            |
| #10          | 45-55            |
| #40          | 25-35            |
| #200         | 3-8              |

- E. Recycled Portland Cement Concrete Base Course (RPCCBC): Graded mixture of crushed, recycled Portland cement concrete mixed together with sand or sand-gravel in accordance with

Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

1. Prior to installation, provide certification, by qualified Geotechnical Testing Agency, that RPCCBC is in accordance with the requirements of Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- F. Bedding Course: Naturally or artificially graded mixture of crushed gravel or stone, in accordance with the gradation requirements for Coarse Aggregate #57 as defined by the South Carolina Department of Transportation Standard Specifications for Highway Construction.
1. For locations within areas of SCDOT jurisdiction, bedding for drainage pipe culverts shall be in accordance with Supplementary Technical Specification SC-M-714 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- G. Filter Aggregate: Naturally or artificially graded mixture of crushed gravel or stone, in accordance with the gradation requirements for Coarse Aggregate #57 as defined by the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- H. Sand: Natural or manufactured sand in accordance with the gradation requirements for Fine Aggregate FA-10 (natural) or FA-10M (manufactured) as defined by the South Carolina Department of Transportation Standard Specifications for Highway Construction.

## 2.3 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 1, Type A, B, or C; SCDOT Standard Specs
  2. Grab Tensile Strength: 90 lbf; ASTM D 4632.
  3. Puncture Strength: 60 lbf; ASTM D 4833.
  4. Trapezoidal Tear: 40 lbf; ASTM D-4533
  5. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
  6. Permittivity: 2.2 second-1, minimum; ASTM D 4491.
  7. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.
  8. Water Flow Rate: 150 gal/min/ft<sup>2</sup>; ASTM D-4491
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 15 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 1, Type D; SCDOT Standard Specs
  2. Grab Tensile Strength: 200 lbf; ASTM D 4632.
  3. Mullen Burst: 400 psi; ASTM D-3786
  4. Puncture Strength: 90 lbf; ASTM D 4833.
  5. Trapezoidal Tear: 75 lbf; ASTM D-4533
  6. Apparent Opening Size: No. 50 sieve, maximum; ASTM D 4751.
  7. Permittivity: 0.05 second-1, minimum; ASTM D 4491.
  8. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.
  9. Water Flow Rate: 5 gal/min/ft<sup>2</sup>; ASTM D-4491

## 2.4 FLOWABLE FILL

- A. Flowable Fill: Low-density, self-compacting, flowable concrete material (controlled low-strength material) in accordance with the requirements for Excavatable Flowable Fill as defined by Section 210 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

## 2.5 PIPE DETECTION MATERIALS

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.
- B. Locator Wire In addition to warning tape where required by operating utility.
  - 1. Material, Gauge and Insulation: as required by operating utility.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section titled "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Section titled "Site Clearing," during earthwork operations.

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Where required, install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned, based on the recommendations of the Geotechnical Testing Agency. \ Changes in the Contract time may be authorized for rock excavation.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials or rock, replace with satisfactory soil materials. The Contract Sum will be adjusted for replacement of unsatisfactory soils according to unit prices included in the Contract Documents.
2. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
  - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
3. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
  - a. 24 inches outside of concrete forms other than at footings.
  - b. 12 inches outside of concrete forms at footings.
  - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
  - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. 6 inches beneath bottom of concrete slabs on grade.
  - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.



### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter and where specific gradients, lines, depths, and elevations are not indicated, excavate trenches to allow installation of top of pipe below frost line or a minimum depth of 36" below finished grade, whichever is greater.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit or as indicated.
- C. Trench bottoms where bedding course is indicated: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course, unless otherwise indicated.
  - 1. See "Utility Trench Backfill" paragraph below for bedding course requirements.
- D. Trench bottoms where no bedding course is indicated: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
  - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.8 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If based on the recommendations of the Geotechnical Testing Agency, determined that unsatisfactory soil is present: a) continue excavation and replace with compacted backfill or fill material or; b) prepare cement modified subgrade as directed.
  - 1. Authorized additional excavation and replacement material or cement modified subgrade will be paid for according to unit prices included in the Contract Documents.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Unless otherwise directed by Architect, based on the recommendations

of the Geotechnical Testing Agency (typically, in order to avoid over-compaction of porous pavement subgrades) perform proof-rolls as follows:

1. Completely proof-roll subgrade in one direction and, where dimensions permit, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, based on the recommendations of the Geotechnical Testing Agency, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, based on the recommendations of the Geotechnical Testing Agency, without additional compensation.

### 3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations, wall footings, utility pipe, or other construction as directed by Architect, based on the recommendations of the Geotechnical Testing Agency.

### 3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following, as applicable:
1. Making arrangements for required testing and evaluation of subdrainage requirements by Geotechnical Testing Agency.
  2. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  3. Surveying locations of underground utilities for Record Documents.
  4. Testing and inspecting underground utilities.
  5. Removing concrete formwork.
  6. Removing trash and debris.
  7. Removing temporary shoring and bracing, and sheeting.
  8. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Comply with the requirements indicated in the paragraph below titled "Compaction of Soil Backfills and Fills".

### 3.12 UTILITY TRENCH BACKFILL

- A. For locations within areas of SCDOT jurisdiction, bedding and backfill for drainage pipe culverts shall be in accordance with Supplementary Technical Specification SC-M-714 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Bedding Course: Where indicated or required by agency having jurisdiction, place and compact bedding course on trench bottoms. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
  - 1. Unless otherwise indicated or required by agency having jurisdiction, bedding course shall be required for the following pipe materials:
    - a. Corrugated High Density Polyethylene Pipe (AASHTO M 252M)
    - b. Gravity Flow Polyvinyl Chloride Pipe (ASTM D 3034)
    - c. Gravity Flow Ductile Iron Pipe (ASTM A 746)
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings as directed by Architect, based on the recommendations of the Geotechnical Testing Agency.
- D. Flowable Fill: Where indicated or required by agency having jurisdiction, place backfill of flowable fill over the utility pipe or conduit for the full depth of the trench to final subgrade elevation.
- E. Initial Backfill—Bedding Material: Where indicated or required by agency having jurisdiction, place and compact initial backfill of bedding course to a height of 2 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Initial Backfill—Satisfactory Soil: Where no other initial backfill is indicated, place and compact initial backfill of satisfactory soil to a height of 6 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
  - 2. Coordinate backfilling with utilities testing.
- G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- H. Place and compact final backfill of satisfactory soil, in accordance with requirements for Backfill as indicated above, to final subgrade elevation.
- I. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- J. Place backfill on subgrades free of mud, frost, snow, or ice.
- K. Comply with the requirements indicated in the paragraph below titled “Compaction of Soil Backfills and Fills”.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Make arrangements for required testing by Geotechnical Testing Agency as required. Do not place subsequent layers until required testing is complete and acceptable results have been obtained and documented.
  - 2. Under grass and planted areas, use satisfactory soil material.
  - 3. Under walks and pavements, use satisfactory soil material.
  - 4. Under steps and ramps, use satisfactory soil material.
  - 5. Under building slabs, use satisfactory soil material.
  - 6. Under footings and foundations, use satisfactory soil material.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.
- D. Do not place soil fill on yielding or unapproved subgrade.

3.14 "SKINNED" CLAY FOR BALLFIELD INFIELD AND HOME PLATE AREA

- A. Lightly scarify prepared subgrade so clay soil mixture will bond to subgrade surface.
- B. Place and compact clay soil mixture to required slope and elevations.
  - 1. Minimum depth of soil clay mixture shall be 6 inches.
- C. Finish grade shall be within a plus or minus ½ inch tolerance:

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry density.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
  - 1. Make arrangements for required testing by Geotechnical Testing Agency as required. Do not place subsequent layers until required testing is complete and acceptable results have been obtained and documented.

- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry density according to ASTM D 1557:
  - 1. Under structures, building slabs, steps, and pavements, compact each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, compact each layer of backfill or fill soil material at 95percent.
  - 3. Under lawn or unpaved areas, compact each layer of backfill or fill soil material at 90percent.
  - 4. For utility trenches under lawns or unpaved areas, compact each layer of initial and final backfill soil material at 90 percent. For all other areas compact to the level required for that area.
  - 5. For porous pavements, compact each layer of backfill or fill soil material to the level specified by the Architect, based on the recommendations of the Geotechnical Testing Agency. Generally, this level will be that required to provide a level of permeability and stability that is equivalent to the original, undisturbed subgrade soil.

### 3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks and Pavements: Plus or minus 1/2 inch.

### 3.18 SUBSURFACE DRAINAGE

- A. Subsurface Drainage (if applicable): Specified in Section titled "Subdrainage."
- B. Make arrangements for evaluation of subsurface drainage requirements by Geotechnical Testing Agency as required.
- C. If Architect, based on the recommendations of the Geotechnical Testing Agency, determines that subsurface drainage requirements differ from those indicated in the Contract Documents, install revised subsurface drainage as directed.
- D. Authorized adjustments of Subsurface Drainage will be paid for according to Contract provisions for unit prices. If Contract does not provide units prices for Subsurface Drainage, adjustment will be based on mutually acceptable pricing established prior to the initiation of the Work.

### 3.19 GRADED AGGREGATE BASE COURSE (GABC)

- A. Place GABC on subgrades free of mud, frost, snow, or ice.

- B. Immediately prior to placing GABC, proof-roll subgrade as directed in the “Subgrade Inspection” paragraph above. Do not proceed with placement of GABC until subgrade is approved.
- C. On prepared and approved subgrade, place GABC under pavements as follows:
  - 1. Make arrangements for required testing by Geotechnical Testing Agency.
  - 2. Where indicated, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - 3. Place GABC material over subgrade under pavements as indicated.
  - 4. Shape GABC to required crown elevations and cross-slope grades.
  - 5. Place GABC 8 inches or less in compacted thickness in a single layer.
  - 6. Place GABC that exceeds 8 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 8 inches thick or less than 4 inches thick.
    - a. Do not place subsequent layers until required testing is complete and acceptable results have been obtained and documented.
  - 7. Compact GABC at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 100 percent of maximum dry density according to ASTM D 1557.
- D. Shoulders: Where installation is not bordered by concrete curb, walks or alternate confinement system, place shoulders along edges of GABC to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than 92 percent of maximum dry density according to ASTM D 1557.

### 3.20 POROUS GRAVEL SURFACE COURSE (PGSC)

- A. Place PGSC on subgrades free of mud, frost, snow, or ice.
- B. Immediately prior to placing PGSC, proof-roll subgrade as directed in the “Subgrade Inspection” paragraph above. Do not proceed with placement of PGSC until subgrade is approved.
- C. On prepared and approved subgrade, place PGSC under pavements as follows:
  - 1. Make arrangements for required testing by Geotechnical Testing Agency.
  - 2. Where indicated, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - 3. Place PGSC material over subgrade under pavements as indicated.
  - 4. Shape PGSC to required crown elevations and cross-slope grades.
  - 5. Place PGSC 8 inches or less in compacted thickness in a single layer.
  - 6. Place PGSC that exceeds 8 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 8 inches thick or less than 4 inches thick.
    - a. Do not place subsequent layers until required testing is complete and acceptable results have been obtained and documented.
  - 7. Compact PGSC at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry density according to ASTM D 1557.
- D. Shoulders: Where installation is not bordered by concrete curb, walks or alternate confinement system, place shoulders along edges of PGSC to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than [95] [92] percent of maximum dry density according to ASTM D 1557.

3.21 RECYCLED PORTLAND CEMENT CONCRETE BASE COURSE (RPCCBC)

- A. Do not place RPCCBC until it has been tested and certified by a qualified Geotechnical Testing Agency.
- B. Place RPCCBC on subgrades free of mud, frost, snow, or ice.
- C. Immediately prior to placing RPCCBC, proof-roll subgrade as directed in the "Subgrade Inspection" paragraph above. Do not proceed with placement of RPCCBC until subgrade is approved.
- D. On prepared and approved subgrade, place RPCCBC under pavements as follows:
  - 1. Make arrangements for required testing by Geotechnical Testing Agency.
  - 2. Where indicated, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - 3. Place RPCCBC material over subgrade under pavements as indicated.
  - 4. Shape RPCCBC to required crown elevations and cross-slope grades.
  - 5. Place RPCCBC 8 inches or less in compacted thickness in a single layer.
  - 6. Place RPCCBC that exceeds 8 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 8 inches thick or less than 4 inches thick.
    - a. Do not place subsequent layers until required testing is complete and acceptable results have been obtained and documented.
  - 7. Compact RPCCBC at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 100 percent of maximum dry density according to ASTM D 1557.
- E. Shoulders: Where installation is not bordered by concrete curb, walks or alternate confinement system, place shoulders along edges of RPCCBC to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than 92 percent of maximum dry density according to ASTM D 1557.

3.22 FIELD QUALITY CONTROL

- A. Geotechnical Testing Agency: Responsible party will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports in accordance with requirements of International Building Code Chapter 1704.7.
  - 1. Soils: Verify site preparation complies with approved soils report.
  - 2. Placement and Compaction: Verify placement and compaction of fill materials comply with approved soils report.
  - 3. Dry-Density: Verify dry-density of compacted fill complies with approved soils report.
- C. Allow Geotechnical Testing Agency to inspect and test subgrades, each fill or backfill layer, and each base course layer as applicable. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing

subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect, based on the recommendations of the Geotechnical Testing Agency.

- E. Geotechnical Testing Agency will test compaction of soils and base course in place according to ASTM D 1556 or ASTM D 2922 as applicable, except for locations within areas of SCDOT jurisdiction which shall be tested according to applicable SCDOT procedures and rates.
  - 1. Unless otherwise indicated or required by SCDOT or other authorities having jurisdiction, tests will be performed at the following locations and frequencies:
    - a. Paved and Building Slab Areas: At subgrade, each compacted fill and backfill layer, and each base course layer, at least 1 test for every 5000 sq. ft or less of paved area or building slab, but in no case fewer than 3 tests.
    - b. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
    - c. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 300 feet or less of trench length, but no fewer than 2 tests.
- F. When Geotechnical Testing Agency reports that subgrades, fills, backfills, or base course have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace to depth required; recompact and retest until specified compaction is obtained.

### 3.23 PROTECTION

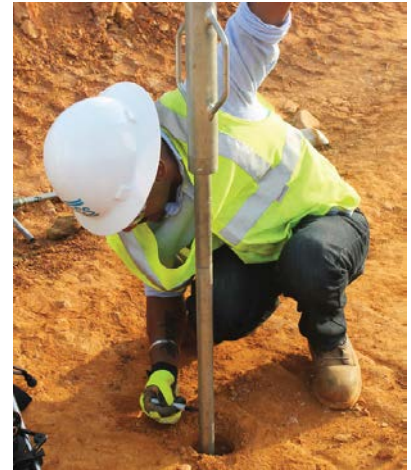
- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.
- D. Protect PGSC installation from deposition of sediments from adjoining grounds and vehicular traffic.
  - 1. Install and maintain erosion control measures as necessary, at boundaries of installations, to prevent migration of sediment onto the base course surface.
  - 2. Erect and maintain barricades to prevent construction traffic on the base course surface.
  - 3. Do not allow tracking of mud or debris onto the pavement surface by any vehicle.
  - 4. If deposition of sediment on the base course surface is noted, immediately contact Architect and request instructions for cleaning and repair. Do not delay cleaning efforts as subsequent rainfall events will wash sediments into lower levels of the base course and worsen potential damage.
  - 5. Do not use PGSC installation as construction access roads without prior approval of Architect. If approval is received, implement, monitor, and maintain any specified protection measures.



3.24 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Unless directed to stockpile onsite, remove surplus satisfactory and unsatisfactory soil and legally dispose of it off Owner's property. Remove waste material, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 312000



# ECS Southeast, LLP

Report of Subsurface Exploration and Geotechnical Engineering Analysis

## Tanner Park - Hanahan

Williams Lane and North Rhett Avenue  
Hanahan, SC

ECS Project Number 34:3542

September 10, 2019





# ECS SOUTHEAST, LLP

Geotechnical • Construction Materials • Environmental • Facilities

"Setting the Standard for Service"

Professional Engineering Firm 2240  
Professional Engineering Firm 2240  
Professional Engineering Firm 2240

September 10, 2019

Mr. J. Lee Gastley, PLA LEED AP.  
Principal/Director of Landscape Architectural Services  
Seamon, Whiteside, & Associates  
Mount Pleasant, SC 29464

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis  
**Tanner Park - Hanahan**  
Williams Lane and North Rhett Avenue  
Hanahan, SC

ECS Project Number 34:3542

Dear Mr. Gastley:

ECS Southeast, LLP (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 34:3422-GP, dated August 14, 2018. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and engineering analyses conducted and our recommendations for design and construction of geotechnical related items.

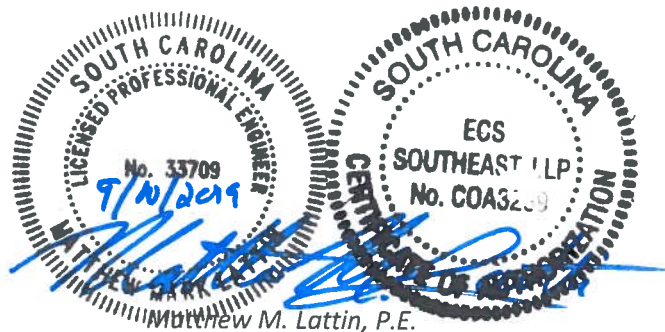
It has been our pleasure to be of service to you during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify the assumptions of subsurface conditions made for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

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**APPENDICES**

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- Site Location Diagram
- Test Location Diagram

**APPENDIX B – Field Operations**

- Reference Notes for Cone Penetration Test (CPT) Soundings
- CPT Soundings
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- Hand Auger boring Logs
- KDCP Logs

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## EXECUTIVE SUMMARY

ECS Southeast, LLP (ECS) has completed the subsurface exploration for the proposed recreational park to be located between Williams Lane and North Rhett Avenue in Hanahan, South Carolina. The project information summarized below is based exclusively on the information made available to us by the client at the time of this report and the results of our subsurface exploration. Our findings, conclusions, and recommendations are summarized below.

### PROJECT INFORMATION:

- Site Location : Williams Lane and North Rhett Avenue, Hanahan, South Carolina
- Building Scope: Several 1-story buildings and recreational facilities with associated parking and drive lanes, and a small bridge
- Building Type: Shallow foundations, slab-on-grade
- Assumed Building Loads: Max. column loads = 40 kips, Max. wall loads = 4 klf
- Assumed Bridge Type: Single span, flat slab (no loading or details provided)
- Earthwork: Up to 3 feet of cut and fill in some recreational areas, less than 2 feet anticipated in building footprints
- Sitework: Parking lots, ponds, and underground utilities

### SUBSURFACE CONDITIONS:

- Field Exploration: 5 CPTs, 16 Hand Auger Borings, and 4 Kessler DCPs in the building areas, bridge, recreations areas, ponds, and parking and drive areas.
- Organic Laden Topsoil: Between 4 and 12 inches observed in hand auger borings
- Coastal Sedimentary Deposits: Observed to the maximum depth explored of approximately 30 feet
- Groundwater: Observed while drilling at depths of approximately 4 to 9 feet below the existing ground surface

### GEOTECHNICAL CONCERNS:

- Presence of organic laden soil to a depth of approximately 1 foot
- Liquefaction Settlement: On the order of 2 inches
- Ground improvement and deep foundation options to support the proposed bridge

### DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Seismic Design: Seismic Site Class "D"
- Building Foundations: 2,000 psf
- Building Slabs-on-Grade: Modulus of Subgrade Reaction,  $k = 150$  pci
- Bridge Foundations: Shallow foundations on ground improved soils or driven timber piles

This summary should not be considered apart from the entire text of the report with all the qualifications and considerations mentioned herein. Details of our conclusions and recommendations are discussed in the report text.

---

## 1.0 INTRODUCTION

### 1.1 GENERAL

The purpose of this study was to provide geotechnical recommendations for the design of a recreational park that includes several small single-story structures, a small bridge, and associated parking and drive areas.

The recommendations developed for this report are based on the results of our subsurface exploration and project information supplied by Seamon Whiteside, & Associates. This report contains the results of our subsurface exploration, site characterization, engineering analyses, and recommendations for the design and construction of the planned structure and pavements.

### 1.2 SCOPE OF SERVICES

To obtain geotechnical information for design of the planned structures and pavements, five (5) Cone Penetration Tests (CPTs), four (4) Kessler Dynamic Cone Penetrometer Tests (KDCPs), and a total of sixteen (16) hand auger borings were performed at locations selected by ECS. The test locations were located within the footprint of the proposed buildings, bridge, recreational areas, parking and drive areas, and ponds.

This report discusses our exploratory and testing procedures, presents our findings and evaluations, and includes the following.

- Description of subsurface exploration program and test location plan.
- Description of tests performed, results of tests and data collected.
- CPT and Hand-Auger boring logs and soil classification in accordance with Unified Soil Classification System.
- Pertinent geological data and general description of area soils.
- Site class determination per 2015 International Building Code (IBC 2015).
- Shallow foundation recommendations for buildings.
- Deep foundation recommendations for the small bridge.
- Estimated total and differential settlement.
- Impact of potential soil liquefaction on design and construction.
- Constructability recommendations including suitability of site soils for use as structural fill, compaction requirements, dewatering, maximum slopes, and identifying any undesirable subgrade material present such as old fill, refuse, rubble, existing foundations, organic material, etc., which are recommended for removal.
- Recommendations on subgrade modulus for design of at-grade slabs.
- Pavement recommendations.

### **1.3 AUTHORIZATION**

Our services were provided in accordance with our Proposal No. 34:3422-GP (Revised July 27, 2019), as authorized by Mr. Lee Gastley on July 29, 2018 and includes the Terms and Conditions of Service outlined with our Proposal.



## 2.0 PROJECT INFORMATION

### 2.1 PROJECT LOCATION

The project site is located between Williams Lane and North Rhett Avenue in Hanahan, South Carolina, as shown below and on Figure 1 in [Appendix A](#). The site is bound by North Rhett Avenue and a section of recently cleared undeveloped land to the north. North Rhett Avenue to the east, an undeveloped wooded area to the south, and commercial properties and an elementary school to the west.

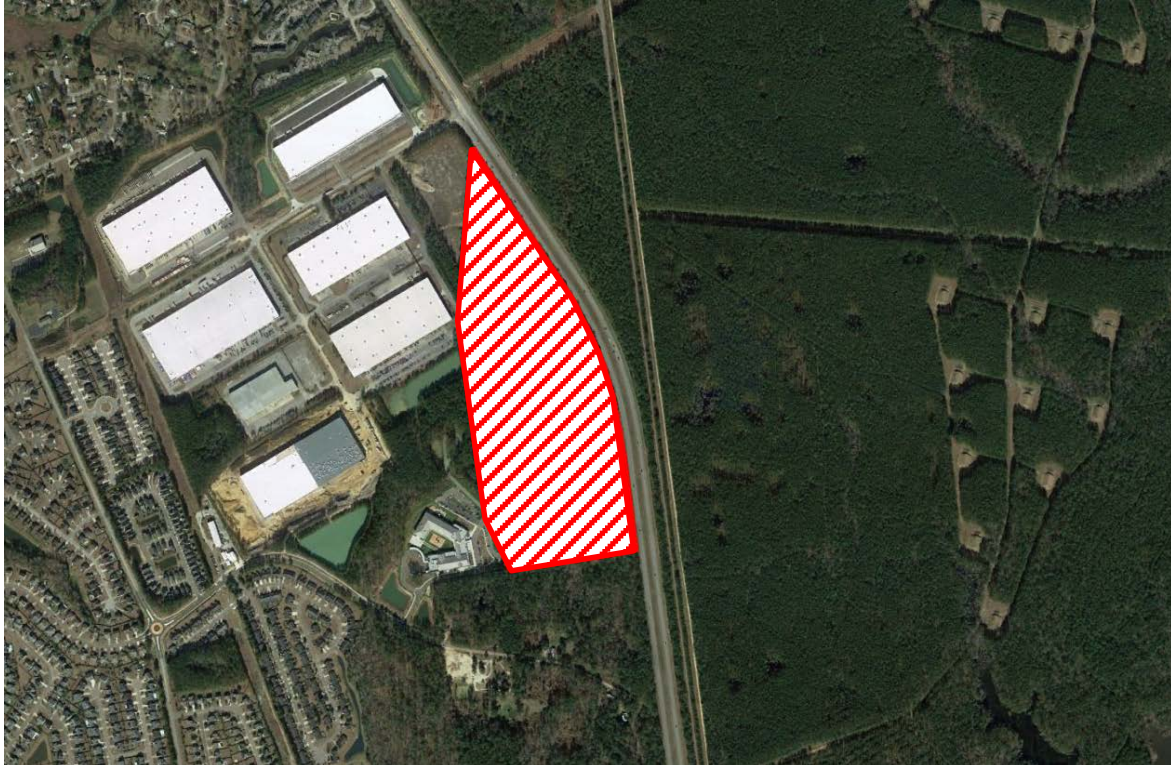


Figure 2-1 Site Location

### 2.2 CURRENT SITE CONDITIONS

Currently the site is undeveloped, heavily wooded, and is bisected from east to west by a low lying wetlands area. According to available topographic information provided by Seamon Whiteside, & Associates, current site grades range from approximately +23 feet to +31 feet (NAVD 83).

### 2.3 PROPOSED CONSTRUCTION

According to the Site Exhibit dated July 17, 2019 provided by Seamon Whiteside & Associates, the proposed structures planned for construction will consist of a series of maintenance sheds ranging from approximately 1,500 to 3,500 square feet, an approximate 1,800 square foot restroom building, an approximately 1,400 square foot open air pavilion, and an approximately 5,600 square foot recreational building.

Recreational facilities planned for construction include a football/soccer field, basketball court, volleyball court, tennis courts, and several multipurpose fields.

Site work planned for this project includes a small bridge for vehicular and pedestrian traffic located at the western portion of the site, a total of four parking lots, six ponds, and a series of pedestrian walking paths and roads. We assume that the bridge will be a single span flat slab bridge supported on shallow or deep foundations.

### 2.3.1 Structural Information/Loads

The following information explains our understanding of the structures and their loads:

**Table 2-1** Design Assumptions for Proposed Structures

| SUBJECT                   | DESIGN INFORMATION / EXPECTATIONS                                |
|---------------------------|--|
| Building Footprints       | Ranging from approximately 1,500 to 5,600 square feet            |
| # of Stories              | One story above grade  |
| Usage                     | Maintenance Storage, Office Space, and Public                    |
| Column Loads              | 40 kips maximum allowable load (assumed)                         |
| Wall Loads                | 4 kips per linear feet (klf) allowable load (assumed)            |
| Finished Floor Elevations | Approximately 2 feet above current grades (assumed)              |
| Bridge                    | Flat slab bridge (assumed). Structural loading was not provided. |

---

## 3.0 FIELD EXPLORATION

### 3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field data to assist in the determination of geotechnical recommendations.

Test locations were identified in the field by ECS personnel using GPS techniques and are shown on the Test Location Diagram in [Appendix A](#). Prior to performing the field exploration, we contacted Palmetto Utility Protection Service (PUPS) to check the test locations for potential underground utilities.

#### 3.1.1 Cone Penetration Testing (CPT)

Five (5) CPT soundings, designated C-1 and C-5, were performed within the footprint of the proposed structures during our field exploration. CPT C-4 was advanced at the proposed bridge location. The cone penetration test soundings were performed in general conformance with ASTM D5778 by our subcontractor. The soundings were performed with a track-mounted rig.

The cone used in the sounding has a tip area of 15 cm<sup>2</sup> and a sleeve area of 225 cm<sup>2</sup>. The CPT sounding records tip resistance and sleeve friction measurements to assist in determining pertinent index and engineering properties of the site soils. The ratio of the sleeve friction to tip resistance is then used to aid in assessing the soil types through which the tip is advanced. The CPT sounding logs are presented in [Appendix B](#).

#### 3.1.2 Hand Auger Borings

Sixteen (16) hand auger borings designated C-1 through C-5, HA-1 through HA-7, and K-1 through K-4 were performed adjacent to the CPT locations, within the proposed ponds, within the recreational facilities, and throughout the proposed parking and drive areas during our field exploration. Hand auger borings HA-1, HA-3 and HA-5, located in the proposed ponds, were advanced to a depth of approximately 10 feet below ground surface. The remaining hand augers were advanced to a depth of approximately 4 feet below ground surface. The hand auger borings were conducted in general conformance with ASTM D1452.

In this procedure, the auger boring is made by manually rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings were visually classified in the field. Stratification lines shown on the hand auger boring logs represent approximate boundaries between physical soil types. The hand auger boring logs are presented in [Appendix B](#).

#### 3.1.3 Kessler Dynamic Cone Penetrometer Testing (KDCP)

Four (4) Kessler DCPs, designated as K-1 through K-4, were performed within the proposed parking and drive areas during our field exploration. The KDCP tests were conducted in general conformance with ASTM D6951.

The Kessler DCP is driven into the soil by dropping either a Single-Mass 10.1 lb (4.6 kg) Hammer or a Dual-Mass 17.6 lb (8 kg) Hammer from a height of 22.6 in (575mm). Based on the encountered soil conditions at this site, the 10.1 lb (4.6 kg) hammer was selected. The depth of cone penetration is measured at selected penetration or hammer drop intervals and the soil shear strength is reported in terms of DCP index. The DCP index is based on the average penetration

depth resulting from one blow of the hammer. The index values are correlated to strength parameters, such as CBR, which can be used in pavement recommendations. The Kessler DCP logs are presented in [Appendix B](#).

### 3.2 REGIONAL/SITE GEOLOGY

The site is located in the Coastal Plain Physiographic Province of South Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the adjacent Piedmont Physiographic Province.

In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

### 3.3 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata encountered during our subsurface exploration. For subsurface information at a specific location, refer to the CPT soundings and hand auger logs in [Appendix B](#).

**Table 3-1** General Subsurface Stratigraphy

| Approximate Depth Range (ft) | Stratum | Description   | Estimated Ranges of SPT <sup>(1)</sup> N-values (bpf) <sup>(1)</sup> |
|------------------------------|---------|---|--|
| 0 to 1                       | N/A     | Topsoil was observed to depths ranging from 4 to 12 inches. Deeper topsoil, organic-laden soils, or rootmat may be present in unexplored areas.                             | N/A  |
| 1 to 9                       | I       | Interbedded layers of very loose to medium dense SAND with varying amounts of clay (SP-SC, SC) and soft to very stiff CLAY (CL) with varying amounts of sand, moist to wet. | 2 to 19  |
| 9 to 15                      | II      | Interbedded layers of stiff to very stiff CLAY (CL) with varying amounts of silt and loose to medium dense SAND with varying amounts of silt (SP, SM, SP-SM), wet           | 6 to 20  |
| 15 to 21                     | III     | Soft to stiff CLAY/SILT (CL/ML), wet.   | 3 to 11  |
| 21 to 26                     | IV      | Loose to medium dense SAND with varying amounts of silt (SM), wet.  | 5 to 18  |
| 26 to 30                     | V       | Stiff to very stiff SILT (ML)/medium dense silty SAND (SP,SM), wet [Cooper Marl <sup>(2)</sup> ].   | 10 to 15   |

Notes: (1) Standard Penetration Test UBC-1983 SPT Correlations

(2) The Cooper Marl, locally referred to as "Marl", is a relatively incompressible, thick (≥ 200 ft) stratum which underlies the area and is typically the bearing stratum for deep foundations in the greater Charleston area.

### 3.4 GROUNDWATER OBSERVATIONS

Water levels were measured after completion of the CPT soundings and during the advancement of the hand auger borings during our field exploration, as noted on the logs in [Appendix B](#) and the table below.

**Table 3-2** Groundwater Observations

| Test Location | Approximate Groundwater Depth (ft) | Test Location | Approximate Groundwater Depth (ft) |
|---------------|------------------------------------|---------------|------------------------------------|
| C-1           | 6.0                                | HA-4          | NE                                 |
| C-2           | 4.0                                | HA-5          | 9.0                                |
| C-3           | 5.0*                               | HA-6          | NE                                 |
| C-4           | 6.0                                | HA-7          | NE                                 |
| C-5           | 7.0                                | K-1           | NE                                 |
| HA-1          | 8.5**                              | K-2           | NE                                 |
| HA-2          | NE                                 | K-3           | NE                                 |
| HA-3          | 5.0**                              | K-4           | NE                                 |

(\*) indicates cave in at depth

(\*\*) indicates 24 hour groundwater depth

NE = Not Encountered

Groundwater was observed at depths ranging from approximately 4 to 9 feet below the current site grades during our field exploration. Caving was observed at test locations C-3 at a depth of approximately 5 feet. Caving may be an indicator of groundwater presence.

Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors. Following seasonal heavy rains the groundwater table could rise 1 foot or more and perch on near-surface clayey soil.

---

## 4.0 DESIGN RECOMMENDATIONS

### 4.1 GENERAL

The primary purpose of this geotechnical exploration was to help identify and evaluate the general subsurface conditions relative to the proposed construction. Our recommendations have been developed on the basis of the previously described project information and subsurface conditions identified during this study.

#### 4.1.1 Organic-Laden Soil and Root Mat

Existing organic-laden soil was observed in the hand auger borings at depths of approximately 4 to 12 inches across the project site. Based on our local experience, root balls and stumps may extend to 2 feet or more in wooded areas and will require additional localized stripping depth to remove the organics.

Deeper topsoil or soft near-surface soils may be present at unexplored areas of the site. Some undercut or remediation will likely be required prior to fill placement or footing construction. The extent of those measures should be determined by ECS at the time of construction.

#### 4.1.2 Near Surface Clayey Soils

Fine grained sandy CLAY (CL) and clayey SAND (SC) was encountered in the hand auger borings at varying depths across the site. Depending on the rainfall conditions at the time of construction, the clayey soils at the site could become unworkable. We recommend providing a minimum 12 inch separation between any sandy CLAY (CL) and clayey SAND (SC) materials and the bottom of footings, slabs on grade, and pavement base course.

The separation material should consist of a free draining sandy fill (approved imported fill) that meets the structural fill recommendations of this report with a maximum 15 percent fines passing the number 200 sieve.

#### 4.1.3 Groundwater Control

Based upon our subsurface exploration at this site, as well as significant experience on sites in nearby areas of similar geologic setting, it is our opinion that construction dewatering at this site will likely be limited to mainly removing perched water or accumulated rain water. Dewatering can be completed using pumps in sumps for small areas. Removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with No. 57 Stone or open graded bedding material.

#### 4.1.4 Construction Monitoring

ECS should be on-site full-time during earthwork and foundation construction activities to document that our recommendations are followed and to provide recommendations for remedial activities, where necessary. If we are not retained for this critical geotechnical consulting during earthwork construction and foundation construction, ECS cannot be responsible for long-term performance of the subgrade-supported construction.

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## 4.2 BUILDING DESIGN

The following sections provide recommendations for seismic design parameters, foundation design, and soil supported slabs.

### 4.2.1 Seismic Design Considerations

**Liquefaction:** When a saturated soil with little to no cohesion liquefies during a major earthquake, it experiences a temporary loss of shear strength as a result of a transient rise in excess pore water pressure generated by strong ground motion. Flow failure, lateral spreading, differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction.

We completed our liquefaction analysis in accordance with the 2015 International Building Code (IBC) design earthquake<sup>1</sup>. Layers of very loose to medium dense saturated silty sand, silty clay, and sandy silt varying in thickness were encountered below the ground water table to a depth of approximately 30 feet below the existing ground surface. ECS has compared the cyclic stress in these saturated soils to the cyclic resistance to estimate a Factor of Safety Against Liquefaction (FASL).<sup>2</sup> On the basis of the results of our analyses, we conclude several of these layers have the potential to liquefy during the design seismic event.

Although the FSAL represents the liquefaction resistance of a soil stratum at a specific depth in a soil profile and are used in determining liquefaction-induced settlements, it does not quantify the severity of liquefaction-induced settlements or potential infrastructure damage for a site. Iwasaki et al. (1978) proposed the liquefaction potential index (LPI), which expresses liquefaction potential over an entire soil profile by integrating the product of the liquefaction potential of liquefiable soil layers and a weighting factor with respect to depth to the center of each liquefiable layer.

LPI is an empirical tool used to assess site liquefaction hazards and potential for liquefaction-related damage that ranges from 0 to 100. An LPI less than 5 indicates no anticipation of surface manifestations and low to moderate liquefaction-induced damages, LPIs ranging from 5 to 15 indicates surface manifestations and a high degree of liquefaction-induced damages are possible, and an LPI greater than 15 indicates probable surface manifestations with severe liquefaction-induced damages and that foundation damage is likely.

The LPI determined for this site is approximately 15, which indicates surface manifestations and a high degree of liquefaction-induced damages are possible during and immediately following the design seismic event. When soils susceptible to liquefaction are located within approximately 10 feet of the surface, ground surface disruptions (i.e., sand boils) are possible. Such disruptions beneath at-grade structures would result in bearing capacity failure. Since potentially liquefiable sands are not located in the upper 10 feet at this site, there is low risk of ground surface disruption.

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1 The IBC design earthquake has a 2% probability of exceedance in 50 years. Our liquefaction analysis was based on an earthquake with a magnitude of 7.3 and ground surface acceleration of 1.035 g.

2 Analysis completed following the procedures presented in the 1996 NCEER and the 1998 NCEER/NSF workshops on the Evaluation of Liquefaction Resistance of Soils (Youd and Idriss 2001). To estimate volumetric strain and associated liquefaction-induced settlement, we used the procedures developed by Zhang et al. (2002) and a depth weighting factor proposed by Cetin (2009).

**Our analysis indicates that at-grade structures such as parking, slabs and shallow foundations could potentially settle on the order of 2 inches during and immediately following the design seismic event.** Differential settlement associated with liquefaction-induced settlement is expected to be approximately ½ to ¾ of the overall anticipated liquefaction settlement. This settlement would result from volumetric compression of the liquefiable sand layers which occurs as seismically-induced excess soil pore water pressures dissipate.

**Liquefaction Mitigation:** If risks associated with liquefaction are not acceptable or the proposed structure cannot be designed to accommodate the anticipated liquefaction induced settlement without suffering catastrophic failure, ground improvement techniques will be required. If it is determined that ground improvement will be necessary ECS can provide recommendations on liquefaction mitigation techniques, upon request.

**Seismic Site Classification:** Section 1613.3.2 of the International Building Code (IBC) 2015 classifies sites with the potential for liquefaction as Seismic Site Class F. However, the IBC 2015 allows the design spectral response accelerations for a site to be determined without regard to liquefaction provided buildings have a fundamental period of less than or equal to 0.5 seconds and the risks of liquefaction are considered in design. The buildings should meet this criterion; however, this must be confirmed by the structural engineer.

In addition, the IBC requires site classification for seismic design based on the upper 100 feet of a soil profile. Three methods are utilized in classifying sites, namely the shear wave velocity ( $v_s$ ) method; the Standard Penetration Resistance (N-value) method; and the undrained compressive strength ( $s_u$ ) method.

Based on the results of the CPT soundings and our knowledge of local geologic conditions, it is our interpretation the site may be considered a **Seismic Site Classification “D”**, in accordance with the IBC 2015.

**Ground Motion Parameters** In addition to the seismic site classification noted above, ECS has determined the design spectral response acceleration parameters following the IBC 2015 methodology. The Mapped Responses were estimated from the free Seismic Design Map Tool available from <https://hazards.atcouncil.org>. The design responses for the short (0.2 second,  $S_{DS}$ ) and long period (1-second,  $S_{D1}$ ) are noted in bold at the far right end of the following table.

**Table 4-1** Ground Motion Parameters – Site Class D (IBC 2015 Method)

| Period (sec) | Mapped Spectral Response Accelerations (g) |       | Values of Site Coefficient for Site Class (unitless) |       | Maximum Spectral Response Acceleration Adjusted for Site Class (g) |                  | Design Spectral Response Acceleration (g) |                     |
|--------------|--|-------|--|-------|--|------------------|---|---------------------|
|              | $S_s$                                      | $S_1$ | $F_a$  | $F_v$ | $S_{MS}=F_a S_s$   | $S_{M1}=F_v S_1$ | $S_{DS}=2/3 S_{MS}$                       | $S_{D1}=2/3 S_{M1}$ |
| Reference    | Figures 1613.3.1 (1) & (2)                 |       | Tables 1613.3.3 (1) & (2)                            |       | Eqs. 16-37 & 16-38   |                  | Eqs. 16-39 & 16-40                        |                     |
| 0.2          | $S_s$                                      | 1.498 | $F_a$  | 1.000 | $S_{MS}=F_a S_s$   | 1.498            | $S_{DS}=2/3 S_{MS}$                       | <b>0.999</b>        |
| 1.0          | $S_1$                                      | 0.495 | $F_v$  | 1.505 | $S_{M1}=F_v S_1$   | 0.745            | $S_{D1}=2/3 S_{M1}$                       | <b>0.496</b>        |

The Site Class definition should not be confused with the Seismic Design Category designation, which the structural engineer typically assesses.



#### 4.2.2 Shallow Foundations

Assuming that fill heights and building loads are no greater than those assumed, liquefaction risk is accepted or mitigated, and subgrade preparation and earthwork operations are completed in strict accordance with the recommendations of this report, the proposed small, lightly loaded structures can be supported by conventional shallow foundations: individual column footings and continuous wall footings. The design of the foundations shall utilize the following parameters:

**Table 4-2** Shallow Foundation Design

| Design Parameter  | Column Footing                          | Wall Footing                         |
|---|---|--------------------------------------|
| Net Allowable Bearing Pressure <sup>1</sup>                       | 2,000 psf                               | 2,000 psf                            |
| Acceptable Bearing Soil Material                                  | Approved structural fill.               | Approved structural fill.            |
| Minimum Width   | 30 inches                               | 18 inches                            |
| Minimum Footing Embedment Depth<br>(below slab or finished grade) | 12 inches                               | 12 inches                            |
| Estimated Total Settlement <sup>2</sup>                           | 1 inch                                  | 1 inch                               |
| Estimated Differential Settlement                                 | Less than 0.5 inches<br>between columns | Less than 0.5 inches<br>over 30 feet |

1. Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
2. The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. These settlements are in addition to the estimated liquefaction induced settlement reported in Section 4.2.1. The settlement calculations were based on maximum footing sizes of 4.5 ft x 4.5 ft for columns and 2 ft wide strip footings.

Estimates of settlement for foundations bearing on engineered or non-engineered fills are strongly dependent on the quality of fill placed. Factors which may affect the quality of fill include maximum loose lift thickness of the fills placed and the amount of compactive effort placed on each lift. The final footing elevation should be evaluated by ECS personnel to document that the bearing soils are capable of supporting the recommended net allowable bearing pressure and are suitable for foundation construction. These evaluations should include visual observations, hand rod probing, and dynamic cone penetrometer (ASTM STP 399) testing, or other methods deemed appropriate by the geotechnical engineer at the time of construction, in each column footing excavation and at intervals not greater than 25 feet in continuous footing excavations.

If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled up to the original design bottom of footing elevation with one of the following:

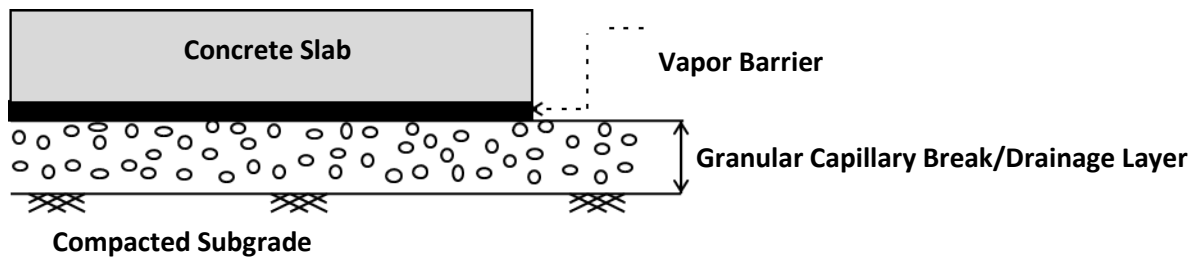
- Lean concrete ( $f'_c \geq 1,000$  psi at 28 days).
- Concrete at the time of footing concrete placement (ensure that footing reinforcing steel is placed at the project specified elevation).
- Number 57 stone; up to 2 feet in thickness.
- Compacted structural fill (with additional compaction testing and soil bearing evaluation).

**Protection of Foundation Excavations:** Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing

soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

#### 4.2.3 Floor Slabs

We have assumed that 2 feet of fill is planned for the proposed building areas. Newly placed structural fill that is observed to be free of unsuitable materials, placed in accordance with the recommendations of this report, are considered suitable for support of floor slabs. Moisture control during earthwork operations, including the use of diking or appropriate drying equipment, may be necessary. The following graphic depicts our soil-supported slab recommendations:



1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)
3. Subgrade compacted to at least 95% maximum dry density per ASTM D1557

**Figure 4-1** Concrete slab-on-grade diagram

**Subgrade Modulus:** Provided the placement of structural fill and granular drainage layer per the recommendations discussed herein, the slab may be designed assuming a modulus of subgrade reaction,  $k_1$  of 150 pci (lbs/cu. inch).

**Slab Isolation:** Ground-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

**Design Considerations:** We also recommend that slabs-on-grade be underlain by a minimum of 4 inches of suitable material as shown in the figure above to help provide a firm working surface for equipment and reduce the risk of capillary rise of subsurface moisture from adversely affecting the slab. If open graded aggregate is not available or is cost prohibitive, clean sand with less than 5 percent fines can be used provided the placement and compaction of the sand complies with the above recommendations. If floor covering such as tile or carpet will be utilized for interior finishes, a polyethylene vapor barrier may be used beneath the floor slab for moisture control considerations.

A vapor barrier should be installed on top of the subgrade in areas to receive moisture-sensitive floor coverings to help reduce dampness on the surface of the floor slab. A vapor barrier is generally understood to consist of a minimum 10-mil thickness, overlapping sheets of plastic in

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which no attempt is made to seal the overlap between the individual sheets. If at least one foot of sandy fill is placed prior to slab placement an open graded aggregate is not required under the slabs; provided that a 10 mil or thicker vapor barrier is provided and suitable placement of the material is considered during construction.

We recommend that the perm rating of the vapor barrier be sufficient to protect the rating of the floor coverings (0.01 perms or less for moisture sensitive floor coverings) and have sufficient puncture resistance according to the expected foot traffic and equipment and materials placed on the barrier. If the vapor barrier is punctured or unsealed during construction, the perm rating will be greatly decreased and vapor intrusion may occur through the slab after construction. Punctures can be caused by concrete finishing, placement of reinforcement, or by equipment and foot traffic. Openings may be caused by unsealed edges at the floor wall interface or laps.

**Slab Subgrade Verification:** A representative of ECS should observe exposed subgrades within the expanded building limits prior to structural fill placement to confirm that adequate subgrade preparation has been achieved. A proofroll using a loaded dump truck should be performed in their presence at that time.

Once subgrades have been prepared and compacted, new structural fill can be placed. Existing subgrades to a depth of at least 10 inches and structural fill should be moisture conditioned to within -3/+3 percentage points of optimum moisture content then be compacted to the required density. If there will be a significant time lag between the site grading work and final grading of concrete slab areas prior to the placement of the subbase stone and concrete, a representative of ECS should confirm and document the condition of the prepared subgrade. Prior to final slab construction, the subgrade may require scarification, moisture conditioning, and re-compaction to restore stable conditions.

### 4.3 SITE DESIGN CONSIDERATIONS

#### 4.3.1 Pavement Sections

We have performed analyses of the pavement sections using the SCDOT Pavement Design Guidelines (2008) and associated literature. Figure A-1 from the 2008 SCDOT Pavement Design Manual shows the relationship between the California Bearing Ratio (CBR) and the Soil Support Value (SSV).

As a part of the exploration, a CBR value was interpreted using the results from the Kessler DCP Tests. The tests indicated CBR values ranging from 2 to 9, below the topsoil. Based on our experience in the area and the variation in the subgrade conditions throughout the project area, a CBR value of 5 was utilized in our analysis which corresponds to a SSV of approximately 2.4. This design CBR value assumes that topsoil and unsuitable material is removed during stripping and grubbing and that site grades have been established to provide a minimum of 12 inches of separation between the seasonal high water table and the bottom of the pavement base course material.

**Table 4-3 Recommended Minimum Pavement Sections**

| Material                                    | Flexible Pavement |             | Rigid Pavement |            |
|---|-------------------|-------------|----------------|------------|
|   | Heavy Duty        | Light Duty  | Heavy Duty     | Light Duty |
| Asphaltic Concrete Surface Course (9.5 mm)* | 3.5 inches        | 2.75 inches | -              | -          |
| Portland Cement Concrete (f'c = 4,000 psi)  | -                 | -           | 6 inches       | 4 inches   |
| Graded Aggregate Base Course                | 8 inches          | 6 inches    | 4 inches       | 4 inches   |

\*A combination of asphaltic concrete surface course and asphaltic concrete binder course may be used.

Based on our analyses, we anticipate the pavement sections listed above can sustain design traffic loads of approximately 25,000 ESAL and 125,000 ESALs over 15 years for light duty and heavy duty flexible pavement, respectively. Light duty pavement is suitable for parking and drive areas subject only to automobile traffic. Heavy duty pavements should be used in main entrance driveways and any areas subject to heavy truck traffic. Materials and workmanship should follow the latest edition of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

The light and heavy-duty rigid pavement sections should be a minimum of 4 inch and 6 inch thick concrete, respectively. Heavy duty rigid pavements are recommended for trash dumpster and other heavily trafficked areas such as main entrance driveways where wheel loads will be concentrated. Provisions for construction traffic have not been included in our analysis.

Please note that large, front-loading trash dumpsters frequently impose concentrated front-wheel loads on pavements during loading. This type of loading typically results in rutting of bituminous pavements and ultimately pavement failures and costly repairs. Consequently, we recommend the use of a 6 inch thick, concrete slab that extends the entire length of the truck and dumpster. Concrete pavements should be properly jointed and reinforced as needed to help reduce the potential for cracking and to permit proper load transfer.

A stable subgrade is very important to pavement performance. Immediately prior to paving, the subgrade should be proofrolled and any unstable areas that are not firm and unyielding be repaired. The base course should be compacted to at least 100% of the maximum dry density, as determined by the Modified Proctor Compaction Test (ASTM D1557). To document that the base course has been uniformly compacted, in-place field density tests should be performed by ECS and the area should be methodically proofrolled under our observation.

The performance of pavements will be dependent upon a number of factors, including subgrade conditions at the time of paving, rainwater runoff, and traffic. Rainwater runoff should not be allowed to seep below pavements from adjacent areas. Therefore, drainage swales or underdrains may be required.

The above recommendations are very important for long-term performance of the pavements. Because pavement design typically has relatively low factors of safety, it will be very important that the specifications are followed closely during pavement construction. Our analysis was based on a 15-year design life; however, some isolated areas could require repair or premature maintenance in a shorter period of time.

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#### 4.4 PRELIMINARY BRIDGE RECOMMENDATIONS

Specific bridge structural details and loading information was not available at the time of this report. According to the provided information, the bridge will be located at the western portion of the site. We assume that the bridge will be a single span flat slab bridge. CPT/Hand Auger C-4 was advanced at the proposed bridge location in order to provide preliminary geotechnical recommendations.

Due to the presence of soft clays from the ground surface to about 8 feet below the current site grades at the proposed bridge location, the bridge should be supported on shallow foundations with ground improvement or deep foundations. We have provided preliminary recommendations for ground improvement and deep foundations below.

##### 4.4.1 Aggregate Piers

Assuming scour will not be a significant concern or other erosion control measures such as rip rap are planned, the bridge abutments can be supported on a conventional shallow foundation system, resting on improved soils designed with a new allowable bearing pressure of between 3,000 and 4,000 pounds per square foot (psf).

Soil improvement should consist of aggregate piers used to stiffen the soils in the upper soil layers below the footings to reduce settlements. The piers should be designed and installed to limit the maximum settlement to 1 inch and differential settlement to ½ inch.

If aggregate piers are used to improve the near surface soil profile, the following recommendations should be considered prior to construction.

- A specialty contractor should design the aggregate piers with proper depth, spacing, and other details based on the soil conditions and project specifications and prepare a submittal for installation. The design should be submitted to the structural engineer and geotechnical engineer of record for review and approval.
- At least one demonstration pier should be installed using the contractor's proposed procedures and then load-tested to determine the composite modulus of the improved ground. The demonstration pier should be installed at the foundation grade level. ECS should participate in the testing program.
- An engineer working for the specialty contractor should perform calculations to show the design assumptions, including soil modulus, have been verified through the test program. Additional piers should be installed and tested if the test pier fails to meet the design requirements.
- ECS should be retained to monitor the installation of all production piers to maintain continuity.

##### 4.4.2 Deep Foundations

A conventional deep foundation system can be used to support the bridge abutments. Please note that construction elements not supported on piles will settle differentially from pile-supported elements.

We performed axial compressive pile capacity calculations for 8-inch tip timber piles installed to a depth of 30 to 40 feet below the current site grades. Our analysis indicates that 8-inch tip timber piles have an allowable axial capacity of 15 tons per pile when driven to a depth of 30 to 40 feet

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below the current site grades. Other pile types such as H-piles or helical piles could also be considered at your request.

We recommend that timber piles penetrate a minimum of 10 feet into the Marl. The Marl was encountered at a depth of approximately 25 feet below the existing site grades. Allowable uplift pile loads can be assumed to be one-half of the compressive loads.

The structural capacity and design of the piles was not considered in our analyses and should be the responsibility of the project Structural Engineer. Piles should be spaced at least three pile diameters center-to-center, to prevent vertical capacity reductions due to pile interaction effects.

A lateral pile analysis has not been performed; if lateral pile capacity is of concern, we should be contacted in order to perform additional analysis.

**Driven Pile Construction Considerations:** Pre-augering can be performed to aid in the installation of the piles; however, pre-augering should not extend deeper than about 10 feet below the existing ground. The diameter of the auger should be no larger than the least pile dimension. Jetting should be prohibited.

We recommend that the pile driving hammer used to install timber piles have a maximum rated energy blow of 22,400 foot/pounds. ECS should observe pile driving to document that the piles are driven to competent soil bearing and to note damage or other concerns during installation.

#### **4.5 SITE DRAINAGE**

Positive drainage should be provided around the perimeter of the structures to minimize the potential for moisture infiltration into the foundation and slab subgrade soils. We recommend that landscaped areas adjacent to the structure and pavements be sloped away from the construction and maintain a fall of at least 6 inches for the first 10 feet outward from the structure.

Roof drains should discharge at least 5 feet from the building perimeter or directly into below grade storm water piping. The parking lots, sidewalks, and any other paved areas should also be sloped to divert surface water away from the proposed building. Site drainage should be the sole responsibility of the project civil engineer.

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## 5.0 SITE CONSTRUCTION RECOMMENDATIONS

### 5.1 SUBGRADE PREPARATION

Fine grained sandy clay and clayey sands were encountered in the hand auger borings at varying depths across the site. Depending on the rainfall conditions at the time of construction, the clayey soils at the site could become unworkable. We recommend providing a minimum 12 inch separation of more free draining structural fill (SM, SW, or SP) be provided between any sandy CLAY (CL) or clayey SAND (SC) materials and the bottom of footings, slabs on grade, and pavement base course.

Because organic laden topsoil was noted during our exploration, we emphasize the importance of comprehensive subgrade evaluations prior to engineered fill placement and/or other construction activities. These evaluations may include proofrolling the subgrade soils, performing hand auger borings, and excavation of test pits. The mentioned evaluations would help in identifying areas of soft, loose, otherwise unsuitable materials, uncontrolled fill, or buried debris, which would require remedial activities.

#### 5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, and any other soft or unsuitable materials from the 10-foot expanded building pad and 5-foot expanded pavement limits and to 5 feet beyond the toe of structural fills.

Hand auger borings performed across the site contained between 4 and 12 inches of organic-laden topsoil. Based on our local experience, root balls and stumps may extend to 2 feet or more in wooded areas and will require additional localized stripping depth to remove the organics.

Deeper topsoil may be present at unexplored areas of the site. Some undercut or remediation will likely be required prior to fill placement or footing construction. ECS should observe and document that unsuitable surficial materials have been removed or are firm and unyielding with adequate bearing capacity prior to the placement of structural fill or footing construction.

#### 5.1.2 Proofrolling

After removing all unsuitable surface materials, cutting to the proposed grade, and prior to the placement of any structural fill or other construction materials, the exposed subgrade should be examined by ECS. The exposed subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck).

The areas subject to proofrolling should be traversed by the equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle under the observation of ECS. This procedure is intended to assist in identifying any localized yielding materials. In the event that unstable or "pumping" subgrade is identified by the proofrolling, those areas should be repaired prior to the placement of any subsequent structural fill or other construction materials.

Loose/soft subgrade soils that cannot be improved in-place should be undercut and replaced with new engineered fill. Methods of repair of unstable subgrade, such as stabilization with geogrid, undercutting or moisture conditioning or chemical stabilization, should be discussed with ECS to determine the appropriate procedure with regard to the existing conditions causing the instability.

A test pit(s) may be excavated to explore the shallow subsurface materials in the area of the instability to help in determining the cause of the observed unstable materials and to assist in the evaluation of the appropriate remedial action to stabilize the subgrade.

## 5.2 STRUCTURAL FILL RECOMMENDATIONS

### 5.2.1 Structural Fill Materials

**Product Submittals:** Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which will include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

**Satisfactory Structural Fill Materials:** Materials satisfactory for use as structural fill should consist of inorganic soils classified as SM, SC, SW, SP, GW, GP, GM, and GC, or a combination of these group symbols, per ASTM D2487. The structural fill materials should be free of organic matter, debris, and should contain no particle sizes greater than 3 inches in the largest dimension. Open graded materials, such as gravels (GW and GP), which contain void space in their mass should not be used in structural fills unless properly encapsulated with filter fabric. Suitable structural fill material should have the index properties shown in the table below.

**Table 5-1** Structural Fill Index Properties

| Location with Respect to Final Grade | Liquid Limit | Plastic Index | Max % Fines Passing # 200 Sieve |
|--------------------------------------|--------------|---------------|---------------------------------|
| Building Area                        | 35 max       | 10 max        | 35                              |
| Pavement Area                        | 35 max       | 10 max        | 35                              |

**Unsatisfactory Materials:** Materials that should not be used as engineered fill include topsoil, organic materials (OH, OL), and high plasticity CLAYS and SILTS (CH, MH). Such materials removed during grading operations should be placed in approved off-site disposal areas.

**On-Site Borrow Suitability:** Hand auger borings HA-1, HA-3, and HA-5 were advanced within the proposed ponds to a depth of approximately 10 feet below the current ground surface. At these locations, organic-laden topsoil was observed from the ground surface to a depth of approximately 6 to 8 inches. Below the topsoil, near-surface clayey SAND (SC) and sandy CLAY (CL) was observed to the maximum depth explored in the hand auger borings.

In our experience, the on-site upper SC materials may be suitable, but of marginal quality for use as structural fill. If the onsite pond material is used as structural fill, laboratory testing should be completed to determine if the material has suitable fines content and natural moisture content for use as structural fill as outlined above in Table 5-1.

In our experience the on-site CL pond material is of poor quality and likely not suitable for reuse as structural fill; however, both the SC and CL materials may be utilized as non-structural fill.

If the onsite pond material is used as structural fill, the grading Contractor should anticipate significant additional efforts including disking and drying as the material is placed to facilitate



compaction and reduce the risk of pumping conditions during placement. Use of the clayey sand (SC) material may require extensive reworking and disking.

### 5.2.2 Compaction

**Structural Fill Compaction:** Structural fill within the expanded building and pavement limits should be moisture conditioned as necessary to within -3 and +3 % of the soil's optimum moisture content and be compacted with suitable equipment to a dry density of at least 95% of the modified Proctor maximum dry density (ASTM D1557) or at least 98% of the standard Proctor maximum dry density (ASTM D698). In landscape or non-structural areas (such as recreational fields), compaction of at least 90% of the Modified Proctor maximum dry density should be achieved. ECS should document that proper fill compaction has been achieved.

**Fill Compaction Control:** The expanded limits of the proposed construction areas should be well defined, including the limits of the fill zones for buildings, pavements, and slopes, etc., at the time of fill placement. Grade controls should be maintained throughout the filling operations. Filling operations should be observed on a full-time basis by ECS to determine that the minimum compaction requirements are being achieved. Field density testing of fills should be performed at the frequencies shown in the table below, but not less than 1 test per lift.

**Table 5-2** Frequency of Compaction Tests in Fill Areas

| Location         | Frequency of Tests        |
|------------------|---------------------------|
| Building Area    | 1 test per 2,500 sq. ft.  |
| Utility Trenches | 1 test per 200 lineal ft. |
| Pavement Areas   | 1 test per 5,000 sq. ft.  |

**Compaction Equipment:** Compaction equipment suitable to the soil type being compacted should be used to compact the subgrades and fill materials. Sheepsfoot compaction equipment should be suitable for the fine-grained soils (clays and silts). A vibratory steel drum roller should be used for compaction of coarse-grained soils (sands and gravels) as well as for sealing compacted surfaces.

The maximum loose lift thickness depends upon the type of compaction equipment used. For isolated excavations around footing locations or within utility excavations, a hand tamper will likely be required. We recommend the following maximum loose lift thickness based on the utilized compaction equipment:

**Table 5-3** Lift Thickness Recommendations

| Equipment  | Maximum Loose Lift Thickness (inches) |
|--|---------------------------------------|
| Large, Self-Propelled Equipment                            | 12                                    |
| Small, Self-Propelled or Remote Controlled (Rammax, etc.)  | 8                                     |
| Hand Operated (Plate Tamps, Jumping Jacks, Wacker-Packers) | 6                                     |

**Fill Placement Considerations:** Fill materials should not be placed on excessively wet soils. Borrow fill materials should not be excessively wet at the time of placement. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

---

At the end of each work day, fill areas should be graded to facilitate drainage of any precipitation and the surface should be sealed by use of a smooth-drum roller to limit infiltration of surface water.

Drying and compaction of wet soils is typically difficult during the winter months. Accordingly, earthwork should be performed during the drier/warmer times of the year, if practical. Proper drainage should be maintained during the earthwork phases of construction to prevent ponding of water which has a tendency to degrade subgrade soils.

We recommend that the grading Contractor have equipment on site during earthwork for both drying and wetting fill soils. We do not anticipate significant problems in controlling moisture within the fill during dry weather, but moisture control may be difficult during winter months or extended periods of rain. The control of moisture content of higher plasticity soils is difficult when these soils become wet. Further, such soils are easily degraded by construction traffic when the moisture content is elevated.

### 5.3 UTILITY INSTALLATIONS CONSIDERATIONS

**Utility Subgrades:** Utility subgrade should be observed and probed for stability by ECS to evaluate the suitability of the materials encountered. Any loose or unsuitable materials encountered at the utility pipe subgrade elevation should be removed and replaced with suitable compacted structural fill or pipe bedding material.

**Utility Backfilling:** The granular bedding material should be at least 4 inches thick, but not less than that specified by the project drawings and specifications. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for structural fill given in this report. Compacted backfill should be free of topsoil, roots, ice, or any other material designated by ECS as unsuitable. The backfill should be moisture conditioned, placed, and compacted in accordance with the recommendations of this report.

**Utility Excavation Dewatering:** It is possible that perched water may be encountered by utility excavations which extend more than 4 to 5 feet below existing grades. It is expected that removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with No. 57 Stone or open graded bedding material. Should water conditions beyond the capability of sump pumping be encountered, the Contractor should submit a dewatering plan in accordance with project specifications.

**Excavation Safety:** Excavations and slopes should be made and maintained in accordance with OSHA excavation safety standards. The Contractor is solely responsible for designing and constructing stable, temporary excavations and slopes and should shore, slope, or bench the sides of the excavations and slopes as required to maintain stability of both the excavation sides and bottom.

The Contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

#### 5.4 GENERAL CONSTRUCTION CONSIDERATIONS

**Moisture Conditioning:** During the wetter periods of the year, delays and additional costs should be anticipated. At these times, reduction of soil moisture may need to be accomplished by a combination of mechanical manipulation and the use of chemical additives, such as lime or cement, to lower moisture contents to levels appropriate for compaction. Alternatively, during the drier times of the year, moisture may need to be added to the soil to provide adequate moisture for successful compaction according to the project requirements.

**Subgrade Protection:** Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas, including structural and pavement areas.

**Surface Drainage:** Surface drainage conditions should be properly maintained. Surface water should be directed away from the construction area, and the work area should be sloped away from the construction area at a gradient of 1 percent or greater to reduce the potential of ponding water and the subsequent saturation of the surface soils. At the end of each work day, the subgrade soils should be sealed by rolling the surface with a smooth drum roller to minimize infiltration of surface water.

**Erosion Control:** The surface soils may be erodible. Therefore, the Contractor should provide and maintain good site drainage during earthwork operations to maintain the integrity of the surface soils. Erosion and sedimentation controls should be in accordance with sound engineering practices and local requirements.

---

## 6.0 CLOSING

ECS has prepared this report of findings, evaluations, and recommendations to guide geotechnical-related design and construction aspects of the project.

The description of the proposed project is based on information provided to ECS by Seamon Whiteside & Associates. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

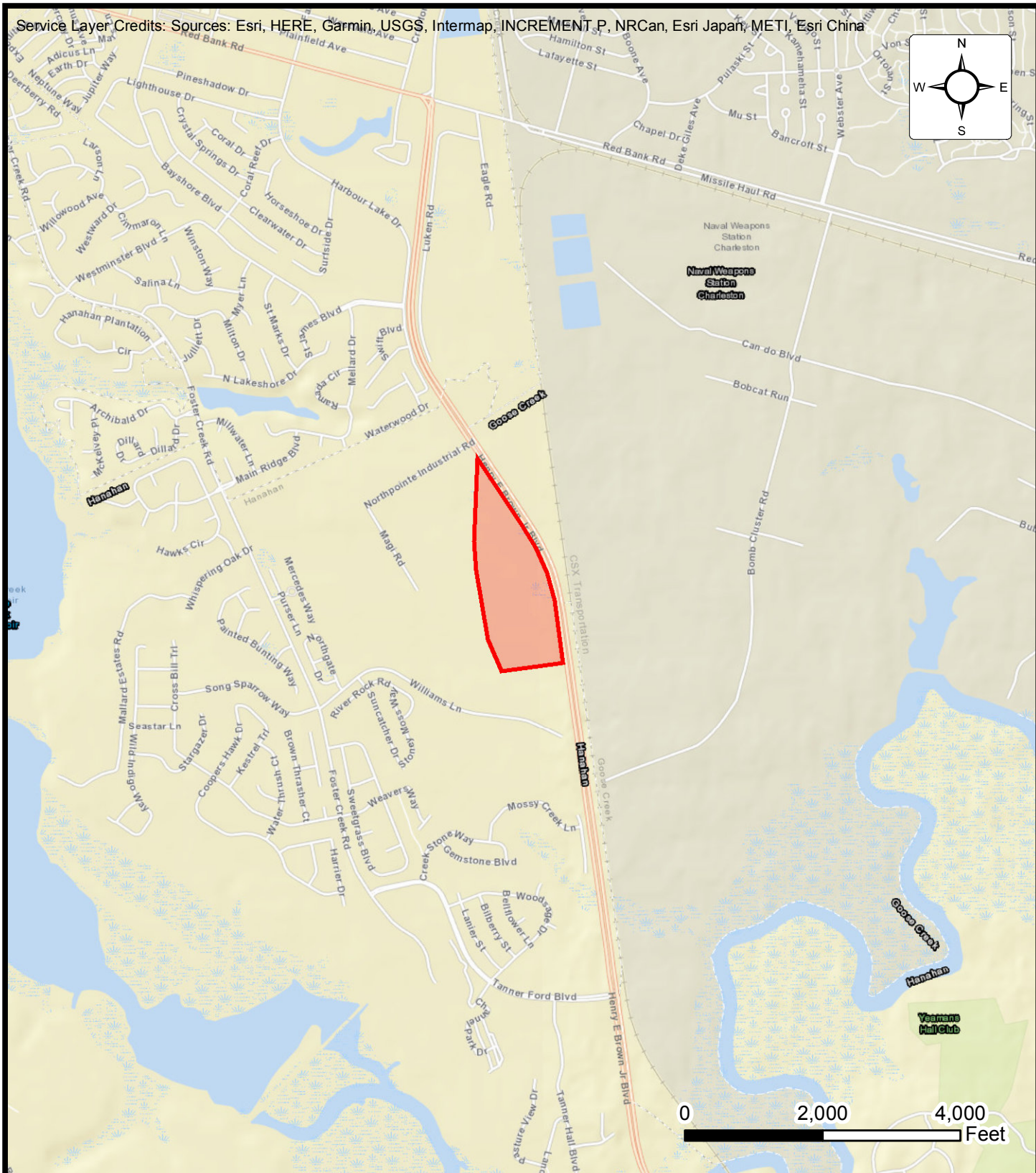
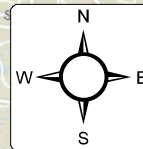
We recommend that ECS be allowed to review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the Owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

## **APPENDIX A – Drawings & Reports**

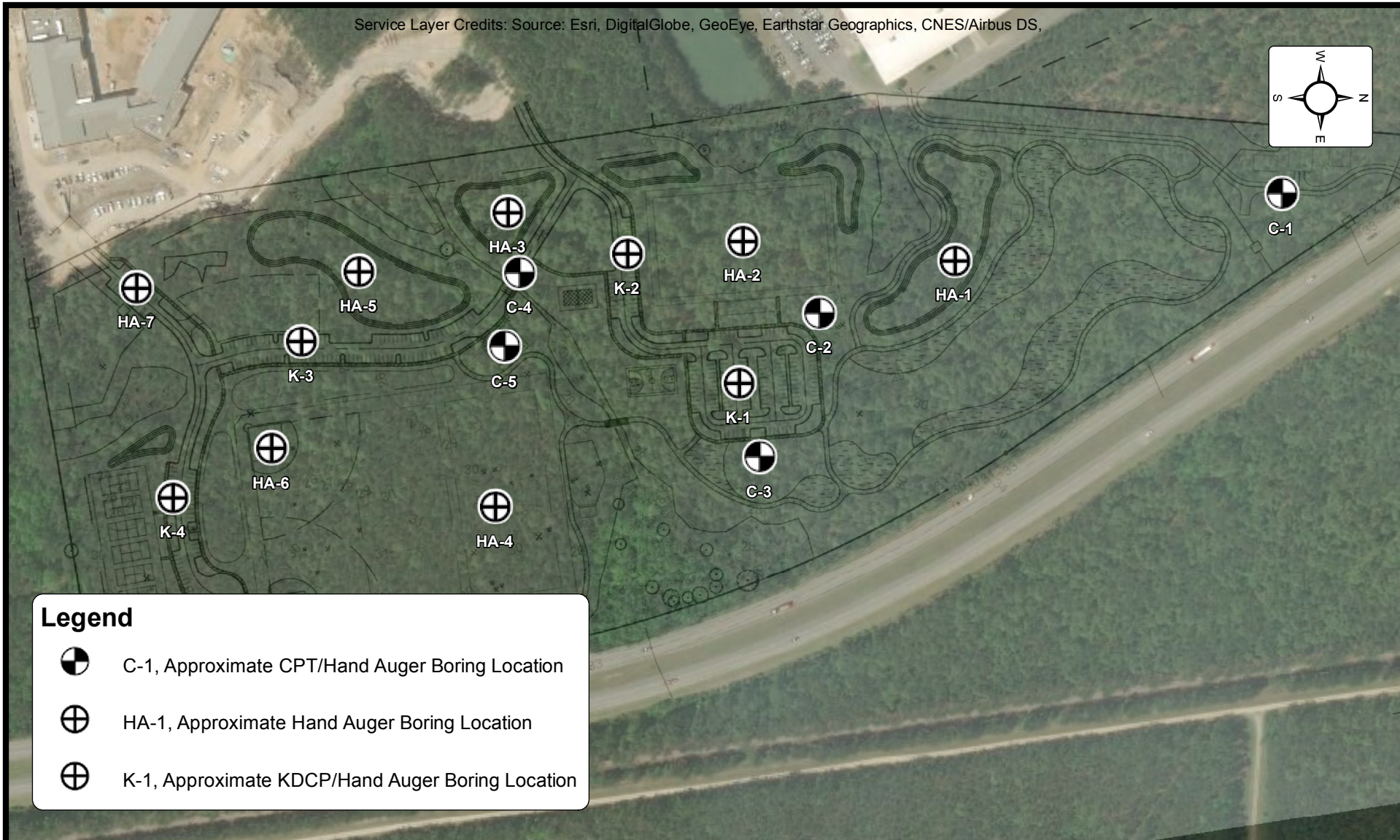
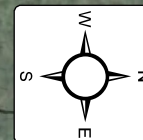
Site Location Diagram

Test Location Diagram



**SITE LOCATION DIAGRAM  
TANNER PARK - HANAHAN  
WILLIAMS LANE AND NORTH RHETT  
AVENUE HANAHAN, SOUTH CAROLINA  
SEAMON, WHITESIDE & ASSOCIATE**

|                        |
|------------------------|
| ENGINEER<br>PDK        |
| SCALE<br>1" = 2000'    |
| PROJECT NO.<br>34:3542 |
| FIGURE<br>1            |
| DATE<br>8/20/2019      |



**Legend**

- C-1, Approximate CPT/Hand Auger Boring Location
- HA-1, Approximate Hand Auger Boring Location
- K-1, Approximate KDCP/Hand Auger Boring Location



# TEST LOCATION DIAGRAM TANNER PARK - HANAHAN

WILLIAMS LANE & NORTH RHETT AVENUE  
HANAHAN, SOUTH CAROLINA  
SEAMON, WHITESIDE & ASSOCIATE

|                        |
|------------------------|
| ENGINEER<br>PDK        |
| SCALE<br>NTS           |
| PROJECT NO.<br>34:3542 |
| FIGURE<br>2            |
| DATE<br>8/23/2019      |

## **APPENDIX B – Field Operations**

Reference Notes for Cone Penetration Test (CPT) Soundings

CPT Soundings

Reference Notes for Boring Logs

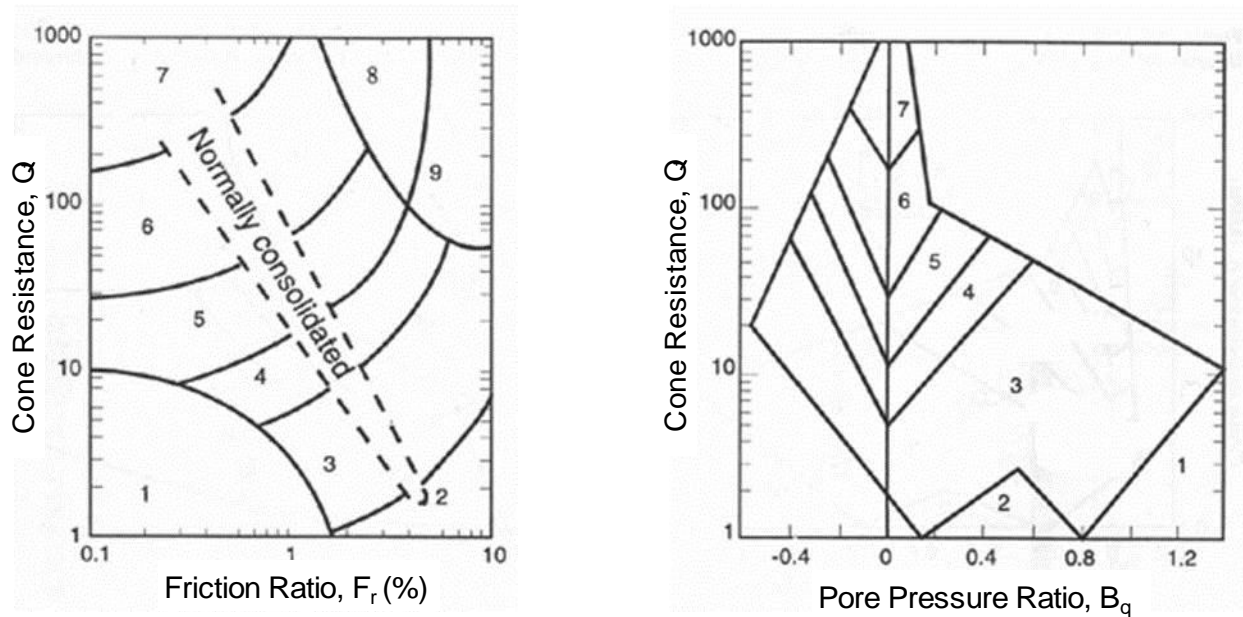
Hand Auger boring Logs

KDCP Logs



## REFERENCE NOTES FOR CONE PENETRATION TEST (CPT) SOUNDINGS

In the CPT sounding procedure (ASTM-D-5778), an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance ( $q_c$ ), pore water pressure ( $u_2$ ), and sleeve friction ( $f_s$ ). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, preconsolidation pressure, and undrained shear strength. The graphs below represent one of the accepted methods of CPT soil behavior classification (Robertson, 1990).



1. Sensitive, Fine Grained
2. Organic Soils-Peats
3. Clays; Clay to Silty Clay
4. Clayey Silt to Silty Clay
5. Silty Sand to Sandy Silt

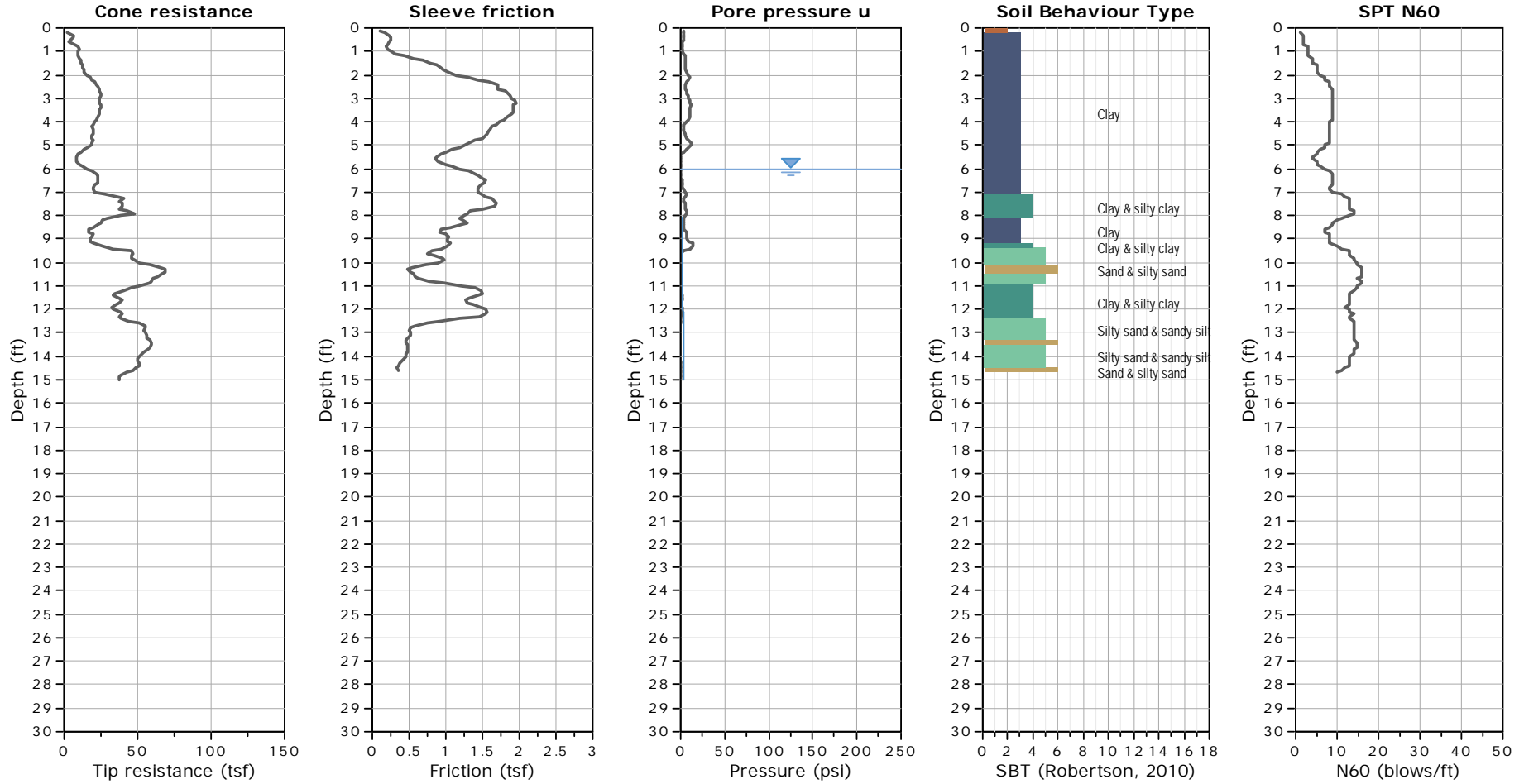
6. Clean Sands to Silty Sands
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff Fine Grained

The following table presents a correlation of corrected cone tip resistance ( $q_t$ ) to soil consistency or relative density:

| SAND  |                  | SILT/CLAY                                     |                  |
|---|------------------|---|------------------|
| Corrected Cone Tip Resistance ( $q_t$ ) (tsf) | Relative Density | Corrected Cone Tip Resistance ( $q_t$ ) (tsf) | Relative Density |
| <20   | Very Loose       | <5  | Very Soft        |
| 20-40   | Loose            | 5-10  | Soft             |
| 40-120  | Medium Dense     | 10-15   | Medium Stiff     |
|   |                  | 15-30   | Stiff            |
| 120-200                                       | Dense            | 30-45   | Very Stiff       |
| >200  | Very Dense       | 45-60   | Hard             |
|   |                  | >60   | Very Hard        |

**Project:** Tanner Park - Hanahan (ECS Project # 34:3542)

**Location:** Williams Lane and North Rhett Avenue, Hanahan, SC

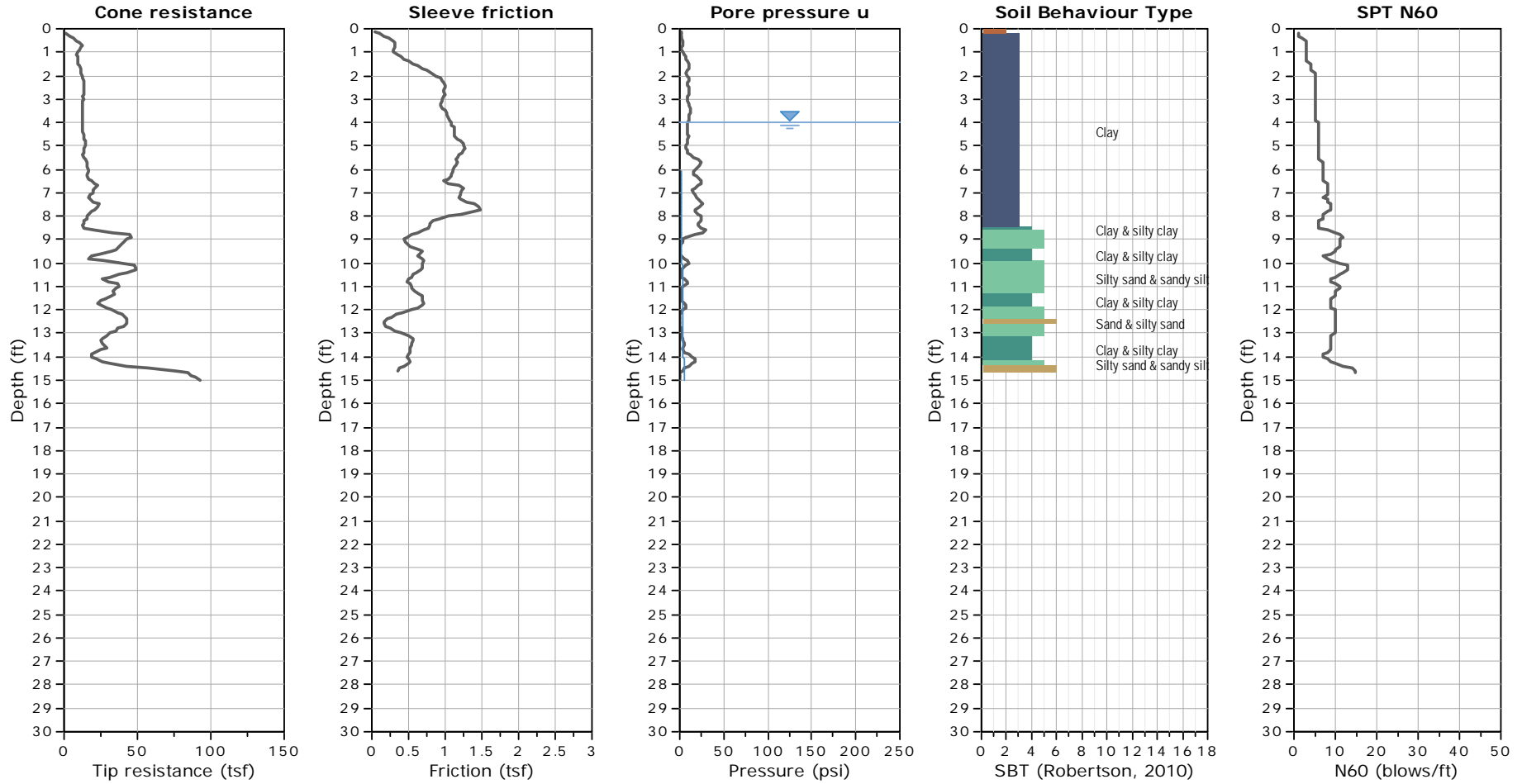


**SBTn legend**

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

**Project:** Tanner Park - Hanahan (ECS Project # 34:3542)

**Location:** Williams Lane and North Rhett Avenue, Hanahan, SC

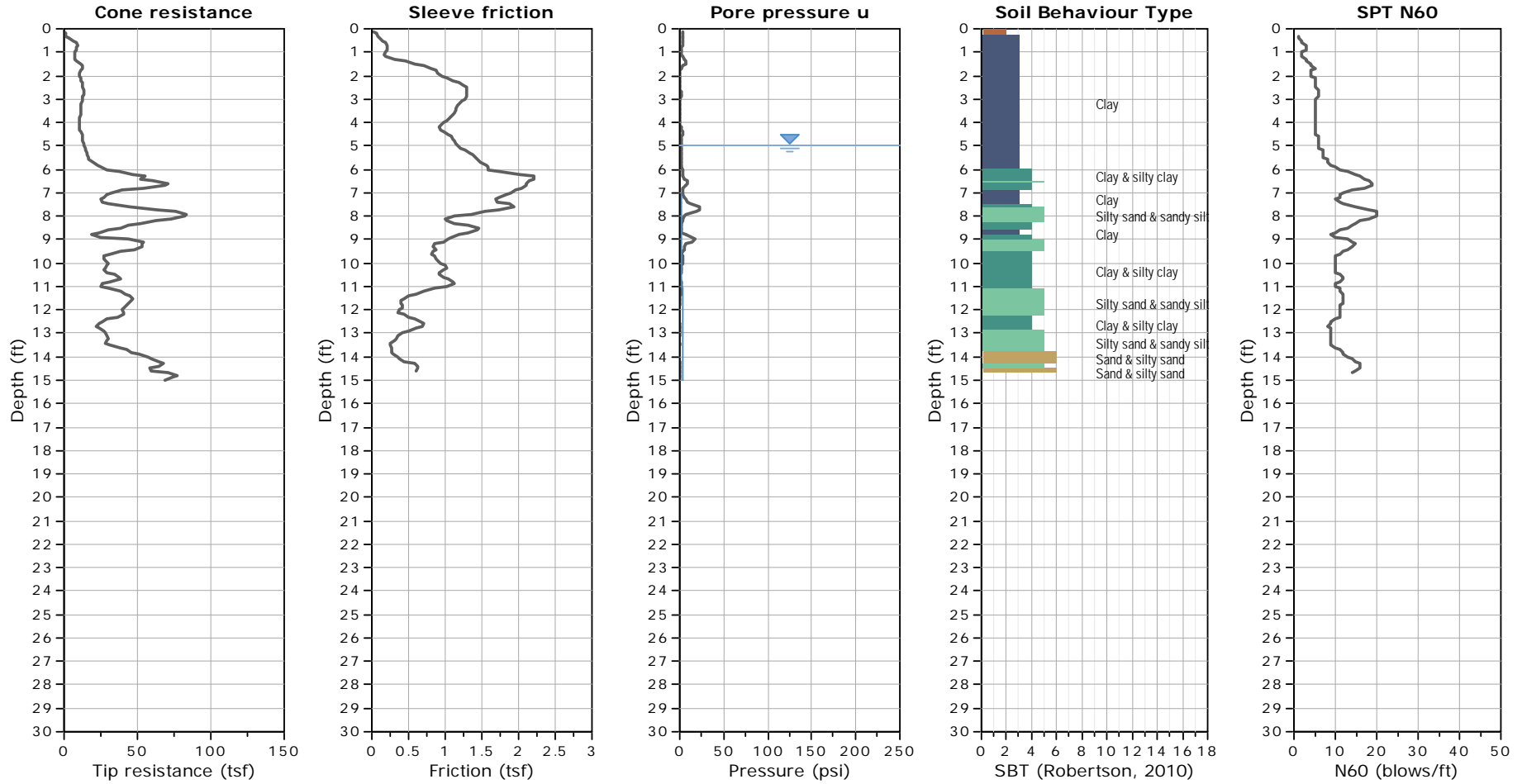


**SBTn legend**

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

**Project:** Tanner Park - Hanahan (ECS Project # 34:3542)

**Location:** Williams Lane and North Rhett Avenue, Hanahan, SC

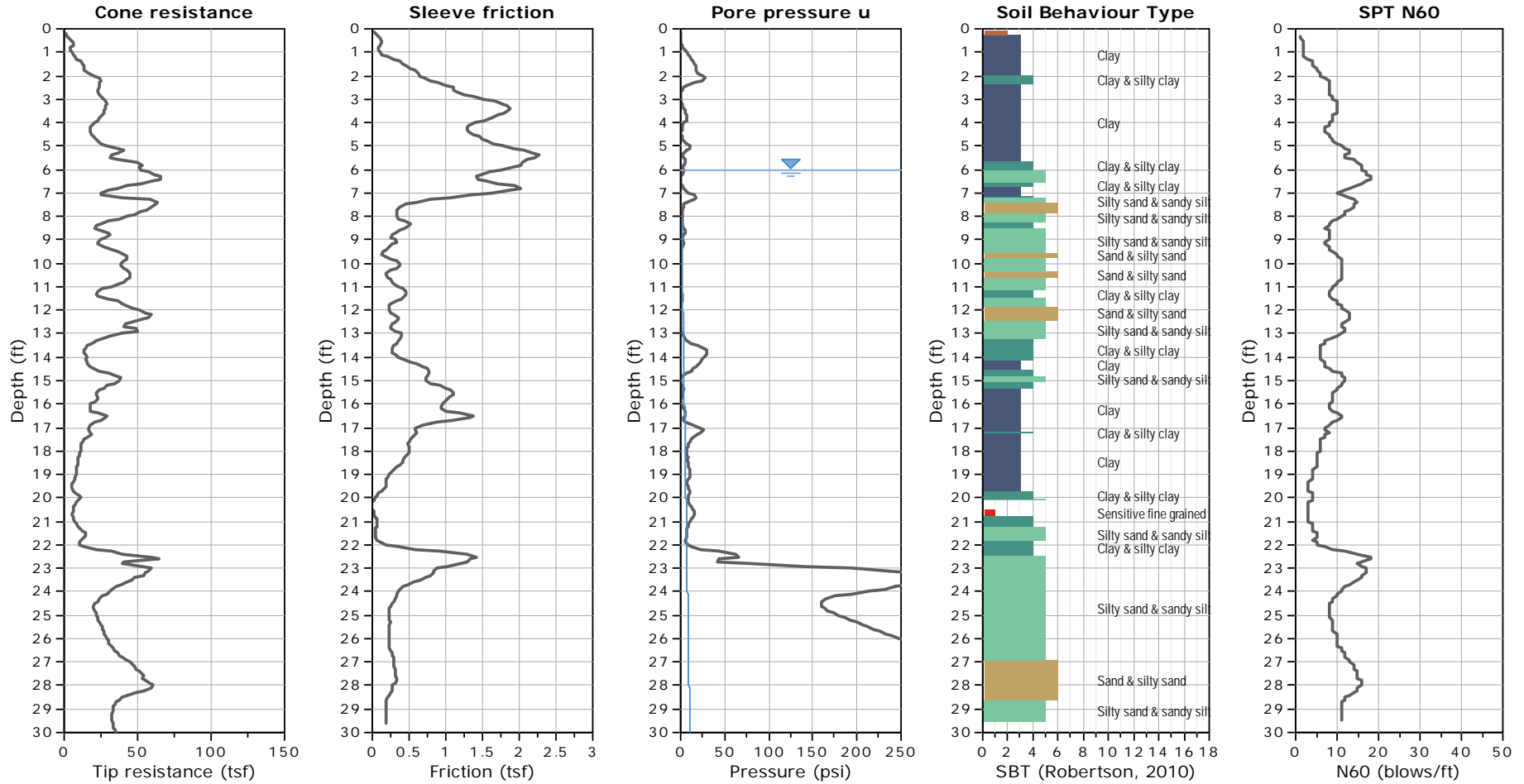


**SBTn legend**

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravelly sand to sand          |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
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**Project:** Tanner Park - Hanahan (ECS Project # 34:3542)

**Location:** Williams Lane and North Rhett Avenue, Hanahan, SC

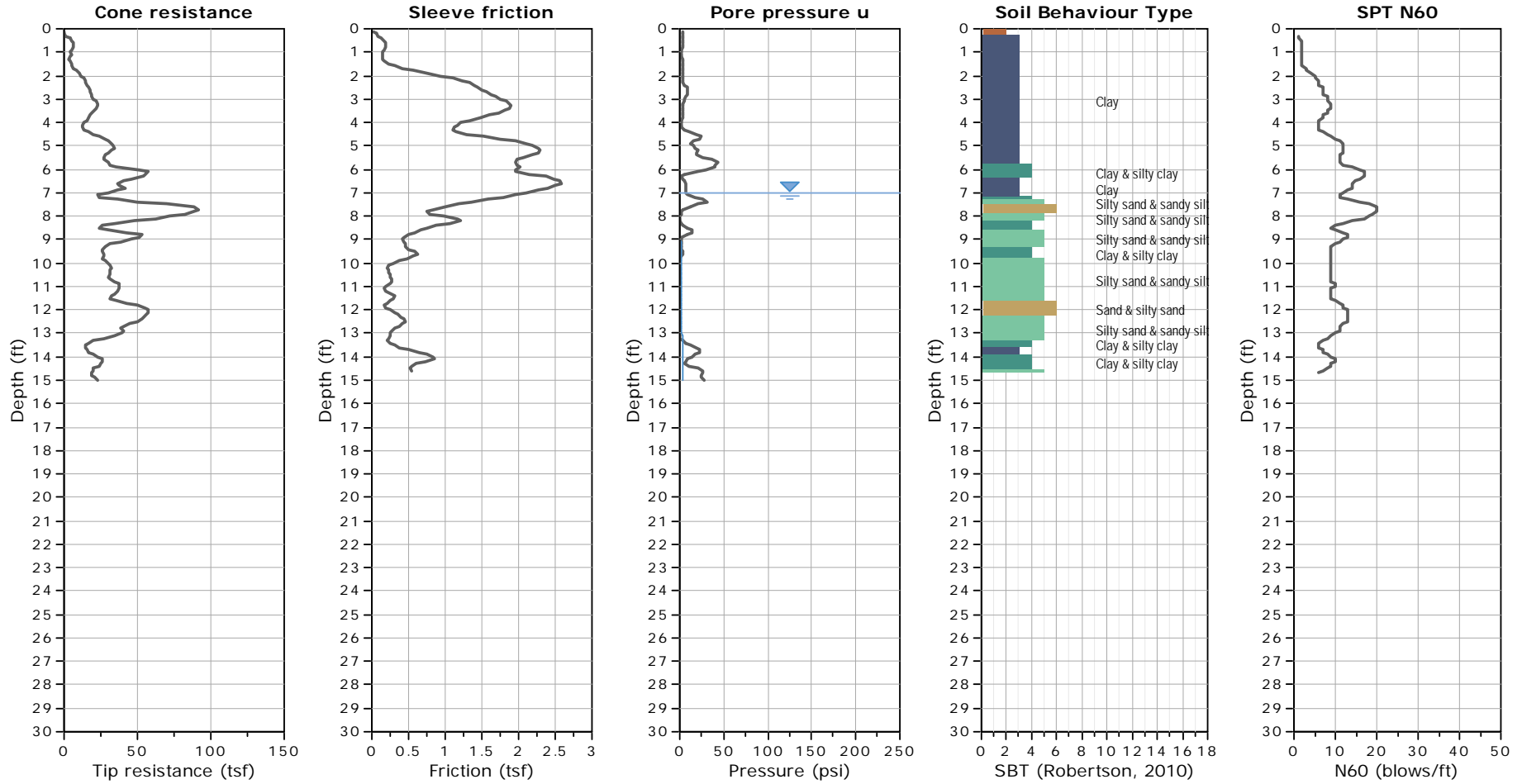


**SBTn legend**

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

**Project:** Tanner Park - Hanahan (ECS Project # 34:3542)

**Location:** Williams Lane and North Rhett Avenue, Hanahan, SC



**SBTn legend**

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



# REFERENCE NOTES FOR BORING LOGS

| MATERIAL <sup>1,2</sup> |  |
|-------------------------|--|
|                         | <b>ASPHALT</b>   |
|                         | <b>CONCRETE</b>  |
|                         | <b>GRAVEL</b>  |
|                         | <b>TOPSOIL</b>   |
|                         | <b>VOID</b>  |
|                         | <b>BRICK</b>   |
|                         | <b>AGGREGATE BASE COURSE</b>   |
|                         | <b>FILL<sup>3</sup> MAN-PLACED SOILS</b>                                   |
|                         | <b>GW WELL-GRADED GRAVEL</b><br>gravel-sand mixtures, little or no fines   |
|                         | <b>GP POORLY-GRADED GRAVEL</b><br>gravel-sand mixtures, little or no fines |
|                         | <b>GM SILTY GRAVEL</b><br>gravel-sand-silt mixtures                        |
|                         | <b>GC CLAYEY GRAVEL</b><br>gravel-sand-clay mixtures                       |
|                         | <b>SW WELL-GRADED SAND</b><br>gravelly sand, little or no fines            |
|                         | <b>SP POORLY-GRADED SAND</b><br>gravelly sand, little or no fines          |
|                         | <b>SM SILTY SAND</b><br>sand-silt mixtures                                 |
|                         | <b>SC CLAYEY SAND</b><br>sand-clay mixtures                                |
|                         | <b>ML SILT</b><br>non-plastic to medium plasticity                         |
|                         | <b>MH ELASTIC SILT</b><br>high plasticity                                  |
|                         | <b>CL LEAN CLAY</b><br>low to medium plasticity                            |
|                         | <b>CH FAT CLAY</b><br>high plasticity                                      |
|                         | <b>OL ORGANIC SILT or CLAY</b><br>non-plastic to low plasticity            |
|                         | <b>OH ORGANIC SILT or CLAY</b><br>high plasticity                          |
|                         | <b>PT PEAT</b><br>highly organic soils                                     |

| DRILLING SAMPLING SYMBOLS & ABBREVIATIONS |                         |     |                            |
|---|-------------------------|-----|----------------------------|
| SS  | Split Spoon Sampler     | PM  | Pressuremeter Test         |
| ST  | Shelby Tube Sampler     | RD  | Rock Bit Drilling          |
| WS  | Wash Sample             | RC  | Rock Core, NX, BX, AX      |
| BS  | Bulk Sample of Cuttings | REC | Rock Sample Recovery %     |
| PA  | Power Auger (no sample) | RQD | Rock Quality Designation % |
| HSA                                       | Hollow Stem Auger       |     |                            |

| PARTICLE SIZE IDENTIFICATION |  |
|------------------------------|--|
| DESIGNATION                  | PARTICLE SIZES                                 |
| Boulders                     | 12 inches (300 mm) or larger                   |
| Cobbles                      | 3 inches to 12 inches (75 mm to 300 mm)        |
| Gravel: Coarse               | ¾ inch to 3 inches (19 mm to 75 mm)            |
| Gravel: Fine                 | 4.75 mm to 19 mm (No. 4 sieve to ¾ inch)       |
| Sand: Coarse                 | 2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)     |
| Sand: Medium                 | 0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)   |
| Sand: Fine                   | 0.074 mm to 0.425 mm (No. 200 to No. 40 sieve) |
| Silt & Clay ("Fines")        | <0.074 mm (smaller than a No. 200 sieve)       |

| COHESIVE SILTS & CLAYS                                       |                        |                                     |
|--|------------------------|-------------------------------------|
| UNCONFINED COMPRESSIVE STRENGTH, Q <sub>p</sub> <sup>4</sup> | SPT <sup>5</sup> (BPF) | CONSISTENCY <sup>7</sup> (COHESIVE) |
| <0.25  | <3                     | Very Soft                           |
| 0.25 - <0.50   | 3 - 4                  | Soft                                |
| 0.50 - <1.00   | 5 - 8                  | Medium Stiff                        |
| 1.00 - <2.00   | 9 - 15                 | Stiff                               |
| 2.00 - <4.00   | 16 - 30                | Very Stiff                          |
| 4.00 - 8.00  | 31 - 50                | Hard                                |
| >8.00  | >50                    | Very Hard                           |

| RELATIVE AMOUNT <sup>7</sup> | COARSE GRAINED (%) <sup>8</sup> | FINE GRAINED (%) <sup>8</sup> |
|------------------------------|---------------------------------|-------------------------------|
| Trace                        | ≤5                              | ≤5                            |
| Dual Symbol<br>(ex: SW-SM)   | 10                              | 10                            |
| With                         | 15 - 20                         | 15 - 25                       |
| Adjective<br>(ex: "Silty")   | ≥25                             | ≥30                           |

| GRAVELS, SANDS & NON-COHESIVE SILTS |              |
|-------------------------------------|--------------|
| SPT <sup>5</sup>                    | DENSITY      |
| <5                                  | Very Loose   |
| 5 - 10                              | Loose        |
| 11 - 30                             | Medium Dense |
| 31 - 50                             | Dense        |
| >50                                 | Very Dense   |

| WATER LEVELS <sup>6</sup> |     |  |
|---------------------------|-----|--|
|                           | WL  | Water Level (WS)(WD)<br>(WS) While Sampling<br>(WD) While Drilling |
|                           | SHW | Seasonal High WT   |
|                           | ACR | After Casing Removal   |
|                           | SWT | Stabilized Water Table   |
|                           | DCI | Dry Cave-In  |
|                           | WCI | Wet Cave-In  |

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

<sup>2</sup>To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

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





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

<sup>5</sup>Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf).








<sup>6</sup>The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.





<sup>7</sup>Minor deviation from ASTM D 2488-09 Note 16.





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





|  |                |  |                   |  |  |   |             |               |                        |
|--|----------------|--|-------------------|--|--|---|-------------|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   | HAND AUGER #<br>C-1  |  |  |             |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |  | SURFACE ELEVATION<br>Approx+32 Feet (NAVD83) |   |             |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |  | EXCAV.<br>EFFORT                             | DCP   | QP<br>(TSF) | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |  |  |   |             |               |                        |
| 0  | 32             | Topsoil Thickness [6.0"]   |                   |  | E  |   |             |               |                        |
|  |                | (SC) CLAYEY SAND, tan and gray, moist, trace organics, trace rootlets          |                   |  |  |   |             |               |                        |
| 1  |                | (SC) CLAYEY SAND, gray and orange, moist, contains organics, contains rootlets |                   |  | M  |   |             |               |                        |
| 2  | 30             | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets               |                   |  |  |   |             |               |                        |
| 3  |                | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist                       |                   |  | E  |   |             |               |                        |
| 4  | 28             | END OF HAND AUGER @ 4'   |                   |  |  |   |             |               |                        |
| 5  |                |  |                   |  |  |   |             |               |                        |
| 6  | 26             |  |                   |  |  |   |             |               |                        |
| 7  |                |  |                   |  |  |   |             |               |                        |
| 8  | 24             |  |                   |  |  |   |             |               |                        |
| 9  |                |  |                   |  |  |   |             |               |                        |
| 10   | 22             |  |                   |  |  |   |             |               |                        |
| 11   |                |  |                   |  |  |   |             |               |                        |
| 12   | 20             |  |                   |  |  |   |             |               |                        |
| 13   |                |  |                   |  |  |   |             |               |                        |
| REMARKS:   |                |  |                   |  |  |   |             |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |  |  |   |             |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |  |   |             |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling:  | Groundwater After Drilling:                  | Seasonal High Water Table:  |             |               |                        |
| MEA  | 8/6/19         | Feet   |                   | Not Encountered  |  |   |             |               |                        |




















|  |             |   |                   |                |   |                             |          |   |                  |
|--|-------------|---|-------------------|----------------|---|-----------------------------|----------|---|------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |             |   |                   |                | HAND AUGER #<br>C-2   |                             |          |  |                  |
| CLIENT:<br>Seamon Whiteside & Associates   |             |   | Job #:<br>34:3542 |                | SURFACE ELEVATION<br>Approx+28 Feet (NAVD83)  |                             |          |   |                  |
| DEPTH (FT.)  | ELEV. (FT.) | LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC |                   | ARCH./ENG:     | EXCAV. EFFORT   | DCP                         | QP (TSF) | SAMPLE NO.  | MOIST. CONT. (%) |
| DESCRIPTION OF MATERIAL  |             |   |                   |                |   |                             |          |   |                  |
| 0  | 28          | Topsoil Thickness [6.0"]  |                   |                |  | E                           |          |   |                  |
| 1  | 27          | (SC) CLAYEY SAND, gray and orange, moist, trace rootlets          |                   |                |  | M                           |          |   |                  |
| 2  |             | (CL) SANDY LEAN CLAY, gray mottled orange, moist                  |                   |                |  | E                           |          |   |                  |
| 3  | 25          |   |                   |                |   |                             |          |   |                  |
| 4  |             | END OF HAND AUGER @ 4'  |                   |                |   |                             |          |   |                  |
| 5  | 23          |   |                   |                |   |                             |          |   |                  |
| 6  |             |   |                   |                |   |                             |          |   |                  |
| 7  | 21          |   |                   |                |   |                             |          |   |                  |
| 8  |             |   |                   |                |   |                             |          |   |                  |
| 9  | 19          |   |                   |                |   |                             |          |   |                  |
| 10   |             |   |                   |                |   |                             |          |   |                  |
| 11   | 17          |   |                   |                |   |                             |          |   |                  |
| 12   |             |   |                   |                |   |                             |          |   |                  |
| 13   | 15          |   |                   |                |   |                             |          |   |                  |
| REMARKS:   |             |   |                   |                |   |                             |          |   |                  |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |             |   |                   |                |   |                             |          |   |                  |
| GROUND WATER: While Drilling  After Drilling  SHWT  |             |   |                   |                | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT            |                             |          |   |                  |
| ECS REP.:<br>MEA   |             | DATE:<br>8/7/19   |                   | UNITS:<br>Feet |   | Cave-in Depth:              |          | Groundwater While Drilling:<br>Not Encountered                                      |                  |
|  |             |   |                   |                |   | Groundwater After Drilling: |          | Seasonal High Water Table:  |                  |





|  |                |  |                   |  |  |   |               |                        |
|--|----------------|--|-------------------|--|--|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   | HAND AUGER #<br>C-3  |  |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |  | SURFACE ELEVATION<br>Approx+28 Feet (NAVD83) |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                | ARCH./ENG:   |                   | EXCAV.<br>EFFORT   | DCP  | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |  |  |   |               |                        |
| 0  | 28             | Topsoil Thickness [6.0"]   |                   | E  |  |   |               |                        |
| 1  |                | (SC) CLAYEY SAND, orangish tan, moist, trace rootlets            |                   |  |  |   |               |                        |
| 2  | 26             | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets |                   | M  |  |   |               |                        |
| 3  |                | (SC) CLAYEY SAND, gray and reddish orange, moist                 |                   |  |  |   |               |                        |
| 4  | 24             | END OF HAND AUGER @ 4'   |                   |  |  |   |               |                        |
| 5  |                |  |                   |  |  |   |               |                        |
| 6  | 22             |  |                   |  |  |   |               |                        |
| 7  |                |  |                   |  |  |   |               |                        |
| 8  | 20             |  |                   |  |  |   |               |                        |
| 9  |                |  |                   |  |  |   |               |                        |
| 10   | 18             |  |                   |  |  |   |               |                        |
| 11   |                |  |                   |  |  |   |               |                        |
| 12   | 16             |  |                   |  |  |   |               |                        |
| 13   |                |  |                   |  |  |   |               |                        |
| REMARKS:   |                |  |                   |  |  |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |  |  |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |  |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling:  | Groundwater After Drilling:                  | Seasonal High Water Table:  |               |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered  |  |   |               |                        |





|  |                |   |                   |                             |  |                            |   |               |                        |
|--|----------------|---|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |   |                   |                             | HAND AUGER #<br>C-4  |                            |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |   | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+25 Feet (NAVD83)                             |                            |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |   | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL   |                   |                             |  |                            |   |               |                        |
| 0  | 25             | Topsoil Thickness [6.0"]  |                   |                             | E  |                            |   |               |                        |
|  |                | (SC) CLAYEY SAND, gray and orange, moist, contains organics, trace rootlets |                   |                             | M  |                            |   |               |                        |
| 1  | 24             | (CL) SANDY LEAN CLAY, gray mottled red and orange, moist, trace rootlets    |                   |                             |  |                            |   |               |                        |
| 2  |                |   |                   |                             | E  |                            |   |               |                        |
| 3  | 22             | (CL) SANDY LEAN CLAY, gray mottled red and orange, moist                    |                   |                             |  |                            |   |               |                        |
| 4  |                | END OF HAND AUGER @ 4'  |                   |                             |  |                            |   |               |                        |
| 5  | 20             |   |                   |                             |  |                            |   |               |                        |
| 6  |                |   |                   |                             |  |                            |   |               |                        |
| 7  | 18             |   |                   |                             |  |                            |   |               |                        |
| 8  |                |   |                   |                             |  |                            |   |               |                        |
| 9  | 16             |   |                   |                             |  |                            |   |               |                        |
| 10   |                |   |                   |                             |  |                            |   |               |                        |
| 11   | 14             |   |                   |                             |  |                            |   |               |                        |
| 12   |                |   |                   |                             |  |                            |   |               |                        |
| 13   | 12             |   |                   |                             |  |                            |   |               |                        |
| REMARKS:   |                |   |                   |                             |  |                            |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |   |                   |                             |  |                            |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |   |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:  | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |
| MEA  | 8/6/19         | Feet  |                   | Not Encountered             |  |                            |   |               |                        |

|  |                |  |                   |                             |  |                            |   |               |                        |
|--|----------------|--|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   |                             | HAND AUGER #<br>C-5  |                            |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+28 Feet (NAVD83)                             |                            |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |                             |  |                            |   |               |                        |
| 0  | 28             | Topsoil Thickness [12.0"]  |                   |                             | E  |                            |   |               |                        |
| 1  |                | (SC) CLAYEY SAND, tan and orangish red, moist, trace rootlets            |                   |                             | M  |                            |   |               |                        |
| 2  | 26             | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist, trace rootlets |                   |                             | E  |                            |   |               |                        |
| 3  |                | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist, trace rootlets |                   |                             | E  |                            |   |               |                        |
| 4  | 24             | END OF HAND AUGER @ 4'   |                   |                             |  |                            |   |               |                        |
| 5  |                |  |                   |                             |  |                            |   |               |                        |
| 6  | 22             |  |                   |                             |  |                            |   |               |                        |
| 7  |                |  |                   |                             |  |                            |   |               |                        |
| 8  | 20             |  |                   |                             |  |                            |   |               |                        |
| 9  |                |  |                   |                             |  |                            |   |               |                        |
| 10   | 18             |  |                   |                             |  |                            |   |               |                        |
| 11   |                |  |                   |                             |  |                            |   |               |                        |
| 12   | 16             |  |                   |                             |  |                            |   |               |                        |
| 13   |                |  |                   |                             |  |                            |   |               |                        |
| REMARKS:   |                |  |                   |                             |  |                            |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |                             |  |                            |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |
| MEA  | 8/6/19         | Feet   |                   | Not Encountered             |  |                            |   |               |                        |


|  |        |   |  |   |  |   |            |                  |
|--|--------|---|--|---|--|---|------------|------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |        |   |  | HAND AUGER #<br>HA-1  |  |  |            |                  |
| CLIENT:<br>Seamon Whiteside & Associates   |        |   | Job #:<br>34:3542  |   | SURFACE ELEVATION<br>Approx+28 Feet (NAVD83) |   |            |                  |
| DEPTH (FT.)  |        | ELEV. (FT.)   |  | LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC                     |  | ARCH./ENG:  |            |                  |
| DESCRIPTION OF MATERIAL  |        |   |  | EXCAV. EFFORT   | DCP  | QP (TSF)  | SAMPLE NO. | MOIST. CONT. (%) |
| 0  | 28     | Topsoil Tickness [8.0"]   |  |    | E  |   |            |                  |
| 1  |        | (SC) CLAYEY SAND, gray and orange, moist, trace rootlets                              |  |    | M  |   |            |                  |
|  |        | (CL) SANDY LEAN CLAY, dark gray mottled orange, moist, trace organics, trace rootlets |  |    |  |   |            |                  |
| 2  | 26     |   |  |   |  |   |            |                  |
| 3  |        |   |  |   |  |   |            |                  |
| 4  | 24     | (CL) SANDY LEAN CLAY, dark gray mottled orange, moist                                 |  |    |  |   |            |                  |
| 5  |        | (CL) LEAN CLAY, dark to light gray mottled orange, moist                              |  |    | E  |   |            |                  |
| 6  | 22     | (CL) LEAN CLAY, gray mottled orange, moist  |  |   |  |   |            |                  |
| 7  |        | (CL) SANDY LEAN CLAY, gray mottled orange, moist                                      |  |  |  |   |            |                  |
| 8  | 20     | (CL) SANDY LEAN CLAY, gray, moist   |  |  |  |   |            |                  |
| 9  |        | (SC) CLAYEY SAND, gray and orange, moist  |  |  | M  |   |            |                  |
| 10   | 18     | END OF HAND AUGER @ 10'   |  |   |  |   |            |                  |
| 11   |        |   |  |   |  |   |            |                  |
| 12   | 16     |   |  |   |  |   |            |                  |
| 13   |        |   |  |   |  |   |            |                  |
| REMARKS:   |        |   |  |   |  |   |            |                  |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |        |   |  |   |  |   |            |                  |
| GROUND WATER: While Drilling  After Drilling  SHWT  |        |   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |   |  |   |            |                  |
| ECS REP.:  | DATE:  | UNITS:  | Cave-in Depth:   | Groundwater While Drilling:   | Groundwater After Drilling:                  | Seasonal High Water Table:  |            |                  |
| MEA  | 8/6/19 | Feet  |  |   | 8.5 at 24 hr                                 |   |            |                  |





|  |             |  |                   |  |               |   |          |  |                  |                             |                            |
|--|-------------|--|-------------------|--|---------------|---|----------|--|------------------|-----------------------------|----------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |             |  |                   | HAND AUGER #<br>HA-2   |               |  |          |  |                  |                             |                            |
| CLIENT:<br>Seamon Whiteside & Associates   |             |  | Job #:<br>34:3542 | SURFACE ELEVATION<br>Approx+25 Feet (NAVD83)                             |               |   |          |  |                  |                             |                            |
| DEPTH (FT.)  | ELEV. (FT.) | LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC                |                   | ARCH./ENG:   | EXCAV. EFFORT | DCP   | QP (TSF) | SAMPLE NO.                                     | MOIST. CONT. (%) |                             |                            |
| DESCRIPTION OF MATERIAL  |             |  |                   |  |               |   |          |  |                  |                             |                            |
| 0  | 27          | Topsoil Thickness [12.0"]  |                   |  |               |   |          |  |                  |                             |                            |
| 1  | 26          | (CL) SANDY LEAN CLAY, tannish gray mottled orange and red, moist, trace rootlets |                   |  | E             |   |          |  |                  |                             |                            |
| 2  |             | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist                         |                   |  |               |   |          |  |                  |                             |                            |
| 3  | 24          |  |                   |  |               |   |          |  |                  |                             |                            |
| 4  |             | END OF HAND AUGER @ 4'   |                   |  |               |   |          |  |                  |                             |                            |
| 5  | 22          |  |                   |  |               |   |          |  |                  |                             |                            |
| 6  |             |  |                   |  |               |   |          |  |                  |                             |                            |
| 7  | 20          |  |                   |  |               |   |          |  |                  |                             |                            |
| 8  |             |  |                   |  |               |   |          |  |                  |                             |                            |
| 9  | 18          |  |                   |  |               |   |          |  |                  |                             |                            |
| 10   |             |  |                   |  |               |   |          |  |                  |                             |                            |
| 11   | 16          |  |                   |  |               |   |          |  |                  |                             |                            |
| 12   |             |  |                   |  |               |   |          |  |                  |                             |                            |
| 13   | 14          |  |                   |  |               |   |          |  |                  |                             |                            |
| REMARKS:   |             |  |                   |  |               |   |          |  |                  |                             |                            |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |             |  |                   |  |               |   |          |  |                  |                             |                            |
| GROUND WATER: While Drilling  After Drilling  SHWT  |             |  |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |               |   |          |  |                  |                             |                            |
| ECS REP.:<br>MEA   |             | DATE:<br>8/6/19  |                   | UNITS:<br>Feet   |               | Cave-in Depth:  |          | Groundwater While Drilling:<br>Not Encountered |                  | Groundwater After Drilling: | Seasonal High Water Table: |





| PROJECT NAME:<br>Tanner Park - Hanahan   |                 |   |  | HAND AUGER #<br>HA-3                         |   |  |            |                  |
|--|-----------------|---|--|--|---|---|------------|------------------|
| CLIENT:<br>Seamon Whiteside & Associates   |                 | Job #:<br>34:3542   |  | SURFACE ELEVATION<br>Approx+25 Feet (NAVD83) |   |   |            |                  |
| DEPTH (FT.)  | ELEV. (FT.)     | LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC           | ARCH./ENG:   | EXCAV. EFFORT                                | DCP                                       | QP (TSF)  | SAMPLE NO. | MOIST. CONT. (%) |
| DESCRIPTION OF MATERIAL  |                 |   |  |  |   |   |            |                  |
| 0  | 25              | Topsoil Thickness [6.0"]  |  | E  |   |   |            |                  |
| 1  | 24              | (SC) CLAYEY SAND, tan and orange, moist, contains organics                  |  | M  |   |   |            |                  |
| 2  |                 | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist, contains rootlets |  |  |   |   |            |                  |
| 3  | 22              | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist, trace rootlets    |  | E  |   |   |            |                  |
| 4  |                 | (SC) CLAYEY SAND, gray and orangish red, moist to wet                       |  |  |   |   |            |                  |
| 5  | 20              |   |  | M  |   |   |            |                  |
| 6  |                 | (CL) SANDY LEAN CLAY, gray mottled orange, moist to wet                     |  | E  |   |   |            |                  |
| 7  | 18              | (SC) CLAYEY SAND, gray and orange, wet                                      |  |  |   |   |            |                  |
| 8  |                 |   |  | M  |   |   |            |                  |
| 9  | 16              | (SP-SC) SAND WITH CLAY, orange, wet   |  |  |   |   |            |                  |
| 10   |                 | END OF HAND AUGER @ 10'   |  |  |   |   |            |                  |
| 11   | 14              |   |  |  |   |   |            |                  |
| 12   |                 |   |  |  |   |   |            |                  |
| 13   | 12              |   |  |  |   |   |            |                  |
| REMARKS:   |                 |   |  |  |   |   |            |                  |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                 |   |  |  |   |   |            |                  |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                 |   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |  |   |   |            |                  |
| ECS REP.:<br>MEA   | DATE:<br>8/7/19 | UNITS:<br>Feet  | Cave-in Depth:   | Groundwater While Drilling:<br>7             | Groundwater After Drilling:<br>5 at 24 hr | Seasonal High Water Table:  |            |                  |





|  |                |  |                   |  |  |   |             |               |                        |
|--|----------------|--|-------------------|--|--|---|-------------|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   | HAND AUGER #<br>HA-4   |  |  |             |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |  | SURFACE ELEVATION<br>Approx+30 Feet (NAVD83) |   |             |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |  | EXCAV.<br>EFFORT                             | DCP   | QP<br>(TSF) | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |  |  |   |             |               |                        |
| 0  | 30             | Topsoil Thickness [8.0"]   |                   |  | E  |   |             |               |                        |
| 1  |                | (SC) CLAYEY SAND, tan, moist, trace organics, trace rootlets             |                   |  |  |   |             |               |                        |
| 2  | 28             | (SC) CLAYEY SAND, gray and orange, moist, trace organics, trace rootlets |                   |  | M  |   |             |               |                        |
| 3  |                | (SC) CLAYEY SAND, gray and orange, moist, trace rootlets                 |                   |  |  |   |             |               |                        |
| 4  | 26             | END OF HAND AUGER @ 4'   |                   |  |  |   |             |               |                        |
| 5  |                |  |                   |  |  |   |             |               |                        |
| 6  | 24             |  |                   |  |  |   |             |               |                        |
| 7  |                |  |                   |  |  |   |             |               |                        |
| 8  | 22             |  |                   |  |  |   |             |               |                        |
| 9  |                |  |                   |  |  |   |             |               |                        |
| 10   | 20             |  |                   |  |  |   |             |               |                        |
| 11   |                |  |                   |  |  |   |             |               |                        |
| 12   | 18             |  |                   |  |  |   |             |               |                        |
| 13   |                |  |                   |  |  |   |             |               |                        |
| REMARKS:   |                |  |                   |  |  |   |             |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |  |  |   |             |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |  |   |             |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling:  | Groundwater After Drilling:                  | Seasonal High Water Table:  |             |               |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered  |  |   |             |               |                        |











|  |             |   |                   |  |                             |   |          |            |                  |
|--|-------------|---|-------------------|--|-----------------------------|---|----------|------------|------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |             |   |                   | HAND AUGER #<br>HA-5   |                             |  |          |            |                  |
| CLIENT:<br>Seamon Whiteside & Associates   |             |   | Job #:<br>34:3542 | SURFACE ELEVATION<br>Approx+24 Feet (NAVD83)                             |                             |   |          |            |                  |
| DEPTH (FT.)  | ELEV. (FT.) | LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC |                   | ARCH./ENG:   | EXCAV. EFFORT               | DCP   | QP (TSF) | SAMPLE NO. | MOIST. CONT. (%) |
| DESCRIPTION OF MATERIAL  |             |   |                   |  |                             |   |          |            |                  |
| 0  | 24          | Topsoil Thickness [6.0"]  |                   |  | E                           |   |          |            |                  |
|  |             | (SC) CLAYEY SAND, orangish tan, moist, trace rootlets             |                   |  |                             |   |          |            |                  |
| 1  |             | (SC) CLAYEY SAND, orangish tan and red, moist, trace rootlets     |                   |  |                             |   |          |            |                  |
| 2  | 22          | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets  |                   |  |                             |   |          |            |                  |
| 3  |             |   |                   |  |                             |   |          |            |                  |
| 4  | 20          | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets  |                   |  |                             |   |          |            |                  |
| 5  |             |   |                   |  | M                           |   |          |            |                  |
| 6  | 18          |   |                   |  |                             |   |          |            |                  |
| 7  |             |   |                   |  |                             |   |          |            |                  |
| 8  | 16          |   |                   |  |                             |   |          |            |                  |
| 9  | ▽           | (SP-SC) CLAY WITH SAND, gray and orange, wet                      |                   |  |                             |   |          |            |                  |
| 10   | 14          | END OF HAND AUGER @ 10'   |                   |  |                             |   |          |            |                  |
| 11   |             |   |                   |  |                             |   |          |            |                  |
| 12   | 12          |   |                   |  |                             |   |          |            |                  |
| 13   |             |   |                   |  |                             |   |          |            |                  |
| REMARKS:   |             |   |                   |  |                             |   |          |            |                  |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. |             |   |                   |  |                             |   |          |            |                  |
| GROUND WATER: While Drilling ▽ After Drilling ▽ SHWT ▽   |             |   |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                             |   |          |            |                  |
| ECS REP.:  | DATE:       | UNITS:  | Cave-in Depth:    | Groundwater While Drilling:  | Groundwater After Drilling: | Seasonal High Water Table:  |          |            |                  |
| MEA  | 8/7/19      | Feet  |                   | 9  |                             |   |          |            |                  |





|  |                |  |                   |                             |  |                            |   |               |                        |
|--|----------------|--|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   |                             | HAND AUGER #<br>HA-6   |                            |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+25 Feet (NAVD83)                             |                            |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL                                  |                   |                             |  |                            |   |               |                        |
| 0  | 25             | Topsoil Thickness [12.0"]                                |                   |                             | E  |                            |   |               |                        |
| 1  | 24             | (SC) CLAYEY SAND, gray and orange, moist, trace rootlets |                   |                             | M  |                            |   |               |                        |
| 2  |                |  |                   |                             | M  |                            |   |               |                        |
| 3  | 22             | (CL) SANDY LEAN CLAY, gray mottled orange, moist         |                   |                             | E  |                            |   |               |                        |
| 4  |                | END OF HAND AUGER @ 4'                                   |                   |                             |  |                            |   |               |                        |
| 5  | 20             |  |                   |                             |  |                            |   |               |                        |
| 6  |                |  |                   |                             |  |                            |   |               |                        |
| 7  | 18             |  |                   |                             |  |                            |   |               |                        |
| 8  |                |  |                   |                             |  |                            |   |               |                        |
| 9  | 16             |  |                   |                             |  |                            |   |               |                        |
| 10   |                |  |                   |                             |  |                            |   |               |                        |
| 11   | 14             |  |                   |                             |  |                            |   |               |                        |
| 12   |                |  |                   |                             |  |                            |   |               |                        |
| 13   | 12             |  |                   |                             |  |                            |   |               |                        |
| REMARKS:   |                |  |                   |                             |  |                            |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |                             |  |                            |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered             |  |                            |   |               |                        |

|  |                |  |                   |                             |  |                            |   |               |                        |   |
|--|----------------|--|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|---|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   |                             | HAND AUGER #<br>HA-7   |                            |  |               |                        |   |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+23 Feet (NAVD83)                             |                            |   |               |                        |   |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |   |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |                             |  |                            |   |               |                        |   |
| 0  | 23             | Topsoil Thickness [6.0"]   |                   |                             |  |                            |   |               |                        | E |
| 1  | 22             | (SC) CLAYEY SAND, tan, moist, trace rootlets                     |                   |                             |  |                            |   |               |                        | M |
| 2  |                | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets |                   |                             |  |                            |   |               |                        |   |
| 3  | 20             |  |                   |                             |  |                            |   |               |                        |   |
| 4  |                | END OF HAND AUGER @ 4'   |                   |                             |  |                            |   |               |                        |   |
| 5  | 18             |  |                   |                             |  |                            |   |               |                        |   |
| 6  |                |  |                   |                             |  |                            |   |               |                        |   |
| 7  | 16             |  |                   |                             |  |                            |   |               |                        |   |
| 8  |                |  |                   |                             |  |                            |   |               |                        |   |
| 9  | 14             |  |                   |                             |  |                            |   |               |                        |   |
| 10   |                |  |                   |                             |  |                            |   |               |                        |   |
| 11   | 12             |  |                   |                             |  |                            |   |               |                        |   |
| 12   |                |  |                   |                             |  |                            |   |               |                        |   |
| 13   | 10             |  |                   |                             |  |                            |   |               |                        |   |
| REMARKS:   |                |  |                   |                             |  |                            |   |               |                        |   |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |                             |  |                            |   |               |                        |   |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |   |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |   |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered             |  |                            |   |               |                        |   |

|  |                |  |                   |                             |  |                            |   |               |                        |
|--|----------------|--|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   |                             | HAND AUGER #<br>K-1  |                            |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+29 Feet (NAVD83)                             |                            |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |                             |  |                            |   |               |                        |
| 0  | 29             | Topsoil Thickness [6.0"]   |                   |                             | E  |                            |   |               |                        |
| 1  | 28             | (SC) CLAYEY SAND, orangish tan, moist, trace rootlets            |                   |                             | M  |                            |   |               |                        |
| 2  |                | (SC) CLAYEY SAND, gray and reddish orange, moist, trace rootlets |                   |                             |  |                            |   |               |                        |
| 3  | 26             | (SC) CLAYEY SAND, gray and reddish orange, moist                 |                   |                             |  |                            |   |               |                        |
| 4  |                | END OF HAND AUGER @ 4'   |                   |                             |  |                            |   |               |                        |
| 5  | 24             |  |                   |                             |  |                            |   |               |                        |
| 6  |                |  |                   |                             |  |                            |   |               |                        |
| 7  | 22             |  |                   |                             |  |                            |   |               |                        |
| 8  |                |  |                   |                             |  |                            |   |               |                        |
| 9  | 20             |  |                   |                             |  |                            |   |               |                        |
| 10   |                |  |                   |                             |  |                            |   |               |                        |
| 11   | 18             |  |                   |                             |  |                            |   |               |                        |
| 12   |                |  |                   |                             |  |                            |   |               |                        |
| 13   | 16             |  |                   |                             |  |                            |   |               |                        |
| REMARKS:   |                |  |                   |                             |  |                            |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |                             |  |                            |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered             |  |                            |   |               |                        |

|  |                |  |                   |                             |  |                            |             |   |                        |
|--|----------------|--|-------------------|-----------------------------|--|----------------------------|-------------|---|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   |                             | HAND AUGER #<br>K-2  |                            |             |  |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+27 Feet (NAVD83)                             |                            |             |   |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF) | SAMPLE<br>NO.   | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL                                      |                   |                             |  |                            |             |   |                        |
| 0  | 27             | Topsoil Thickness [6.0"]                                     |                   |                             | E  |                            |             |   |                        |
|  |                | (SC) CLAYEY SAND, tan, moist, trace organics, trace rootlets |                   |                             |  |                            |             |   |                        |
| 1  | 26             | (SC) CLAYEY SAND, gray and orange, moist, trace rootlets     |                   |                             |  |                            |             |   |                        |
| 2  |                | (SC) CLAYEY SAND, gray and reddish orange, moist             |                   |                             | M  |                            |             |   |                        |
| 3  | 24             |  |                   |                             |  |                            |             |   |                        |
| 4  |                | END OF HAND AUGER @ 4'                                       |                   |                             |  |                            |             |   |                        |
| 5  | 22             |  |                   |                             |  |                            |             |   |                        |
| 6  |                |  |                   |                             |  |                            |             |   |                        |
| 7  | 20             |  |                   |                             |  |                            |             |   |                        |
| 8  |                |  |                   |                             |  |                            |             |   |                        |
| 9  | 18             |  |                   |                             |  |                            |             |   |                        |
| 10   |                |  |                   |                             |  |                            |             |   |                        |
| 11   | 16             |  |                   |                             |  |                            |             |   |                        |
| 12   |                |  |                   |                             |  |                            |             |   |                        |
| 13   | 14             |  |                   |                             |  |                            |             |   |                        |
| REMARKS:   |                |  |                   |                             |  |                            |             |   |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |                             |  |                            |             |   |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |             |   |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |             |   |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered             |  |                            |             |   |                        |

|  |                |  |                   |  |  |   |             |               |                        |
|--|----------------|--|-------------------|--|--|---|-------------|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |  |                   | HAND AUGER #<br>K-3  |  |  |             |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |  | Job #:<br>34:3542 |  | SURFACE ELEVATION<br>Approx+24 Feet (NAVD83) |   |             |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |  | ARCH./ENG:        |  | EXCAV.<br>EFFORT                             | DCP   | QP<br>(TSF) | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL  |                   |  |  |   |             |               |                        |
| 0  | 24             | Topsoil Thickness [6.0"]   |                   |  | E  |   |             |               |                        |
|  |                | (SC) CLAYEY SAND, tan and orange, moist, trace organics, trace rootlets  |                   |  | M  |   |             |               |                        |
| 1  |                | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist, trace rootlets |                   |  |  |   |             |               |                        |
| 2  | 22             |  |                   |  | E  |   |             |               |                        |
| 3  |                | (CL) SANDY LEAN CLAY, gray mottled orange and red, moist                 |                   |  |  |   |             |               |                        |
| 4  | 20             | END OF HAND AUGER @ 4'   |                   |  |  |   |             |               |                        |
| 5  |                |  |                   |  |  |   |             |               |                        |
| 6  | 18             |  |                   |  |  |   |             |               |                        |
| 7  |                |  |                   |  |  |   |             |               |                        |
| 8  | 16             |  |                   |  |  |   |             |               |                        |
| 9  |                |  |                   |  |  |   |             |               |                        |
| 10   | 14             |  |                   |  |  |   |             |               |                        |
| 11   |                |  |                   |  |  |   |             |               |                        |
| 12   | 12             |  |                   |  |  |   |             |               |                        |
| 13   |                |  |                   |  |  |   |             |               |                        |
| REMARKS:   |                |  |                   |  |  |   |             |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |  |                   |  |  |   |             |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |  |                   | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |  |   |             |               |                        |
| ECS REP.:  | DATE:          | UNITS:   | Cave-in Depth:    | Groundwater While Drilling:  | Groundwater After Drilling:                  | Seasonal High Water Table:  |             |               |                        |
| MEA  | 8/7/19         | Feet   |                   | Not Encountered  |  |   |             |               |                        |

|  |                |   |                   |                             |  |                            |   |               |                        |
|--|----------------|---|-------------------|-----------------------------|--|----------------------------|---|---------------|------------------------|
| PROJECT NAME:<br>Tanner Park - Hanahan   |                |   |                   |                             | HAND AUGER #<br>K-4  |                            |  |               |                        |
| CLIENT:<br>Seamon Whiteside & Associates   |                |   | Job #:<br>34:3542 |                             | SURFACE ELEVATION<br>Approx+27 Feet (NAVD83)                             |                            |   |               |                        |
| LOCATION:<br>Williams Lane and North Rhett Avenue,<br>Hanahan, SC  |                |   | ARCH./ENG:        |                             | EXCAV.<br>EFFORT   | DCP                        | QP<br>(TSF)   | SAMPLE<br>NO. | MOIST.<br>CONT.<br>(%) |
| DEPTH<br>(FT.)   | ELEV.<br>(FT.) | DESCRIPTION OF MATERIAL   |                   |                             |  |                            |   |               |                        |
| 0  | 27             | Topsoil Thickness [4.0"]  |                   |                             | E  |                            |   |               |                        |
|  |                | (SM) SILTY SAND, dark gray, moist, contains organics, contains rootlets |                   |                             | E  |                            |   |               |                        |
| 1  | 26             | (SC) CLAYEY SAND, tan and reddish orange, moist, trace rootlets         |                   |                             | M  |                            |   |               |                        |
| 2  |                | (SC) CLAYEY SAND, gray and reddish orange, moist                        |                   |                             | M  |                            |   |               |                        |
| 3  | 24             |   |                   |                             |  |                            |   |               |                        |
| 4  |                | END OF HAND AUGER @ 4'  |                   |                             |  |                            |   |               |                        |
| 5  | 22             |   |                   |                             |  |                            |   |               |                        |
| 6  |                |   |                   |                             |  |                            |   |               |                        |
| 7  | 20             |   |                   |                             |  |                            |   |               |                        |
| 8  |                |   |                   |                             |  |                            |   |               |                        |
| 9  | 18             |   |                   |                             |  |                            |   |               |                        |
| 10   |                |   |                   |                             |  |                            |   |               |                        |
| 11   | 16             |   |                   |                             |  |                            |   |               |                        |
| 12   |                |   |                   |                             |  |                            |   |               |                        |
| 13   | 14             |   |                   |                             |  |                            |   |               |                        |
| REMARKS:   |                |   |                   |                             |  |                            |   |               |                        |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.   |                |   |                   |                             |  |                            |   |               |                        |
| GROUND WATER: While Drilling  After Drilling  SHWT  |                |   |                   |                             | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT |                            |   |               |                        |
| ECS REP.:  | DATE:          | UNITS:  | Cave-in Depth:    | Groundwater While Drilling: | Groundwater After Drilling:  | Seasonal High Water Table: |   |               |                        |
| MEA  | 8/7/19         | Feet  |                   | Not Encountered             |  |                            |   |               |                        |











## SECTION 312319 - DEWATERING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes construction dewatering.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
  1. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
  2. Prevent surface water from entering excavations by grading, dikes, or other means.
  3. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
  4. Remove dewatering system when no longer required for construction.

#### 1.4 SUBMITTALS

- A. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.
- B. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site.
  1. Review methods and procedures related to dewatering including, but not limited to, the following:

- a. Discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
- b. Geotechnical Report.
- c. Proposed site clearing and excavations.
- d. Existing utilities and subsurface conditions.
- e. Construction schedule.
- f. Monitoring of dewatering system.

D. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.

1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

## 1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Owner's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.

C. Survey Work: Where the dewatering is in the vicinity of existing structures, engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
  - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
  - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain erosion and sedimentation controls, which are specified in Section titled "Site Clearing," during earthwork operations.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
  - 1. Space well points or wells at intervals required to provide sufficient dewatering.
  - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

Hanahan Recreation Complex  
City of Hanahan

- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others and complies with the requirements of authorities having jurisdiction. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
  - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 312319

## SECTION 321216 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Hot-mix asphalt patching.Hot-mix asphalt paving.
  - 2. Hot-mix asphalt paving overlay.
  - 3. Pavement-marking.

#### 1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
  - 1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- B. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the South Carolina Department of Transportation for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- B. Preinstallation Conference: Conduct conference at Project site
- C. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
    - a. For locations within areas of DOT jurisdiction, perform all work, testing, and inspections in accordance with applicable DOT standards and procedures.



1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
  - 1. Where Work activities encroach into public rights-of-way, provide traffic control to maintain safe transit of work area by vehicular and pedestrian traffic.
    - a. All traffic control shall be in accordance with the requirements of the authorities having jurisdiction.
- B. Environmental Limitations: Do not apply asphalt materials if subgrade is frozen, wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. During the months of December, January and February except with the written permission of the Architect.
  - 2. Lift thickness of 1.0" or less: Min surface temp: 55 deg F and rising at time of placement.
  - 3. Lift thickness of 1.1" to 2.0": Min surface temp: 45 deg F and rising at time of placement.
  - 4. Lift thickness of 2.1" to 3.0": Min surface temp: 40 deg F and rising at time of placement.
  - 5. Lift thickness of 3.1" to 4.5": Min surface temp: 35 deg F and rising at time of placement.
- C. Pavement-Marking: Proceed with pavement marking only on clean, dry surfaces; at a minimum ambient or surface temperature of at least 55 deg F, and not exceeding 95 deg F; and at a maximum relative of 85%. Do not apply pavement markings if rain is imminent or expected before time required for adequate drying.

PART 2 - PRODUCTS

2.1 ASPHALT PAVING MIXES

- A. Base Course: Type A Hot Mix Asphalt Aggregate Base Course in accordance with Sections 310 and 401 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Prime/Tack Coat: Asphalt binder or emulsified asphalt in accordance with Section 401 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- C. Intermediate (Binder) Course: Type B Hot Mix Asphalt Intermediate Course in accordance with Sections 401 and 402 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

- D. Asphalt Surface Course: Type B, Type C Hot Mix Asphalt Surface Course in accordance with Sections 401 and 403 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

## 2.2 AUXILIARY MATERIALS

- A. Joint Sealant: ASTM D 6690, Type II, hot-applied, single-component, polymer-modified bituminous sealant.

## 2.3 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Reflectorized, heavy metals free, fast drying, waterborne paint for pavement markings in accordance with Section 625 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Color: As indicated.
  - 2. Glass Beads: AASHTO M 247, Type 1.
- B. Thermoplastic Pavement Markings: Reflectorized mixture of thermoplastic binder and spherical glass beads in accordance with Section 627 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Color: As indicated.
  - 2. Glass Beads: AASHTO M 247, Type 1.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that the subgrade and base course have been installed in accordance with the requirements of Division 31 Section "Earth Moving", and that it is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
  - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt surface course, in lifts not to exceed 3 inches thick, and compact each lift while still hot. Compact final lift flush with adjacent surface.

### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade and base course are ready to receive paving.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### 3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Place hot-mix asphalt aggregate base course to the total thicknesses indicated in lifts not to exceed 6 inches in thickness.
  - 2. Place hot-mix asphalt intermediate (binder) course to the total thicknesses indicated in lifts not to exceed 4 inches in thickness.
  - 3. Place hot-mix asphalt surface course to the total thicknesses indicated in lifts not to exceed 3 inches in thickness.
  - 4. Spread mix at temperature of not less than 250 deg F nor more than 325 deg F.
  - 5. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
  - 6. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in a minimum number of equal width consecutive strips, up to a maximum width of 12 feet for each strip.
  - 1. Adjust width and number of strips as necessary to provide the minimum number while maintaining requirement for longitudinal joint spacing of successive courses as indicated below. Make adjustments in lower courses such that the top course will be applied using the minimum possible number of strips.
  - 2. The width of each strip of the top course shall equal the width of the travel lane unless otherwise indicated.
  - 3. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of each asphalt course before beginning a succeeding course.

- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.
  - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
  - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.6 COMPACTION

- A. General: Begin compaction, starting at outside edges and joints, as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F.
  - 2. Roll with an 8 to 12 ton tandem steel-wheel roller conforming to the requirements of Section 401 of the South Carolina Department of Transportation Standard Specifications for Highway Construction
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density: between 98% and 102% of the target density established in accordance with SCDOT Specification SC-T-65.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Intermediate (Binder) Course: Plus or minus 1/4 inch.
  - 3. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Intermediate (Binder) Course: 1/4 inch.
  - 3. Surface Course: 1/8 inch.
  - 4. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### 3.8 PAVEMENT MARKING

- A. Do not apply pavement-markings until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Surface shall be dry and free of glaze, oil, dirt, grease or other foreign contaminants.
- E. Apply paint with mechanical equipment for the application of waterborne asphalt paint meeting the requirements of Section 625 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 2. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.
- F. Apply thermoplastic pavement markings with mechanical equipment for the application of thermoplastic pavement markings meeting the requirements of Section 627 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Apply at manufacturer's recommended rates to provide a finished thickness of 90 mils.
  - 2. Glass beads shall be mechanically applied to the surface of the thermoplastic material immediately after it is applied to the pavement surface and while it is still molten. Uniformly apply at a rate of 12 lb per 100 sq ft.

- G. Apply to produce pavement markings of the dimensions indicated; which are straight or of uniform curvature; of consistent width; and with crisp, uniform, edges.
  - 1. The finished line markings shall be free from waviness and the lateral deviations shall not exceed 2 inches in 15 feet.
  - 2. No markings shall be less than the specified width.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Contractual responsibilities for testing are identified in Division 1 Section "Quality Requirements". Responsible party will engage a qualified independent testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined by core samples in accordance with SCDOT Specification SC-T-100.
  - 1. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 samples taken, except for locations within areas of DOT jurisdiction which shall be sampled according to applicable DOT rates.
  - 2. Replace and compact hot-mix asphalt where core tests were taken.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with SCDOT Specifications SC-T-65 and SC-T-100.
  - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to SCDOT Specification SC-T-65, and compacted according to job-mix specifications.
  - 2. In-place density of compacted pavement will be determined by nuclear gauge in accordance with SCDOT Specifications SC-T-65, SC-T-68 and SC-T-100, as applicable.
    - a. One test will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 tests taken, except for locations within areas of DOT jurisdiction which shall be tested according to applicable DOT rates.
- E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### 3.10 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

### 3.11 PROTECTION

- A. Protect paving installations from deposition of sediments from adjoining grounds and vehicular traffic.
  - 1. Install and maintain erosion control measures as necessary, at boundaries of paving installations, to prevent migration of sediment onto the pavement surface.

Hanahan Recreation Complex  
City of Hanahan, South Carolina

2. Where practicable, erect and maintain barricades to prevent construction traffic on the paving surface.
3. Do not allow tracking of mud or debris onto the pavement surface by any vehicle.
4. If deposition of sediment on the paving surface is noted, remove and clean pavement surface immediately. Do not delay cleaning efforts as subsequent rainfall events may worsen potential damage.

END OF SECTION 321216

## SECTION 321313 - CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
  - 1. Curbs and gutters.
  - 2. Walkways.
  - 3.
  - 4.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C.
- D. Field quality-control test reports.
- E. Minutes of preinstallation conference.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with the equipment, material and production requirements of Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Concrete Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 and ASTM C 1077 to perform material evaluation tests and to design concrete mixtures.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- D. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.



## 1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
  - 1. Where Work activities encroach into public rights-of-way, provide traffic control to maintain safe transit of work area by vehicular and pedestrian traffic.
    - a. All traffic control shall be in accordance with the requirements of the authorities having jurisdiction.
- B. Environmental Limitations: Do not install concrete paving if subgrade is frozen, wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the ambient air temperature is below, or is expected to fall below, 40 deg F during the time of placement.

## PART 2 - PRODUCTS

### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  - 1. Use flexible or curved forms for curves as necessary in order to prevent a chord effect in the alignment of the finished work.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

### 2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Plain Steel Wire: ASTM A 82, as drawn.
- D. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- E. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- F. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
  2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- H. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.
- I. Zinc Repair Material: ASTM A 780.

## 2.3 CONCRETE MATERIALS

- A. Concrete: Class 3000 concrete in accordance with Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Water: ASTM C 94/C 94M.
- C. Admixtures: Air-entraining, accelerating, retarding, and water reducing admixtures shall be in accordance with Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

## 2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

### 1. Products:

- a. Axim Concrete Technologies; Cimfilm.
- b. Burke by Edeco; BurkeFilm.
- c. ChemMasters; Spray-Film.
- d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
- e. Dayton Superior Corporation; Sure Film.
- f. Euclid Chemical Company (The); Eucobar.
- g. Kaufman Products, Inc.; Vapor Aid.
- h. Lambert Corporation; Lambco Skin.
- i. L&M Construction Chemicals, Inc.; E-Con.
- j. MBT Protection and Repair, ChemRex Inc.; Confilm.
- k. Meadows, W. R., Inc.; Sealtight Evapre.
- l. Metalcrete Industries; Waterhold.
- m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
- n. Sika Corporation, Inc.; SikaFilm.
- o. Symons Corporation; Finishing Aid.

- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. Products:
  - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
  - b. Burke by Edoko; Aqua Resin Cure.
  - c. ChemMasters; Safe-Cure Clear.
  - d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
  - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
  - f. Euclid Chemical Company (The); Kurez DR VOX.
  - g. Kaufman Products, Inc.; Thinfilm 420.
  - h. Lambert Corporation; Aqua Kure-Clear.
  - i. L&M Construction Chemicals, Inc.; L&M Cure R.
  - j. Meadows, W. R., Inc.; 1100 Clear.
  - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
  - l. Symons Corporation; Resi-Chem Clear.
  - m. Tamms Industries Inc.; Horncure WB 30.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

1. Products:
  - a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
  - b. Burke by Edoco; Resin Emulsion White.
  - c. ChemMasters; Safe-Cure 2000.
  - d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
  - e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
  - f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
  - g. Kaufman Products, Inc.; Thinfilm 450.
  - h. Lambert Corporation; Aqua Kure-White.
  - i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
  - j. Meadows, W. R., Inc.; 1200-White.
  - k. Symons Corporation; Resi-Chem White.
  - l. Tamms Industries, Inc.; Horncure 200-W.

## 2.5 RELATED MATERIALS

- A. Preformed Joint Filler: AASHTO M 153, preformed sponge rubber expansion joint filler.
  1. Use only materials manufactured from rubber.
  2. Use materials that require a load of not less than 340 kPa or greater than 5,200kPa to compress to 50% of its thickness when tested in accordance with AASHTO T 42.
  3. Use materials that have a recovery of at least 70% when tested in accordance with AASHTO T 42.
  4. For locations within areas of SCDOT jurisdiction, use only products that are listed on SCDOT Qualified Product List 81.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
  1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 3000 psi/ as indicated.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: in accordance with Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 3. Slump Limit: 5 inches, plus or minus 1 inch, except where lower slump is required for automatic machine placement or other specialized applications.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to the requirements of Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction as follows:
  - 1. Fly Ash: 20 percent.
  - 2. Ground Granulated Blast-Furnace Slag: 50 percent.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to Sections 501 and 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. For concrete curb and gutter and pavements to be subjected to vehicular traffic, proof-roll prepared subbase surface with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
  - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Section titled "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

#### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

#### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

#### 3.4 STEEL REINFORCEMENT

- A. General: Comply with Sections 501 and 703 of the South Carolina Department of Transportation Standard Specifications for Highway Construction and CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
  2. For locations within areas of DOT jurisdiction, perform all work, testing, and inspections in accordance with applicable DOT standards and procedures.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  2. Provide tie bars at sides of pavement strips where indicated.
  3. Butt Joints: Use bonding agent or epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Unless otherwise indicated, joints shall be 3/4 inch in width.
  2. Locate expansion joints at intervals of 100 feet, unless otherwise indicated.
  3. Extend joint fillers full width and depth of joint.
  4. Place top of joint filler flush with finished concrete surface.
  5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction (Control) Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/2-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces unless indicated to remain.
  2. Spacing in Pavements: Unless otherwise indicated, locate as follows:
    - a. Locate transverse contraction joints at intervals twice the width of the pavement, not to exceed 10 feet.
    - b. Where the pavement width exceeds 10 feet to a maximum of 24 feet, locate a longitudinal contraction joint along the centerline of the pavement.

- c. Where the pavement width exceeds 24 feet, locate longitudinal contraction joints at evenly spaced divisions not to exceed 10 feet.
- 3. Spacing in Curb: Unless otherwise indicated, locate contraction joints to coincide with the adjoining concrete pavement or, where an adjoining concrete pavement does not exist, at an interval of 10 feet.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/2-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces unless indicated to remain.

### 3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with the requirements of Sections 501, 701, and 720 of the South Carolina Department of Transportation Standard Specifications for Highway Construction for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to Sections 501 and 720 of the South Carolina Department of Transportation Standard Specifications for Highway Construction by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed pavement surfaces with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

- K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- L. When adjoining pavement lanes are placed in separate pours, do not operate concrete installation equipment on placed concrete until it has attained 85 percent of its 28-day compressive strength.
- M. Cold-Weather Placement: Comply with Sections 501, 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. Concrete operations shall not be undertaken when air temperature has fallen to or is expected to fall below 40 deg F.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- N. Hot-Weather Placement: Comply with Sections 501, 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

### 3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.



- B. Comply with Sections 501, 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.9 PAVEMENT TOLERANCES

- A. Comply with tolerances of Section 501 of the South Carolina Department of Transportation Standard Specifications for Highway Construction and as follows:
  - 1. Elevation: 1/4 inch.
  - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
  - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
  - 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
  - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
  - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
  - 8. Joint Spacing: 3 inches.
  - 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
  - 10. Joint Width: Plus 1/8 inch, no minus.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Contractual responsibilities for testing are identified in Division 1 Section "Quality Requirements". Responsible party will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
    - 1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day, except for locations within areas of DOT jurisdiction which shall be sampled according to applicable DOT rates.
      - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
    - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
    - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
    - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
    - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
    - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
      - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
  - C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  - D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  - E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  - F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
  - G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
  - H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.11 REPAIRS AND PROTECTION
- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

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- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude vehicular traffic from pavement for at least 7 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

## SECTION 321410 – ADA DETECTABLE WARNING PAVERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. ADA detectable warning concrete pavers set in mortar setting beds.

#### 1.3 SUBMITTALS

- A. Product Data: For materials other than water and aggregates.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Regulatory Requirements: Comply with the requirements of the Americans with Disabilities Act and related regulations and guidelines.
- C. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store liquids in tightly closed containers protected from freezing.

## 1.6 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Mortar:
  - 1. Cold-Weather Requirements: Protect unit paver work against freezing when ambient temperature is 40 deg F and falling. Heat materials to provide mortar temperatures between 40 and 120 deg F. Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40 deg F, cover with weather-resistant membrane; below 25 deg F, cover with insulating blankets; below 20 deg F, provide enclosure and temporary heat to maintain temperature above 32 deg F.
  - 2. Hot-Weather Requirements: Protect unit paver work when temperature and humidity conditions produce excessive evaporation of setting beds. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
    - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

## PART 2 - PRODUCTS

### 2.1 ADA DETECTABLE WARNING PAVERS

- A. ADA Detectable Warning Concrete Pavers: Solid interlocking paving units complying with ASTM C 936 and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ADA Detectable Warning Pavers by ECG (Elizabeth City Glass), Inc. (These pavers are approved by SCDOT and therefore must be used for all work within an SCDOT R/W).
    - b. Hanover Detectable Warning Pavers by Hanover Architectural Products
    - c. Detectable Warning Pavers by Tile Tech Industries.
    - d. ADA Detectable Warning Pavers by Pavestone Company.
  - 2. Surface Texture: Non-slip, truncated dome surface texture meeting the requirements of the Americans with Disabilities Act (ADA).
  - 3. Thickness: From 1" to 4" depending on manufacturer.
  - 4. Face Size and Shape: Square or rectangular, depending on manufacture with no dimension larger than 11-3/4".
  - 5. Color: As selected by Architect from manufacturer's full range.

### 2.2 MORTAR SETTING-BED MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.

- B. Sand: ASTM C 144.
- C. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
  - 1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
    - a. Boiardi Products Corporation.
    - b. Bonsal, W. R. Company.
    - c. Bostik Findley Inc.
    - d. C-Cure.
    - e. Custom Building Products.
    - f. DAP Inc.
    - g. Jamo Inc.
    - h. Laticrete International, Inc.
    - i. MAPEI Corp.
    - j. SGM.
    - k. Summitville Tiles, Inc.
    - l. TEC Incorporated; H. B. Fuller Company.
- D. Water: Potable.

### 2.3 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout if they have reached their initial set before being used.
- B. Mortar-Bed Bond Coat: Mix neat cement or cement and sand with latex additive to a creamy consistency.
- C. Latex-Modified, Portland Cement Setting-Bed Mortar: Proportion and mix portland cement, sand, and latex additive for setting bed to comply with written instructions of latex-additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.
- D. Latex-Modified, Portland Cement Slurry Bond Coat: Proportion and mix portland cement, sand, and latex additive for slurry bond coat to comply with written instructions of latex-additive manufacturer.

### 2.4 AGGREGATE MATERIALS

- A. All sand and aggregate materials shall be free of shale, clay, friable material, debris, waste, frozen materials, vegetation, organic material, or other deleterious matter.
- B. Sand for Joints: Natural or manufactured sand in accordance with the gradation requirements for Fine Aggregate FA-10 (natural) or FA-10M (manufactured) as defined by the South Carolina Department of Transportation Standard Specifications for Highway Construction.

1. Provide sand of color needed to produce required joint color.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Clean concrete substrates to remove dirt, dust, debris, and loose particles.
- C. Confirm that job-built concrete edge restraints comply with requirements in Division 32 Section "Concrete Paving."

#### 3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: As indicated.
- E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

#### 3.4 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing setting bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
- C. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

- D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Cut back, bevel edge, remove, and discard setting-bed material that has reached initial set before placing pavers.
- E. Place pavers before initial set of cement occurs. Immediately before placing pavers on setting bed, apply uniform 1/16-inch- thick, slurry bond coat to bed or to back of each paver with a flat trowel.
- F. Tamp pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- G. Spaced Joint Widths: Provide 1/8-inch nominal joint width with variations not exceeding plus or minus 1/16 inch.
- H. Do not allow traffic on installed pavers until sand has been swept into joints.
- I. After mortar has fully cured for at least 24 hours, spread dry sand and fill joints. Sweep pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
- J. Do not allow traffic on installed pavers until sand has been swept into joints.
- K. Repeat joint-filling process 30 days later.

### 3.5 REPAIRING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321400



## SECTION 323113 - CHAIN LINK FENCES AND GATES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Chain-Link Fences: Residential.
  - 2. Gates: swing.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Determine minimum post size, group, and section according to ASTM F 1043 for framework height indicated and post spacing not to exceed 10 feet.
- B. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

#### 1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
  - 1. Fence and gate posts, rails, and fittings.
  - 2. Chain-link fabric, reinforcements, and attachments.
  - 3. Gates and hardware.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for gates serving as a required means of access.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.
- B. Interruption of Existing Utility Service: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect no fewer than two days in advance of proposed interruption of utility services.
  - 2. Do not proceed with interruption of utility services without Architect's written permission.

## PART 2 - PRODUCTS

### 2.1 CHAIN-LINK FENCE FABRIC

- A. General: Height indicated on Drawings. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:
  - 1. Steel Wire Fabric: Polymer-coated wire with a diameter as indicated.
    - a. Mesh Size: 2 inches.
    - b. Weight of Metallic (Zinc) Coating: ASTM A 392, Type II, Class 1, 1.2 oz./sq. ft.
    - c. Polymer Coating: ASTM F 668, Class 1 over metallic-coated steel wire.
      - 1) Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.
  - 2. Selvage: Twisted top and knuckled bottom.

### 2.2 FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
  - 1. Group: IA, round steel pipe, Schedule 40.
  - 2. Fence Height: As indicated.
  - 3. Strength Requirement: Light industrial according to ASTM F 1043.
  - 4. Post Diameter and Thickness: According to ASTM F 1043.
  - 5. Post Size and Thickness: According to ASTM F 1043.
    - a. Top Rail: As indicated.
    - b. Line Post: As indicated.
    - c. End, Corner and Pull Post: As indicated.
    - d. Swing Gate Post: According to ASTM F 900.
  - 6. Coating for Steel Framing:
    - a. Metallic Coating:

- 1) Type A, consisting of not less than minimum 2.0-oz./sq. ft. average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating per ASTM A 653/A 653M.
  - 2) Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
  - 3) External, Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- thick, zinc pigmented coating.
  - 4) Coatings: Any coating above.
- b. Polymer coating over metallic coating: ASTM F 1043, Class 1 over metallic-coated steel framing.
- 1) Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

### 2.3 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations:
1. Location: Extended along bottom of fence fabric for 5' high outfield fence.
- B. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire complying with ASTM A 817, ASTM A 824, and the following:
1. Metallic Coating: Type II, zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:
    - a. Matching chain-link fabric coating weight.
- C. Polymer coating over metallic coating: ASTM F 1043, Class 1 over metallic-coated steel wire.
- 1) Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

### 2.4 SWING GATES

- A. General: Comply with ASTM F 900 for single and double swing gate types.
1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1043 and ASTM F 1083 for materials and protective coatings.
- B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:
1. Gate Fabric Height: 2 inches less than adjacent fence height.
  2. Leaf Width: As indicated.
  3. Frame Members:
    - a. Tubular Steel: 1.90 inches round.

- C. Frame Corner Construction:
  - 1. Welded, with 5/16-inch- diameter, adjustable truss rods for panels 5 feet wide or wider].
- D. Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and keepers for each gate leaf more than 5 feet wide. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
- E. Polymer coating over metallic coating: ASTM F 1043, Class 1 over metallic-coated steel framing.
  - 1. Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

## 2.5 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post and Line Caps: Provide for each post.
- C. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
  - 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
    - a. Hot-Dip Galvanized Steel: 0.148-inch-diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
- I. Finish: Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.
- J. Polymer coating over metallic coating: ASTM F 1043, Class 1 over metallic-coated steel fittings.
  - 1. Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.6 CAST-IN-PLACE CONCRETE

2.7 Materials: Ready-mixed concrete complying with ASTM C 94/C 94M or dry-packaged concrete mix complying with ASTM C 387 for normal-weight concrete mixed with potable water according to manufacturer's written instructions.

1. Concrete Mixes: Normal-weight concrete with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.8 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.9 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
  1. Material above Finished Grade: Copper.
  2. Material on or below Finished Grade: Copper.
  3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.
  1. Grounding Rods: Copper-clad steel.
    - a. Size: 5/8 by 96 inches.

2.10 POLYMER FINISHES

- A. Supplemental Color Coating: In addition to specified metallic coatings for steel, provide fence components with polymer coating.
- B. Metallic-Coated Steel Tension Wire: PVC-coated wire complying with ASTM F 1664.
- C. Metallic-Coated Steel Framing and Fittings: Comply with ASTM F 626 and ASTM F 1043 for polymer coating applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces.
  1. Polymer Coating: Not less than 10-mil- thick PVC or 3-mil- thick polyester finish.
- D. Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.
  - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

### 3.4 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Concealed Concrete: Top 2 inches below grade as indicated on Drawings to allow covering with surface material.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more and as indicated on Drawings.
- D. Line Posts: Space line posts uniformly at 10 feet maximum o.c. or as indicated, whichever is shorter.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 6 feet or higher, on fences with top rail and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

- F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.
  - 1. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Bottom Rails: Install, spanning between posts.
- I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

### 3.5 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

### 3.6 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
  - 1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
    - a. Gates and Other Fence Openings: Ground fence on each side of opening.
      - 1) Bond metal gates to gate posts.

- 2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
  - C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:
    1. Each Barbed Wire Strand. Make grounding connections to barbed wire with wire-to-wire connectors designed for this purpose.
    2. Each Barbed Tape Coil: Make grounding connections to barbed tape with connectors designed for this purpose.
  - D. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
  - E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
    1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
    2. Make connections with clean, bare metal at points of contact.
    3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
    4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
    5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
  - F. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

### 3.7 FIELD QUALITY CONTROL

- A. Grounding-Resistance Testing: Engage a qualified independent testing and inspecting agency to perform field quality-control testing.
  1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
  2. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify Architect promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
  3. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.



3.8 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION 323113

## SECTION 323223 - SEGMENTAL RETAINING WALLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes single-depth segmental retaining walls without soil reinforcement.

#### 1.3 SUBMITTALS

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

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle concrete units and accessories to prevent deterioration or damage due to moisture, temperature changes, contaminants, breaking, chipping, or other causes.
- B. Store geosynthetics in manufacturer's original packaging with labels intact. Store on elevated platforms, protected from moisture, sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geosynthetics before using and examine them for defects as material is placed.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Segmental Retaining Wall Units:
    - a. Licensees of Allan Block Corporation.
    - b. Licensees of Anchor Wall Systems, Inc.
    - c. Licensees of Geo Western, Inc.
    - d. Licensees of ICD Corporation.
    - e. Licensees of Keystone Retaining Wall Systems, Inc.
    - f. Licensees of Reinforced Earth Company (The).
    - g. Licensees of Risi Stone Systems; a division of Rothbury International Inc.
    - h. Licensees of Rockwood Retaining Wall Systems.
    - i. Licensees of Tensor Earth Technologies, Inc.
    - j. Licensees of Versa-Lok Retaining Wall Systems; a division of Kiltie Corp.
    - k. Licensees of RidgeRock Retaining Walls, Inc.

## 2.2 SEGMENTAL RETAINING WALL UNITS

- A. Concrete Units: ASTM C 1372, Normal Weight, except that units shall not differ in height more than plus or minus 1/16 inch from specified dimension.
  - 1. Provide units that comply with requirements for freeze-thaw durability.
  - 2. Provide units that interlock with courses above and below by means of clips.
- B. Colors: As selected by Architect from manufacturer's full range.
- C. Shapes: Provide units of basic shape and dimensions indicated with machine-split textured exposed faces.
- D. Cap Units: Provide cap units of shape indicated with smooth, as-cast top surfaces without holes or lugs.
- E. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces as indicated.

## 2.3 INSTALLATION MATERIALS

- A. Clips: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from nondegrading polymer reinforced with glass fibers.
- B. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.
- C. Leveling Base: Comply with requirements in Section titled "Earth Moving".
- D. Drainage Fill: Comply with requirements in Section titled "Subdrainage."
- E. Filter Fabric: Comply with requirements in Section titled "Subdrainage."
- F. Drainage Pipe: Comply with requirements in Section titled "Subdrainage."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 RETAINING WALL INSTALLATION

- A. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions. Lay units in running bond.

- B. Leveling Base: Place and compact base material to thickness indicated and with not less than 95 percent maximum dry unit weight according to ASTM D 698.
- C. First Course: Place first course of segmental retaining wall units on leveling base/course for full length of wall. Place units in firm contact with each other, properly aligned and level.
- D. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.
- E. Cap Units: Place cap units and secure with cap adhesive according to manufacturer's written instructions.

### 3.3 FILL PLACEMENT

- A. General: Comply with requirements in Section titled "Earth Moving", NCMA's "Segmental Retaining Wall Installation Guide," and segmental retaining wall unit manufacturer's written instructions.
- B. Place, spread, and compact fill in uniform lifts for full width and length of embankment as wall is laid. Begin at back of wall and place and spread fill toward embankment.
  - 1. Use only hand-operated compaction equipment within 48 inches of wall, or one-half of height above bottom of wall, whichever is greater.
  - 2. Compact drainage fill to not less than 95 percent maximum dry unit weight according to ASTM D 698.
  - 3. Compact nonreinforced soil fill to comply with Section titled "Earth Moving."
- C. Place filter fabric against back of wall and place layer of drainage fill at least 12 inches deep behind filter fabric to within 12 inches of finished grade. Place another layer of filter fabric between drainage fill and soil fill.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Comply with requirements in Section titled "Earth Moving" for in-place compaction testing.
  - 1. In each compacted backfill layer, perform at least 1 field in-place compaction test for each 150 feet or less of segmental retaining wall length.

### 3.5 ADJUSTING AND CLEANING

- A. Remove and replace segmental retaining wall construction of the following description:
  - 1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if methods and results are approved by Architect.
  - 2. Segmental retaining walls that do not match approved samples.
  - 3. Segmental retaining walls that do not comply with other requirements indicated.
- B. Replace units so segmental retaining wall matches approved samples, complies with other requirements, and shows no evidence of replacement.

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END OF SECTION 323223

## SECTION 328400 – IRRIGATION SYSTEMS

### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes piping, valves, sprinklers, controls, and wiring for automatic control irrigation systems.
- B. Extent of the underground irrigation system is shown in the plans, schedules, and notes.
- C. Provide all labor. Materials and equipment required or inferred from the Drawing and Specifications to complete the Work of this Section.
- D. Provide a complete and operable system for the irrigation of all landscapes areas on the project site, unless indicated otherwise. The Drawings and specifications are intended to include all items obviously necessary and requisite for the proper irrigation of the project.
- E. The contractor shall be responsible for adjusting head locations, nozzle type and size, and any other system components so that the irrigation system layout is coordinated with actual field conditions. Such adjustments shall be made at no cost to the Owner except, when authorized in writing, such adjustments which will be compensated for at an agreed upon cost.

#### 1.03 DEFINITIONS

- A. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Mainline Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- D. The following are industry abbreviations for plastic materials:
  - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
  - 2. FRP: Fiberglass-reinforced plastic.
  - 3. PA: Polyamide (nylon) plastic.
  - 4. PE: Polyethylene plastic.
  - 5. PP: Polypropylene plastic.
  - 6. PTFE: Polytetrafluoroethylene plastic.
  - 7. PVC: Polyvinyl chloride plastic.
  - 8. TFE: Tetrafluoroethylene plastic.
  - 9. HDPE High Density Polyethylene plastic.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. Head-to-head coverage irrigation system for lawns and exterior plants as shown or indicated on associated plans.
- B. Drawings are diagrammatic and generally indicate the Work to be installed. The Drawing do not indicate all off-set fittings that may be necessary. The Contractor shall furnish such items as may be required to complete the work.
- C. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain a minimum of head-to-head coverage and dripline row spacing for turf and planting areas unless otherwise indicated.
- D. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:
  - 1. Irrigation Main Piping: 200 psi.
  - 2. Lateral Piping: 200 psi.

#### 1.05 SUBMITTALS

- A. Approval: Obtain approval from Landscape Architect for all submittals prior to the beginning of Work, unless otherwise approved.
- B. Product Data: Individual copies for product data shall be submitted Include pressure ratings, rated capacities, and settings of selected models for the following:
  - 1. Contractor Qualifications as per Section 1.06.A.
  - 2. Sprinklers and nozzles.
  - 3. Electrical Control Valves.
  - 4. Drip Control Valves.
  - 5. Quick Coupler Valves.
  - 6. Isolation Valves.
  - 7. Valve boxes.
  - 8. Drip Tubing and fittings.
  - 9. Drip Indicator.
  - 10. Controllers and associated communication equipment.
  - 11. Control cables. Include splice kits.
  - 12. Decoders.
  - 13. Grounding equipment.
  - 14. Rain Sensor
  - 15. PVC fittings.
  - 16. PVC Primer and Cement.
  - 17. Mainline, Lateral and Sleeve piping.
  - 18. Mainline, Lateral pipe fittings

- B. As-Built Drawings: Any changes in the layout and or arrangements of the proposed irrigation system, or any other differences between the proposed system and actual installed conditions are to be recorded by the Irrigation Contractor in the form of an "As-Built" Drawing. As-Built Drawing to be produced in an electronic format using AutoCAD. Provide the Owner and the Landscape Architect and AutoCAD & PDF file along with five(5) hard copies of the As-Built Drawings before Work under this Contract will be considered for Acceptance. All automatic and manual valves, hose bibs or quick couplers, wire splice, and pressurized mainline locations shall be show with actual field dimensions in feet and inches from tow permanent reference points so they may be located easily in the field. Submittals of approved As-Built Drawing will precede any Application for Final Payment by the Contractor.
- C. Operation and Maintenance Data: For irrigation systems, to include in emergency, operation, and maintenance manuals, including data for the following:
  - 1. Automatic-control valves.
  - 2. Isolation valves.
  - 3. Sprinklers.
  - 4. Control systems.
- C. Test Reports: Field test results of the irrigation supply well to include flow rates, and recovery rates.
- D. Shop Drawings: Submit certified shop drawings showing complete information for fabrication and installation of pump station. Shop drawings shall include a complete electrical wiring diagram.

#### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage a firm or firms specializing in irrigation system installation. Installer shall have successfully completed five projects similar in material, size, scope and complexity to that indicated for this Project that have resulted in construction with a record of successful in-service performance. Provide listing of the 5 similar project showing number of zones, water source, mainline sizes, control system and project contact phone number and e-mail address.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Codes and Standards: Perform the work in compliance with applicable requirements of governing authorities having jurisdiction. County regulations supersede these specifications. Notify Landscape Architect in writing of all discrepancies immediately.
- D. Approval and Selection of Materials and Work: The selection of all materials and the execution of all operations required under the Drawings and Specifications is subject to the approval of the Owner and Landscape Architect. They have the right to reject any and all materials and any and all work which, in their opinion, does not meet the requirements of the Contract Documents at any state of the operations. Remove rejected Work and or materials from the project site and replace promptly.
- E. Do Not Make Substitutions: If the Contractor desires to make substitutions of materials, sufficient descriptive literature and material samples must be furnished to establish the material as an equal substitute. In addition, the Contractor must state his reasons for desiring substitute



materials and any potential cost savings. Submit this request and information to the Landscape Architect.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

#### 1.08 PROJECT CONDITIONS

- A. The site irrigation system is comprised of 4 major components, pumping system, pond recharge well, sprinkler system and the control system.
- B. The irrigation system is designed to operate under the following conditions. A minimum of 115 psi water pressure, and at least a 200 gpm available water supply at the pump station discharge outlet.
- C. Insurance on irrigation materials or equipment stored or installed is the responsibility of the Contractor. Such insurance shall cover fire, theft and vandalism. Should the Contractor elect not to provide for such insurance, he will in no way hold the Owner responsible for any losses incurred by the aforementioned acts. The Contractor is responsible for all costs incurred in replacing damaged or stolen materials or equipment prior to Substantial Completion of the Work.
- D. Obtain all required permits and pay all required fees, at no additional cost to the Owner. Any penalties imposed due to the failure to obtain permits or pay fees are the responsibility of the Contractor.
- E. Provide and maintain all passageways, guard fences, warning lights and other protective devices required by the local authorities.
- F. Existing grades: Existing grades will be within .2 feet of grades shown on the Civil Engineering Drawings at the time of work. Determine conditions of existing grades prior to beginning the Work. When irregular or incomplete grading conditions are encountered, notify the Owner in writing before beginning the Work. Determine location of existing drainage patterns and maintain patterns in completed Work. Perform Work in a manner which will avoid damage to finished grading and drainage patterns. All damage to finished grading and drainage resulting from Work covered in these Contract Documents shall be repaired at the Contractor's expense.
- G. Existing Utilities: Determine location of underground utilities. Perform Work in a manner which will avoid possible damage. Excavate as required. Maintain grade stakes set by other unless removal is mutually agreed upon by parties concerned. All damage to utilities resulting from Work covered in these Contract Documents shall be repaired at the Contractor's expense.
- H. Existing Conditions: Perform irrigation Work in Tree Protection zones and in existing or previously completed landscape areas to avoid damage and disturbance to these areas. Limit work in these areas to only that necessary to perform work specified herein and shown on the Drawings. Return and repair any areas damaged or disturbed while performing the Work to the existing conditions encountered prior to the Work.

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- I. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Owner's Representative no fewer than two (2) days in advance of proposed interruption of water service.
  - 2. Do not proceed with interruption of water service without Owner's Representative written permission.
  
- J. Removal of Hardscape: Do not remove hardscape surface unless permitted under the following conditions:
  - 1. Coordinate with Owner's Representative no fewer than two (2) days in advance of proposed hardscape removal.
  - 2. Hardscape removal must not interrupt normal traffic flow on hardscape area.
  - 3. Area of removal must be useable prior to close of workday and completely repaired within 2 days of removal.

#### 1.09 COORDINATION

- A. Coordinate installation of irrigation system with Owner's Representative and/or all other trades on site to ensure irrigation system or other work on site will not be damaged. Should contractor fail to coordinate, and damages occur it will be the contractor's responsibility to repair damages at his own costs.

#### 1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Sprinkler Units: Equal to two (2) percent of amount installed for each type and size indicated, but no fewer than 10 units of each type.
  - 2. Spray Sprinkler Units: Equal to two (2) percent of amount installed for each type and size indicated, but no fewer than 10 units.
  - 3. Electric Control Valve Units: Equal to five (5) percent of amount installed for each type indicated, but no fewer than five (5) units of each size and type.
  - 4. Isolation Valves: Equal to five (5) percent of amount installed for each type indicated, but no fewer than two (2) units of each type.
  - 5. Decoders: A minimum of 2 units of each type.

#### 1.11 PRE-INSTALLATION MEETING

- A. Conduct a conference/meeting at the Project site. Review methods and procedures related to the site landscape irrigation system including, but not limited to the following.

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1. The General Contractor is to contact the Irrigation Consultant/Landscape Architect and Owner Representative a minimum of 60 days prior to the schedule date of commencement of the irrigation installation.
2. Meet with Owner Representative and Irrigation Consultant/Landscape Architect to review Contract documents.
3. Verify current drawing release date with contractor's documents.
4. Review submittal procedure including codes, substitutions, product data, qualifications, and As-Built procedures and formats.
5. Review project conditions including tap & meter Size, permits, utility locations and water conditions.
6. Review methods and procedures related to irrigation installation.
7. Review and finalize construction schedule and verify availability of materials, contractor's personnel, equipment, and facilities needed to make progress and avoid delays.
8. Review warranty guidelines.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

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

### 2.02 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, Schedule 40, Type S or E, Grade A or B, galvanized with threaded ends.
1. Steel Pipe Nipples: ASTM A 733 made of ASTM A 53A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe with threaded ends.
  2. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface and female threaded ends.
  3. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
  4. Cast-Iron Flanges: ASME B16.1, Class 125.
  5. Cast-Iron Flanged Fittings: ASME B16.1, Class 125, galvanized.
- B. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

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1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
  2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
  3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
- C. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
  2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
  3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
- D. PVC Pipe: ASTM D 1785, PVC 1120 compound, Class 200.
1. Pipe 3" and larger to have gasket joint connections. Pipe 2-1/2" and smaller to be bell end.
  2. PVC Socket Fittings, Schedule 40: ASTM D 2466, 2-1/2" and smaller
  3. Ductile Iron Gasket Joint Fittings ASTM A536 for pipe sizes 3" and larger, all ductile iron fittings to have joint restraints as per manufacturer's recommendations.
- E. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 80.
1. PVC Socket Fittings, Schedule 80: ASTM D 2467.
  2. PVC Threaded Fittings: ASTM D 2464.

## 2.03 GENERAL-DUTY VALVES

- A. AWWA, Cast-Iron Gate Valves: AWWA C509, resilient-wedge nonrising-stem, gray- or ductile-iron body and bonnet gate valve, epoxy coated; with steel stem and 2" operating nut.
1. Minimum: Working Pressure: 200 psig.
  2. End Connections: Mechanical joint flanged or ring-tite.  
Interior Coating: Complying with AWWA C550.
  3. Manufacturers:
    - a. Matco
    - b. Leemco
    - c. Approved Equal
- B. Isolation Valve Boxes: Ten-inch circular valve box with 6" SDR 21 PVC pipe riser from top of valve to center line of valve box. Pipe to be centered on operating nut to allow easy access.

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1. Operating Wrenches: Furnish total of two (2) steel, tee-handle operating wrenches with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Bronze Gate Valves: MSS SP-80, Class 125, Type 1, non-rising-stem, bronze body with solid wedge, threaded ends, and malleable-iron hand wheel.
1. Manufacturers:
    - a. NIBCO INC.
    - b. Approved Equal.

#### 2.04 SPECIALTY VALVES

- A. Quick-Couplers: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
1. Locking-Top Option: Vandal-resistant, locking feature. Include four matching keys with hose swivel for each key.
  2. Manufacturers:
    - a. Hunter Industries.
    - b. Approved Equal

#### 2.05 CONTROL-VALVE BOXES

- A. Plastic Control-Valve Boxes: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Size for all valves to be standard 14" rectangular.
1. Shape: Rectangular.
  2. Sidewall Material: ABS or HDPE.
  3. Cover Material: ABS or HDPE.
    - a. Lettering: IRRIGATION.
    - b. Green in Color.
    - c. Lockable with hex key mechanism or similar.
  4. Manufacturers:
    - a. Rain Bird.
    - b. Approved Equal.

## 2.06 SPRINKLERS

- A. Description: Plastic housing and corrosion-resistant interior parts designed for uniform coverage over entire spray area indicated, at available water pressure.
1. Manufacturers:
    - a. Hunter Industries.
    - b. Or Approved Equal
  2. Pop-up Spray Sprinklers: Fixed or adjustable pattern with screw-type flow adjustment, stainless-steel retraction spring, drain check valve, pressure regulation, co-molded riser seal that seals cap to body and pop-up heights of 4", 6", 12".
  3. Pop-up, Rotary Sprinklers: Gear drive, full-circle and adjustable part-circle types with screw-type flow adjustment, stainless-steel retraction spring, stainless steel riser, drain check valve, flow stop valve, minimum of 8 nozzles available, integral rubber cover, adjustable from the top of the sprinkler and pop-up heights of 4", 6", 12".

## 2.07 DRIP COMPONENTS

- A. Description: Inline Drip Tubing with pressure compensating and check valve emitters. Use manufacturers fittings specifically for specified tubing.
1. Manufacturers:
    - a. Rain Bird.
    - b. Or Approved Equal
- B. Description: Drip Control Zone Kit with pressure regulation, disc filtration, filter cleaning indicator, 220 psi control valve and a pre-assembled package.
1. Manufacturers:
    - a. Rain Bird.
    - b. Or Approved Equal
- C. Description: Drip Indicator. 6" pop-up sprinkler body with yellow indicator on sprinkler pop-up stem.
1. Manufacturers:
    - a. Rain Bird.
    - b. Or Approved Equal
- D. Description: Flush Valve. ½" plastic ball valve with barbed inlet and outlet.
1. Manufacturers:
    - a. Rain Bird.
    - b. Or Approved Equal

## 2.08 ELECTRIC CONTROL VALVES

- A. Description: Electrically controlled hydraulically actuated control valves.
1. Manufacturers:

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- a. Hunter Industries
- b. Approved Equal

B. Features:

1. 24vac solenoid with 410mA inrush current and 280mA holding current.
2. Pressure rating of 220 psi.
3. Fabric reinforced diaphragm.
4. Internal and external bleed.
5. Flow control handle.
6. Contamination Resistant.

## 2.09 AUTOMATIC-CONTROL SYSTEM

A. Manufacturers:

1. Rain Bird
2. Or Approved Equal

B. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.

1. Material: Stainless steel.
2. Mounting: Surface type, concrete mounting base for pedestal.

C. Control Transformer/Decoder Output: 24VAC 4A secondary, with overload protection and or primary fuse.

1. Decoder Line Output: 32 VAC RMS over 2-wire path
2. Solenoid Capacity: 2 standard 24VAC solenoids per output, maximum output of 14 simultaneously.

D. Controller Stations for Automatic Control Valves: Each station is variable from approximately 1 minute to 23.9 hours. Include switch for manual or automatic operation of each station.

E. Timing Device: Adjustable, 24-hour, 365-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, odd-even days, interval days, to operate 8 or more times daily.

1. Manual or Semi-automatic Operation: Allows this mode without disturbing preset automatic operation.
2. Minimum 30-day internal power storage: Automatically powers timing device during power outages.
3. Eight (8) start times.
4. Simultaneous program operation.
5. Test program.
6. One button manual start.
7. Seasonal adjust 25% to 200%.
8. Ten (10) independent programs.
9. Surge Protection: Metal-oxide-varistor type on each station and primary power.
10. Rain Sensor compatible with over-ride capabilities.
11. Remote control capabilities.

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12. Four (4) Master Valve and Flow Meter input.
13. Flow monitoring by station.
14. Remote access from internet enabled device.
15. ET based irrigation scheduling.

F. Wiring:

1. Manufacturers:
  - a. Paige Electric.
  - b. Or Approved Equal
2. Feeder-Circuit Cables: No. 14 AWG minimum, between building and controllers.
3. Decoder Output Cable: No. 14 Paige #P7072D "Maxi Cable".
4. Splicing Materials: 3M DBY-6 as required by manufacturer.

### PART 3 EXECUTION

#### 3.02 GENERAL

- A. Observation of Work in Progress: During the installation, the Landscape Architect/Irrigation Consultant will make regular site visits and reject any work and materials which do not meet the requirements called for in the Contract Documents.
- B. Inspect project site prior to start of Work to determine that all site conditions are acceptable for Work to begin. Inform Landscape Architect/Irrigation Consultant of unsuitable conditions. Do not proceed with installation of the irrigation system until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- C. Locate all existing underground utilities prior to trenching and/or boring operations and protect them against damage during the Work. Obtain utility location from Owner and/or General Contractor and utilize utility locating services when necessary.

#### 3.03 EXAMINATION

- A. Investigate and determine available water supply, water pressure and flow characteristics.
- B. When unanticipated utilities that conflict with the intended function or design are encountered, investigate, and measure the nature and extent of the conflict. Promptly submit a written report to the Owner for action.

#### 3.04 EARTHWORK

- A. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
- B. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads.
  1. Install piping sleeves prior to hardscape sub-base being installed if possible.
  2. Sleeving installed in open trench to be completely backfilled crushed limestone, approved by owner's representative and compacted to ensure no future settling.
  3. Pipe sleeves are to be a minimum of two times the diameter of the pipe in the sleeve.



- C. Provide minimum cover over top of underground piping according to the following:
1. Irrigation Main Piping: Minimum depth of 18 inches from top of pipe to finished grade.
  2. Circuit Piping: 12" within general landscape areas, 18" within all sports fields, piping to be a minimum of 3 inches laterally/vertically from any other pipe or conduit at all times.
  3. Drain Piping: 12 inches.
  4. Sleeves: 18 inches from top of pipe for mainlines and 12 inches from top of pipe for laterals.

### 3.05 EXCAVATION PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Owner's Representative's approval before excavation.
- B. Excavate area for pipe installation 4" wider than diameter of pipe.
1. Level trench base to insure consistent contact of pipe to trench bottom.
  2. Remove all rocks and other sharp objects.
  3. Place pipe in trench snaking from side to side if possible.
  4. Backfill to the top of pipe compacting the sides.
  5. Backfill in 8" lifts compacting to 90% between lifts until complete.
  6. All trenches greater than 4" in width to be restored to grade,  $\pm \frac{1}{4}$ ", with sod as approved by owner's representative.
  7. All trenches 4" or small in width to be restored to grade,  $\pm \frac{1}{4}$ " with a minimum of 3" of topsoil as approved by owner's representative.
  8. Whenever possible trenching should be outside of a tree dripline. If trenching is done within the dripline it should be at least 10' from existing tree, if 10' is not possible the trenching must be done by hand and all tree roots greater than 1" to be left in place. All tree roots 1" or less may be removed by saw cutting root on either side of the excavation and root removal.

### 3.06 PIPING APPLICATIONS

- A. Install components having pressure rating as shown on the plan.
- B. Piping in above ground may be joined with flanges instead of joints indicated.
- C. Aboveground Irrigation Main Piping: Use the following piping materials for each size range:
1. NPS 3 and Larger: Steel pipe; malleable-, gray-, or cast-iron fittings; and threaded joints.
  2. NPS 25 and Smaller: hard copper tube, wrought- or cast-copper fittings, and soldered joints.
- D. Underground Irrigation Main Piping: Use the following piping materials for each size range:

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1. NPS 25 and Smaller: Class 200, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
  2. NPS 3 and larger: Class 200 PVC, pressure rated pipe with gasket joint ends, Ductile Iron gasket joint fittings with manufacturer's recommended joint restraint.
- E. Circuit Piping: Use the following piping materials for each size range:
1. NPS 4 and Smaller: Class 200, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
- F. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; acme threaded o-ring sealed PVC fittings.
1. Option: Plastic piping manufactured for this application may be used on sprinkler inlets of 1/2" or smaller instead of pipe and fittings specified, "swing pipe and spiral barbed elbows). If this is to be used the offset must be more than 12" and less than 18" as per detail.
- G. Risers to Aboveground Sprinklers and Specialties: Type L hard copper tube, wrought-copper fittings, and soldered joints.
- H. Sleeves: SCH 40 PVC pipe and socket fittings; and solvent-cemented joints.
- I. Transition Fittings: Use transition fittings for plastic-to-metal pipe connections according to the following:
1. Couplings:
    - a. Underground Piping NPS 2-1/2 and Smaller: Manufactured fitting or coupling.
    - b. Underground Piping NPS 3 and Larger: PVC Flange with stainless steel bolts and rubber gasket.
  2. Fittings:
    - a. Aboveground Piping: Plastic-to-metal transition fittings.
    - b. Underground Piping: Union with plastic end of same material as plastic piping.
- J. Dielectric Fittings: Use dielectric fittings for dissimilar-metal pipe connections according to the following:
1. Underground Piping:
    - a. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
    - b. NPS 2-1/2 and Larger: Prohibited except in valve box.
  2. Aboveground Piping:
    - a. NPS 2 and Smaller: Dielectric unions.

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- b. NPS 2-1/2 to NPS 4: Dielectric flanges.
- 3. Piping in Valve Boxes or Vaults:
  - a. NPS 2 and Smaller: Dielectric unions.
  - b. NPS 2-1/2 to NPS 4: Dielectric flanges.

### 3.07 VALVE APPLICATIONS

- A. Aboveground, Shutoff-Duty Valves:
  - 1. NPS 2 and Smaller: Bronze gate valve.
  - 2. NPS 2-1/2 and Larger: Cast-iron, nonrising-stem gate valve.
- B. Isolation Valves:
  - 1. NPS 2 and Smaller: Bronze nonrising-stem gate valve.
  - 2. NPS 2-1/2 and Larger: Cast-iron, nonrising-stem gate valve with 2" operating nut.

### 3.08 PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate suggested location and arrangement of piping systems. Install piping as indicated unless deviations are approved by Owner's Representative.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other with a space between minimum of 4", spaced to permit single valve removal and or servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install dielectric fittings to connect piping of dissimilar metals.
- F. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
- G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- H. Install PVC piping in dry weather when temperature is above 32 deg F 5 deg C. Allow joints to cure at least 24 hours at temperatures above 32 deg F 5 deg C before testing unless otherwise recommended by manufacturer.
- I. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Flush the line prior to installation to remove debris. Install the valve so that the flow arrow

marked on the valve body tag corresponds to the flow through the line. Install shutoff valve on outlet.

### 3.09 VALVE INSTALLATION

- A. Electrical Control Valves: Install in valve box with top flush with and perpendicular to grade.
  - 1. All electrical control valve boxes to be 14" rectangular valve box.
  - 2. From bottom of valve to a depth of 6" install washed stone or gravel sized between  $\frac{3}{4}$ " and 1" in diameter to create sump and stabilize valve box.
  - 3. Install valve box extensions as necessary to bring lid level with finished landscape grade.
  - 4. Control Valves to be installed with center line of valve 12" below finished grade.
  
- B. Underground, Manual Control Valves: Install with 6" SDR 21 PVC riser from top of pipe to center line of valve box finishing with 10" round valve box level with finished landscape grade.
  - 1. Install valves and PVC pipe with restrained, gasketed joints as necessary at the same depth as the mainline pipe.

### 3.10 SPRINKLER INSTALLATION

- A. Flush circuit piping with full head of water prior to installing sprinklers.
  
- B. Install sprinklers at manufacturer's recommended heights perpendicular to grade.
  
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries, unless otherwise indicated.
  
- D. Adjust all sprinklers to irrigated plant material indicated for the station.

### 3.11 DRIP COMPONENT INSTALLATION

- A. All dripline to be installed on FG. Flush all dripline tubing prior to covering with mulch. Install dripline in grid fashion as per plan details and manufacturers recommendations.
  
- B. Install drip control zone kit as per valve installation specification 3.09.A and plan detail.
  
- C. Install Drip Indicator as per specification 3.10.B and plan detail.
  
- D. Install Drip Flush Valves in a 10" valve box as per plan detail.

### 3.12 AUTOMATIC-CONTROL SYSTEM INSTALLATION

- A. Obtain approval of controller location from owner's representative prior to installation. Install wall mount controller level and at eye level. Securely fasten controller to wall with metallic fasteners appropriate for wall type or install pedestal controller on concrete pad with all necessary conduit installed through the pad to accommodate all wire to controller. All irrigation control wire between controller and finished grade to be in PVC electrical conduit.
- B. Install control wire conduit in same trench as mainline piping and at least 4 inches to the side of the piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install wire in separate sleeve under paved areas if irrigation piping is installed in sleeve. All wire splices to be in minimum 10" round valve box.

### 3.13 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Ground equipment according to ASIC Grounding Guidelines [www.aisc.org](http://www.aisc.org). Resistance readings to ground to be as recommended by the manufacturer. If there are no manufacturer's requirements, then the controller should have a resistance of 10 ohms or less.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.14 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 4. Remove and replace units and retest and re-inspect as specified above.

### 3.15 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service of control system.

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- B. Verify that controllers are installed and connected according to the Contract Documents.
- C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.
- D. Complete startup checks according to manufacturer's written instructions.

### 3.16 ADJUSTING

- A. Program controller(s) to ensure adequate moisture is available for the root zone of the plant. Insure there is no run-off, over watering or deep percolation. Ensure controller operates within irrigation window as defined by Owner's Representative or local governing authorities. See additional controller programming notes on plans provided.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit. Use pressure regulation for each control valve if pressure is higher than recommended for the sprinklers in the circuit.
- C. Adjust sprinklers so they will be 1/8 inch above finish grade in sodded lawns and 1/2 inch above grade in seeded lawns. In shrub beds adjust sprinklers to insure top of sprinkler is at finished mulch levels.
- D. Adjust sprinklers arc and radius to ensure no water is sprayed outside of the irrigated area.

### 3.17 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

### 3.18 DEMONSTRATION

- A. It is contractors' responsibility to train Owner's maintenance personnel to adjust, operate, and maintain sprinklers, isolation valves, controllers, and automatic control valves.
- B. OBSERVATION AND ACCEPTANCE
- C. Periodic site visits will be made by the Landscape Architect/Irrigation Consultant to review the quality and progress of the work. Work found to be unacceptable must be corrected within five (5) calendar days. Remove rejected materials promptly from the project.
- D. Upon completion of the Work, the Contractor shall notify the Landscape Architect and Owner at least ten (10) days prior to requested date of the site visit for Substantial Completion of all

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portions of the Work. Landscape Architect/Irrigation Consultant will issue a punch list for all work to be corrected. All work on the punch list must be complete within five (5) working days from the date of the site visit. Where Irrigation Work does not comply with the requirements, replace rejected Work. If such replacements are not completed within the time specified, the Irrigation Contractor may be considered to be in default of the Contract, and the Owner may use the Contract Retainage to hire other Contractors to finish the work.

- E. It will be the responsibility of the Irrigation Contractor to provide reliable communication system (remote control or two-way radios) for Substantial Completion and all periodic site visits.
- F. If a site visit to verify Substantial Completion has been scheduled and the Landscape Architect/Irrigation Consultant arrives at the site and determines that the irrigation system is not substantially complete (all system components in place, operational and checked) the Contractor will be responsible for all expenses included but are not limited to the following: mileage, airfare, consultant's time, parking fees, meals, car rental, etc. All incurred expenses will be deducted from the final contract amount.

## SECTION 329200 - TURF AND GRASSES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Seeding.
  - 2. Hydroseeding.
  - 3. Sodding.
  - 4. Planting soil and amendments.
  - 5. Erosion-control materials (turf related only)
  - 6. Maintenance.

#### 1.3 SUBMITTALS

- A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
  - 1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.
- B. Material Test Reports: Soil analysis report for existing in-place surface soil.
- C. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.
- D. Sod Installation Schedule: Provide schedule of installation dates for sod. Do not install dormant sod without prior approval of Architect.
- E. Minutes of preinstallation conference.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.



- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
- D. Preinstallation Conference: Conduct conference at Project site.
- E. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.
- C. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

#### 1.6 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade, base course, or setting beds.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

#### 1.7 MAINTENANCE SERVICE

- A. Maintenance Service: Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until Final Completion of project.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: State-certified seed of grass species as follows:
  - 1. Seed: Provide seed mix, for the project location and planting date, as defined by the Seeding Schedules for Permanent Vegetation in Section 810 of the SCDOT Standard Specifications for Highway Construction.
  - 2. Seed: as indicated on Plant Schedule.

### 2.2 TURFGRASS SOD

- A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
  - 1. Turfgrass Species: as indicated on Plant Schedule.
  - 2. Sod shall be delivered to the project site within twenty four (24) hours after harvest at the nursery, and shall be sheltered from the sun and wind until planted by the Contractor.
  - 3. Contractor shall lay sod within thirty six (36) hours after harvest. Sod shall not be laid where the roots have dried due to exposure from the sun and wind, or has thinned for these or other reasons.

### 2.3 INORGANIC SOIL AMENDMENTS

- A. Provide inorganic soil amendments in quantities and proportions recommended by soil analysis report.

### 2.4 ORGANIC SOIL AMENDMENTS

- A. Provide organic soil amendments in quantities and proportions recommended by soil analysis report.

### 2.5 FERTILIZERS

- A. Provide fertilizers in quantities and proportions recommended by soil analysis report.

### 2.6 MULCHES

- A. Fiber Mulch: Biodegradable, non-dyed wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

## 2.7 PESTICIDES AND HERBICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

## 2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets (ECB): Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended staples, 6 inches long.
  - 1. Products: Subject to compliance with requirements and approval of Architect.
- B. Turf Reinforcement Mat: Three dimensional, woven, highly UV resistant, polypropylene geotextile specifically designed for erosion control applications on steep slope and high velocity, vegetated waterway applications. Conforming to FHWA FP-03, Section 713.18. Include manufacturer's recommended installation anchor materials.
  - 1. Products: Subject to compliance requirements and approval of Architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
  - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
  - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### 3.3 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply fertilizer directly to subgrade before loosening.
  - 2. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
  - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  - 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
    - a. Apply fertilizer directly to surface soil before loosening.
  - 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
  - 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.4 TURF REINFORCEMENT MAT (TRM)

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For turf reinforcement mat, install planting soil in two lifts, with second lift equal to thickness and on top of the mat.

- C. Install mat and fasten as instructed by material manufacturer.
- D. Fill cells of turf reinforcement mat with planting soil and compact before planting.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

### 3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
  - 1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
  - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
- B. Protect seeded areas with erosion-control blankets where shown on Drawings; install and anchor according to manufacturer's written instructions.

### 3.6 SODDING

- A. Lay sod within 36 hours of harvesting. Do not lay sod if ground is frozen or muddy.
  - 1. Do not lay dormant sod without prior approval of Architect.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
  - 1. Lay sod across angle of slopes exceeding 1:3.
  - 2. Anchor sod on slopes exceeding 1:4 with staples spaced as instructed by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

### 3.7 TURF MAINTENANCE (SEED AND SOD)

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Watering
  - 1. Acceptable Watering Methods:
    - a. Water Truck

- b. Irrigation
  - c. Other methods as approved by Owner
- C. Keep turf (seed and sod) sufficiently watered throughout the maintenance period through the completion of the warranty period.
  - D. Contractor to create a temporary watering schedule for turf establishment (seed, sprigs and sod), if there is no irrigation installed.
  - E. Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources to keep turf uniformly moist to a depth of 4 inches.
  - F. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  - G. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
  - H. Mowing: Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
    - 1. Mow bermudagrass to a height of 1/2 to 1 inch.
    - 2. Mow carpetgrass, centipedegrass, perennial ryegrass, and zoysiagrass to a height of 1 to 2 inches.
    - 3. Mow Kentucky bluegrass, buffalograss, annual ryegrass, chewings, and red fescue to a height of 1-1/2 to 2 inches.
    - 4. Mow bahiagrass, turf-type tall fescue, and St. Augustinegrass to a height of 2 to 3 inches.
  - I. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
    - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

### 3.8 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
  - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities.
  - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

### 3.9 PESTICIDE AND HERBICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written instructions.

Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

- B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

### 3.10 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
  - 1. Unless otherwise instructed, do not permit traffic on grass paving areas until turf is established:
    - a. For a minimum of 8 weeks on seeded grass pavements.
    - b. For a minimum of 4 weeks on sodded grass pavements.

END OF SECTION 329200

SECTION 329210 - ARTIFICIAL TURF

Sprinturf Predator or Approved Equal

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. The extent of artificial turf work is shown on the drawings.
- B. Artificial turf work includes, but is not limited to, the following:
  - 1. A complete synthetic turf system, consisting of a vertical draining gravel blanket and nominal two inch (2") long polyethylene parallel-ling slit and monofilament blended fibers, tufted in alternate stitch rows into a primary backing with a secondary backing consisting of a minimum of 22 ounces of urethane per square yard.
  - 2. A resilient infill system, Greenplay Eco-fiber or approved equal.
  - 3. Tufted-in game lines and perimeter lines per drawings. Remaining required game marking shall be permanently inlaid or painted as per drawings; direction of Owner or Owner's Representative.
  - 4. Pre-manufactured porous shock pad. (Alternate Bid Item)
  - 5. Edge details.
  - 6. Maintenance manual.
  - 7. Written company warranty: 8-year warranty supported by a 3rd party insured 8-year warranty policy from an A-Rated domestic insurance carrier. Letters of credit are not permissible. Actual and current policy must be submitted for verification.
  - 8. Striping and seaming plan: Striping plan; layouts for the sports as shown on the drawings showing any field lines, logos, markings and boundaries.
  - 9. Train field maintenance personnel in proper care maintenance procedures.
  - 10. When applicable, Field Builder and Base Construction Contractor to coordinate to make sure football goal posts are adjusted to achieve ten feet (10') height above finished playing surface.
- C. Provide all materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.
- D. The artificial turf shall be specifically designed, manufactured and installed for the intended sports and events. Typically sports include, but are not limited to, football, soccer, lacrosse, field hockey, baseball and softball. At the time of substantial completion, the system's shock attenuation shall have an average G-max value less than 125, based on ASTM-F355A. At no time shall the G-max value exceed 165 throughout the life of the warranty.
- E. Copies of independent laboratory test reports on system or components:



1. ASTM D 792 Specific Gravity
  2. ASTM D 1335 Tuft Bind
  3. ASTM D 5034 Grab Breaking Strength
  4. ASTM D 418 Pile Height, Tuft Spacing, Face Weight and Total Weight
  5. ASTM D 2859 Flammability (Pill test)
  6. ASTM F 1551 Water Permeability
- F. Prior to Final Acceptance, the Turf Vendor shall submit to the owner three (3) copies of their maintenance manuals. These manuals will include all necessary instructions for the proper care and maintenance of the newly installed synthetic turf system.

## 1.02 SUBMITTALS

Submit the following within 48 hours of bid opening, as requested:

- A. Three (3) copies of most recent installation/reference list for all projects of similar scope to this project completed in the last three years.
- B. Written certification that the Turf Vendor manufactures all of its own polyethylene turf fibers and finished turf systems at its own facilities that are located in the U.S.
- C. Three (3) copies of most recent independently audited financial statements.
- D. Turf Vendor's current ASBA Certified Field Builder (synthetic) certificate
- E. Written certification that the synthetic turf will be installed by the Turf Vendor's own in-house installation crew. Distributors and third party installation companies will not be allowed.
- F. Three (3) copies of required 3rd party insurance policy, demonstrating that all of the requirements outlined in Section 1.03 F Quality Assurance are met. Actual policy must be submitted.
- G. One (1) 12" x 12" sample of proposed synthetic turf carpet and one (1) 12" x 12" boxed turf sample including infill representative of finished synthetic turf system. Also submit three (3) copies of product data and testing documents demonstrating that proposed system meets or exceeds all specified requirements. One (1) 12" x 12" sample of rubber ShockPad must also be submitted.

Note: If these submittal items are requested and deemed to be insufficient, the Turf Vendor will not be approved.

Submit the following prior to the ordering of materials:

- A. Provide a colored striping plan detailing lines, numbers and letters. Coordinate with Owner or Owner's Representative and Engineer to get final approval of all designated colors, dimensions and logo/lettering designs.
- B. Material Certificates and Samples: Provide seven (7) copies for each material from material producer that will be used for this project. Each material certificate must be stamped and checked as approved by the Turf Vendor before submittal to the Engineer.

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- C. If an alternate is being requested, provide to the Engineer materials samples of the following: Two (2) 12" x 12" samples of synthetic turf carpet and color yarn samples, one 12 oz bagged infill sample.
- D. Submit two (2) 12" x 12" samples of shock pad with product data sheet, if Owner chooses this alternate.
- E. Submittals: Prior to order of materials, the Turf Vendor shall submit a sample warranty, seam layout plan, striping plan and any details of construction that deviate from the plans and specifications.
- F. Submit three (3) copies of the resume of proposed installation foreman. Installation crew must meet or exceed all requirements outlined in Section 1.03.
- G. Three (3) copies of Field Builder's recommended maintenance equipment cut sheets.

### 1.03 QUALITY ASSURANCE

- A. Provide a qualified installation foreman to coordinate and review the component parts of the artificial turf system. Submit a resume of experience for Engineer's approval prior to starting work.
- B. Infilled Artificial Turf:
  - 1. Technicians employed by the Turf Vendor skilled in the installation of athletic-caliber infilled synthetic turf systems will undertake the placement of the turf. Special brushing equipment and techniques will be used in the installation.
  - 2. The designated in-house installation crew shall have installed a minimum of thirty (30) high quality, stadium grade infilled synthetic turf systems of 65,000 square feet or greater in the past three years.
  - 3. A notarized letter from the Turf Vendor that the installation crew and foreman are factory certified must be submitted prior to the start of turf installation.
- C. The Turf Vendor shall meet the following criteria:
  - 1. Manufacturer:
    - a. The Turf Vendor must manufacture its own turf fibers and finished turf systems in the U.S., and install this type of artificial turf system with its own in-house installation crews, and provide project references of the synthetic grass system being installed at 100 similar exterior sites in the United States over the last 5 years, a minimum of 65,000 square feet each.
    - b. The Turf Vendor must have actively been in business – under its current name and ownership – for at least the past five years; and must have a minimum of 250 athletic fields still in use in the United States for a minimum of the past 5 years.
    - c. The Turf Vendor must provide competent workmen skilled in this type of artificial turf installation. The designated Supervisory personnel on the project must be

employed by, and certified, in writing, by the Turf Vendor as competent in the installation of this material, including gluing or sewing seams and proper installation of the infill mixture. The Turf Vendor shall have a qualified job foreman on site to certify the installation and warranty compliance.

D. Warranty:

1. The warranty coverage shall not be prorated nor place limits on the amount of the field's usage
2. The Field Builder shall submit its written company warranty: 8-year warranty which warrants the usability and playability of the artificial turf system for its intended uses. A 3rd party insured 8-year warranty from an A-Rated domestic insurance carrier is required in addition to the Field Builder's warranty. Letters of credit in lieu of an insurance policy are no acceptable.
3. The Field Builder's warranty must have the following characteristics:
  - a. Provide full coverage for a minimum of eight (8) years from the date of Substantial Completion.
  - b. Warrant materials and workmanship.
  - c. Warrant that the materials installed meet or exceed the system specifications.
  - d. Repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
  - e. Be from a single source covering workmanship and all materials.
  - f. Assure the availability of exact or substantially the same replacement materials for the artificial turf system installed for the full warranty period.
  - g. Include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism and acts of God beyond the control of the Turf Manufacturer or Field Builder.
  - h. Cover defects in the installation and workmanship. Assure the installation was done in accordance with both the Field Builder's recommendations and any written directives of the Field Builder's on-site representative.
  - i. Shall be limited to repair or replacement of the affected areas at the option of the Field Builder, and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs.
  - j. The Field Builder may be required, upon the request of the Owner, to provide a list of ten (10) clients for which they have completed after-the-sale warranty work.
  - k. All designs, game markings and layouts shall conform to all currently applicable National Federation State High School Association or NCAA rules and regulations, or league specific requirements, depending on what applies.

- l. All components and Turf Vendor's installation methods shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified, shall withstand full climatic exposure in the location of the field, be resistant to insect infestation, rot, fungus and mildew; it shall also withstand ultra-violet rays and extreme heat, it shall allow the free flow of water horizontally to perimeter areas and vertically to the gravel blanket and into the field drainage system below the surface.
- m. The sewn primary seams of all system components shall provide a permanent, tight, secure and hazard-free athletic playing surface. All inlaid markings (game lines, logos, etc.) shall remain in place throughout the duration of the warranty period.
- n. The installed artificial turf system's drainage capability shall allow water flow through the system (turf & infill) at a rate of not less than 10 inches +/- per hour.

## PART 2 – PRODUCTS

### 2.01 SYNTHETIC GRASS SYSTEM

- A. Synthetic Grass – Sprinturf Predator or approved equal
  - Pile Weight: 50 oz/sy
  - Face Yarn Type: 100% polyethylene parallel-long slit fiber and monofilament tufted in alternating stitch rows
  - Yarn Size: 21,000 (8 ends/1,375 denier per end for MX, 10,000 denier per end for Predator )
  - Yarn Thickness: 120 microns for Predator, 330 microns for MX
  - Pile Height (Finished): 2"
  - Color: Field Green/ Rye Green Blend (Field Green and Field Green/Rye Green blend as alternating field panels
  - Construction: Broadloom tufted
  - Stitch Rate: 9/3"
  - Tufting Gauge: 3/8"
  - Primary Backing: 9 oz. per SY, 3 part, woven, non-woven, woven backing
  - Secondary Backing: 22 oz/sy urethane
  - Total Product Weight: 77 oz/sy (+/- 2 oz)
  - Finished Roll Width: 15'
  - Finished Roll Length: Up to 220'
  - Perforation (Outdoors): 3/16" holes on staggered 2" by 2.25" (approximate) centers
  - Turf Permeability: > 20" +/- per hour
  - Infill Composition: Greenplay Eco-Fiber™ or approved equal.

The carpet shall be delivered in 15-foot wide rolls with the four (4") inch white, football 5-yard lines tufted into each roll, when applicable. The perimeter white line shall also be tufted into the individual sideline rolls, when applicable. The rolls shall be of sufficient length to go from sideline to sideline. Head seams, between the sidelines, will not be

acceptable.

Coordinate permanent field markings with owner. Contractor shall provide shop drawings to owner for the owner's review and approval. All markings shall be sewn in and glued or painted in accordance with Turf Vendor's recommendations.

Alternative painting for those who choose to not inlay lines, game markings and graphics shall be as directed and approved by Field Builder. Acceptable synthetic turf paint manufacturers:

1. Pioneer Paints: 800-877-1500
2. World Class Paints: 800-748-9649
3. Approved Equivalent

B. Seaming Materials:

Adhesives for bonding inlaid synthetic turf markings shall be two-component fast-set urethane adhesive obtained from a single manufacturer and be equivalent to Ultrabond Turf PU 2K as manufactured by Mapei Corporation, Deerfield Beach, FL (800) 992-6273, or approved equal as designated by the Turf Vendor.

Seaming Tape: Tape for securing inlays in the tufted synthetic turf shall be high quality tape made with a minimum roll width of 12 inches.

C. Resilient Infill: Greenplay Eco-fiber or approved equal. Refer to manufacturer specifications for installation rate.

D. BASE BID: Standard of Quality shall be Sprinturf Predator synthetic turf system as built by Sprinturf, LLC, or Engineer approved equal. Contact Sprinturf:

Manufacturers for synthetic turf alternates shall meet or exceed the requirements listed in Part 2.01. If these submittal items are requested and deemed to be insufficient, the Field Builder will not be approved.

2.02 RESILIENT UNDERLAYMENT (PRE-MANUFACTURED RESILIENT SHOCKPAD) –

A. ShockPad as manufactured by Enplast or Engineer approved equal.

2.03 VERTICAL DRAINAGE BASE MATERIALS

D. Excavation: Existing natural grass field shall be excavated to the depth established by the Engineer and as shown on the excavation plan. The sub grade shall be shaped to achieve a .5% (one half of one percent) slope from the center of the field to each sideline in order to mirror the grade of the finished synthetic turf surface. The sub grade shall also be compacted and proof rolled to a minimum of a 95% compaction rate.

E. Geotextile Filter Fabric: Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be Mirafi 140N, Mirafi Inc., Pendergrass, GA (888) 795-0808, or approved equal.

F. Drainage Pipe: A network of perforated HDPE highway grade drainage pipe (1" x 12" flat panel pipe) shall be installed under a 6" layer of free draining base aggregate. The drainage pipe will be installed in a herringbone pattern every 15 feet on center and will be connected to 8" perimeter collector lines as shown on drawings.

1. ADS AdvanEdge, 800-821-6710 or approved equal.

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- A. 1 inch by 12-inch flat drain.
- B. 8-inch diameter perforated collector drainpipe.
- C. Engineer approved equal.

G. Stone Base Courses:

The following gradation of stone is a typical and recommended specification. The synthetic turf Base Contractor is required to focus on achieving the planarity, porosity and compaction requirements to provide a sound crushed stone base for synthetic turf installation.

- 1. The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate. Material shall conform to the AASHTO #57 limestone classification. An open graded aggregate material may be used if available.

#57 Base Aggregate: (4" depth)

|              | <u>Approximate Percentage Passing</u> |
|--------------|---------------------------------------|
| 1-1/2" Sieve | 100%                                  |
| 1" Sieve     | 95 - 100%                             |
| 1/2" Sieve   | 25 - 60%                              |
| #4 Sieve     | 0 - 10%                               |
| #8 Sieve     | 0 - 5%                                |

- 2. The finishing stone material shall be AASHTO #89.

It is critically important that the #89 finishing layer is not laser-graded at more than 2" depth. Layers deeper than 2" are susceptible to over-compaction and restriction of porosity, leading to drainage issues.

Subject to Engineer's approval, local or regional stone specifications that meet compaction and porosity requirements are permitted.

#89 Finishing Stone: (2" depth)

|            | <u>Approximate Percentage Passing</u> |
|------------|---------------------------------------|
| 1/2" Sieve | 100%                                  |
| 3/8" Sieve | 90-100%                               |
| #4 Sieve   | 20-55%                                |
| #8 Sieve   | 0 - 15%                               |
| #16 Sieve  | 0-10%                                 |
| #50 Sieve  | 0-5%                                  |

2.04 NEW GROOMING EQUIPMENT

- A. Provide one (1) pull behind GreensGroomer drag brush as manufactured by WorldWide, Inc., 888-298-8852. Must be electrical unit, model number 720SDE.
- B. (list desired sweeper model – if required)

PART 3 – EXECUTION

ARTIFICIAL TURF

### 3.01 SUBMITTALS

- A. Prior to ordering materials, submit a 3<sup>rd</sup> party insured warranty policy, a sample warranty, seam layout of field, striping plan and all details of construction that deviate from the plans and specifications.

### 3.02 VERTICALLY DRAINING BASE

- A. The synthetic turf Base Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Field Builder's on-site representative, and submitted to the Engineer/Owner, verifying that the changes do not in any way affect the warranty.
- B. Install geotextile fabric over excavated and prepared sub-grade in accordance Field Builder's recommendations. Provide a 36" minimum overlap at all seams. Fabric shall first be installed in the drainage trenches prior to installation of perimeter collector lines. After backfilling of all trenches is complete, the entire field shall be covered with fabric prior to the base aggregate application.
- C. Trenching, Drainage Pipe Installation and Backfilling: All piping shall be as specified and connected by Field Builder's couplers, plugs etc.
  - 1. The base grade shall be shaped to mirror the finished grade and approved by the Engineer and/or Owner's Representative. The Base Contractor shall begin layout and trenching for the drainage network as indicated on the drainage plan and all details that apply. Collector lines shall be installed before lateral lines and shall begin with the deepest elevations. Collector lines shall be connected to discharge outlet at the onset of operations. Trenching progress shall work upward in elevation to allow for immediate discharge of water from the entire field in the event of a rainfall.
  - 2. No trenches, with or without pipe, shall be permitted, to remain unfilled overnight and/or while crews are not progressively working on site.
  - 3. All perimeter trenches must be dug in accordance with the field drainage plan details.
  - 4. After all collector and lateral lines have been installed, the Base Contractor shall repair any sub grade undulations prior to installing geotextile fabric.
- D. Concrete Header Curb and Pressure Treated Wood Turf Nailer: The synthetic turf perimeter fastening structure shall be installed before the drainage aggregate.
  - 1. The 6" x 12" concrete header curb shall be installed in accordance with the Drawings and/or Shop Drawings and these Specifications. The foundation of the concrete header curb shall be a compacted free draining aggregate. Future water entering the foundation shall have a free draining path directly to the perimeter collector pipe.
  - 2. Install a pressure treated wood 2" x 4" nailer. Pressure treated wood nailer shall be set 1.5 inches below top of the curb by means of a Tapcon or ramset every 12 inches. This shall be the responsibility of the Base Contractor. See synthetic turf edge attachment detail.

- E. Base Drainage Aggregate: The installation of the base drainage aggregate shall only begin after the drainage pipe installation has been inspected and approved by Owner's Representative. Installation of the Free Draining Base Aggregate shall follow procedures that protect the base grade soils and drainage pipe. The drainage pipe network and its existing elevations shall not be disrupted through ground pressures from trucks, dozers or by any other means.
1. The base grade subsoil shall be dry before undertaking the placement of base aggregate.
  2. Delivery trucks shall enter the field only from the designated entrance point. Base course stone shall be dumped closest to the entrance first and continuously worked towards the furthest point of the field. Extreme care must be taken not to disturb sub grade or drainage network.
  3. Track-type dozers shall push out the stone from behind the pile onto and toward the field center. Dozers shall only traffic the aggregate they are spreading.
  4. Bulldozer blades shall be equipped with a laser-guided hydraulic system. Care shall be taken not to disturb or contact the base grade soils with the dozer blades or tracks. All equipment trafficking over the drainage aggregate shall insure there is a minimum depth of 4" of aggregate between the geotextile fabric and the dozer track ground contact position.
  5. When the aggregate spreading is completed, the surface shall be further-firmed by a 5-ton roller. Static vibration shall not be part of this process.
  6. The stone shall be left firm, but not over-compacted as to protect the porosity and drainage capabilities of the aggregate profile.
  7. After the drainage stone has been uniformly spread throughout the surface, the surface shall receive a final laser finished grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.
  8. The free-draining base course must be installed to a depth of 5 inches and shall be independently tested for an overall compaction rate of 95% proctor.
- F. Choker Levels: The base drainage stone final elevations shall mirror the proposed choker layer final grade material. Care shall be taken not to allow the coarser aggregate to surface into the profile or finished grade of the choker layer.
1. It is critically important that the #10 choker layer is not laser-graded at more than 1" depth. Layers deeper than 1" are susceptible to over-compaction and restriction of porosity, leading to drainage issues.
  2. The choker layer shall be applied using high flotation grading equipment. The choker material shall be evenly spread throughout the proposed field surface to the final pre-pad or pre-turf elevations.



3. After the choker material has been uniformly spread throughout the surface by the described method, the surface shall receive a final laser finish grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.
  4. Care shall be taken throughout the installation not to force the choker material into the porosity of the base aggregate below.
  5. Final choke layer must be graded by means of a laser within 0 to 1/2 inch from design grade. The finished surface tolerance must not exceed 1/4 inch over 10 feet in all directions. Base Contractor must provide a topographical survey with a minimum of 200 shots demonstrating finished grade meets all written requirements.
  6. Final layer of stone must be installed at a depth of 1.5 inches. Finished aggregate base must be proof-rolled by means of 2- to 5-ton roller. The finished aggregate base must achieve an overall compaction rate of 95% proctor in accordance with ASTM D1557. It shall also be flush with top of pressure treated wood nailer.
  7. The synthetic turf Base Contractor is required to stringline the entire field every five feet to identify high and low spots. And identified high and low spots must be eliminated prior to installation of the synthetic turf.
- G. Base Acceptance: The Engineer and/or Owner's Representative must jointly approve the base before ShockPad or turf installation can begin.
- H. Optional Resilient ShockPad, when applicable:
1. After the choker layer grades have been approved and inspected, the resilient ShockPad shall be installed from sideline to sideline.
    - a. Equipment and personnel shall take extreme care to minimize disturbance of the stone base during ShockPad installation.
    - b. All operations shall work from behind the rolled out ShockPad or from adjacent, pre-installed pad surface.
    - c. One head seam shall be allowed per length. Head seams shall be staggered so as not to be within 10' of the previously installed roll.
    - d. The head seam shall overlap approximately 4 inches on original roll out. Second and subsequent rolls shall be rolled out within 1 inch, or less, of the previous roll and allowed to expand or contract before manually sliding in place.
    - e. After allowance for expansion or contraction, the padding shall slide into place so as to touch the edge or seam of the previous. Care shall be taken so as not to disturb the choker layer material when butting the seams together.
  2. The Resilient ShockPad shall not receive a final cut or edging detail until the material has relaxed/expanded in direct sunlight for a minimum of six hours.

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- a. No open seams shall exceed 1/4" (in expanded state) after final seam or end cutting is complete.
    - b. Padding material shall stop just short of the exposed nailer board.
  3. The Resilient ShockPad shall be inspected by the Field Builder after completion to insure the surface is smooth with only minor bumps from stone particles or other material protruding from underneath that will not show up once the turf is laid over top.
    - a. Expansion bubbles and open seams shall be repaired prior to final inspection.
    - b. Repeat inspections shall be carried out prior to each roll of synthetic turf being installed.
- I. Synthetic Turf and Infill Materials
  1. After a final inspection of the Resilient ShockPad by the Field Builder and the Owner's Representative, the synthetic turf installation shall begin. The first roll shall begin with the longest perpendicular cross-field distance. No head seams shall be permitted in the inbound playing surface.
  2. The rolls of turf shall be rolled out a minimum of four hours prior to starting seaming procedures and allowed to relax/expand.
    - a. All visible wrinkles shall be stretched out before seaming.
    - b. Seams shall be flat, tight and permanent with no separation or fraying.
    - c. Synthetic turf yarn fabric that is trapped or glued between seams shall be freed from the seams by hand or other approved method to an upright position prior to the commencement of brushing and top dressing procedures.
    - d. All synthetic turf seams shall be assembled as follows: The full width rolls shall be laid out across the field. Utilizing standard state of the art adhering or sewing procedures, each roll shall be attached to the next.
    - e. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed perpendicular to the playing field. The yard lines, game markings, sidelines, etc. of all applicable sports shall be tufted into carpet by the manufacturer wherever possible.
  3. After all seaming is completed and inlaid lines, logos and lettering have been installed; the infill materials shall be spread evenly, using a drop spreader or top dresser.
    - a. Install Greenplay Eco-fiber or approved equal per manufacture specifications

J. Tufted and Inlaid Lines

1. Layout and descriptions of tufted, inlaid and/or painted lines shall be as indicated on final shop drawings.
2. Inlaid lines and field markings shall be cut in using seaming methods recommended by the Field Builder.

K. Synthetic Turf Perimeter Attachment:

1. After final trimming of the turf, the turf shall be screwed, nailed or stapled to the pressure treated wood nailer system as per the Field Builder's recommendations.

3.03 FIELD LAYOUT

- A. Field layout shall be as shown on the record drawings. Typically the final approved striping and seaming plan that was used to manufacture and install the field is acceptable. Any Owner-approved changes that took place during the installation must be marked in red and resubmitted.

3.04 CLOSEOUT

- A. The Field Builder must verify that a qualified representative has inspected the installation and that the finished field surface conforms to the Field Builder's requirements.
- B. The Field Builder must provide the Owner with the pull behind maintenance brush as outlined in section 2.04 New Synthetic Turf Grooming Equipment.
- C. The Field Builder shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of 8 years from the date of Substantial Completion as described in 1.03 F. Submit three (3) copies of the warranty.
- D. The company's 8-year warranty must also be supported by a 3rd party insured 8-year warranty from an A-rated domestic insurance carrier. The value of the policy shall be \$20,000,000 for each insured warranty and \$25,000,000 annual aggregate. Only true 3rd party policies will be accepted. Companies submitting policies that are actually letters of credit or not truly a 3<sup>rd</sup> party insurance policy will not be accepted. Submit three (3) copies of the actual insurance policy.
- E. The Field Builder must submit three (3) copies of its standard maintenance manual to the owner.
- F. Field Builder must train Owner's designated field personnel in proper grooming and care procedures. This includes training field personnel how to properly use grooming equipment as well as make minor repairs.
- G. Extra materials: Field Builder must leave 500 lbs. of Greeplay Eco-fiber or approved equal and the equivalent of 15' x 10' (all pieces combined) of turf with Owner before leaving job site. All salvageable pieces of colored turf used during the installation should be left with the Owner as well.

3.05 CLEAN UP

Hanahan Recreation Complex  
City of Hanahan, South Carolina

- A. Field Builder shall provide the labor, supplies and equipment as necessary for final cleaning of surface and installed items.
- B. All usable remnants of new material shall be neatly rolled up and turned over to the Owner at a place and area designated by the Owner.
- C. During the contract and at intervals as directed by the Engineer and as synthetic turf installation is completed, clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well draining, neat condition.
- D. Surface, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

3.06 G-MAX TESTING

- A. Optional at substantial completion, the Field Builder can, as specified, hire an independent testing laboratory to perform a G-max test (ASTM 355, 1936 method) to verify that the shock attenuation properties of the field meet the requirements set forth in this specification. Submit three (3) copies of the G-max test to the Owner.
- B. At the time of substantial completion, the average G-max rating must not exceed 110 for a padded system and 135 for a non-padded system. The average G-max of a padded system must not exceed 145 and for a non-padded system 170 at any time during the life of the warranty. The Owner reserves the right to have the field tested for shock attenuation at its own cost at anytime it deems necessary. If at anytime the G-max ranges reach unacceptable levels, it is the responsibility of the Field Builder to bring the field back into the required ranges at no cost to the Owner.

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Plants.
  - 2. Planting soil and amendments
  - 3. Tree stabilization.
  - 4. Weed control barriers
  - 5. Mulch.
  - 6. Maintenance.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- H. Finish Grade: Elevation of finished surface of planting soil.

- I. **Manufactured Topsoil:** Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- J. **Pesticide:** A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- K. **Pests:** Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- L. **Planting Area:** Areas to be planted.
- M. **Planting Soil:** Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- N. **Plant; Plants; Plant Material:** These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- O. **Root Flare:** Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- P. **Stem Girdling Roots:** Roots that encircle the stems (trunks) of trees below the soil surface.
- Q. **Subgrade:** Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- R. **Subsoil:** All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- S. **Surface Soil:** Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

#### 1.4 SUBMITTALS

- A. **Product Data:** For each type of product indicated, including soils.
  - 1. **Plant Materials:** Include quantities, sizes, and quality for plant materials.
  - 2. **Pesticides and Herbicides:** Include product label and manufacturer's application instructions specific to the Project.
- B. **Samples for Verification:** For each of the following:
  - 1. **Trees and Shrubs:** Three samples of each variety and size. Maintain approved samples on-site as a standard for comparison.
  - 2. **Organic/Compost Mulch:** 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

3. Mineral Mulch: 2 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.
  4. Weed Control Barrier: 12 by 12 inches.
- C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
  2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- D. Material Test Reports: Soil Analysis Report.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- F. Warranty: Sample of special warranty.
- G. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
- B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
1. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil. Report suitability of tested soil for plant growth.
    - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
- E. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size,

and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

- F. Preinstallation Conference: Conduct conference at Project site.
- G. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- G. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
  - 1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
  - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  - 3. Do not remove container-grown stock from containers before time of planting.



4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
  1. Notify Owner no fewer than two days in advance of proposed interruption of each service or utility.
  2. Do not proceed with interruption of services or utilities without Owner's written permission.
- B. Planting Restrictions: Coordinate planting periods with maintenance periods to provide required maintenance from time of planting through required warranty period.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- D. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

#### 1.8 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
    - b. Structural failures including plantings falling or blowing over.
    - c. Faulty performance.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  2. Warranty Periods from Date of Final Completion:
    - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
    - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
    - c. Annuals: Three months.
  3. Include the following remedial actions as a minimum:

- a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
- b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
- c. Provide extended warranty for period equal to original warranty period, for replaced plant material

## 1.9 MAINTENANCE SERVICE

- A. Maintenance Service for Plants: Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until date of Final Completion.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
  2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

### 2.2 INORGANIC SOIL AMENDMENTS

- A. Provide inorganic soil amendments in quantities and proportions recommended by soil analysis report.

### 2.3 ORGANIC SOIL AMENDMENTS

- A. Provide organic soil amendments in quantities and proportions recommended by soil analysis report.

## 2.4 FERTILIZERS

- A. Provide fertilizers in quantities and proportions recommended by soil analysis report.

## 2.5 PLANTING SOILS

- A. All soils used for planting shall be prepared as necessary using soil amendments and fertilizers in the quantities recommended in the soil analysis report to produce satisfactory planting soil suitable for healthy, viable plants.
  - 1. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
    - a. Supplement with another specified planting soil when quantities are insufficient.
    - b. Mix existing, native surface topsoil with soil amendments and fertilizers in the quantities recommended in the soil analysis report to produce planting soil.
  - 2. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with soil amendments and fertilizers in the quantities recommended in the soil analysis report to produce planting soil.

## 2.6 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
  - 1. Type: Pine straw or as indicated on Plant Schedule.
  - 2. Color: Natural.

## 2.7 PESTICIDES AND HERBICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

## 2.8 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
  - 1. Upright and Guy Stakes: Rough-sawn, sound, new wood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.

2. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
3. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
  - a. Products: Subject to compliance with requirements and approval of Architect.
4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
5. Proprietary Staking Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.
  - a. Products: Subject to compliance with requirements and approval of Architect.

B. Root-Ball Stabilization Materials:

1. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.
  - a. Products: Subject to compliance with requirements and approval of Architect.

C. Palm Bracing: Battens or blocks, struts, straps, and protective padding as indicated.

1. Proprietary Palm-Bracing Devices: Proprietary systems to secure each new planting by trunk; sized per manufacturer's written recommendations unless otherwise indicated.
  - a. Products: Subject to compliance with requirements and approval of Architect.

2.9 MISCELLANEOUS PRODUCTS

- A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
  1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,

- paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

### 3.3 PLANTING AREA ESTABLISHMENT

- A. Loosen subgrade of planting areas to a minimum depth of 8 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them.
- 1. Apply fertilizer and soil amendments after fine grading and mix thoroughly into upper 2 inches of soil.
  - 2. Fertilizer and other necessary soil amendments shall be applied at the rate recommended by the soil analysis.
- B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 60-degree angle. Excavations with vertical sides shall be avoided. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling.
- 1. Excavate approximately three times as wide as root ball diameter.
  - 2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  4. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  5. Keep excavation covered or otherwise protected when unattended by Installer's personnel.
- B. Subsoil and topsoil removed from excavations may be used as planting soil for individually planted trees that are not located within a prepared plant bed.
- C. Obstructions: Notify Owner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

### 3.5 TREE, SHRUB, AND VINE PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
1. Use excavated soil for backfill.
  2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
1. Use excavated soil for backfill.
  2. Carefully remove root ball from container without damaging root ball or plant.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.

- E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
  - 1. Use excavated soil for backfill.
  - 2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - 4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
  - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
  
- F. Set and support bare-root stock in center of planting pit or trench with root flare 2 inches above adjacent finish grade.
  - 1. Use excavated soil for backfill.
  - 2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
  - 3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
  - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
  
- G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.6 TREE, SHRUB, AND VINE PRUNING

- A. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
  
- B. Do not apply pruning paint to wounds.

### 3.7 TREE STABILIZATION

- A. Install trunk stabilization staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
  
- B. Root-Ball Stabilization: Install at or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated according to manufacturer's written instructions.
  
- C. Palm Bracing: Install bracing system at three or more places equally spaced around perimeter of trunk to secure each palm until established unless otherwise indicated according to manufacturer's written instructions.

### 3.8 GROUND COVER PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.
- B. Use planting soil <Insert drawing designation> for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### 3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  - 1. Trees and Tree-like Shrubs in Turf Areas: Apply mulch ring of 3-inch average thickness, with 30-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks.
  - 2. Mulch in Planting Areas: Apply 3-inch average thickness of mulch as indicated on Drawings. Extend at least 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

### 3.10 EDGING INSTALLATION

- A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch-deep, shovel-cut edge as shown on Drawings.

### 3.11 TREE GRATE INSTALLATION

- A. Tree Grates: Set grate segments flush with adjoining surfaces as shown on Drawings. Shim from supporting substrate with soil-resistant plastic. Maintain a 3-inch- minimum growth radius around base of tree; break away units of casting, if necessary, according to manufacturer's written instructions.

### 3.12 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.



- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

### 3.13 PESTICIDE AND HERBICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

### 3.14 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

### 3.15 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them.

END OF SECTION 329300

## SECTION 331100 - WATER DISTRIBUTION SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.
- B. The Section includes general requirements that will apply to all water systems. In addition, the operating utility (the authority having jurisdiction) has numerous specific requirements for materials and execution that are too varied to cover in this specification.
  1. For this Project, the operating utility is Charleston Water System.
  2. Materials and execution requirements that are not covered in this Section shall comply with the requirements of the operating utility.
  3. Materials and execution requirements that are covered, but are in conflict with the requirements of the operating utility, shall comply with the higher quality or more restrictive requirement.
- C. Utility-furnished products include water meters that will be furnished to the site, ready for installation by Contractor.
  1. Tap and Impact Fees will be paid directly to the utility by the Owner and payment of said fees shall not be included in the Contractor's scope of services.

#### 1.3 DEFINITIONS

- A. CTS: Copper Tubing Size.
- B. DIP: Ductile iron pipe.
- C. EPDM: Ethylene propylene diene terpolymer rubber.
- D. HDPE: High density polyethylene pipe.
- E. LLDPE: Linear, low-density polyethylene plastic.
- F. NPS: Nominal pipe size.
- G. PE: Polyethylene plastic.
- H. PVC: Polyvinyl chloride plastic.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Ductile iron pipe.
  - 2. Tees, elbows, reducers and similar fittings.
  - 3. Joint restraint.
  - 4. Valves and valve boxes.
  - 5. Tapping sleeve assemblies.
  - 6. Fire hydrants.
  - 7.
  - 8. Yard hydrants.
  - 9. Service connection piping and fittings
  - 10. Corrosion-protection piping encasement.
  - 11. Protective enclosures.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Installer Qualifications: For high density polyethylene pipe installations, provide names and documentation of completed training by manufacturer's authorized representative for installers, fusion welders and joint inspectors.
- D. Field quality-control test reports.
- E. Bacteriological test reports.
- F. Record Drawings: Provide record drawings as required by authorities having jurisdiction

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Preinstallation Conference: Conduct conference to comply with project requirements in Division 01 Section "Project Management and Coordination."
  - 1. Review methods and procedures related to water system installation including, but not limited to, the following:
    - a. Review requirements of the operating utility.
    - b. Review site conditions and preparatory work.
    - c. Review requirements for protecting work.
    - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - e. Review inspection schedule and procedures required to monitor and document quality assurance.

- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic (PVC and HDPE) water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance: Comply with NSF 61 for materials for water-service piping and specialties for domestic water.
- H. Lead Free Requirement: Section 1417 of the Federal Safe Drinking Water Act has mandated that "Any pipe, solder, or flux used after June 19, 1986, in the installation or repair of public water systems and plumbing used for drinking water must be "Lead Free". The act defines "Lead Free" as less than 0.2-percent lead in solder and flux and less than 8.0-percent lead in pipes and fittings.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

## 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
1. Notify Architect, Owner, and Utility having jurisdiction no fewer than 72 hours in advance of proposed interruption of service.
  2. Do not proceed with interruption of water-distribution service without Architect's written permission.

## 1.8 COORDINATION

- A. Where required, coordinate connection to water main with utility company.

## PART 2 - PRODUCTS

### 2.1 STANDARDS OF OPERATING UTILITY

- A. See paragraph 1.2.B above for information regarding materials standards of the operating utility.

### 2.2 DUCTILE-IRON PIPE (DIP)

- A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless mechanical joint or flanged ends are indicated on Drawings or required by operating utility.
1. Gaskets: AWWA C111, rubber. Use only non-toxic lubricants approved by the manufacturer and that will not support microbiological growth. Vegetable shortening shall not be used.
  2. Pressure class: Class 350 for NPS 3 to NPS 12; Class 250 for NPS 14 and larger.
  3. Cement mortar lining: AWWA C 104, standard thickness.
  4. Laying length: 18 feet-0 inches to 20 feet-0 inches.
  5. Pipe size: No metric sized pipe shall be permitted.
  6. Testing: All pipe lengths shall be tested to 500 psi working pressure prior to shipping.
  7. Marking: Clearly mark each joint of pipe at convenient intervals, as follows:
    - a. Manufacturer's name.
    - b. Nominal pipe size.
    - c. Letters "DI" or "Ductile".
    - d. Weight.
    - e. Pressure Class.
  8. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. American-Cast Iron Pipe Co.
    - b. Griffin Pipe Co.
    - c. McWane Cast Iron Pipe Co..
    - d. U.S. Pipe Co.

- B. Flanged Joints: where indicated on Drawings or where required by operating utility and in accordance with standards of operating utility.
- C. Mechanical Joints: where indicated on Drawings or where required by operating utility and in accordance with standards of operating utility.

### 2.3 HIGH DENSITY POLYETHYLENE PIPE(HDPE)

- A. HDPE, AWWA Pipe: AWWA C906, DR No. 7, 9, or 11; with PE compound number required to give working pressure rating not less than 160 psig.
  - 1. Joints: Thermal butt fused, saddle fused, or socket fused in accordance with manufacturer's instructions.
  - 2. Marking: Clearly mark each joint of pipe at convenient intervals, as follows:
    - a. Manufacturer's name.
    - b. Nominal pipe size.
    - c. Pressure class.
    - d. Material designation.
    - e. National Sanitation Foundation (NSF) seal.
  - 3. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. Performance Pipe (Chevron Phillips Chemical Company, LLC)
    - b. J-M Manufacturing Co.
    - c. WL Plastics Co.
    - d. KWH Pipe Ltd.

### 2.4 FITTINGS (NPS 3 AND LARGER)

- A. Mechanical-Joint, Ductile-Iron Fittings: For NPS 3 and larger, AWWA C110, ductile-iron standard pattern or AWWA C153, ductile-iron compact pattern. For NPS 2 and smaller see "Service Connections" article below.
  - 1. Glands and Gaskets: AWWA C111, ductile-iron glands, rubber gaskets. Use only non-toxic lubricants approved by the manufacturer and that will not support microbiological growth. Vegetable shortening shall not be used.
  - 2. Nuts and Bolts: 316 Stainless Steel, material shall be marked on nuts and bolts.
  - 3. Material: Cast iron fittings are not permitted.
  - 4. Pressure class: Class 250.
  - 5. Fitting size: Metric sized fittings are not permitted.
  - 6. Cement mortar lining: AWWA C 104, standard thickness.
  - 7. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. American-Cast Iron Pipe Co.
    - b. Griffin Pipe Co.
    - c. McWane Cast Iron Pipe Co..
    - d. U.S. Pipe Co.

## 2.5 RESTRAINED JOINTS

- A. Push-on (DIP only) or mechanical joint type joint restraint where indicated on Drawings or where required by operating utility and in accordance with standards of operating utility.
1. Push-on Gaskets: AWWA C 111, for use on DIP only, approved for use on the pipe on which it is installed. Use only non-toxic lubricants approved by the manufacturer and that will not support microbiological growth. Vegetable shortening shall not be used.
  2. Mechanical Joint Glands, Gaskets and Bolts: AWWA C 111, the gland, gasket and bolts shall be part of an integral system by the same manufacturer and approved for use on the pipe on which it is installed. Installation shall require only standard mechanical joint assembly techniques. Bolts shall be 316 Stainless Steel. Use only non-toxic lubricants approved by the manufacturer and that will not support microbiological growth. Vegetable shortening shall not be used.
  3. DIP Pressure Rating: 350 psi.
  4. PVC Pressure Rating: rated at a 2:1 safety factor for the pipe on which it is installed.
  5. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. American-Cast Iron Pipe Co.
    - b. Griffin Pipe Co.
    - c. McWane Cast Iron Pipe Co..
    - d. U.S. Pipe Co.
    - e. Ebba Iron Inc.
    - f. Ford Meter Box Co.
    - g. Sigma Corporation.

## 2.6 VALVES (NPS 3 AND LARGER)

- A. General:
1. For NPS 2 and smaller: see "Service Connections" article below.
  2. Available Manufacturers: Subject to compliance with these requirements and the standards of operating utility, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American AVK Co.; Valves & Fittings Div.
    - b. American Cast Iron Pipe Co.; American Flow Control Div.
    - c. Crane Co.; Crane Valve Group.
    - d. East Jordan Iron Works, Inc.
    - e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    - f. McWane, Inc.; Kennedy Valve Div.
    - g. McWane, Inc.; M & H Valve Company Div.
    - h. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
    - i. Mueller Co.; Water Products Div.
    - j. U.S. Pipe and Foundry Company.
  3. Opening direction: As required by operating utility.
  4. Operating system: 2" square operating nut for below grade installation, wheel for above grade or vault installations.
  5. Exterior Nuts and Bolts: 316 stainless steel
  6. Interior Coating: Complying with AWWA C550.
- B. AWWA, Gate Valves:

1. Nonrising-Stem, Resilient-Seated Gate Valves:
  - a. Description: For NPS 3 to NPS 12, gray- or ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 250 psig.
    - 3) End Connections: AWWA C 111, mechanical joint.

C. Tapping-Sleeve Assemblies:

1. Description: Sleeve and valve compatible with drilling machine.
  - a. Standard: MSS SP-60.
  - b. Tapping Sleeve: Ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  - c. Pressure Rating: 250 psig.
  - d. Tapping Valve: AWWA C 509, cast or ductile-iron, nonrising-stem, resilient-seated gate valve.
  - e. Valve End Connections: Flanged (ANSI B16.1) for end mating tapping-sleeve flange and mechanical joint (AWWA C111) for opposite end.

2.7 VALVE ACCESSORIES (NPS 3 AND LARGER)

A. Valve Boxes:

1. Material: Cast or ductile-iron, suitable for heavy traffic use and conforming to ASTM A-48, Class 20.
  - a. Available Manufacturers: Subject to compliance with these requirements and the standards of operating utility, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) East Jordan Iron Works
    - 2) Tyler Pipe
    - 3) Bingham and Taylor.
  - b. Model: as required by the operating utility.
  - c. Elevation Adjustment: as required by operating utility.
  - d. Inside Shaft Diameter: 5-1/4 inches.
  - e. Coating: Asphaltic, not less than 1 mil thick.
  - f. Cover: Heavy cast iron with the word WATER cast in raised letters.
  - g. Base: Enlarged to enclose and protect valve operating nut without actually being in contact with pipe or valve.

B. Valve Box Protection Rings:

1. Material: Reinforced, precast 3,000 psi concrete.
  - a. Inside diameter: 9-1/4 inches.
  - b. Outside Diameter: 27 inches.
  - c. Thickness: 5 inches at inner diameter with top tapering to 2 inches at outer diameter.



- d. Reinforcing: Two #3 rebar, one at 21 inch diameter and one at 24 inch diameter.
- e. Min. Weight: 110 lbs.

## 2.8 FIRE HYDRANTS

### A. Dry-Barrel Fire Hydrants:

1. Available Manufacturers: Subject to compliance with these requirements and the standards of authorities having jurisdiction, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. American AVK Co.; Valves & Fittings Div.
  - b. American Cast Iron Pipe Co.; American Flow Control Div.
  - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - d. American Foundry Group, Inc.
  - e. East Jordan Iron Works, Inc.
  - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - g. McWane, Inc.; Kennedy Valve Div.
  - h. McWane, Inc.; M & H Valve Company Div.
  - i. Mueller Co.; Water Products Div.
  - j. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
  - k. U.S. Pipe and Foundry Company.
2. Description: Freestanding, with one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
  - a. Standard: AWWA C502.
  - b. Pressure Rating: 150 psig minimum.
  - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
  - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
  - e. Direction of Opening: as required by authorities having jurisdiction.
  - f. Exterior Finish: Paint type and colors as required by authorities having jurisdiction.

## 2.9 YARD HYDRANTS

- ### A. Available Manufacturers: Subject to compliance with these requirements and the standards of operating utility, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Zurn Plumbing Products Group
  2. Kupferle Foundry Co. (The).
  3. Woodford Manufacturing Co.
- ### B. Description: Nonfreeze and automatic draining, with integral backflow prevention device.
1. Pressure Rating: 125 psig minimum.
  2. Length: Sufficient to provide 30 inch installation height with depth of bury to position drain port below frost line.
  3. Outlet: Brass 3/4 inch male hose thread.
  4. Casing: 1-1/4 inch galvanized steel pipe.

5. Operating Handle: Cast Iron.
6. Inlet: Female pipe thread, 3/4 inch minimum.
7. Operating Rod: 3/8 inch diameter brass or galvanized steel.

## 2.10 WATER METERS

- A. See paragraph 1.2.C above regarding water meters.
  - 1.

## 2.11 SERVICE CONNECTIONS (NPS 3 AND SMALLER)

- A. Copper Tubing and Fittings

1. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
  - a. Copper, Pressure-Seal Fittings: wrought-copper fitting with EPDM O-ring seal in each end.
  - b. Copper, Solder-Joint Fittings: Only acceptable where other connections will not work. ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

- B. Tapping Saddles and Sleeves: in accordance with standards of operating utility.

- C. Corporation Stops: in accordance with standards of operating utility.

- D. Curb Stops: in accordance with standards of operating utility.

- E. Meter Boxes: in accordance with standards of operating utility.

- F. Water Meters: see paragraph 1.2.C regarding water meters.

- G. Miscellaneous Fittings: in accordance with standards of operating utility.

## 2.12 CORROSION-PROTECTION PIPING ENCASEMENT

- A. Encasement for Underground Metal Pipe, Fittings and Appurtenances:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Tube.
3. Material: LLDPE film of 0.008-inch minimum thickness.
4. Color: Blue.

## 2.13 PIPE DETECTION MATERIALS

- A. Detectable Warning Tape: specified in Section titled "Earth Moving".

- B. Locator Wire In addition to warning tape where required by operating utility. Specified in Section titled "Earth Moving".

## 2.14 PROTECTIVE ENCLOSURES

### A. Weather-Resistant Enclosures:

1. Available Manufacturers: Subject to compliance with these requirements, the standards of authorities having jurisdiction, and approval by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. DekoRRa Products.
  - b. G&C Enclosures.
  - c. Hot Box, Inc.
  - d. HydroCowl, Inc.
  - e. Watts Water Technologies, Inc.
2. Description: Uninsulated enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.
  - a. Standard: ASSE 1060.
  - b. Class II: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
    - 1) Housing: Reinforced aluminum or fiberglass construction.
      - a) Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
      - b) Drain opening for units with drain connection.
      - c) Access doors with locking devices.
      - d) Insulation inside housing.
      - e) Anchoring devices for attaching housing to concrete base.

### B. Enclosure Bases:

1. Description: 4 inch minimum thickness precast concrete, of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

## PART 3 - EXECUTION

### 3.1 STANDARDS OF OPERATING UTILITY

- A. See paragraph 1.2.B above for information regarding execution standards of the operating utility.

### 3.2 EARTHWORK

- A. Refer to Section titled "Earth Moving" for excavating, trenching, and backfilling.
- B. Refer to Section titled "Earth Moving" for installation requirements of pipe detection materials.

### 3.3 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
  2. Do not use flanges or unions for underground piping.
  3. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
  4. Restrained joints shall be provided where required by the operating utility and where indicated on Drawings.
  5. Underground Water Main Piping NPS 3 and larger shall be the following, subject to approval by the operating utility and as indicated on the Drawings:
    - a. Ductile-iron, push-on-joint pipe with ductile-iron, mechanical-joint fittings and gasketed joints.
    - b. HDPE pipe with ductile-iron, mechanical-joint fittings, and thermal fused joints.
- B. Underground Water-Service Piping NPS 3/4 to NPS 2 shall be the following, subject to approval by the operating utility:
1. Soft copper tubing with copper, pressure-seal fittings and pressure-sealed joints. Wrought-copper, solder-joint fittings only where other connections will not work.

### 3.4 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use flanged-end valves for installation above ground or in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation stops and curb stops with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Underground Valves for Water Mains: NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.

### 3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
1. Make connections larger than NPS 2 with tapping machine according to the following:
    - a. Install tapping sleeve and tapping valve according to MSS SP-60.
    - b. Install tapping sleeve on pipe to be tapped. Position flanged outlet for tapping valve.
    - c. Install tapping valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
    - d. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Extract bit and close valve. Remove tapping machine.

- e. Slightly open valve briefly to flush out filings. Close valve and connect water-piping.
  - 2. Make connections NPS 2 and smaller with drilling machine according to the following:
    - a. Install service-saddle assemblies and corporation stops in size, quantity, and arrangement required by operating utility.
    - b. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation stops.
    - c. Install corporation stops into service-saddle assemblies.
    - d. Use drilling machine compatible with service-saddle assemblies and corporation stops. Drill hole in main. Extract bit and close corporation stop.
    - e. Remove drilling machine.
    - f. Slightly open stop briefly to flush out filings. Close stop and connect water-service piping.
    - g. Install manifold for multiple taps in water main.
    - h. Install curb valve in water-service piping with head pointing up and with service box.
  - C. Install ductile-iron pipe according to AWWA C600, AWWA M41 and the standards of the operating utility.
    - 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
  - D. Install HDPE, AWWA pipe according to AWWA M 55, PPI Handbook of Polyethylene Pipe and the standards of the operating utility.
  - E. Install copper tubing according to CDA's "Copper Tube Handbook" and the standards of the operating utility.
  - F. Bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
    - 1. Under Driveways and Streets: With at least 36 inches cover over top.
    - 2. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
  - G. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
  - H. Install underground piping with restrained joints at horizontal and vertical changes in direction, at locations indicated on Drawings and where required by the operating utility. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports as accepted by the operating utility.
- 3.6 JOINT CONSTRUCTION
- A. Make pipe joints according to the following (as applicable):
    - 1. Ductile-Iron Piping, Gasketed Joints for Water Main Piping : AWWA C600, AWWA C111 AWWA M41 and standards of authorities having jurisdiction.
    - 2. HDPE Piping: Thermally butt fuse joints according to ASTM D 2657 and PPI Handbook of Polyethylene Pipe.
      - a. Butt fusion joining of dissimilar SDR pipe sections is prohibited.

- b. Installers and joining inspectors shall be trained by manufacturer's authorized representative.
  - c. Fusion welding equipment shall be of a make and model approved by the manufacturer and shall operate in accordance with original equipment specifications.
  - d. Join to other pipe materials by means of flanged connections or mechanical joint couplings designed for joining HDPE pipe to the other pipe material.
3. Copper-Tubing, Pressure-Sealed Joints: Use procedure recommended by copper, pressure-seal-fitting manufacturer.
  4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with correct OD, and with system working pressure at least equal to pipe. Install according to fitting manufacturer's written instructions

### 3.7 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water system piping with restrained joints at horizontal and vertical changes in direction, at locations indicated on Drawings, and where required by the operating utility. Subject to acceptance by the operating utility, anchorages and restrained-joint types that may be used include the following:
  1. Concrete thrust blocks.
  2. Set-screw mechanical retainer glands.
  3. Bolted flanged joints.
  4. Heat-fused joints.
  5. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  1. Gasketed-Joint, Ductile-Iron, Water- Piping: According to AWWA C600 and the standards of the operating utility.
  2. Thermally Fused Joint, HDPE Water Piping with Mechanical Joint Fittings: According to AWWA M55 and the standards of the operating utility.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.8 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600, AWWA M44 and standards of the operating utility. Install each underground valve with stem pointing up and with valve box.

### 3.9 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate and adjoining gate valve in supply pipe, anchor with restrained joints or thrust blocks to standards of operating utility, and support in upright position.
- B. AWWA Fire Hydrants: Comply with AWWA M17, standards of operating utility, and standards of authorities having jurisdiction.

3.10 YARD HYDRANT INSTALLATION

- A. Install in accordance with manufacturer's written instructions and standards of operating utility.
- B. Install straight and plumb and positioned such that the drain port is located below frost line.

3.11 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties, according to standards of the operating utility, ready to receive water meter installation.

3.12 WATER METER BOX INSTALLATION

- A. Install meter boxes according to the manufacturer's written instructions and the standards of the operating utility.
- B. Install water meter boxes in paved areas flush with surface.
- C. Install water meter boxes in grass or earth areas with top 2 inches above surface.

3.13 PROTECTIVE ENCLOSURE INSTALLATION

- A. Install protective enclosures according to the manufacturer's written instructions and the standards of the operating utility.
- B. Install concrete base level and with top approximately 2 inches above grade.
- C. Install protective enclosure over valves and equipment.
- D. Anchor protective enclosure to concrete base.

3.14 SERVICE CONNECTION INSTALLATION

- A. Extend water-service piping and connect to water meter and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

3.15 PIPE DETECTION MATERIALS INSTALLATION

- A. Install continuous underground detectable warning tape and locator wire, where required by operating utility, during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping and according to standards of operating utility. Pipe detection materials are specified in Section titled "Earth Moving."

3.16 FIELD QUALITY CONTROL

- A. Hydrostatic Test: Conduct test according to AWWA C 600 or C 605, as applicable, and the standards of the authorities having jurisdiction.
1. Pre-testing: The Contractor shall conduct his on pre-tests and confirm that the system is capable of passing prior to requesting the Architect's presence to witness the test.
    - a. Conduct pre-tests only after all installation is complete including joint restraint. Concrete thrust blocks shall have been in place long enough to have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
    - b. Leaks shall be immediately repaired and the test shall be repeated until acceptable results are obtained.
    - c. The Contractor shall notify the Architect at least 48 hours before the scheduled time of the official test. Passing test performed without the Architect present will be rejected. The Contractor will be required to retest, with the Architect present, without additional compensation.
  2. Test Procedures: The line shall be slowly filled with water and all air expelled through air valves or other means. A suitable test pump, water meter and potable water source, furnished by the Contractor, shall be connected to the line by means of a tap (or other suitable means) in the line and the proper test pressure slowly applied to the line. The test pressure shall be maintained for at least two hours.
    - a. Test at not less than 150 psi or one-and-one-half times working pressure, whichever is larger, for two hours. If pressure falls more than 5 psi during the test, the pump shall be reactivated and the pressure restored to the starting pressure as often as necessary. At the end of two hours, the pressure shall be restored to the starting pressure a final time and the total quantity of water used (leakage) to maintain the pressure for two hours shall be read.
    - b. Open and close each valve within the system several times during the test period.
    - c. Service connections, if present, shall be subjected to the hydrostatic test concurrently with the main lines.
  3. Allowable Leakage: Allowable leakage shall be determined by the following formula:
    - a.  $L = 0.000007SD\sqrt{P}$
    - b. Where:
    - c. L = allowable leakage in gallons per hour.
    - d. S = the total length of the pipe tested in feet.
    - e. D = the nominal diameter of the pipe in inches.
    - f. P = the average test pressure in psi gauge.
- B. Preliminary Inspection: Make arrangements with Architect to conduct preliminary final inspection.
1. Pre-inspection: The Contractor shall conduct his own pre-inspection and confirm that the system is capable of passing prior to requesting the Architect's presence to witness the preliminary inspection.
    - a. Repair or remove and replace components where test results or pre-inspections indicate that they do not comply with specified requirements.



2. Preliminary Inspection: The Contractor shall notify the Architect at least 48 hours before the scheduled time of the preliminary inspection.
  - a. Preliminary inspection shall include but shall not necessarily be limited to the following (as applicable):
    - 1) A visual inspection of fire hydrants: Requirements include: verification that hydrant is plumb and at correct elevation, verification that caps are in place and operational, verification that hydrant is operational and that no apparent leakage exists, verification that gate valve is in place and operational, verification that hydrant finish is adequate, verification that hydrant location is correct.
    - 2) A visual inspection of valves: Requirements include: verification that valves are operational, verification that valve boxes are centered, plumb, at correct elevation, and properly backfilled, verification that valve indicates that water line is at adequate depth, verification that valve location is correct, verification that valve protection rings are properly installed, and verification that any valve appurtenances are properly installed and functioning.
    - 3) A visual inspection of connections to existing water system: Requirements include: verification of adequacy of connection work, verification that leakage does not exist, verification that connection valve is off, verification that safeguards are in place to prevent contamination of existing system by backflow from the new system.
    - 4) A visual inspection of water meters, backflow preventers and other appurtenances to confirm proper installation.
  - b. Repair or remove and replace components where test results or preliminary final inspections indicate that they do not comply with specified requirements.
  - c. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Final Inspection: Upon successful completion of the preliminary inspection and after any required documentation has been received and approved by the authorities having jurisdiction, the Contractor, Architect, representatives of the authorities having jurisdiction shall conduct a final inspection of the system.
  - a. The Contractor shall notify the Architect at least 48 hours before the desired time of the pre-inspection. The Architect shall endeavor to schedule attendance by representatives of the authorities having jurisdiction at the desired time; however, the Architect provides no guarantee of availability at that time. If unavailable, the Architect will schedule the representative at the soonest reasonable time. Final inspections will not be held without the attendance of both the Architect and a representative of the authorities having jurisdiction.
  - b. Final inspection shall include but shall not necessarily be limited to the items listed for the pre-inspection.
  - c. Repair or remove and replace components where test results or final inspections indicate that they do not comply with specified requirements.
  - d. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Reports of Inspection Activities.
  1. Where required, the Architect will provide final required documentation to authorities having jurisdiction for the purpose of obtaining a Permit to Operate. Promptly provide any documents required from Contractor. Once Permit to Operate is received, Architect

will notify Contractor. Make final connections, when necessary, and place system in operation. Do NOT place system in operation before notification by Architect that Permit to Operate has been received.

### 3.17 DISINFECTION AND BACTERIOLOGICAL TESTING

#### A. Clean and disinfect water-distribution piping as follows:

1. Purge and disinfect according to AWWA C 651 and standards of authorities having jurisdiction.
  - a. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
    - 1) Provide adequate openings to ensure that required flushing velocities are met.
    - 2) Where applicable, provide protective measures as required to ensure that flushing waters do not damage property or cause erosion or flooding.
  - b. Fill lines to be disinfected with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for at least 24 hours.
  - c. At end of retention time, perform concentration testing of solution at the extreme end of the lines to be disinfected. Solution shall contain not less than 25 ppm of chlorine. If residual chlorine is less than 25 ppm, repeat procedure.
  - d. Once an acceptable residual chlorine count is obtained, flush system with clean, potable water until no chlorine remains in water coming from the system.

#### B. Bacteriological Testing:

1. Perform bacteriological testing according to AWWA C 651 and the standards of the authorities having jurisdiction.
  - a. Using methods acceptable to the Architect and authorities having jurisdiction, take two successive samples, at each dead-end line and at points deemed representative of the water in the newly constructed mains, at a period of at least 24 hours apart.
    - 1) A test for residual chlorine content must be performed within 15 minutes of the time that the sample is drawn. Residual chlorine must be below the level required by AWWA C 651 and the authorities having jurisdiction.
  - b. Perform tests, at an independent laboratory certified by the authorities having jurisdiction, for coliform growth, non-coliform growth and residual chlorine.
  - c. Should the test values exceed the maximum acceptable values permitted by the authorities having jurisdiction, repeat disinfection, flushing and testing until acceptable values are obtained (with the exception of residual chlorine, in which case the samples are considered invalid and system must be only be flushed and retested).
  - d. Prepare reports of purging, disinfecting, and testing activities, including water sample chain of custody and copies of passing bacteriological tests, and provide to Architect.
    - 1) No more than 30 days can have passed between the time that the first passing sample is drawn and the time the corresponding bacteriological test results are submitted, along with all other required water system closeout documents, to the authorities having jurisdiction.

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- e. After passing samples are obtained, make arrangements for follow-up samples to be taken by the authorities having jurisdiction.
- f. As before, should the test values of the follow-up samples exceed maximum acceptable values, repeat disinfection, flushing and testing until acceptable values are obtained.

END OF SECTION 331100

## SECTION 333100 – GRAVITY FLOW SANITARY SEWERAGE SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes gravity sanitary sewer piping and related components outside the building.
- B. The Section includes general requirements that will apply to all gravity sanitary sewerage systems. In addition, the operating utility (the authority having jurisdiction) has numerous specific requirements for materials and execution that are too varied to cover in this specification.
  1. For this Project, the operating utility is Berkeley County Water and Sewer
  2. Materials and execution requirements that are not covered in this Section shall comply with the requirements of the operating utility.
  3. Materials and execution requirements that are covered, but are in conflict with the requirements of the operating utility, shall comply with the higher quality or more restrictive requirement.
- C. Tap and Impact Fees will be paid directly to the utility by the Owner and payment of said fees shall not be included in the Contractor's scope of services.

#### 1.3 DEFINITIONS

- A. DIP: Ductile iron pipe.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. NPS: Nominal pipe size.
- D. PP: Polypropylene plastic.
- E. PVC: Polyvinyl chloride plastic.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
  1. Polyvinyl chloride pipe.
  2. Wyes, elbows, reducers and similar fittings.
  3. Precast concrete manholes, frame and covers, and related components.
  4. Cleanout caps and covers.

5. Nonpressure-type pipe couplings.
  6. Restrained joint type pipe couplings.
- B. Field quality-control test reports.
- C. Record Drawings: Provide record drawings as required by authorities having jurisdiction

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Comply with requirements of the authorities having jurisdiction.
  2. Comply with standards of operating utility for sanitary sewer-service piping, including materials, installation, and testing.
- B. Preinstallation Conference: Conduct conference to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Review methods and procedures related to sanitary sewerage installation including, but not limited to, the following:
    - a. Review requirements of the operating utility.
    - b. Review site conditions and preparatory work.
    - c. Review requirements for protecting work.
    - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - e. Review inspection schedule and procedures required to monitor and document quality assurance.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic materials in direct sunlight. Support to prevent sagging and bending.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes and precast concrete structures, according to manufacturer's written rigging instructions.

#### 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewer Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sanitary sewer service according to requirements indicated:
1. Notify Architect, Owner, and Utility having jurisdiction no fewer than two days in advance of proposed interruption of service.
  2. Do not proceed with interruption of water-distribution service without Architect's written permission.

1.8 COORDINATION

- A. Where required, coordinate connection to existing sewer lines with operating utility.

PART 2 - PRODUCTS

2.1 STANDARDS OF OPERATING UTILITY

- A. See paragraph 1.2.B above for information regarding materials standards of the operating utility.

2.2 POLYVINYL CHLORIDE PLASTIC PIPE AND FITTINGS (PVC)

- A. PVC Sewer Pipe (ASTM): ASTM D 3034, Class 150, with bell end with gasket, and with spigot end.

- 1. Gaskets: ASTM F 477, rubber. Use lubricants approved by the manufacturer.
- 2. Fittings: ASTM D 3034. Use of saddle type fittings is prohibited.
- 3. Joints: ASTM D 3212.
- 4. Laying length: 18 feet-0 inches to 20 feet-0 inches
- 5. Pipe size: comply with outside diameter dimensions of DIP.
- 6. Standard dimension ratio: SDR 26, unless otherwise indicated on Drawings. SDR 21 where indicated for greater depth and crossings of other utilities (AWWA C900 or DIP may alternately be indicated for these applications).
- 7. Pipe color: green.
- 8. The use of solvent weld joints is prohibited.
- 9. Marking: Clearly mark each joint of pipe at convenient intervals, as follows:
  - a. Manufacturer's name.
  - b. Nominal pipe size.
  - c. Pressure class.
  - d. Material designation.
  - e. National Sanitation Foundation (NSF) seal.

- B. PVC Sewer Pipe (AWWA): AWWA C900, Class 150, with bell end with gasket, and with spigot end.

- 1. Gaskets: ASTM F 477, rubber. Use only non-toxic lubricants approved by the manufacturer and that will not support microbiological growth. Vegetable shortening shall not be used.
- 2. Joints: ASTM D 3139.
- 3. Laying length: 18 feet-0 inches to 20 feet-0 inches
- 4. Pipe size: comply with outside diameter dimensions of DIP.
- 5. Standard dimension ratio: SDR 18.
- 6. Pipe color: green.
- 7. The use of solvent weld joints is prohibited.
- 8. Marking: Clearly mark each joint of pipe at convenient intervals, as follows:
  - a. Manufacturer's name.
  - b. Nominal pipe size.
  - c. Pressure class.
  - d. Material designation.

## 2.3 MANHOLES

- A. Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
1. Diameter: 48 inches minimum or as required to accommodate pipe size, unless otherwise indicated.
  2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
  4. Inverts (channels and benches): See "Concrete" article below.
  5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
  6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
  9. Steps: Individual ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12 to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
  10. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
  11. Protective Coating: For interior surfaces of lift station receiving manholes, manholes with force main connections, and the next manhole downstream apply Raven 405 by Raven Lining Systems or approved equal. 120 mil nominal thickness.
  12. Manhole Frames and Covers: Ferrous; 24 inch ID by 7 to 9 inch riser with 4 inch minimum width flange and 26 inch diameter cover. Include indented top design with lettering cast into cover, using wording or design required by agency having authority. Where no specific wording or design is required by agency, wording equivalent to "SANITARY SEWER" shall be cast.
    - a. Material: ASTM A 48, Class 35 gray iron, unless otherwise indicated.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil minimum thickness applied to all surfaces, unless otherwise

## 2.4 FIELD INSTALLED PIPE TO MANHOLE CONNECTORS

- A. Resilient Pipe Connectors: ASTM C 923, design specifically for field installation, for each pipe connection.

## 2.5 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
1. Manufacturers:
    - a. Canplas Inc.

- b. IPS Corporation.
  - c. NDS Inc.
  - d. Plastic Oddities, Inc.
  - e. Sioux Chief Manufacturing Company, Inc.
  - f. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.
- B. Frame and Cover: Traffic grade cast-iron according to the standards of the authorities having jurisdiction, as indicated or, where not indicated, in accordance with the following:
- 1. Use medium-duty, top-loading classification cleanouts in landscaped and foot-traffic areas.
  - 2. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
  - 3. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.
- C. Concrete Collar: Where not located as a casting embedded in pavement, provide cast-in-place concrete collar as indicated on Drawings or, where not indicated 18 by 18 by 12 inches deep.

## 2.6 CONCRETE

- A. General: Class 3000 concrete in accordance with Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Portland Cement Design Mix: 3000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
- 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Manhole Channels and Benches: Field formed from concrete.
- 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: Minimum of 1 percent or as required to provide uniform slope between invert elevations indicated on Drawings.
  - 2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: 8 percent.
- D. Ballast and Pipe Supports: Field formed from concrete.
- 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

## 2.7 PIPE DETECTION MATERIALS

- A. Detectable Warning Tape: specified in Section titled "Earth Moving".
- B. Locator Wire In addition to warning tape where required by operating utility. Specified in Section titled "Earth Moving".



### PART 3 - EXECUTION

#### 3.1 STANDARDS OF OPERATING UTILITY

- A. See paragraph 1.2.B above for information regarding execution standards of the operating utility.

#### 3.2 EARTHWORK

- A. Refer to Section titled "Earth Moving" for excavating, trenching, and backfilling.
- B. Refer to Section titled "Earth Moving" for installation requirements of pipe detection materials.

#### 3.3 PIPING APPLICATIONS

- A. Flexible pipe couplings may be used in applications below, unless otherwise indicated.
  - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping of different material type or size, unless otherwise indicated. No other use of flexible couplings will be permitted.
    - a. Unshielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- B. Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials as indicated on the Drawings.
  - 1. Ductile-iron, gravity sewer pipe; ductile-iron standard or compact fittings; gaskets; and gasketed joints.
  - 2. PVC sewer pipe and fittings, gaskets, and gasketed joints.

#### 3.4 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, and other installation requirements.
- C. Install manholes for changes in direction, unless fittings are indicated. Use fittings for service branch connections, unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or combination of both.
- F. Install gravity-flow, nonpressure, sanitary sewerage piping according to the following:
  - 1. Install piping pitched down in direction of flow, at the slope indicated or, where not indicated, at a minimum slope of 1/2 percent.
  - 2. Install piping with 36-inch minimum cover unless otherwise indicated.
  - 3. Install PVC sewer piping according to ASTM D 2321, ASTM F 1668 and the standards of the operating utility.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

### 3.5 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, sanitary sewerage piping according to the following:
  - 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints and the standards of the operating utility.
  - 2. Join dissimilar pipe materials with nonpressure-type, flexible couplings in accordance with manufacturer's written instructions.

### 3.6 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. For manholes that occur in pavements, set tops of frames and covers flush with finished surface. Set tops 2 inches above finished surface elsewhere, unless otherwise indicated.

### 3.7 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to Sections 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction for measuring, mixing, transporting, and placing concrete.

### 3.8 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use pipe fittings of same material as pipe at branches for cleanouts and PVC pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Install cast-iron frames and covers.
  - 1. Use medium-duty, top-loading classification cleanouts in landscaped and foot-traffic areas.

2. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
3. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.
4. Set cleanout frames and covers located in earthen areas in cast-in-place concrete collar, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade
5. Set cleanout frames and covers in pavement with tops flush with pavement surface.

### 3.9 SERVICE CONNECTION INSTALLATION

- A. Extend sanitary sewer-service piping and connect to building sanitary sewer system 5' from outside face of building wall in locations and pipe sizes indicated.
  1. Terminate sanitary sewer service piping at building wall until building sanitary sewer piping is installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building sanitary sewer piping systems when those systems are installed.

### 3.10 CONNECTIONS TO EXISTING SANITARY SEWER

- A. Where required by operating utility, connections to existing piping or manholes shall be made in the presence of an authorized inspector. Notify the Architect at least 48 hours before starting a connection.
- B. Where indicated, construct new manhole over existing gravity main by cutting upper half of existing pipe after base of manhole is completed so as not to obstruct flow of the existing pipe.
- C. Where indicated, make connections to existing piping using commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete.
- D. Where indicated, make connections to existing underground manholes as follows:
  1. Core drill opening into existing manhole large enough to allow installation of resilient manhole connector.
  2. Install resilient manhole connector in manhole opening accordance with manufacturer's written instructions.
  3. Install pipe in resilient connector in accordance with manufacturer's written instructions.
  4. Cut end of connection pipe passing through manhole wall to be flush with inside wall, unless otherwise indicated.
  5. On outside of manhole wall, encase entering connection and pipe in 6 inches of concrete for minimum length of 12 inches to provide additional support of connector from connection to undisturbed ground.
  6. On inside of manhole wall, encase outside of pipe to flush with face of wall with grout. Form smooth invert channel transition to existing invert or complete installation of internal drop piping as applicable.
  7. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- E. Protect piping and manholes to prevent concrete or debris from entering while making connections. Remove debris or other extraneous material that may accumulate.

3.11 PIPE DETECTION MATERIALS INSTALLATION

- A. Install continuous underground detectable warning tape and locator wire, where required by operating utility, during backfilling of trench for underground sanitary sewerage piping. Locate below finished grade, directly over piping and according to standards of operating utility. Pipe detection materials are specified in Section titled "Earth Moving."

3.12 FIELD QUALITY CONTROL

- A. During Installation: Inspect interior of piping, to determine whether line displacement or other damage has occurred, continuously during installation. Inspect after approximately 24 inches of backfill is in place, and again at completion of each section of piping between manholes.
  - 1. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 95 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping or manholes.
    - d. Infiltration: Water leakage into piping or manholes.
    - e. Exfiltration: Water leakage from or around piping.
  - 2. Replace defective piping and manholes using new materials, and repeat inspections until defects are within allowances specified.
- B. Testing: The Contractor shall notify the Architect at least 48 hours before the scheduled time of the official tests. Passing test performed without the Architect present will be rejected. The Contractor will be required to retest, with the Architect present, without additional compensation
  - 1. Pipe deflection test: Each section of piping will be tested for internal diametric deflection by the use of a 5% mandrel.
    - a. The mandrel pull shall be performed according to the "Recommended Standards for Wastewater Facilities" by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards)" and the standards of the operating utility.
    - b. The Contractor shall not use any mechanical device for the mandrel pull.
    - c. Deflections of greater than 5% shall be corrected.
  - 2. Low Pressure Air Tests: Test gravity sewer piping according to UNI-B-6, and the standards of operating utility.
    - a. Prior to performing test, system shall be backfilled to final grade and a waiting period, specified by the operating utility, shall have passed.
    - b. All service connections shall be in place prior to testing.
    - c. Leaks and loss in test pressure constitute defects that must be repaired.
    - d. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- C. Preliminary Inspection: Make arrangements with Architect to conduct preliminary final inspection.

1. Pre-inspection: The Contractor shall conduct his own pre-inspection and confirm that the system is capable of passing prior to requesting the Architect's presence to witness the preliminary inspection.
    - a. Repair or remove and replace components where test results or pre-inspections indicate that they do not comply with specified requirements.
    - b. Remove all sand, dirt, brick, excess grout, and other foreign matter from manholes and piping. Material shall not be flushed into existing sewer lines
  2. Preliminary Inspection: The Contractor shall notify the Architect at least 48 hours before the scheduled time of the preliminary inspection.
    - a. Preliminary inspection shall include but shall not necessarily be limited to the following:
      - 1) A visual inspection of manholes. Requirements include: verification that manhole is plumb and at correct elevation; verification that frame and cover is properly installed, centered, grouted inside and out, and at proper elevation; verification that section joints are sealed watertight and properly grouted; verification that inverts and shelves are smooth, of correct slope, and properly formed; verification that steps are properly positioned, securely embedded, and undamaged; verification that drop manhole piping is properly installed and secure; verification that pipe openings are watertight, properly located, and properly grouted; verification that interior of manhole has been cleaned of dirt and construction debris and verification that grades in the vicinity of the manhole are properly established and well drained.
      - 2) A visual inspection of piping. Requirements include: verification that piping is clean and unobstructed; verification that piping is straight and not visually deflected from a circular cross-section (i.e.: full moon when flashed or lamped); verification that no infiltration or exfiltration is visually evident.
      - 3) Verification of proper elevations, slopes, and horizontal and vertical alignment (under no circumstances will a line be accepted which is below the minimum slope required by the authorities having jurisdiction for a given line size.
    - b. Repair or remove and replace components where test results or preliminary inspections indicate that they do not comply with specified requirements.
    - c. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Final Inspection: Upon successful completion of the preliminary final inspection and after any required documentation has been received and approved by the authorities having jurisdiction, the Contractor, Architect, representatives of the authorities having jurisdiction shall conduct a final inspection of the system.
- a. The Contractor shall notify the Architect at least 48 hours before the desired time of the pre-inspection. The Architect shall endeavor to schedule attendance by representatives of the authorities having jurisdiction at the desired time; however, the Architect provides no guarantee of availability at that time. If unavailable, the Architect will schedule the representative at the soonest reasonable time. Final inspections will not be held without the attendance of both the Architect and a representative of the authorities having jurisdiction.
  - b. Final inspection shall include but shall not necessarily be limited to the items listed for the pre-inspection.

- c. Repair or remove and replace components where test results or final inspections indicate that they do not comply with specified requirements.
  - d. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Video Documentation: Immediately after final approval of the completed system, complete a videotaped inspection of the completed piping system utilizing equipment made expressly for the purpose. Provide a written report, inspection logs, and a copy of the inspection videotape to the Architect.
- F. Reports of Inspection Activities.
  - 1. Where required, the Architect will provide final required documentation to authorities having jurisdiction for the purpose of obtaining a Permit to Operate. Promptly provide any documents required from Contractor. Once Permit to Operate is received, Architect will notify Contractor. Make final connections, when necessary, and place system in operation. Do NOT place system in operation before notification by Architect that Permit to Operate has been received.

END OF SECTION 333100

## SECTION 334100 - STORM DRAINAGE SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building with the following components:
  - 1. Pipe culverts.
  - 2. Drainage structures.
  - 3. Outlet protection.

#### 1.3 DEFINITIONS

- A. DIP: Ductile iron pipe
- B. Drainage Structures: catch basins, curb inlets, junction boxes, weir inlets, pond outlet structures.
- C. HDPE: High density polyethylene pipe
- D. LLDPE: Linear low-density, polyethylene plastic.
- E. NPS: Nominal pipe size
- F. PE: Polyethylene plastic.
- G. PP: Polypropylene plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. SRCP: Reinforced Concrete Pipe (sealant joints)
- J. GRCP: Reinforced Concrete Pipe (gasket joints)

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: Pipe joints shall be at least silt-tight, unless otherwise indicated.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Pipe culverts.
  - 2. Outlet protection
- B. Shop Drawings: Include plans, elevations, sections, details, and frames and covers for the following:
  - 1. Drainage structures.
- C. Field quality-control test reports.
- D. Minutes of preinstallation conference.

#### 1.6 QUALITY ASSURANCE

- A. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
  - 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
    - a. For locations within areas of DOT jurisdiction, perform all work, testing, and inspections in accordance with applicable DOT standards and procedures.
- B. Preinstallation Conference: Conduct conference to comply with requirements in Division 01 Section "Project Management and Coordination."
  - 1. Review methods and procedures related to storm drainage installation including, but not limited to, the following:
    - a. Review requirements of the authorities having jurisdiction.
    - b. Review site conditions and preparatory work.
    - c. Review requirements for protecting work.
    - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - e. Review inspection schedule and procedures required to monitor and document quality assurance.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic materials in direct sunlight. Support to prevent sagging and bending.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes, drainage structures and pipe culverts according to manufacturer's written rigging instructions.



## 1.8 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Architect's written permission.

## PART 2 - PRODUCTS

### 2.1 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS (HDPE)

- A. Corrugated HDPE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints
  - 1. Silt-tight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
- B. Corrugated HDPE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling or integral bell and spigot joints.
  - 1. Water-tight Couplings: Bell to bell HDPE couplers or integral bell and spigot joints with ASTM F 447, elastomeric seals that mate with pipe and fittings.
  - 2. Finished joint system shall meet the requirements of ASTM D 3212.

### 2.2 POLYVINYL CHLORIDE PLASTIC PIPE AND FITTINGS (PVC)

- A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 26, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
  - 1. Finished joint system shall meet the requirements of ASTM D 3212.

### 2.3 CONCRETE PIPE (GRCP and SRCP)

- A. Reinforced-Concrete Sewer Pipe: ASTM C 76, with bell-and-spigot or groove and tongue ends.
  - 1. Class III, Wall B.
  - 2. Joints shall be as follows:
    - a. Where indicated as GRCP on Drawings: gasketed joints with ASTM C 443, rubber gaskets.
    - b. Where indicated as SRCP on Drawings: sealant joints with ASTM C 990, bitumen or butyl-rubber sealant.

### 2.4 GEOTEXTILES

- A. Pipe Joint Wrap Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater

than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Width: Min. 18" or sufficient to extend beyond the joint and base of pipe bell at least 6 inches on each side.
2. Length: One continuous piece of sufficient length to extend around the entire pipe circumference with a 12" overlap.
3. Survivability: Class 1, Type A, B, or C; SCDOT Standard Specs
4. Grab Tensile Strength: 90 lbf; ASTM D 4632.
5. Puncture Strength: 60 lbf; ASTM D 4833.
6. Trapezoidal Tear: 40 lbf; ASTM D-4533
7. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
8. Permittivity: 2.2 second-1, minimum; ASTM D 4491.
9. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.
10. Water Flow Rate: 150 gal/min/ft<sup>2</sup>; ASTM D-4491

## 2.5 CONCRETE

- A. General: Class 3000 concrete in accordance with Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- B. Portland Cement Design Mix: 3000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
  1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

## 2.6 CONCRETE DRAINAGE STRUCTURES

- A. Drainage Structure Boxes: Precast reinforced concrete in accordance with Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  1. Design: ASTM C 913, designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading.
  2. Configuration: as indicated on South Carolina Department of Transportation Standard Drawing 719-305.
  3. Depth and Size: as indicated on Drawings.
  4. Pipe Openings: as required for pipe size and location.
    - a. Must be integral to design and provided at time of original casting.
    - b. Where possible, orient structure so pipes enter through walls. Pipes may enter through corners provided a minimum of 6" wall space is provided to top and other openings.
  5. Risers: Precast reinforced concrete as indicated on South Carolina Department of Transportation Standard Drawing 719-315.
  6. Steps: Individual ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12 to 16-inch intervals. Omit steps if total depth from floor of box to finished grade is less than 54 inches.
  7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  8. Mortar and Grout: Comply with ASTM C 270, Type M or S.

- B. Catch Basins: Conforming to Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Transitional Top Slabs (where required): At a minimum, as indicated on South Carolina Department of Transportation Standard Drawing 719-330 with additional reinforcing as required for opening.
  - 2. Frames and Grates: as indicated on Drawings or as required by agency having authority.
    - a. Cast Iron: conforming to AASHTO M 105, Class 35B.
    - b. Steel Tubing: conforming to ASTM A 53, Schedule 80.
    - c. All finished frames and grates shall conform to the alternate load test of AASHTO M 306.
  
- C. Junction Boxes: Conforming to Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Top Slabs: At a minimum, as indicated on South Carolina Department of Transportation Standard Drawing 719-330 with additional reinforcing as required for opening.
  - 2. Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording or design required by agency having authority. Where no specific wording or design is required by agency, wording equivalent to "STORM SEWER" shall be cast.
    - a. Material: ASTM A 48, Class 35 gray iron, unless otherwise indicated.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil minimum thickness applied to all surfaces, unless otherwise noted.
  
- D. Curb Inlets: Conforming with Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Top Slabs and Throats: As indicated on Drawings and conforming to South Carolina Department of Transportation Standard Drawings 719-016, 719-017, and 719-018 as applicable.
  - 2. Throat Transitions to Curb: Cast-in-place concrete, hand formed to provide smooth transition to adjoining curb. Finish to match adjoining curb.
  - 3. Frames and Covers: Ferrous; 24 inch ID. Frame designed to be embedded in concrete with top flush to concrete surface. 2-1/2 inch minimum width flange and 24 inch diameter cover. Include indented top design with lettering cast into cover, using wording or design required by agency having authority. Where no specific wording or design is required by agency, wording equivalent to "STORM SEWER" shall be cast.
    - a. Material: ASTM A 48, Class 35 gray iron, unless otherwise indicated.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil minimum thickness applied to all surfaces, unless otherwise noted.
    - c.
  
- E. Pond Outlet Structures: Conforming to Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
  - 1. Top Slabs (where indicated): At a minimum, as indicated on South Carolina Department of Transportation Standard Drawing 719-330 with additional reinforcing as required for opening.
  - 2. Frames and Covers (where indicated): Ferrous; 24 inch ID. Frame designed to be embedded in concrete with top flush to concrete surface. 2-1/2 inch minimum width

flange and 24 inch diameter cover. Include indented top design with lettering cast into cover, using wording or design required by agency having authority. Where no specific wording or design is required by agency, wording equivalent to "STORM SEWER" shall be cast.

- a. Material: ASTM A 48, Class 35 gray iron, unless otherwise indicated.
  - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil minimum thickness applied to all surfaces, unless otherwise noted.
3. Frames and Grates (where indicated): as indicated on Drawings or as required by agency having authority.
    - a. Cast Iron: conforming to AASHTO M 105, Class 35B.
    - b. Steel Tubing: conforming to ASTM A 53, Schedule 80.
    - c. Plastic: HDPE
  4. Fastenings: Stainless steel, as recommended by manufacturer.

## 2.7 PVC DRAINAGE STRUCTURES

A. Drain Basins: Nyloplast type or approved equal, manufactured from PVC pipe stock meeting the requirements of ASTM D 3034. Fabrication shall utilize a thermo-molding process to reform the pipe stock to the required configuration. The pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the indicated pipe material. Finished joint system shall meet the requirements of ASTM D 3212.

1. Grates: Ductile Iron meeting the requirements or ASTM A 536, Grade 70-50-05.
  - a. Furnished by the same manufacturer as part of an integral system.
  - b. Shall be capable of supporting ASSHTO H-25 loading.
  - c. Protective Coating: Foundry-applied black paint.
2. Manufacturers:
  - a. Advanced Drainage Systems, Inc.
  - b. Hancor, Inc.

B. Inline Drains: Nyloplast type or approved equal, manufactured from PVC pipe stock meeting the requirements of ASTM D 3034. Fabrication shall utilize a thermo-molding process to reform the pipe stock to the required configuration. The pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the indicated pipe material. Finished joint system shall meet the requirements of ASTM D 3212.

1. Grates: Ductile Iron meeting the requirements or ASTM A 536, Grade 70-50-05.
  - a. Furnished by the same manufacturer as part of an integral system.
  - b. Shall be capable of supporting ASSHTO H-25 loading.
  - c. Protective Coating: Foundry-applied black paint.
2. Manufacturers:
  - a. Advanced Drainage Systems, Inc.
  - b. Hancor, Inc.

## 2.8 PIPE INLETS AND OUTLETS

- A. Riprap: Broken, irregular size and shape, graded stone conforming to Section 804 of the South Carolina Department of Transportation Standard Specifications for Highway Construction
  - 1. Gradation: Class B.
- B. Turf Reinforcement Mat: Three dimensional, woven, highly UV resistant, polypropylene geotextile specifically designed for erosion control applications on steep slope and high velocity, vegetated waterway applications. Conforming to FHWA FP-03, Section 713.18. Include manufacturer's recommended installation anchor materials.
  - 1. Manufacturers:
    - a. Propex Geosynthetics: (Pyramat)
    - b. North American Green: (P550)
    - c. American Excelsior Co.: (Recyclex)

## PART 3 - EXECUTION

### 3.1 SCDOT JURISDICTION

- A. For drainage pipe culverts located within areas of SCDOT jurisdiction, installation shall be in accordance with Supplementary Technical Specification SC-M-714 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

### 3.2 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section titled "Earth Moving."
- B. Protect and maintain erosion and sedimentation controls, which are specified in Section titled "Site Clearing," during earthwork operations.

### 3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes or drainage structures for changes in direction unless fittings are indicated. Use manholes or drainage structures for branch connections unless direct connection into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following as applicable:
  - 1. Install piping pitched down in direction of flow, at minimum slope of 0.20 percent, unless otherwise indicated.
  - 2. Install piping below frost line.
  - 3. Install HDPE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
  - 4. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  - 5. Install reinforced-concrete sewer piping, elliptical concrete pipe, and concrete box culverts according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

### 3.4 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following as applicable:
  - 1. Join corrugated HDPE piping according to CPPA 100 and the following:
    - a. Use silttight couplings for Type 2, silttight joints.
    - b. Use watertight couplings for Type 3, watertight joints.
  - 2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
  - 3. Join reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket, bitumen, or butyl-rubber sealant joints as applicable.
  - 4. Join dissimilar pipe materials with nonpressure-type flexible couplings.
- B. Wrap pipe joints with pipe joint wrap geotextile at least 18 inches in width. For larger pipe diameters where an 18 inch width is insufficient to completely cover the pipe bell, use a width sufficient to cover and extend beyond the bell at least 6 inches.

### 3.5 CONCRETE DRAINAGE STRUCTURE INSTALLATION

- A. General: Install drainage structures, complete with appurtenances and accessories indicated.
- B. Install precast concrete drainage structure sections according to ASTM C 891.
- C. Set tops, frames, grates and covers to elevations indicated.
- D. Fabricate inlet throats to shape and elevations indicated.
- E. Seal and grout all opening around pipe penetrations watertight.

### 3.6 PVC DRAINAGE STRUCTURE INSTALLATION

- A. Install manufactured, PVC drainage structures, complete with appurtenances and accessories indicated, according to manufacturer's written instructions and the following:
  - 1. Install PVC drainage structures according to ASTM D 2321 and ASTM F 1668.
  - 2. Join piping to structure according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.

3. Finished joint system shall meet the requirements of ASTM D 3212.

B. Set frames, grates and covers to elevations indicated.

### 3.7 PIPE INLET AND OUTLET INSTALLATION

A. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

B. Construct riprap of broken stone, as indicated.

C. Install turf reinforcement mat as indicated and in accordance with manufacturer's written instructions.

### 3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to Sections 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction for measuring, mixing, transporting, and placing concrete.

### 3.9 IDENTIFICATION

A. Materials and their installation are specified in Section titled "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over piping and over edges of underground structures.

### 3.10 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.

2. Defects requiring correction include the following:

- a. Alignment: Less than full diameter of inside of pipe is visible between structures.
- b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 95 percent of piping diameter.
- c. Crushed, broken, cracked, or otherwise damaged piping.
- d. Infiltration: Water leakage into piping.
- e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

5. Do not enclose, cover or put into service before inspection and approval.

6. Schedule inspections by authorities having jurisdiction with at least 24 hours advance notice.

B. Leaks constitute defects that must be repaired.

- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Collect flushed materials in sediment trapping devices: do not flush into downstream drainage systems or receiving waterbodies.

END OF SECTION 334100



## SECTION 334600 – SUBDRAINAGE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes subdrainage (underdrain) systems for the following:
  - 1. Pavement subgrades.
  - 2. Retaining walls.
  - 3. Landscaped areas.
  - 4. Playing Field areas.

#### 1.3 UNIT PRICES

- A. Quantities to be installed shall be established and accepted by Architect prior to initiation of Work.
- B. Payment shall not be made without prior acceptance of proposed work by the Architect, or for quantities in excess of the quantity accepted by the Architect.
- C. Perforated Pipe Subdrainage
  - 1. Length authorized and completed, including all materials and labor.

#### 1.4 DEFINITIONS

- A. PE: Polyethylene plastic.
- B. PVC: Polyvinyl chloride plastic.
- C. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Perforated-wall pipe and fittings.
  - 2. Geotextiles.

#### 1.6 QUALITY ASSURANCE

- A. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.

1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.
- B. Preinstallation Conference: Conduct conference to comply with requirements in Division 01 Section "Project Management and Coordination."
  1. Review methods and procedures related to storm drainage installation including, but not limited to, the following:
    - a. Review requirements of the authorities having jurisdiction.
    - b. Review site conditions and preparatory work.
    - c. Review requirements for protecting work.
    - d. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - e. Review inspection schedule and procedures required to monitor and document quality assurance.

## PART 2 - PRODUCTS

### 2.1 PERFORATED-WALL PIPES AND FITTINGS

#### A. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. NPS 1" x 12" Flat Panel Pipe: Perforated HPDE Highway Grade subdrainage pipe, ADS AdvanEdge or approved equal.
4. Couplings: Manufacturer's standard, band type.

### 2.2 PIPE TO DRAINAGE STRUCTURE CONNECTORS

1. Resilient Pipe Connectors: ASTM C 923, cast into manhole wall at time of manufacture or fitted into walls in the field, for each pipe connection.
  - a. Fittings shall be specifically designed for integral casting or field installation as applicable.

### 2.3 AGGREGATE MATERIALS

- #### A. Filter Aggregate: specified in Section titled "Earth Moving."

## 2.4 SOIL MATERIALS

- A. Backfill: Satisfactory Soil specified in Section titled "Earth Moving."

## 2.5 GEOTEXTILES

- A. Subsurface Drainage Geotextile specified in Section titled "Earth Moving."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. Locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section titled "Earth Moving."

### 3.3 PIPING APPLICATIONS

- A. Subdrainage Piping:
  - 1. Perforated PE pipe and fittings, couplings, and coupled joints.
- B. Header Piping:
  - 1. PE drainage pipe or tubing, as applicable, and fittings, couplings, and coupled joints.

### 3.4 PEFORATED PIPE SUBDRAINAGE INSTALLATION

- A. Provide trench width to as indicated or, where not indicated, of sufficient width for subdrainage pipe and required distance between pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Line trench with geotextile. Roll of geotextile shall be extended longitudinally along the trench in order to minimize joints. Roll width shall be sufficient to cover bottom, sides, and top of trench, with at a 6 inch overlap, without joints. Where a joint is required for a new roll of geotextile, overlap 6 inches.
- C. Place supporting layer of filter aggregate over compacted subgrade to compacted depth of not less than 4 inches.

- D. Install subdrainage pipe as indicated in Part 3 "Piping Installation" Article for basic subdrainage with horizontal distance as indicated on drawings or, where not indicated, of at least 9 inches between pipe and trench walls.
- E. Add filter aggregate to top of subdrainage pipe.
- F. After satisfactory testing, cover subdrainage pipe with filter aggregate to compacted depth indicated or, where not indicated, to within 12 inches of finish grade.
- G. Place filter aggregate in layers not exceeding 3 inches in loose depth; compact each layer as placed.
- H. Fold sides of geotextile fabric over top of filter aggregate, overlapping longitudinal edges a distance of 6 inches.
- I. Fill to Grade: Place satisfactory soil fill material over filter fabric. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

### 3.5 RETAINING-WALL SUBDRAINAGE INSTALLATION (PERFORATED PIPE TYPE)

- A. Place supporting layer of filter aggregate over compacted subgrade to compacted depth of not less than 4 inches. Place against wall to a width sufficient for subdrainage pipe and required distance between pipe and outside edge of filter aggregate.
- B. Install subdrainage pipe as indicated on drawings and in Part 3 "Piping Installation" Article for retaining-wall subdrainage.
- C. Add filter aggregate to width indicated on drawings or, where not indicated, of sufficient width to provide at least 9 inches between outside wall of pipe and outside edge of filter aggregate. Fill to a level 9 inches above top of pipe to perform tests.
- D. After satisfactory testing, place additional filter aggregate against wall to width of at least 12 inches to within 12 inches of finish grade.
- E. Place filter aggregate in layers not exceeding 3 inches in loose depth; compact each layer as placed.
- F. Place layer of flat-style geotextile filter fabric, of sufficient width to cover filter aggregate surface, over top of filter aggregate. Where required, overlap longitudinal edges at least 4 inches.
- G. Fill to Grade: Place satisfactory soil fill material over filter fabric. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

### 3.6 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering aggregate. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
  - 1. Perforated Pipe Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.

2. Retaining-Wall Subdrainage (Perforated Pipe Type): When water discharges at end of wall into stormwater piping system, install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated. However, when water discharges through wall at regular intervals, pipe may be installed with a minimum slope of zero percent.
  3. Lay perforated pipe with perforations down.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install PE piping according to ASTM D 2321.

### 3.7 PIPE JOINT CONSTRUCTION

- A. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.
- C.

### 3.8 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system at concrete drainage structures as follows:
1. Where resilient connector is not installed at time of drainage structure manufacture,
    - a. Core drill opening into structure large enough to allow installation of resilient manhole connector.
    - b. Install resilient manhole connector in accordance with manufacturer's written instructions.
  2. Install pipe in resilient connector in accordance with manufacturer's written instructions.
  3. Cut end of connection pipe passing through structure wall to be flush with inside wall, unless otherwise indicated.
  4. On inside of structure wall, encase outside of pipe to flush with face of wall with grout.
  5. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  6. Protect piping and structures to prevent concrete or debris from entering while making connections. Remove debris or other extraneous material that may accumulate.

### 3.9 IDENTIFICATION

- A. Materials and their installation are specified in Section titled "Earth Moving." Arrange for installation of green warning tapes directly over piping.

1. Install detectable warning tape over piping and over edges of underground structures.

### 3.10 FIELD QUALITY CONTROL

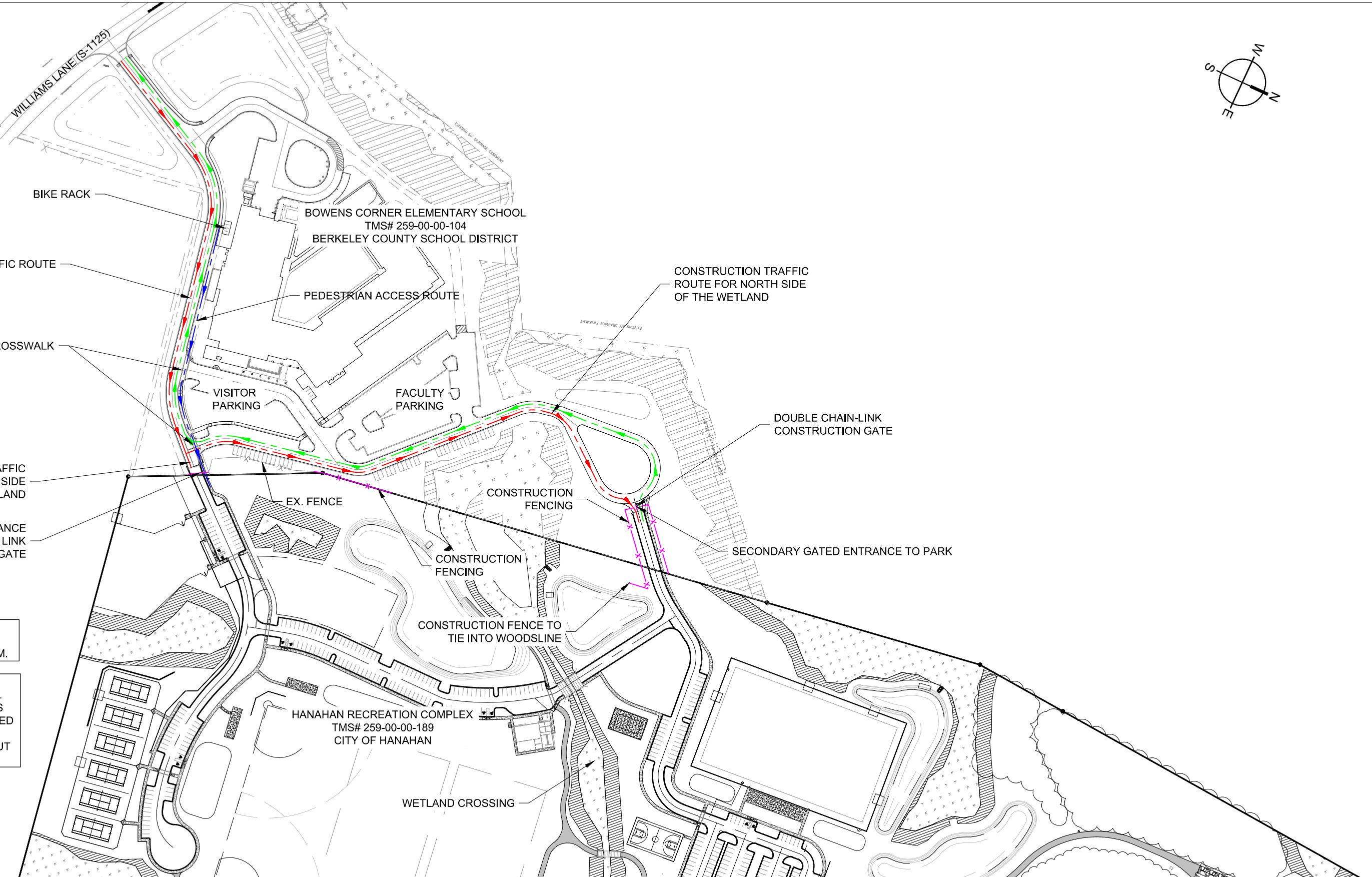
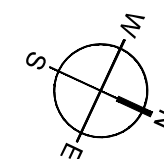
- A. Inspection: Before placing drainage course around and above pipe, inspect pipe to confirm that: it is not crushed or damaged; that joints are sound and properly made; that interior of pipe is unobstructed and free flowing; that pipe is properly aligned and at indicated elevation and grade; and that connections to drainage structures are properly made, sound, and water-tight. As drainage course and backfill is installed, monitor operations to ensure that pipe is not damaged or displaced by placement or compaction operations.

### 3.11 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600

**CITY OF HANAHAN REQUEST FOR BID**  
**HANAHAN RECREATION COMPLEX**  
**EXHIBIT B - DRAWINGS**



WILLIAMS LANE (S-1125)

BIKE RACK

BOWENS CORNER ELEMENTARY SCHOOL  
TMS# 259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

CONSTRUCTION TRAFFIC ROUTE

PEDESTRIAN ACCESS ROUTE

CONSTRUCTION TRAFFIC ROUTE FOR NORTH SIDE OF THE WETLAND

CROSSWALK

VISITOR PARKING

FACULTY PARKING

DOUBLE CHAIN-LINK CONSTRUCTION GATE

CONSTRUCTION TRAFFIC ROUTE FOR SOUTH SIDE OF THE WETLAND

EX. FENCE

CONSTRUCTION FENCING

SECONDARY GATED ENTRANCE TO PARK

MAIN SITE ENTRANCE WITH DOUBLE CHAIN LINK CONSTRUCTION GATE

CONSTRUCTION FENCING

NOTE:  
NO CONSTRUCTION TRAFFIC FROM  
6:30AM - 8:00AM AND 1:30PM - 2:30PM.

NOTE:  
HENRY BROWN BLVD. IS A FEDERAL  
GOVERNMENT CONTROLLED ACCESS  
HIGHWAY AND WILL NOT BE ALLOWED  
TO BE USED FOR DAILY  
CONSTRUCTION TRAFFIC IN AND OUT  
THE PROJECT SITE.

CONSTRUCTION FENCE TO TIE INTO WOODSLINE

HANAHAN RECREATION COMPLEX  
TMS# 259-00-00-189  
CITY OF HANAHAN

WETLAND CROSSING



HANAHAN RECREATION COMPLEX  
PROJECT #7867  
DATE:2/3/21  
SCALE: 1"=200'

CONSTRUCTION TRAFFIC AND  
PEDESTRIAN ROUTES EXHIBIT



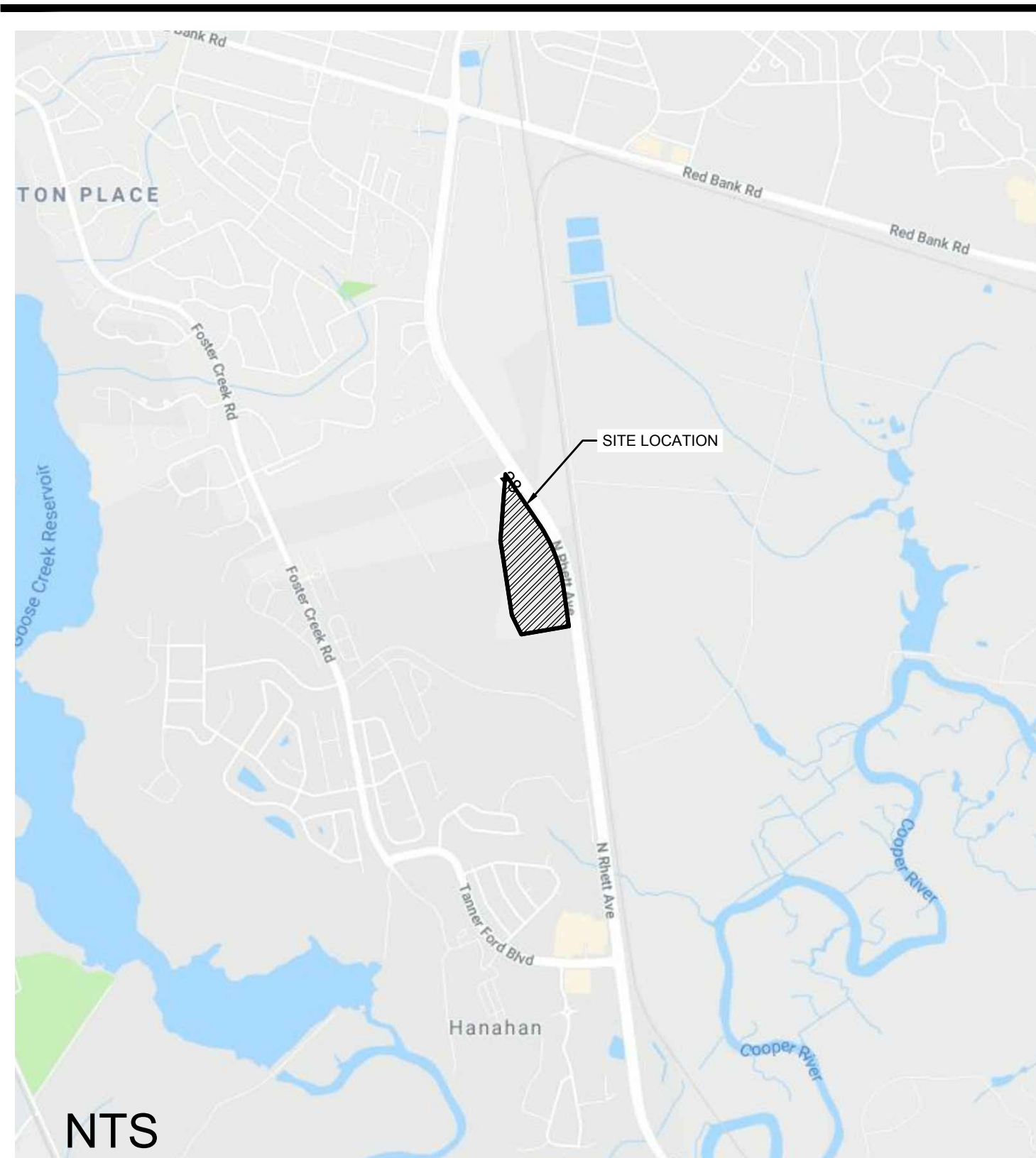
**BID SET**  
DATE: 3/11/2021

# HANAHAN RECREATION COMPLEX

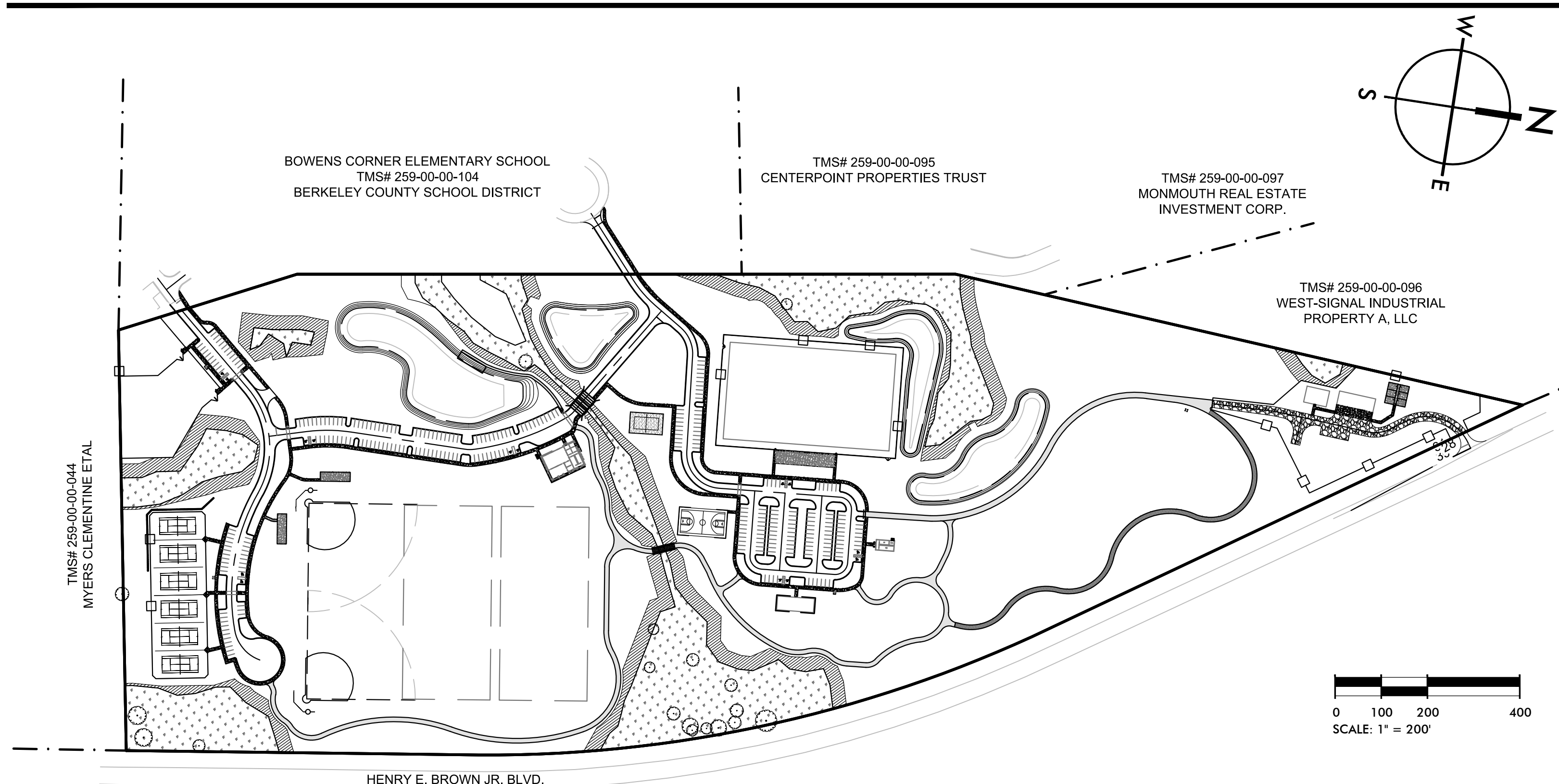
HANAHAN, SOUTH CAROLINA

TMS# 259-00-00-189

## SITE LOCATION MAP



## SITE OVERVIEW



## PROJECT CONTACTS

**OWNER/DEVELOPER:**  
CITY OF HANAHAN  
1255 YEAMANS HALL ROAD  
HANAHAN, SC 29410  
CONTACT: MIKE COCHRAN  
PHONE: 843-266-0958

**CIVIL ENGINEER:**  
SEAMON WHITESIDE & ASSOCIATES  
128 S. MAIN STREET, #B  
SUMMERVILLE, SC 29483  
CONTACT: TAYLOR HART, P.E.  
PHONE: 843-972-0710 EXT 283

**MUNICIPALITY CONTACTS:**  
CITY OF HANAHAN PLANNING & ZONING  
CONTACT: JEFF HAJEK  
PHONE: 843-554-4221

**UTILITY CONTACTS:**  
BERKELEY COUNTY WATER & SEWER  
CONTACT: RYAN GATLIN  
PHONE: 843-719-2319

**BERKELEY COUNTY ENGINEERING/MS4**  
CONTACT: SHAWN PULLEY  
PHONE: 843-719-2321

**CHARLESTON WATER SYSTEM**  
CONTACT: LYDIA OWENS  
PHONE: 843-727-6869

**SCDOT**  
CONTACT: WADE GROOMS  
PHONE: 843-746-6748 (EXT 748)

**SCDHEC-OCRM**  
CONTACT: PAMELA WINKLER  
PHONE: 843-953-5324

**SURVEYOR:**  
SOUTHEASTERN LAND SURVEYING, LLC.  
1035-B JENKINS ROAD  
CHARLESTON, SC 29407  
CONTACT: MIKE SCHMIEDER  
PHONE: 843-795-9330

**CITY OF HANAHAN FIRE DEPARTMENT**  
CONTACT: BO BOWERS  
PHONE: 843-297-7870

SEE SHEET C1.1 FOR DETAILED REVISION HISTORY

SEE ARCHITECT PLANS FOR BUILDING SHEET INDEX

## PROJECT DESCRIPTION

THE CITY OF HANAHAN PLANS TO DEVELOP A 53.31 ACRE TRACT OF LAND ON HENRY BROWN JR. BLVD. (FORMERLY N. RHETT BLVD.) INTO A NEW CITY PARK AND RECREATION COMPLEX. SITE IMPROVEMENTS WILL INCLUDE: STORMWATER PONDS, ASSOCIATED DRAINAGE INFRASTRUCTURE, SITE ACCESS ROADS, PARKING LOTS, MULTIPURPOSE ATHLETIC FIELDS, A SYNTHETIC TURF FOOTBALL/SOCCER FIELD, TENNIS COURTS, A SAND VOLLEYBALL COURT, A BASKETBALL COURT, A DOG PARK, TRAIL SYSTEM, RECREATION BUILDING, RESTROOM BUILDING, PICNIC PAVILION, MAINTENANCE AREA, WATER AND SEWER UTILITY EXTENSIONS, AND OTHER SITE ELEMENTS COMMONLY ASSOCIATED WITH A PARK.

## GENERAL NOTES

**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN LAND SURVEYING, DATED SEPTEMBER 18, 2018. PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).

**FLOOD ZONE INFORMATION:** BASED ON INFORMATION PROVIDED ON THE INDICATED FIRM MAP, THE PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE 'X'. SEE COMMUNITY PANELS 45015C0705E AND 45015C0685E, DATED DECEMBER 7, 2018.

**EXISTING UTILITIES WARNING:** THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO BEGINNING CONSTRUCTION. ALL DIMENSIONS ARE MEASURED FROM FACE OF CURB OR EDGE OF ASPHALT, WITH THE EXCEPTION OF SIDEWALKS, WHICH ARE MEASURED FROM BACK OF CURB.

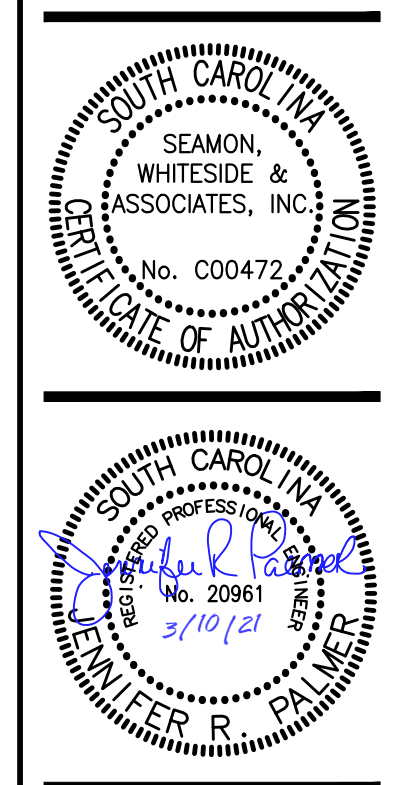
**TOTAL SITE ACREAGE:** 53.31 ACRES  
**TOTAL LAND DISTURBANCE:** 40.00 ACRES  
**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

| Sheet List Table |                         |         |          |          |
|------------------|-------------------------|---------|----------|----------|
| Sheet Number     | Sheet Title             | 6/12/20 | 10/29/20 | 01/22/21 |
| C1.0             | TITLESHEET              | A       | B        | C        |
| C1.1             | LEGEND & REVISION NOTES | A       | B        | C        |
| C2.0             | EXISTING CONDITIONS     | A       | B        | C        |
| C2.1             | EXISTING CONDITIONS     | A       | B        | C        |
| C2.2             | EXISTING CONDITIONS     | A       | B        | C        |
| C2.3             | WETLAND SURVEY          |         |          | 0        |
| C2.4             | WETLAND SURVEY          |         |          | 0        |
| C2.5             | WETLAND SURVEY          |         |          | 0        |
| C3.0             | SWPPP PLAN PHASE 1A     | A       | B        | C        |
| C3.1             | SWPPP PLAN PHASE 1A     | A       | B        | C        |
| C3.2             | SWPPP PLAN PHASE 1B     | A       | B        | C        |
| C3.3             | SWPPP PLAN PHASE 1B     | A       | B        | C        |
| C3.4             | SWPPP PLAN PHASE 2      | A       | B        | C        |
| C3.5             | SWPPP PLAN PHASE 2      | A       | B        | C        |
| C3.6             | SWPPP PLAN PHASE 3      | A       | B        | C        |
| C3.7             | SWPPP PLAN PHASE 3      | A       | B        | C        |
| C3.8             | SWPPP NOTES             | A       | B        | C        |
| C3.9             | SWPPP DETAILS           | A       | B        | C        |
| C3.10            | SWPPP DETAILS           | A       | B        | C        |
| C3.11            | SWPPP DETAILS           | A       | B        | C        |
| C4.0             | OVERALL SITE PLAN       | A       | B        | C        |
| C4.1             | SITE PLAN               | A       | B        | C        |
| C4.2             | SITE PLAN               | A       | B        | C        |
| C4.3             | SITE PLAN               | A       | B        | C        |
| C4.4             | SITE PLAN               | A       | B        | C        |
| C5.0             | SITE DETAILS            | A       | B        | C        |
| C5.1             | SITE DETAILS            | A       | B        | C        |
| C5.2             | SITE DETAILS            | A       | B        | C        |
| C6.0             | OVERALL GRADING PLAN    | A       | B        | C        |
| C6.1             | GRADING PLAN            | A       | B        | C        |

|       |                            |   |   |   |   |
|-------|----------------------------|---|---|---|---|
| C6.2  | GRADING PLAN               | A | B | C | 0 |
| C6.3  | GRADING PLAN               | A | B | C | 0 |
| C6.4  | GRADING PLAN               | A | B | C | 0 |
| C7.0  | OVERALL DRAINAGE PLAN      | A | B | C | 0 |
| C7.1  | DRAINAGE PLAN              | A | B | C | 0 |
| C7.2  | DRAINAGE PLAN              | A | B | C | 0 |
| C7.3  | DRAINAGE PLAN              | A | B | C | 0 |
| C7.4  | DRAINAGE PLAN              | A | B | C | 0 |
| C7.5  | DRAINAGE PROFILES          | A | B | C | 0 |
| C7.6  | DRAINAGE PROFILES          | A | B | C | 0 |
| C7.7  | DRAINAGE PROFILES          | A | B | C | 0 |
| C8.0  | GRADING & DRAINAGE DETAILS | A | B | C | 0 |
| C8.1  | GRADING & DRAINAGE DETAILS | A | B | C | 0 |
| C9.0  | OVERALL WATER & SEWER PLAN | A | B | C | 0 |
| C9.1  | WATER & SEWER PLAN         | A | B | C | 0 |
| C9.2  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.3  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.4  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.5  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.6  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.7  | WATER & SEWER PLAN         |   | B | C | 0 |
| C9.8  | WATER PROFILES             | A | B | C | 0 |
| C9.9  | WATER PROFILES             | A | B | C | 0 |
| C9.10 | WATER PROFILES             | A | B | C | 0 |
| C9.11 | SEWER PROFILES             | A | B | C | 0 |
| C9.12 | SEWER PROFILES             | A | B | C | 0 |
| C10.0 | SEWER DETAILS              | A | B | C | 0 |
| C10.1 | WATER DETAILS              | A | B | C | 0 |
| C10.2 | WATER DETAILS              | A | B | C | 0 |
| C10.3 | WATER DETAILS              |   | B | C | 0 |
| L1.0  | HARDSCAPE DETAILS          | A | B | C | 0 |
| L1.1  | HARDSCAPE DETAILS          | A | B | C | 0 |
| L1.2  | HARDSCAPE DETAILS          | A | B | C | 0 |
| L1.3  | HARDSCAPE DETAILS          | A | B | C | 0 |

|       |                                      |   |   |   |   |
|-------|--------------------------------------|---|---|---|---|
| L1.4  | HARDSCAPE DETAILS                    | A | B | C | 0 |
| L2.0  | LANDSCAPE PLAN                       | A | B | C | 0 |
| L2.1  | LANDSCAPE PLAN                       | A | B | C | 0 |
| L2.2  | LANDSCAPE PLAN                       | A | B | C | 0 |
| L2.3  | LANDSCAPE PLAN                       | A | B | C | 0 |
| L2.4  | PLANT SCHEDULE, DETAILS AND NOTES    | A | B | C | 0 |
| E1.1  | SITE ELECTRICAL PLAN                 | A | B | C | 0 |
| E1.2  | SITE ELECTRICAL PLAN                 | A | B | C | 0 |
| E1.3  | SITE ELECTRICAL PLAN                 | A | B | C | 0 |
| E2.1  | POWER DISTRIBUTION DETAILS           | A | B | C | 0 |
| E2.2  | LIGHTING & MISC. DETAILS             |   | B | C | 0 |
| E2.3  | POWER DISTRIBUTION DETAILS           |   | B | C | 0 |
| E2.4  | ELECTRICAL PANEL SCHEDULES & DETAILS |   | B | C | 0 |
| E2.5  | EXTERIOR EQUIPMENT MOUNTING DETAIL   |   |   | C | 0 |
| IR1.0 | IRRIGATION SHEET LAYOUT PLAN         | A | B | C | 0 |
| IR1.1 | IRRIGATION PLAN                      | A | B | C | 0 |
| IR1.2 | IRRIGATION PLAN                      | A | B | C | 0 |
| IR1.3 | IRRIGATION PLAN                      | A | B | C | 0 |
| IR1.4 | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.5  | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.6  | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.7  | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.8  | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.9  | IRRIGATION PLAN                      | A | B | C | 0 |
| IR.10 | IRRIGATION PLAN, NOTES AND DETAILS   | A | B | C | 0 |
| IR.11 | IRRIGATION DETAILS                   | A | B | C | 0 |
| IR.12 | IRRIGATION DETAILS                   | A | B | C | 0 |
| SP1   | GENERAL SEPTIC NOTES                 |   |   |   | 0 |
| SP2   | SEPTIC SITE PLAN & LAYOUT            |   |   |   | 0 |
| SP3   | SEPTIC DETAILS                       |   |   |   | 0 |
| SP4   | SEPTIC DETAILS                       |   |   |   | 0 |
| SP5   | SEPTIC DETAILS                       |   |   |   | 0 |
| SP6   | SEPTIC DETAILS                       |   |   |   | 0 |

**SW SEAMON WHITESIDE**  
MOUNT PLEASANT, SC 843.884.1667  
GREENVILLE, SC 864.298.0534  
SUMMERVILLE, SC 843.972.0710  
SPARTANBURG, SC 864.298.0534  
CHARLOTTE, NC 980.312.5450  
WWW.SEAMONWHITESIDE.COM



**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

| REVISION HISTORY |          |  |
|------------------|----------|--|
| A                | 6/12/20  |  |
| B                | 10/29/20 |  |
| C                | 01/22/21 |  |
| D                | 03/11/21 |  |

TITLESHEET

THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.

501 WANDO PARK BOULEVARD, SUITE 200 | MOUNT PLEASANT, SC 29464 | 508 RHETT STREET, SUITE 101 | GREENVILLE, SC 29601

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# DRAWING LEGEND

| OBJECTS AND SYMBOLS                | EXISTING | NEW                | OBJECTS AND SYMBOLS                              | EXISTING | NEW |
|------------------------------------|----------|--------------------|--|----------|-----|
| Adjoining Property Line            |          | N/A                | Benchmark  |          | N/A |
| Centerline                         |          | (Same as Existing) | Sanitary Sewer Manhole                           |          |     |
| Easement                           |          | (Same as Existing) | Sanitary Sewer Manhole ID #                      | N/A      |     |
| Sanitary Sewer (Gravity)           |          |                    | Sanitary Sewer Cleanout                          |          |     |
| Sanitary Sewer (Force Main)        |          |                    | Double Sanitary Sewer Service (Residential Only) |          |     |
| Water Line                         |          |                    | Single Sanitary Sewer Service (Residential Only) |          |     |
| Curb & Gutter (Straight)           |          |                    | TYPE 1 Storm Drainage Structure (CI-1)           |          |     |
| Curb & Gutter (Roll)               |          |                    | TYPE 16 Storm Drainage Structure (CI-16)         |          |     |
| Previous Phase Storm Drain Pipe    |          | N/A                | TYPE 17 Storm Drainage Structure (Right) (CI-17) |          |     |
| Storm Drain Pipe                   |          |                    | TYPE 17 Storm Drainage Structure (Left) (CI-17)  |          |     |
| Roof Drain                         |          |                    | TYPE 18 Storm Drainage Structure (CI-18)         |          |     |
| Subsurface Drainage                |          |                    | Catch Basin (CB)                                 |          |     |
| Silt Fence, Standard               |          |                    | Isolation Box (IB)                               |          |     |
| Silt Fence, Reinforced             |          |                    | Storm Drainage Junction Box (JB)                 |          |     |
| Phase Line                         | N/A      |                    | Yard Inlet (YI)                                  |          |     |
| Drainage Basin                     | N/A      |                    | Control Structure (CS)                           |          |     |
| Flood Zone                         |          | N/A                | Storm Drainage Structure ID #                    | N/A      |     |
| Conduit                            |          |                    | Telephone Box                                    | N/A      |     |
| Natural Gas                        |          |                    | Telephone Manhole                                | N/A      |     |
| Overhead Electrical                |          |                    | Electrical Box                                   | N/A      |     |
| Underground Electrical             |          |                    | Electrical Manhole                               | N/A      |     |
| Underground Telephone              |          |                    | Power Pole                                       |          |     |
| Underground Cable                  |          |                    | Light Pole                                       |          |     |
| Underground Fiber Optic            |          |                    | Fire Hydrant Assembly                            |          |     |
| Fence                              |          |                    | Water Blowoff                                    |          |     |
| Elevation Contour                  |          |                    | Water Line Bends, Angle Varies                   | N/A      |     |
| Revision Cloud (Encloses Revision) | N/A      |                    | Water Line Valve                                 |          |     |
|                                    |          |                    | Water Line Reducer                               |          |     |
|                                    |          |                    | Single Water Service (Residential Only)          |          |     |
|                                    |          |                    | Double Water Service (Residential Only)          |          |     |
|                                    |          |                    | Sign   |          |     |
|                                    |          |                    | ADA Accessible Parking Space                     |          |     |
|                                    |          |                    | Spot Elevation                                   |          |     |
|                                    |          |                    | Watershed Area                                   |          |     |
|                                    |          |                    | Detail ID #                                      | N/A      |     |
|                                    |          |                    | Keynote  | N/A      |     |
|                                    |          |                    | Parking Count ID #                               | N/A      |     |
|                                    |          |                    | Lot #  | N/A      |     |
|                                    |          |                    | Revision ID #                                    | N/A      |     |
|                                    |          |                    | Rip Rap at Pipe Outlet                           | N/A      |     |

| ABBREVIATIONS                             | EXISTING   | NEW    |
|---|------------|--------|
| Sewer Easement                            | Ex. S.E.   | S.E.   |
| Storm Easement                            | Ex. W.E.   | W.E.   |
| Drainage Easement                         | Ex. D.E.   | D.E.   |
| General Utility Easement                  | Ex. G.U.E. | G.U.E. |
| Access Easement                           | Ex. A.E.   | A.E.   |
| Ingress/Egress Easement                   | Ex. I/E E. | I/E E. |
| Pond Maintenance Easement                 | Ex. P.M.E. | P.M.E. |
| Water Surface Elevation                   | Ex. W.S.E. | W.S.E. |
| Polyvinyl Chloride Pipe                   | Ex. PVC    | PVC    |
| Reinforced Concrete Pipe                  | Ex. RCP    | RCP    |
| High Density Corrugated Polyethylene Pipe | Ex. HDPE   | HDPE   |
| Ductile Iron Pipe                         | Ex. DIP    | DIP    |
| Corrugated Metal Pipe                     | Ex. CMP    | CMP    |
| Home Owner's Association                  | Ex. HOA    | HOA    |
| Property Owners Association               | Ex. POA    | POA    |

| HATCH PATTERNS                    |  |
|-----------------------------------|--|
| Freshwater Wetland                |  |
| Freshwater Wetland Buffer         |  |
| Saltwater Marsh                   |  |
| Saltwater Marsh Buffer            |  |
| Limits of Disturbance             |  |
| Area to be Permanently Stabilized |  |

| SWPP PLAN LEGEND   |  |
|--|--|
| Turf Reinforcement Mat (See Turf and Grasses Species)                              |  |
| Sodding (See Turf and Grasses Species)   |  |
| Surface Roughening (Surface Tracking/Stair Stepping-See Detail)                    |  |
| Temporary Seeding (See Schedule in EC Notes)                                       |  |
| Permanent Seeding (See Turf and Grasses Species)                                   |  |
| Mulching (See Turf and Grasses Species)  |  |
| Typical Lot Erosion Control Plan (See Detail)                                      |  |
| Flexible Growth Medium (See Turf and Grasses Species)                              |  |
| Erosion Control Blanket (See Turf and Grasses Species)                             |  |
| Dust Control   |  |
| Bonded Fiber Matrix (See Turf and Grasses Species)                                 |  |
| Concrete Washout Basin (See Detail)  |  |
| Block & Stone Inlet Protection (See Detail)  |  |
| Temp. Sediment Control Tube (See Tube)   |  |
| Temp. Rock Ditch Checks (See Detail)   |  |
| Turf Reinforcement Mat Outlet Protection (See Detail and Turf and Grasses Species) |  |
| Filter Fabric Inlet Protection (See Detail)  |  |
| Temp. Curb Inlet Weep Filter (See Detail)  |  |
| Curb Inlet Sediment Filter (See Detail)  |  |
| Both Curb Inlet Filters (See Above)  |  |
| Construction Entrance  |  |
| Grate Gator Inlet Protection (See Detail)  |  |

**NOTE:**  
LEGEND DOES NOT APPLY TO EXISTING CONDITION SHEETS C2.0 - C2.2. THOSE SHEETS ARE SHOWN IN ORIGINAL FORMAT PROVIDED BY THE SURVEYOR

**REVISION SUMMARY**

|    |                                |
|----|--------------------------------|
| A. | AGENCY SUBMITTALS: 06/12/2020  |
| B. | AGENCY RESUBMITTAL: 10/29/2020 |
| C. | AGENCY RESUBMITTAL: 01/22/2021 |
| 0. | BID SET : 03/11/2021           |

**SEAMON WHITESIDE**

MOUNT PLEASANT, SC  
843.884.1667  
GREENVILLE, SC  
864.298.0534  
SUMMERVILLE, SC  
843.972.0710  
SPARTANBURG, SC  
864.298.0534  
CHARLOTTE, NC  
980.312.5450  
WWW.SEAMONWHITESIDE.COM

SEAMON, WHITESIDE & ASSOCIATES, INC.  
No. C0047  
STATE OF SOUTH CAROLINA

SEAMON, WHITESIDE & ASSOCIATES, INC.  
No. 20961  
3/10/21  
STATE OF SOUTH CAROLINA

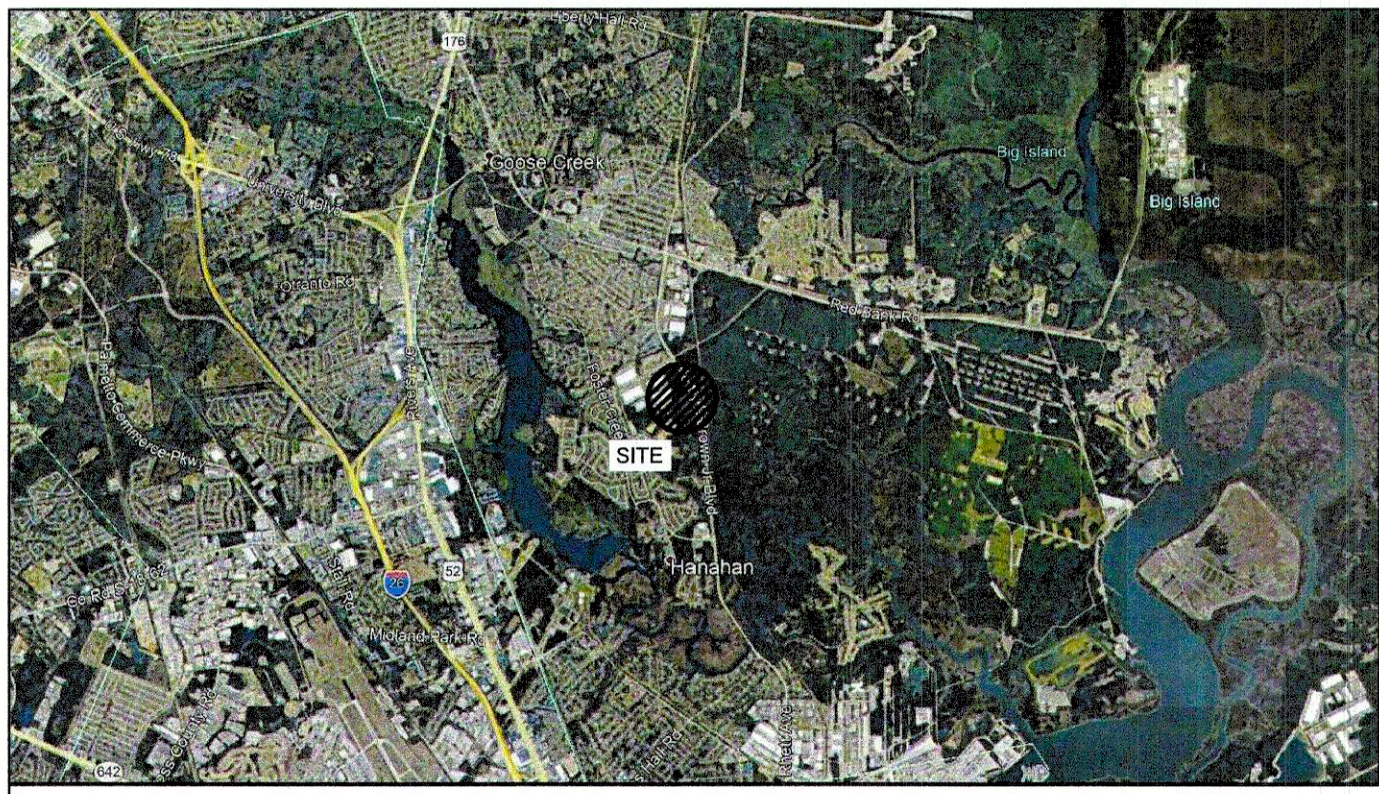
**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| 0 | 03/11/21 |

**LEGEND & REVISION NOTES**



VICINITY MAP (NOT TO SCALE)

| #    | SIZE            | SPECIES  |
|------|-----------------|----------|
| 3023 | 8               | OAK      |
| 3026 | 8               | OAK      |
| 3027 | 8/3             | OAK      |
| 3033 | 10              | OAK      |
| 3035 | 8               | OAK      |
| 3038 | 12              | OAK      |
| 3041 | 9               | HICKORY  |
| 3043 | 7/6/4/17/4/6/15 | MAPLE    |
| 3051 | 16              | LIVE OAK |
| 3052 | 10/8            | MAPLE    |
| 3054 | 5/3/2           | HICKORY  |
| 3057 | 8               | HICKORY  |
| 3058 | 8/9             | MAPLE    |
| 3070 | 10              | HICKORY  |
| 3072 | 13              | HICKORY  |
| 3074 | 7/7             | HICKORY  |
| 3075 | 9               | HICKORY  |
| 3076 | 8               | HICKORY  |
| 3078 | 8               | HICKORY  |
| 3079 | 8/9             | HICKORY  |
| 3080 | 10              | OAK      |
| 3081 | 13              | HICKORY  |
| 3097 | 11              | OAK      |
| 3098 | 14              | HICKORY  |
| 3099 | 8               | OAK      |
| 3114 | 8/7/7/5         | OAK      |
| 3116 | 11/6            | HICKORY  |
| 3133 | 10              | OAK      |
| 3134 | 13              | HICKORY  |
| 3135 | 11              | HICKORY  |
| 3136 | 14              | OAK      |
| 3137 | 8               | OAK      |
| 3155 | 9               | MAPLE    |
| 3156 | 9               | OAK      |
| 3168 | 7/6/3/3/4       | OAK      |
| 3170 | 16              | OAK      |
| 3198 | 6/6/4           | OAK      |
| 3212 | 8               | OAK      |
| 3214 | 8               | OAK      |
| 3221 | 9               | HICKORY  |
| 3236 | 5/5             | HICKORY  |
| 3237 | 5/4/4           | MAPLE    |
| 3238 | 5/4/3/3         | OAK      |
| 3239 | 8               | OAK      |
| 3240 | 9               | HICKORY  |
| 3249 | 9               | OAK      |
| 3265 | 14              | LIVE OAK |
| 3273 | 13              | HICKORY  |
| 3281 | 3/6             | OAK      |
| 3287 | 7/6/4/4/2       | MAPLE    |
| 3307 | 4/6             | MAPLE    |
| 3312 | 5/4             | HICKORY  |
| 3339 | 9               | OAK      |
| 3356 | 7/5/5           | MAPLE    |
| 3363 | 4/3/5/3/3/8/4   | MAPLE    |
| 3365 | 9               | MAPLE    |
| 3371 | 10              | OAK      |
| 3372 | 15              | OAK      |
| 3377 | 11              | OAK      |
| 3381 | 10              | OAK      |
| 3386 | 10              | OAK      |
| 3387 | 10              | OAK      |
| 3388 | 13              | OAK      |
| 3396 | 5/4             | HICKORY  |
| 3417 | 8               | OAK      |
| 3419 | 14              | OAK      |

| #    | SIZE     | SPECIES |
|------|----------|---------|
| 3420 | 13       | OAK     |
| 3422 | 8        | OAK     |
| 3423 | 13       | OAK     |
| 3424 | 10       | OAK     |
| 3425 | 10/7     | OAK     |
| 3447 | 10       | OAK     |
| 3448 | 5/7/6    | HICKORY |
| 3450 | 16       | OAK     |
| 3451 | 12       | OAK     |
| 3461 | 9        | OAK     |
| 3467 | 9        | OAK     |
| 3469 | 10       | OAK     |
| 3471 | 13       | OAK     |
| 3472 | 8        | OAK     |
| 3473 | 10       | OAK     |
| 3474 | 8        | OAK     |
| 3477 | 13       | OAK     |
| 3478 | 8        | HICKORY |
| 3480 | 13       | OAK     |
| 3481 | 15       | OAK     |
| 3482 | 10       | OAK     |
| 3483 | 16       | OAK     |
| 3484 | 11       | OAK     |
| 3485 | 11       | OAK     |
| 3486 | 5/4      | OAK     |
| 3487 | 10       | OAK     |
| 3490 | 12       | OAK     |
| 3513 | 9        | OAK     |
| 3514 | 8        | OAK     |
| 3525 | 7/5/4/3  | MAPLE   |
| 3539 | 14       | OAK     |
| 3547 | 9        | OAK     |
| 3548 | 10       | OAK     |
| 3556 | 10/4/2   | OAK     |
| 3572 | 6/2      | OAK     |
| 3575 | 8        | OAK     |
| 3576 | 6/5/2    | OAK     |
| 3603 | 9        | OAK     |
| 3622 | 11/9/3/2 | MAPLE   |
| 3625 | 10       | MAPLE   |
| 3636 | 13/7     | MAPLE   |
| 3638 | 12/5     | MAPLE   |
| 3640 | 13/10    | MAPLE   |
| 3642 | 12       | OAK     |
| 3648 | 8        | OAK     |
| 3677 | 13       | OAK     |
| 3678 | 14       | OAK     |
| 3708 | 13       | OAK     |
| 3714 | 7/6      | OAK     |
| 3736 | 12       | OAK     |
| 3749 | 9        | OAK     |
| 3761 | 11       | MAPLE   |
| 3764 | 8        | OAK     |
| 3766 | 6/3      | OAK     |
| 3793 | 14/3     | MAPLE   |
| 3795 | 6/4      | HICK    |
| 3798 | 9/8/7/4  | MAPLE   |
| 3799 | 10       | MAPLE   |
| 3807 | 15       | OAK     |
| 3817 | 5/8      | MAPLE   |
| 3844 | 12       | OAK     |
| 3845 | 11/8/6   | MAPLE   |
| 3886 | 6/4      | OAK     |
| 3890 | 6/5/5    | MAPLE   |
| 3892 | 12       | OAK     |
| 3893 | 8/7      | OAK     |

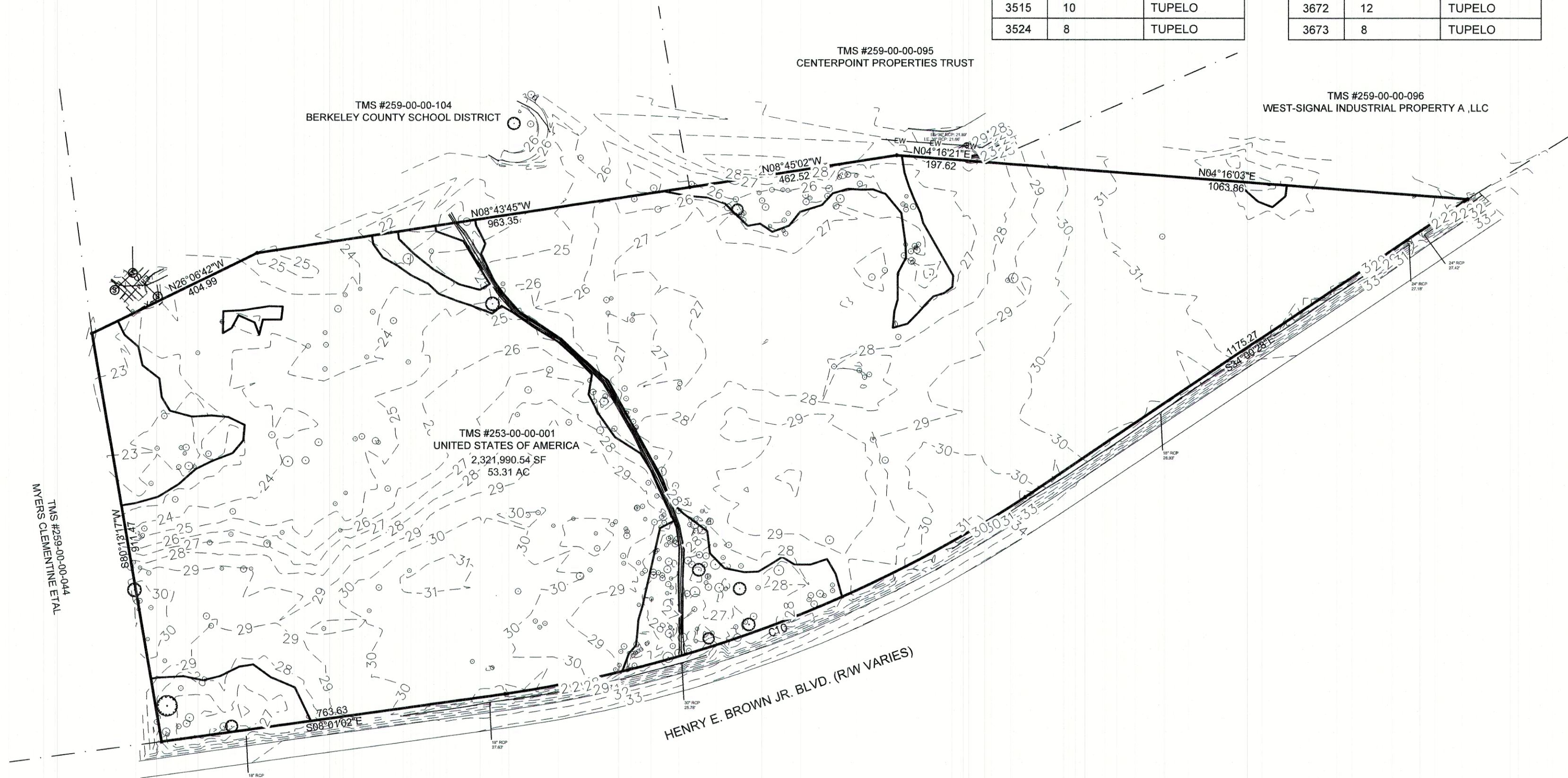
| #    | SIZE  | SPECIES |
|------|-------|---------|
| 5265 | 12    | OAK     |
| 5274 | 16    | OAK     |
| 5275 | 10    | OAK     |
| 5285 | 14    | OAK     |
| 5324 | 14/14 | OAK     |
| 5334 | 11    | OAK     |

| #    | SIZE       | SPECIES |
|------|------------|---------|
| 3895 | 11         | HICK    |
| 3896 | 9          | HICK    |
| 3897 | 9          | HICK    |
| 3900 | 6/3        | HICK    |
| 3901 | 8          | HICK    |
| 3925 | 14         | OAK     |
| 3929 | 7/3        | OAK     |
| 3949 | 11         | OAK     |
| 3967 | 14         | OAK     |
| 4100 | 12         | OAK     |
| 4101 | 15         | OAK     |
| 4121 | 11         | OAK     |
| 4122 | 13         | OAK     |
| 4124 | 10         | OAK     |
| 4125 | 8          | OAK     |
| 4141 | 8/6        | OAK     |
| 4142 | 3/9        | OAK     |
| 4192 | 12/3/2/2/2 | OAK     |
| 4193 | 10         | OAK     |
| 4236 | 7/5        | OAK     |
| 3724 | 18/10      | POPLAR  |
| 3693 | 10         | TUPELO  |
| 3930 | 6/5/4/5    | TUPELO  |
| 3489 | 9          | TUPELO  |
| 3491 | 10         | TUPELO  |
| 3511 | 8          | TUPELO  |
| 3515 | 10         | TUPELO  |
| 3524 | 8          | TUPELO  |

| #    | SIZE | SPECIES |
|------|------|---------|
| 3550 | 10   | TUPELO  |
| 3551 | 20   | TUPELO  |
| 3552 | 14   | TUPELO  |
| 3553 | 8    | TUPELO  |
| 3554 | 9    | TUPELO  |
| 3559 | 16   | TUPELO  |
| 3561 | 15   | TUPELO  |
| 3563 | 8    | TUPELO  |
| 3564 | 11   | TUPELO  |
| 3565 | 12   | TUPELO  |
| 3566 | 20   | TUPELO  |
| 3567 | 18   | TUPELO  |
| 3573 | 14   | TUPELO  |
| 3574 | 11   | TUPELO  |
| 3597 | 28   | TUPELO  |
| 3604 | 15   | TUPELO  |
| 3611 | 14   | TUPELO  |
| 3616 | 11   | TUPELO  |
| 3620 | 8    | TUPELO  |
| 3623 | 13   | TUPELO  |
| 3629 | 11   | TUPELO  |
| 3634 | 8    | TUPELO  |
| 3646 | 18   | TUPELO  |
| 3662 | 8    | TUPELO  |
| 3667 | 8    | TUPELO  |
| 3671 | 12   | TUPELO  |
| 3672 | 12   | TUPELO  |
| 3673 | 8    | TUPELO  |

| #    | SIZE      | SPECIES    |
|------|-----------|------------|
| 3680 | 11/4      | TUPELO     |
| 3684 | 9         | TUPELO     |
| 3711 | 13        | TUPELO     |
| 3712 | 14        | TUPELO     |
| 3713 | 14        | TUPELO     |
| 3716 | 11        | TUPELO     |
| 3846 | 10        | TUPELO     |
| 3848 | 11        | TUPELO     |
| 3850 | 8         | TUPELO     |
| 3877 | 13        | TUPELO     |
| 3928 | 15        | TUPELO     |
| 3931 | 7/3/3     | TUPELO     |
| 3932 | 8         | TUPELO     |
| 3933 | 12        | TUPELO     |
| 3946 | 11        | TUPELO     |
| 3947 | 10        | TUPELO     |
| 3974 | 18        | TUPELO     |
| 3600 | 22        | TUPELO     |
| 3891 | 22        | TUPELO     |
| 3046 | 4/7       | WILLOW OAK |
| 3077 | 13        | WILLOW OAK |
| 3220 | 15        | WILLOW OAK |
| 3222 | 5/4       | WILLOW OAK |
| 3445 | 10        | WILLOW OAK |
| 3475 | 10        | WILLOW OAK |
| 3512 | 13        | WILLOW OAK |
| 3658 | 21        | WILLOW OAK |
| 3709 | 10        | WILLOW OAK |
| 3710 | 17/5      | WILLOW OAK |
| 3843 | 15        | WILLOW OAK |
| 3847 | 5/7       | WILLOW OAK |
| 3888 | 15        | WILLOW OAK |
| 3894 | 7/2       | WILLOW OAK |
| 3898 | 13        | WILLOW OAK |
| 3899 | 14        | WILLOW OAK |
| 3902 | 10        | WILLOW OAK |
| 3903 | 10        | WILLOW OAK |
| 3904 | 8         | WILLOW OAK |
| 3905 | 11        | WILLOW OAK |
| 3906 | 8         | WILLOW OAK |
| 3927 | 13        | WILLOW OAK |
| 3948 | 11        | WILLOW OAK |
| 3024 | 10        | WATER OAK  |
| 3028 | 4/3/3/2   | WATER OAK  |
| 3029 | 9/8/5/5/3 | WATER OAK  |
| 3030 | 8         | WATER OAK  |
| 3031 | 8         | WATER OAK  |
| 3032 | 8         | WATER OAK  |
| 3036 | 8         | WATER OAK  |
| 3037 | 9         | WATER OAK  |
| 3059 | 11        | WATER OAK  |
| 3071 | 10        | WATER OAK  |
| 3176 | 4/3/2     | WATER OAK  |
| 3182 | 8         | WATER OAK  |
| 3197 | 5/5/3/3   | WATER OAK  |
| 3199 | 6/4/4     | WATER OAK  |
| 3213 | 5/4       | WATER OAK  |
| 3223 | 4/4/3     | WATER OAK  |
| 3224 | 5/4       | WATER OAK  |
| 3225 | 6/4       | WATER OAK  |
| 3226 | 6/4       | WATER OAK  |

| #    | SIZE  | SPECIES   |
|------|-------|-----------|
| 3250 | 7/5   | WATER OAK |
| 3262 | 8     | WATER OAK |
| 3263 | 5/6   | WATER OAK |
| 3272 | 5/4   | WATER OAK |
| 3313 | 6/4   | WATER OAK |
| 3382 | 8     | WATER OAK |
| 3446 | 13    | WATER OAK |
| 3449 | 7/4   | WATER OAK |
| 3468 | 9     | WATER OAK |
| 3470 | 6/5/3 | WATER OAK |
| 3476 | 8/3   | WATER OAK |
| 3479 | 9     | WATER OAK |
| 3517 | 6/6   | WATER OAK |
| 3518 | 7/4   | WATER OAK |
| 3519 | 9     | WATER OAK |
| 3521 | 6/4   | WATER OAK |
| 3522 | 6/5   | WATER OAK |
| 3523 | 8     | WATER OAK |
| 3536 | 7/4   | WATER OAK |
| 3537 | 14    | WATER OAK |
| 3543 | 5/5   | WATER OAK |
| 3544 | 9     | WATER OAK |
| 3569 | 10    | WATER OAK |
| 3571 | 10    | WATER OAK |
| 3596 | 15    | WATER OAK |
| 3707 | 3/5   | WATER OAK |
| 3720 | 8     | WATER OAK |
| 3721 | 10/10 | WATER OAK |
| 3728 | 8/2   | WATER OAK |
| 3754 | 8     | WATER OAK |
| 3757 | 9     | WATER OAK |
| 3758 | 9     | WATER OAK |
| 3759 | 8     | WATER OAK |
| 3762 | 9     | WATER OAK |
| 3763 | 5/4   | WATER OAK |
| 3765 | 13    | WATER OAK |
| 3767 | 8     | WATER OAK |
| 3768 | 8     | WATER OAK |
| 3849 | 9     | WATER OAK |
| 3885 | 9     | WATER OAK |
| 3887 | 6/3   | WATER OAK |
| 3889 | 6/4   | WATER OAK |
| 3926 | 7/7/4 | WATER OAK |
| 4092 | 12    | WATER OAK |
| 4123 | 8     | WATER OAK |
| 4143 | 3/6   | WATER OAK |
| 4144 | 2/8   | WATER OAK |
| 4145 | 12    | WATER OAK |
| 4146 | 9     | WATER OAK |
| 4149 | 12    | WATER OAK |
| 4150 | 16    | WATER OAK |
| 4151 | 8     | WATER OAK |



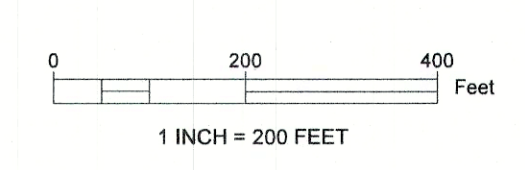
- NOTES:**
1. ANYTHING SHOWN OUTSIDE THE DEFINED BOUNDARY OF THIS PLAT IS FOR DESCRIPTIVE PURPOSES ONLY.
  2. AREA DETERMINED BY COORDINATE (DMD) METHOD.
  3. THE PUBLIC RECORDS REFERENCED ON THIS PLAT ARE ONLY THOSE USED AND NECESSARY FOR THE ESTABLISHMENT OF THE BOUNDARY OF THIS PROPERTY. THEY ARE NOT AND DO NOT CONSTITUTE A TITLE SEARCH.
  4. BEARINGS ARE BASED ON SOUTH CAROLINA STATE PLANE NAD 1983.
  5. ALL ELEVATIONS ARE BASED ON NAVD 1988.
  6. PROPERTY IS LOCATED IN FLOOD ZONE X AS SCALED FROM F.I.R.M. PANEL NO. 45015C 0685E & NO. 45015C 0705E, EFFECTIVE DECEMBER 07, 2018.
  7. PROPERTY FLOOD ZONES AND SETBACKS SHOULD BE APPROVED BY THE APPROPRIATE AUTHORITY BEFORE ANY DESIGN OR CONSTRUCTION.
  8. THIS PROPERTY MAY BE SUBJECT TO VARIOUS UTILITY EASEMENTS THAT WERE NOT NOTED IN THE REFERENCED PLATS. THE UTILITIES SHOWN HEREON WERE BASED ON SURFACE LOCATIONS AND WERE NOT VERIFIED AS TO DEPTH, SIZE, OR MATERIAL. THIS SURVEY DOES NOT SHOW SUBTERRANEAN CONDITIONS.

**REFERENCES:**

| PLAT BOOK | PAGE |
|-----------|------|
| CABO      | 265  |
| CABP      | 033  |
| CABB      | 317  |
| CABS      | 166  |

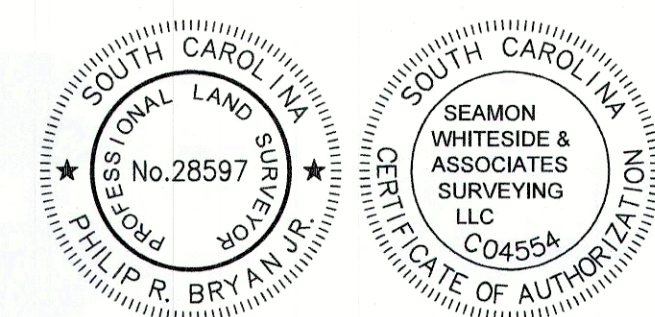
TMS #253-00-00-001

- LEGEND**
- PROPERTY CORNER FOUND, AS DESCRIBED
  - CALCULATED POINT, NO CORNER SET
  - TREE, AS DESCRIBED
  - GRAND TREE (24" +), AS DESCRIBED
  - WETLAND LINE
  - BOUNDARY LINE
  - - - ADJACENT PROPERTY LINE



I HEREBY STATE TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED THEREIN.

*Philip R. Bryan, Jr.*  
 PHILIP R. BRYAN, JR.  
 S.C.P.L.S. No. 28597

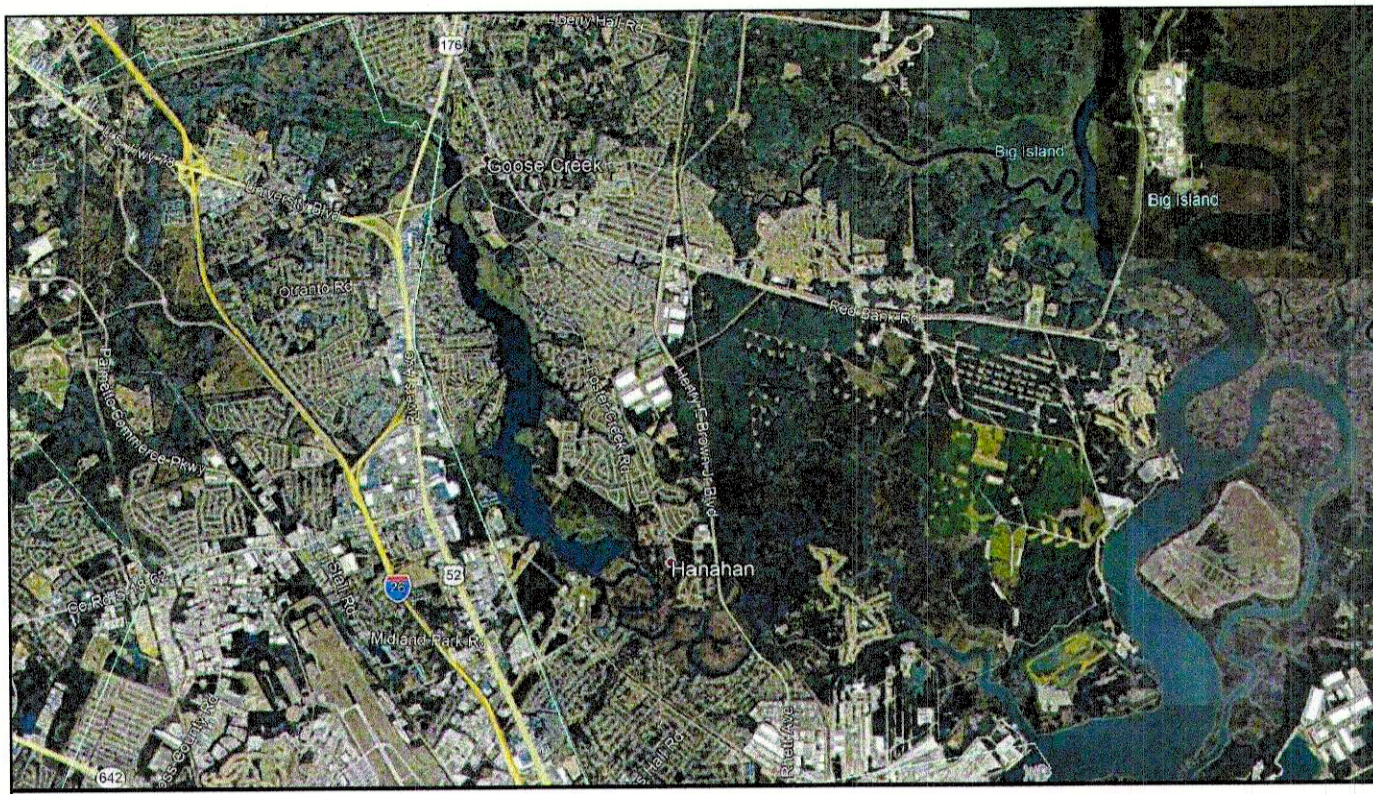


| MAS | ADDITIONAL TOPO AREAS | NO. | DATE | DESCRIPTION |
|-----|-----------------------|-----|------|-------------|
| 1   | 02-13-2020            |     |      |             |
| 2   | 02-28-2020            |     |      |             |
| 3   | 10-01-2020            |     |      |             |

**SOUTHEASTERN LAND SURVEYING LLC**  
 1035-B JENKINS ROAD  
 CHARLESTON SC 29407  
 (843) 795-9330

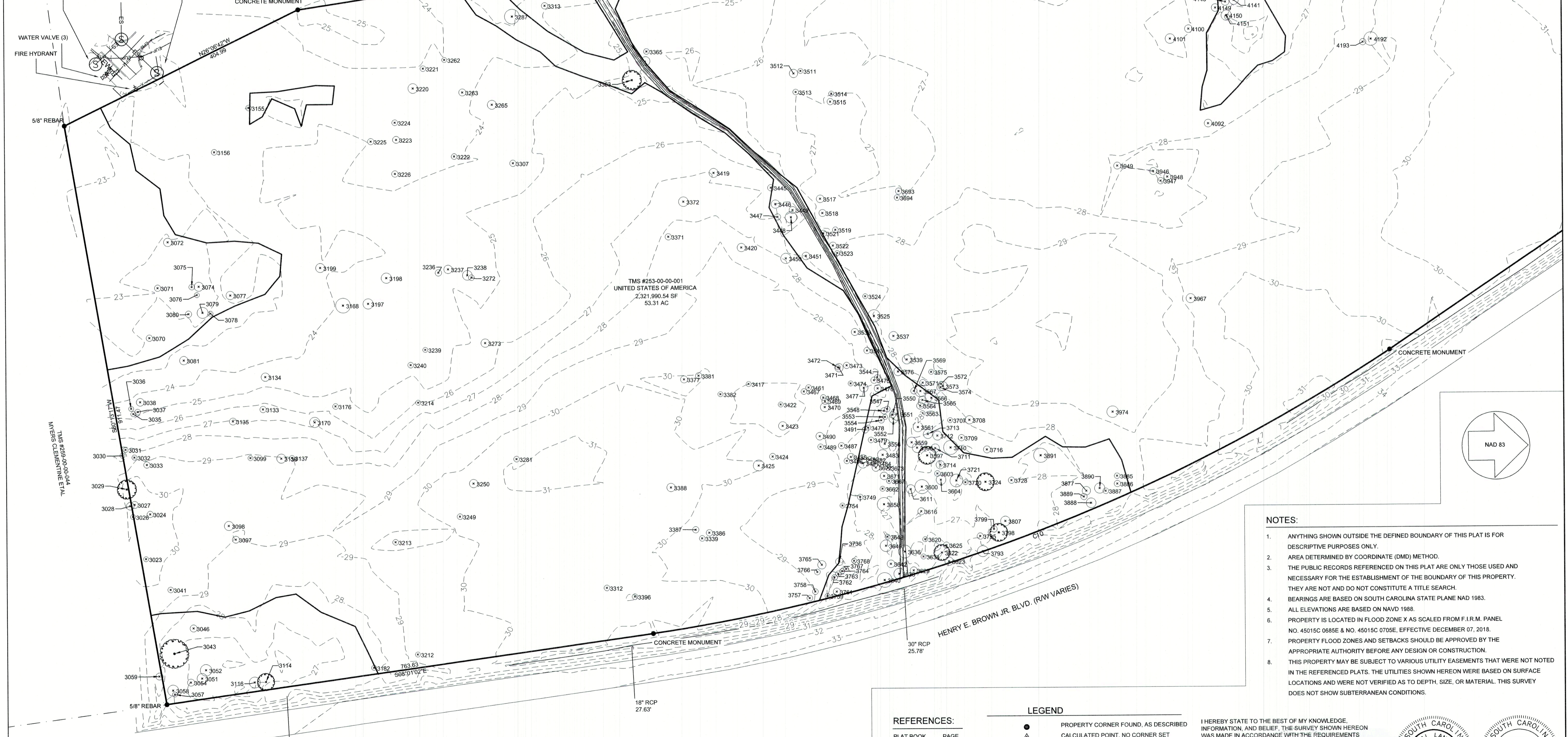
A TREE AND TOPOGRAPHICAL SURVEY OF A PORTION OF TMS #253-00-00-001 OWNED BY THE UNITED STATES OF AMERICA LOCATED IN THE CITY OF HANAHAN BERKELEY COUNTY, SOUTH CAROLINA

|        |            |
|--------|------------|
| DATE:  | 09-18-2018 |
| DRAWN: | MAS        |
| CHECK: | PRB        |
| CC:    | SB         |
| JOB:   | 18088      |
| DWG:   | 18088T&T   |
| SHEET: | 1 OF 3     |



VICINITY MAP (NOT TO SCALE)

| SEWER MANHOLE      | SEWER MANHOLE     | SEWER MANHOLE      |
|--------------------|-------------------|--------------------|
| RIM: 23.26'        | RIM: 23.98'       | RIM: 24.27'        |
| I.E. (IN): 10.70'  | I.E. (IN): 10.92' | I.E. (IN): 11.43'  |
| I.E. (OUT): 10.57' | I.E. (IN): 10.96' | I.E. (OUT): 10.80' |



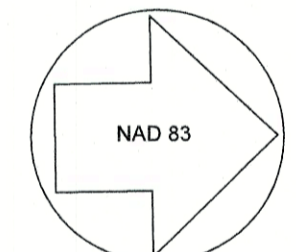
TMS #259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS #259-00-00-095  
CENTERPOINT PROPERTIES TRUST

TMS #259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A, L.L.C.

TMS #253-00-00-001  
UNITED STATES OF AMERICA  
2,321,990.54 SF  
53.31 AC

TMS #259-00-00-004  
AMERS STEINWENTZ E.N.L.



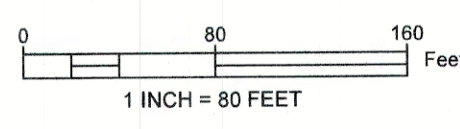
- NOTES:**
1. ANYTHING SHOWN OUTSIDE THE DEFINED BOUNDARY OF THIS PLAT IS FOR DESCRIPTIVE PURPOSES ONLY.
  2. AREA DETERMINED BY COORDINATE (DMD) METHOD.
  3. THE PUBLIC RECORDS REFERENCED ON THIS PLAT ARE ONLY THOSE USED AND NECESSARY FOR THE ESTABLISHMENT OF THE BOUNDARY OF THIS PROPERTY. THEY ARE NOT AND DO NOT CONSTITUTE A TITLE SEARCH.
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  5. ALL ELEVATIONS ARE BASED ON NAVD 1988.
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**REFERENCES:**

| PLAT BOOK | PAGE |
|-----------|------|
| CABO      | 265  |
| CABP      | 033  |
| CABP      | 317  |
| CABS      | 166  |

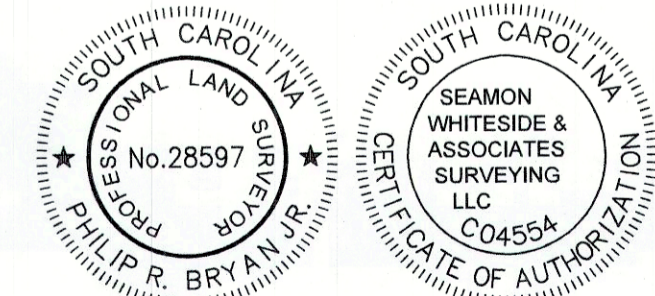
TMS #253-00-00-001

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  - TREE, AS DESCRIBED
  - GRAND TREE (24" +), AS DESCRIBED
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  - BOUNDARY LINE
  - ADJACENT PROPERTY LINE



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*Philip R. Bryan, Jr.*  
PHILIP R. BRYAN, JR. S.C.P.L.S. No. 28597



| NO. | DATE       | DESCRIPTION           | BY  |
|-----|------------|-----------------------|-----|
| 1   | 02-18-2020 | ADDITIONAL TOPO AREAS | MAS |
| 2   | 02-28-2020 | ADDED WATER LINE      | MAS |
| 3   | 10-01-2020 | UPDATED FLOOD PANELS  | MAS |

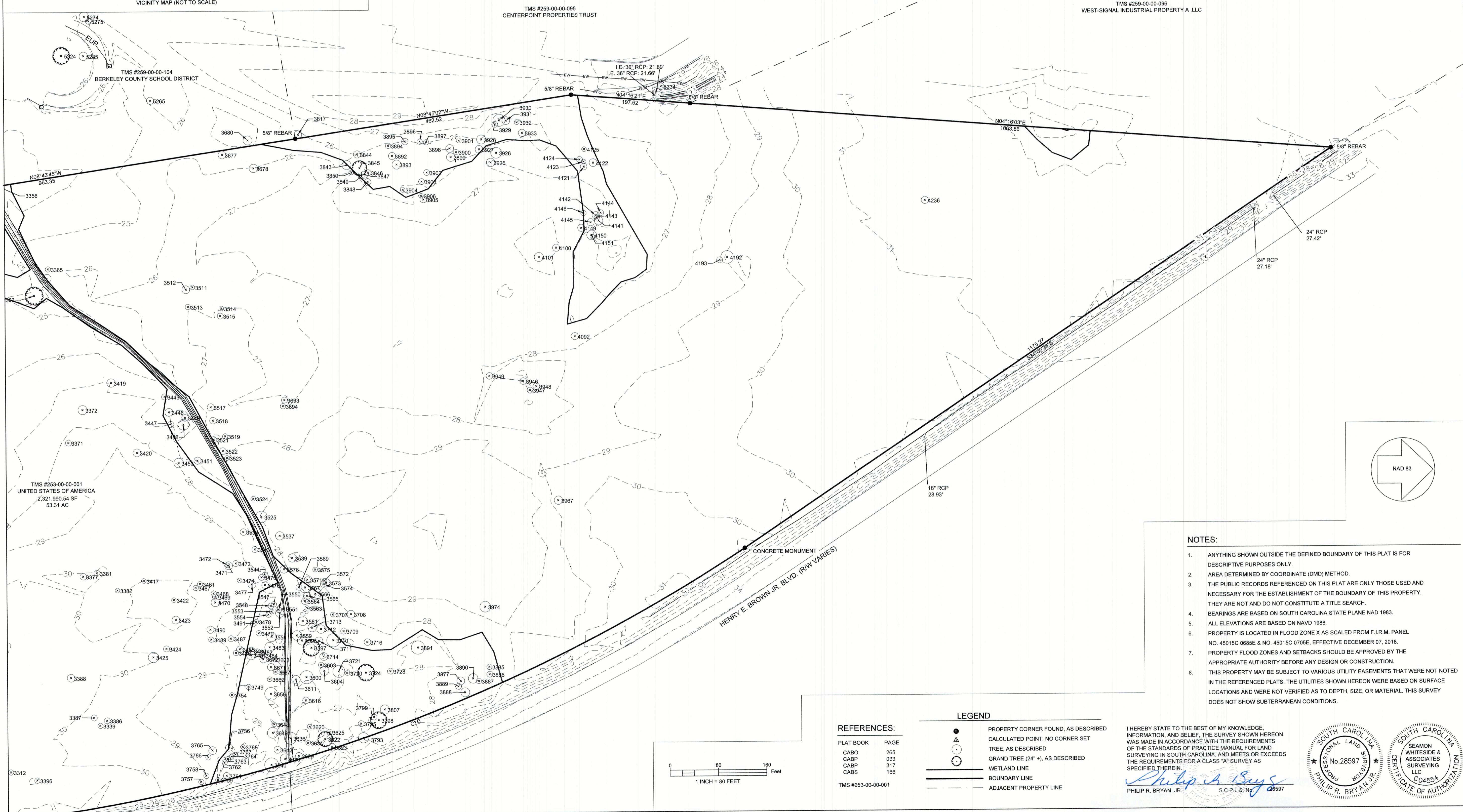
**SOUTHEASTERN LAND SURVEYING LLC**  
1035-B JENKINS ROAD  
CHARLESTON SC 29407  
(843)795-9330

**A TREE AND TOPOGRAPHICAL SURVEY OF A PORTION OF TMS #253-00-00-001 OWNED BY THE UNITED STATES OF AMERICA LOCATED IN THE CITY OF HANAHAN BERKELEY COUNTY, SOUTH CAROLINA**

|        |            |
|--------|------------|
| DATE:  | 09-18-2018 |
| DRAWN: | MAS        |
| CHECK: | PRB        |
| CC:    | SB         |
| JOB:   | 18088      |
| DWG:   | 18088T&T   |
| SHEET: | 2 OF 3     |



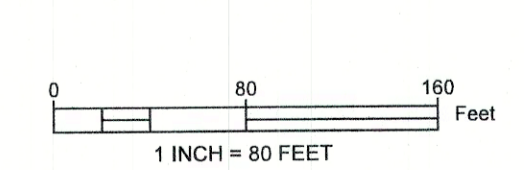
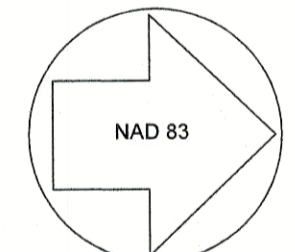
VICINITY MAP (NOT TO SCALE)



TMS #259-00-00-095  
CENTERPOINT PROPERTIES TRUST

TMS #259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

TMS #253-00-00-001  
UNITED STATES OF AMERICA  
2,321,990.54 SF  
53.31 AC



**REFERENCES:**

| PLAT BOOK | PAGE |
|-----------|------|
| CABO      | 265  |
| CABP      | 033  |
| CABP      | 317  |
| CABS      | 166  |

TMS #253-00-00-001

**LEGEND**

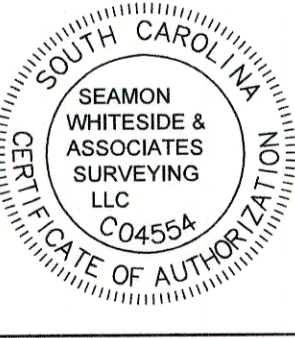
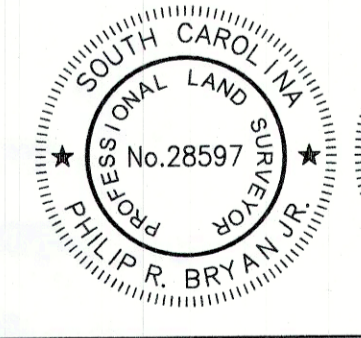
|       |                                     |
|-------|-------------------------------------|
| ●     | PROPERTY CORNER FOUND, AS DESCRIBED |
| ○     | CALCULATED POINT, NO CORNER SET     |
| △     | TREE, AS DESCRIBED                  |
| ⊙     | GRAND TREE (24\"/>                  |
| —     | WETLAND LINE                        |
| —     | BOUNDARY LINE                       |
| - - - | ADJACENT PROPERTY LINE              |

I HEREBY STATE TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS \"A\" SURVEY AS SPECIFIED THEREIN.

*Philip R. Bryan, Jr.*  
PHILIP R. BRYAN, JR. S.C.P.L.S. No. 68597

**NOTES:**

1. ANYTHING SHOWN OUTSIDE THE DEFINED BOUNDARY OF THIS PLAT IS FOR DESCRIPTIVE PURPOSES ONLY.
2. AREA DETERMINED BY COORDINATE (DMD) METHOD.
3. THE PUBLIC RECORDS REFERENCED ON THIS PLAT ARE ONLY THOSE USED AND NECESSARY FOR THE ESTABLISHMENT OF THE BOUNDARY OF THIS PROPERTY. THEY ARE NOT AND DO NOT CONSTITUTE A TITLE SEARCH.
4. BEARINGS ARE BASED ON SOUTH CAROLINA STATE PLANE NAD 1983.
5. ALL ELEVATIONS ARE BASED ON NAVD 1988.
6. PROPERTY IS LOCATED IN FLOOD ZONE X AS SCALED FROM F.I.R.M. PANEL NO. 45015C 0685E & NO. 45015C 0705E, EFFECTIVE DECEMBER 07, 2018.
7. PROPERTY FLOOD ZONES AND SETBACKS SHOULD BE APPROVED BY THE APPROPRIATE AUTHORITY BEFORE ANY DESIGN OR CONSTRUCTION.
8. THIS PROPERTY MAY BE SUBJECT TO VARIOUS UTILITY EASEMENTS THAT WERE NOT NOTED IN THE REFERENCED PLATS. THE UTILITIES SHOWN HEREON WERE BASED ON SURFACE LOCATIONS AND WERE NOT VERIFIED AS TO DEPTH, SIZE, OR MATERIAL. THIS SURVEY DOES NOT SHOW SUBTERRANEAN CONDITIONS.



| NO. | DATE       | DESCRIPTION           | BY  |
|-----|------------|-----------------------|-----|
| 1   | 02-13-2020 | ADDITIONAL TOPO AREAS | MAS |
| 2   | 02-28-2020 | ADDED WATER LINE      | MAS |
| 3   | 10-01-2020 | UPDATED FLOOD PANELS  | MAS |

**SOUTHEASTERN LAND SURVEYING LLC**  
1035-B JENKINS ROAD  
CHARLESTON SC 29407  
(843)795-9330

**A TREE AND TOPOGRAPHICAL SURVEY OF A PORTION OF TMS #253-00-00-001 OWNED BY THE UNITED STATES OF AMERICA LOCATED IN THE CITY OF HANAHAN BERKELEY COUNTY, SOUTH CAROLINA**

|        |            |
|--------|------------|
| DATE:  | 09-18-2018 |
| DRAWN: | MAS        |
| CHECK: | PRB        |
| CC:    | SB         |
| JOB:   | 18088      |
| DWG:   | 18088T&T   |
| SHEET: | 3 OF 3     |



VICINITY MAP (NOT TO SCALE)

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L1     | S64°22'25"W | 35.79  |
| L2     | S64°03'19"W | 45.97  |
| L3     | S22°47'54"W | 57.29  |
| L4     | S36°05'19"W | 48.04  |
| L5     | S09°27'36"E | 31.46  |
| L6     | S26°08'39"E | 46.41  |
| L7     | S14°14'29"E | 39.04  |
| L8     | S12°04'41"W | 43.78  |
| L9     | S03°05'30"E | 56.27  |
| L10    | S09°46'43"E | 16.22  |
| L11    | S08°01'02"E | 331.81 |
| L12    | S80°13'17"W | 140.72 |
| L13    | N63°53'18"E | 33.76  |
| L14    | N40°53'56"E | 40.38  |
| L15    | N77°29'33"E | 41.62  |
| L16    | N37°32'40"E | 47.19  |
| L17    | N82°21'37"E | 41.84  |
| L18    | N58°44'38"E | 34.41  |
| L19    | N15°01'12"E | 50.67  |
| L20    | N03°18'31"W | 43.16  |
| L21    | N05°03'21"E | 36.92  |
| L22    | N25°43'11"E | 39.95  |
| L23    | S85°11'54"E | 34.31  |
| L24    | S50°18'50"E | 36.41  |
| L25    | S21°05'09"E | 50.14  |
| L26    | S26°03'23"E | 39.03  |
| L27    | S42°05'48"E | 50.02  |
| L28    | S31°28'08"E | 53.23  |
| L29    | S15°49'12"E | 50.28  |
| L30    | S09°46'43"E | 33.02  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L61    | S54°22'27"W | 35.90  |
| L62    | S81°16'15"W | 19.12  |
| L63    | N08°43'45"W | 57.23  |
| L64    | S30°33'07"E | 24.88  |
| L65    | S14°44'01"W | 47.19  |
| L66    | S30°09'52"W | 66.30  |
| L67    | S38°49'22"W | 55.17  |
| L68    | S44°11'47"W | 45.62  |
| L69    | S81°16'15"W | 16.49  |
| L70    | S58°27'42"W | 110.86 |
| L71    | S19°44'13"W | 63.85  |
| L72    | S81°16'15"W | 12.14  |
| L73    | N08°43'45"W | 88.90  |
| L74    | N81°16'15"E | 12.50  |
| L75    | N62°59'02"E | 45.03  |
| L76    | S67°38'06"W | 29.33  |
| L77    | N64°23'46"E | 67.07  |
| L78    | N53°10'31"E | 34.27  |
| L79    | N48°32'49"E | 50.27  |
| L80    | N32°03'11"E | 56.29  |
| L81    | N33°39'02"E | 53.67  |
| L82    | N43°28'05"E | 47.69  |
| L83    | N41°21'41"E | 57.35  |
| L84    | N38°31'47"E | 34.12  |
| L85    | N61°30'50"E | 74.34  |
| L86    | N60°34'53"E | 50.59  |
| L87    | N60°58'48"E | 60.46  |
| L88    | N60°31'11"E | 62.03  |
| L89    | N69°51'27"E | 51.26  |
| L90    | N43°56'10"E | 40.45  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L121   | S62°00'31"E | 39.02  |
| L122   | N89°26'18"E | 29.59  |
| L123   | N89°46'50"E | 28.20  |
| L124   | S73°42'24"E | 26.91  |
| L125   | S85°06'25"E | 36.31  |
| L126   | N15°52'58"W | 33.34  |
| L127   | N45°27'03"W | 37.12  |
| L128   | N49°06'59"W | 20.94  |
| L129   | N45°40'30"W | 25.15  |
| L130   | N17°10'43"W | 24.34  |
| L131   | N35°46'38"W | 22.97  |
| L132   | N86°07'52"W | 24.94  |
| L133   | S60°11'26"W | 134.26 |
| L134   | S76°00'09"W | 21.58  |
| L135   | S65°06'46"W | 36.52  |
| L136   | S67°38'06"W | 29.33  |
| L137   | S71°57'29"W | 30.38  |
| L138   | S80°42'17"W | 37.76  |
| L139   | N04°12'39"E | 30.52  |
| L140   | N02°17'38"W | 24.18  |
| L141   | N20°11'54"E | 28.92  |
| L142   | N19°06'48"E | 9.28   |
| L143   | N17°03'02"W | 6.54   |
| L144   | N04°16'03"E | 32.49  |
| L145   | S83°16'53"E | 23.99  |
| L146   | S39°28'32"E | 37.46  |
| L147   | S20°55'46"W | 33.47  |
| L148   | S41°02'32"W | 32.34  |
| L149   | S46°39'25"W | 51.26  |
| L150   | N04°16'03"E | 61.42  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L31    | S80°13'17"W | 384.12 |
| L32    | N26°06'42"W | 63.05  |
| L33    | N69°22'51"W | 42.25  |
| L34    | N49°23'30"W | 23.58  |
| L35    | N83°31'08"W | 27.63  |
| L36    | N85°26'19"W | 29.03  |
| L37    | N73°50'59"W | 35.32  |
| L38    | N77°41'22"W | 28.30  |
| L39    | N77°15'44"W | 144.53 |
| L40    | N27°21'00"W | 34.09  |
| L41    | S65°04'59"W | 79.80  |
| L42    | S66°20'26"W | 42.66  |
| L43    | S57°47'42"W | 43.35  |
| L44    | S32°19'24"W | 66.55  |
| L45    | S54°15'48"W | 61.91  |
| L46    | S62°37'11"W | 48.91  |
| L47    | N80°36'56"W | 44.32  |
| L48    | S46°15'03"W | 56.16  |
| L49    | S41°42'12"W | 48.45  |
| L50    | S30°55'23"W | 59.90  |
| L51    | S34°54'55"W | 56.69  |
| L52    | S29°54'28"W | 30.39  |
| L53    | S39°38'26"E | 26.66  |
| L54    | S20°44'23"W | 50.11  |
| L55    | S17°51'37"W | 33.10  |
| L56    | S20°55'58"W | 42.22  |
| L57    | S43°24'17"W | 32.59  |
| L58    | S27°04'49"W | 42.28  |
| L59    | S34°45'22"W | 37.88  |
| L60    | S29°07'26"W | 35.32  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L91    | N36°07'35"E | 63.77  |
| L92    | N82°41'58"E | 49.66  |
| L93    | N45°41'43"E | 45.80  |
| L94    | N11°29'37"E | 44.90  |
| L95    | N02°34'05"W | 31.45  |
| L96    | N31°45'37"W | 41.23  |
| L97    | N32°17'56"W | 19.75  |
| L98    | N31°37'47"E | 31.42  |
| L99    | N00°42'43"E | 35.34  |
| L100   | N18°34'29"W | 38.91  |
| L101   | N59°17'56"E | 37.72  |
| L102   | N74°16'43"E | 52.64  |
| L103   | N10°46'09"E | 55.14  |
| L104   | N04°30'38"E | 45.82  |
| L105   | N19°59'52"E | 38.29  |
| L106   | N44°37'37"E | 34.53  |
| L107   | N43°18'46"E | 35.69  |
| L108   | N09°48'16"W | 27.89  |
| L109   | N34°32'42"E | 32.19  |
| L110   | N20°28'50"W | 39.55  |
| L111   | N51°20'07"W | 39.12  |
| L112   | N17°09'05"W | 50.34  |
| L113   | N47°06'45"W | 35.07  |
| L114   | N16°44'59"W | 35.56  |
| L115   | N08°43'45"W | 57.97  |
| L116   | N08°45'02"W | 462.52 |
| L117   | N04°16'21"E | 10.81  |
| L118   | N50°00'56"E | 54.69  |
| L119   | N82°11'01"E | 70.24  |
| L120   | N88°25'10"E | 29.33  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L151   | S64°52'25"W | 35.79  |
| L152   | S64°03'19"W | 45.97  |
| L153   | S22°47'54"W | 57.29  |
| L154   | S36°05'19"W | 48.04  |
| L155   | S09°27'36"E | 31.46  |
| L156   | S26°08'39"E | 46.41  |
| L157   | S14°14'29"E | 39.04  |
| L158   | S12°04'41"W | 43.78  |
| L159   | S03°05'30"E | 56.27  |
| L160   | S09°46'43"E | 16.22  |
| L161   | S08°01'02"E | 331.81 |
| L162   | S80°13'17"W | 140.72 |
| L163   | N63°53'18"E | 33.76  |
| L164   | N40°53'56"E | 40.38  |
| L165   | N77°29'33"E | 41.62  |
| L166   | N37°32'40"E | 47.19  |
| L167   | N82°21'37"E | 41.84  |
| L168   | N58°44'38"E | 34.41  |
| L169   | N15°01'12"E | 50.67  |
| L170   | N03°18'31"W | 43.16  |
| L171   | N05°03'21"E | 36.92  |
| L172   | N25°43'11"E | 39.95  |
| L173   | S85°11'54"E | 34.31  |
| L174   | S50°18'50"E | 36.41  |
| L175   | S21°05'09"E | 50.14  |
| L176   | S26°03'23"E | 39.03  |
| L177   | S42°05'48"E | 50.02  |
| L178   | S31°28'08"E | 53.23  |
| L179   | S15°49'12"E | 50.28  |
| L180   | S09°46'43"E | 33.02  |

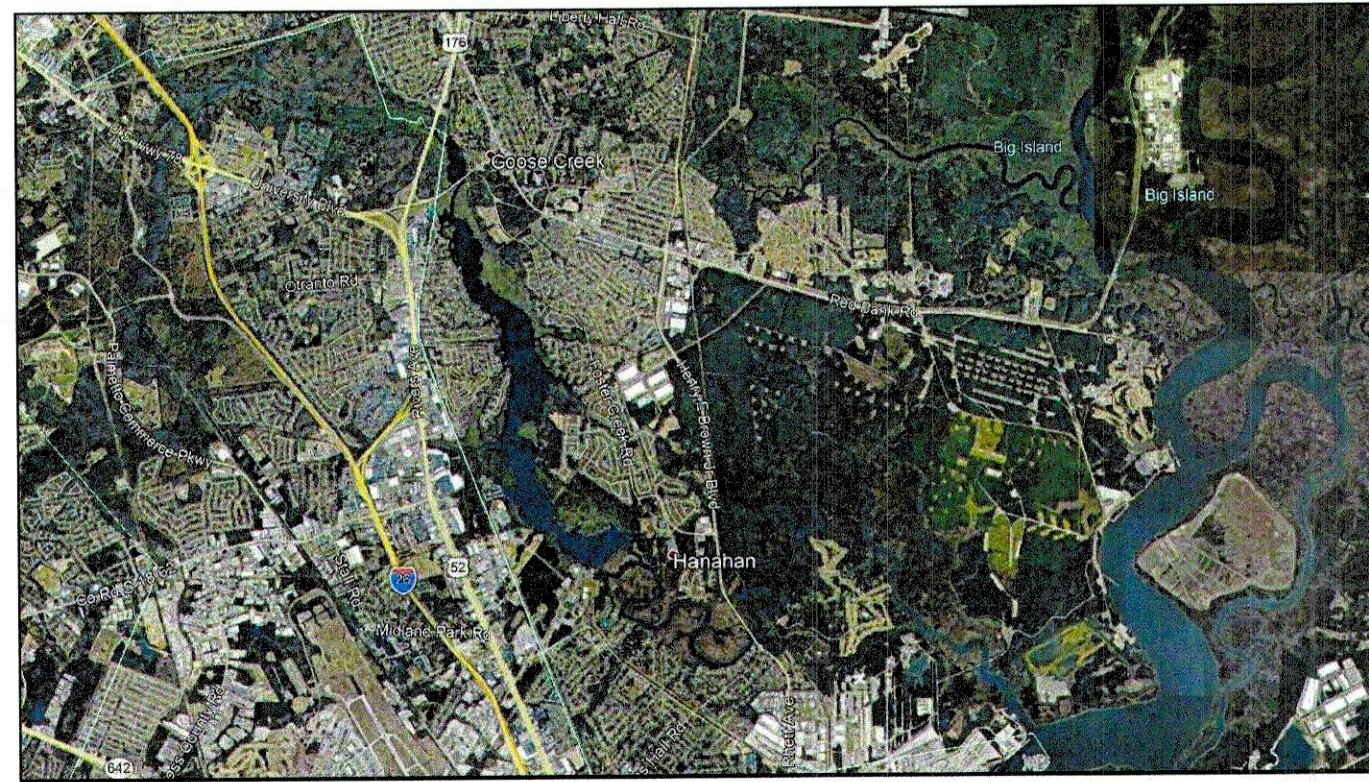
| Line # | Bearing     | Length |
|--------|-------------|--------|
| L199   | S41°42'12"W | 48.45  |
| L200   | S30°55'23"W | 59.90  |
| L201   | S34°54'55"W | 56.69  |
| L202   | S29°54'28"W | 30.39  |
| L203   | S39°38'26"E | 26.66  |
| L204   | S20°44'23"W | 50.11  |
| L205   | S17°51'37"W | 33.10  |
| L206   | S20°55'58"W | 42.22  |
| L207   | S43°24'17"W | 32.59  |
| L208   | S27°04'49"W | 42.28  |
| L209   | S34°45'22"W | 37.88  |
| L210   | S29°07'26"W | 35.32  |
| L211   | S84°22'27"W | 35.90  |
| L212   | S81°16'15"W | 19.12  |
| L213   | N08°43'45"W | 57.23  |
| L214   | S30°33'07"E | 24.88  |
| L215   | S14°44'01"W | 47.19  |
| L216   | S30°09'52"W | 66.30  |
| L217   | S38°49'22"W | 55.17  |
| L218   | S44°11'47"W | 45.62  |
| L219   | S81°16'15"W | 16.49  |
| L220   | S58°27'42"W | 110.86 |
| L221   | S19°44'13"W | 63.85  |
| L222   | S81°16'15"W | 12.14  |
| L223   | N08°43'45"W | 88.90  |
| L224   | N81°16'15"E | 12.50  |
| L225   | N82°59'02"E | 45.03  |
| L226   | S67°38'06"W | 29.33  |
| L227   | N64°23'46"E | 67.07  |
| L228   | N63°10'31"E | 34.27  |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L229   | N48°32'49"E | 52.27  |
| L230   | N32°03'11"E | 56.29  |
| L231   | N33°39'02"E | 53.67  |
| L232   | N43°28'05"E | 47.69  |
| L233   | N41°21'41"E | 57.35  |
| L234   | N38°31'47"E | 34.12  |
| L235   | N61°30'50"E | 74.34  |
| L236   | N60°34'53"E | 50.59  |
| L237   | N60°58'48"E | 60.46  |
| L238   | N60°31'11"E | 62.03  |
| L239   | N69°51'27"E | 51.26  |
| L240   | N43°56'10"E | 40.45  |
| L241   | N36°07'35"E | 63.77  |
| L242   | N82°41'58"E | 49.66  |
| L243   | N45°41'43"E | 45.80  |
| L244   | N11°29'37"E | 44.90  |
| L245   | N02°34'05"W | 31.45  |
| L246   | N31°45'37"W | 41.23  |
| L247   | N32°17'56"W | 19.75  |
| L248   | N31°37'47"E | 31.42  |
| L249   | N00°42'43"E | 35.34  |
| L250   | N18°34'29"W | 38.91  |
| L251   | S19°44'13"W | 37.72  |
| L252   | N74°16'43"E | 52.64  |
| L253   | N10°46'09"E | 55.14  |
| L254   | N04°30'38"E | 45.82  |
| L255   | N19°59'52"E | 38.29  |
| L256   | N44°37'37"E | 34.53  |
| L257   | S17°57'29"W | 30.38  |
| L258   | N09°48'16"W | 27.89  |

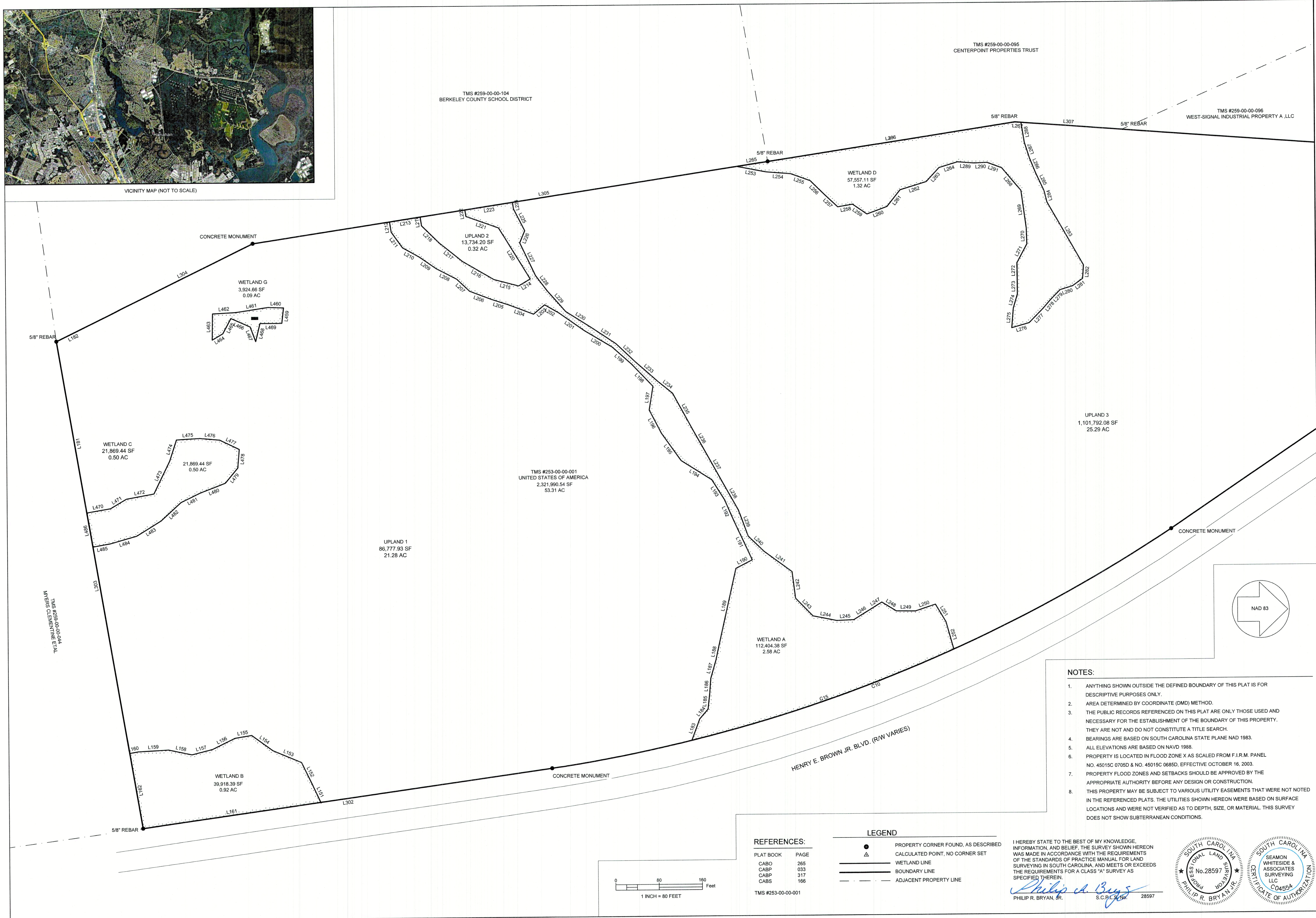
| Line # | Bearing     | Length |
|--------|-------------|--------|
| L259   | N34°32'42"E | 32.19  |
| L260   | N20°28'50"W | 39.55  |
| L261   | N51°20'07"W | 39.12  |
| L262   | N17°09'05"W | 50.34  |
| L263   | N47°06'45"W | 35.07  |
| L264   | N16°44'59"W | 35.56  |
| L265   | N08°43'45"W | 57.97  |
| L266   | N08°45'02"W | 462.52 |
| L267   | N04°16'21"E | 10.81  |
| L268   | N50°00'56"E | 54.69  |
| L269   | N82°11'01"E | 70.24  |
| L270   | N88°25'10"E | 29.33  |
| L271   | S62°00'31"E | 39.02  |
| L272   | N89°26'18"E | 29.59  |
| L273   | N89°46'50"E | 28.20  |
| L274   | S73°42'24"E | 26.91  |
| L275   | S85°06'25"E | 36.31  |
| L276   | N15°52'58"W | 33.34  |
| L277   | N45°27'03"W | 37.12  |
| L278   | N49°06'59"W | 20.94  |
| L279   | N45°40'30"W | 25.15  |
| L280   | N17°10'43"W | 24.34  |
| L281   | N35°46'38"W | 22.97  |
| L282   | N86°07'52"W | 24.94  |
| L283   | S60°11'26"W | 134.26 |
| L284   | S76°00'09"W | 21.58  |
| L285   | S65°06'46"W | 36.52  |
| L286   | S67°38'06"W | 29.33  |
| L287   | S71°57'29"W | 30.38  |
| L288   | S80°42'17"W | 37.76  |

| Line # | Bearing     | Length  |
|--------|-------------|---------|
| L289   | N04°12'39"E | 30.52   |
| L290   | N02°17'38"W | 24.18   |
| L291   | S64°03'19"W | 45.97   |
| L292   | N19°06'48"E | 9.28    |
| L293   | N17°03'02"W | 6.54    |
| L294   | N04°16'03"E | 32.49   |
| L295   | S83°16'53"E | 23.99   |
| L296   | S39°28'32"E | 37.46   |
| L297   | S20°55'46"W | 33.47   |
| L298   | S41°02'32"W | 32.34   |
| L299   | S46°39'25"W | 31.02   |
| L300   | N04°16'03"E | 61.42   |
| L301   | S62°00'31"E | 1175.27 |
| L302   | S08°01'02"E | 763.63  |
| L303   | S80°13'17"W | 911.47  |
| L304   | N26°06'42"W | 404.99  |
| L305   | N08°43'45"W | 963.35  |
| L306   | N08°45'02"W | 462.52  |
| L307   | N04°16'21"E | 197.62  |
| L308   | N04°16'03"E | 1063.88 |
| L309   | N89°22'51"W | 42.25   |
| L310   | N49°23'30"W | 23.58   |
| L311   | N83°31'08"W | 27.63   |
| L312   | N85°26'19"W | 29.03   |
| L313   | N73°50'59"W | 35.32   |
| L314   | N77°41'22"W | 28.30   |
| L315   | N77°15'44"W | 144.53  |
| L316   | N27°21'00"W | 34.09   |
| L317   | S65°04'59"W | 79.80   |
| L318   | S66°20'26"W | 42.66   |

| Line # | Bearing     | Length |
|--------|-------------|--------|
| L319   | S08°01'02"E | 431.82 |
| L320   | S64°52'25"W | 35.79  |
| L321   | S64°03'19"W | 45.97  |
| L322   | S22°47'54"W | 57.29  |
| L323   | S36°05'19"W | 48.04  |
| L324   | S09°27'36"E | 31.46  |
| L325   | S26°08'39"E | 46.41  |
| L326   | S14°14'29"E | 39.04  |
| L327   | S12°04'41"W | 43.78  |
| L328   | S03°05'30"E | 56.27  |



VICINITY MAP (NOT TO SCALE)



TMS #259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS #259-00-00-095  
CENTERPOINT PROPERTIES TRUST

TMS #259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A .LLC

TMS #253-00-00-001  
UNITED STATES OF AMERICA  
2,321,990.54 SF  
53.31 AC

WETLAND G  
3,924.66 SF  
0.09 AC

WETLAND D  
57,557.11 SF  
1.32 AC

UPLAND 2  
13,734.20 SF  
0.32 AC

UPLAND 3  
1,101,792.08 SF  
25.29 AC

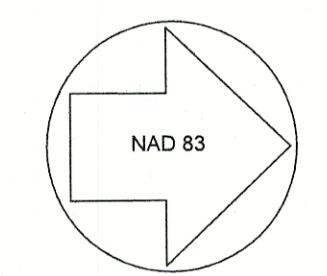
WETLAND C  
21,869.44 SF  
0.50 AC

21,869.44 SF  
0.50 AC

UPLAND 1  
86,777.93 SF  
21.28 AC

WETLAND A  
112,404.38 SF  
2.58 AC

WETLAND B  
39,918.39 SF  
0.92 AC



**NOTES:**

1. ANYTHING SHOWN OUTSIDE THE DEFINED BOUNDARY OF THIS PLAT IS FOR DESCRIPTIVE PURPOSES ONLY.
2. AREA DETERMINED BY COORDINATE (DMD) METHOD.
3. THE PUBLIC RECORDS REFERENCED ON THIS PLAT ARE ONLY THOSE USED AND NECESSARY FOR THE ESTABLISHMENT OF THE BOUNDARY OF THIS PROPERTY. THEY ARE NOT AND DO NOT CONSTITUTE A TITLE SEARCH.
4. BEARINGS ARE BASED ON SOUTH CAROLINA STATE PLANE NAD 1983.
5. ALL ELEVATIONS ARE BASED ON NAVD 1988.
6. PROPERTY IS LOCATED IN FLOOD ZONE X AS SCALED FROM F.I.R.M. PANEL NO. 45015C 0705D & NO. 45015C 0685D, EFFECTIVE OCTOBER 16, 2003.
7. PROPERTY FLOOD ZONES AND SETBACKS SHOULD BE APPROVED BY THE APPROPRIATE AUTHORITY BEFORE ANY DESIGN OR CONSTRUCTION.
8. THIS PROPERTY MAY BE SUBJECT TO VARIOUS UTILITY EASEMENTS THAT WERE NOT NOTED IN THE REFERENCED PLATS. THE UTILITIES SHOWN HEREON WERE BASED ON SURFACE LOCATIONS AND WERE NOT VERIFIED AS TO DEPTH, SIZE, OR MATERIAL. THIS SURVEY DOES NOT SHOW SUBTERRANEAN CONDITIONS.

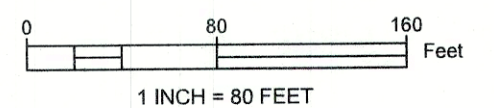
**REFERENCES:**

| PLAT BOOK | PAGE |
|-----------|------|
| CABO      | 265  |
| CABP      | 033  |
| CABP      | 317  |
| CABS      | 166  |

TMS #253-00-00-001

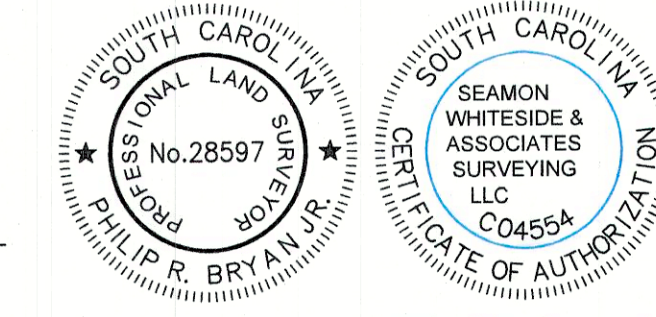
**LEGEND**

- PROPERTY CORNER FOUND, AS DESCRIBED
- ▲ CALCULATED POINT, NO CORNER SET
- WETLAND LINE
- BOUNDARY LINE
- - - ADJACENT PROPERTY LINE



I HEREBY STATE TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED THEREIN.

*Philip R. Bryan, Jr.*  
PHILIP R. BRYAN, JR. S.C.P.L. No. 28597

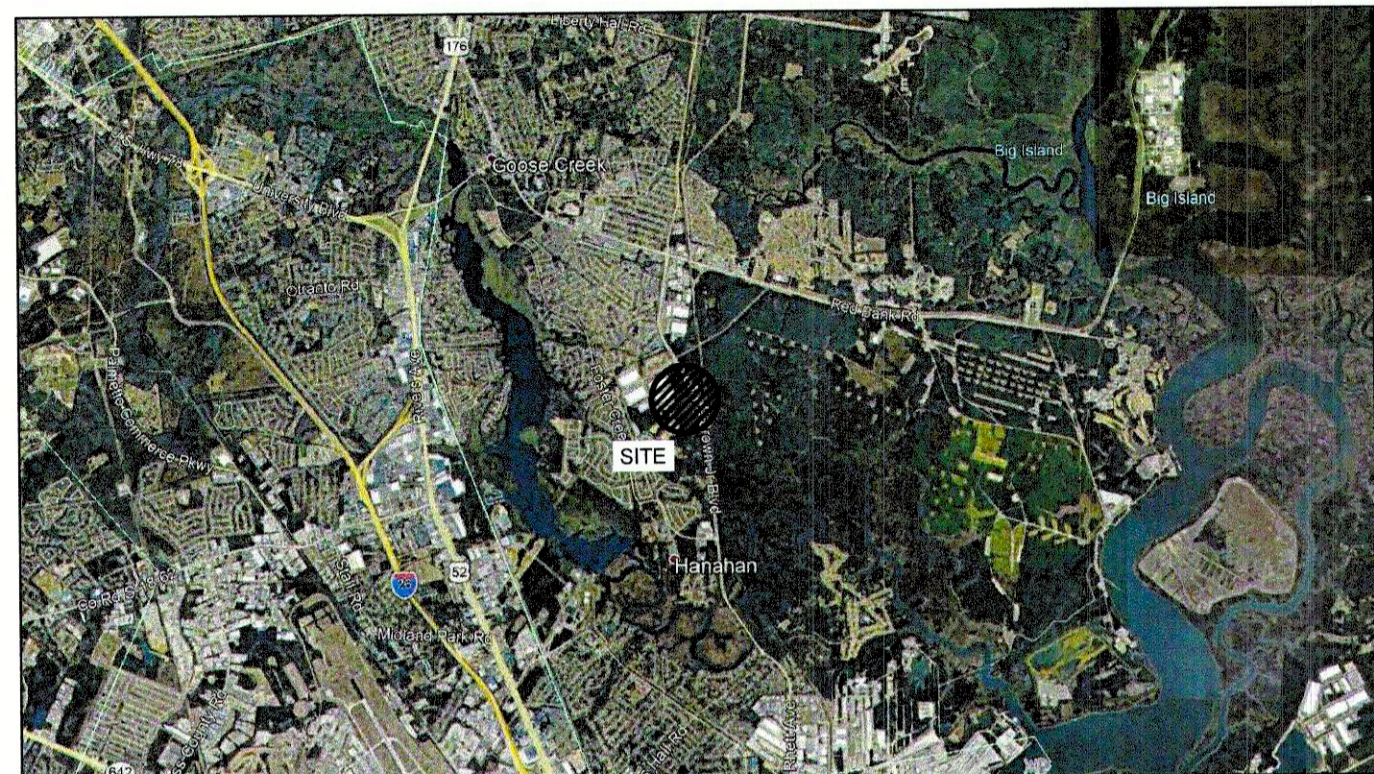


| NO. | DATE       | DESCRIPTION         | BY  |
|-----|------------|---------------------|-----|
| 1   | 03-07-2019 | REVISED WETLAND C   | MAS |
| 2   | 03-03-2021 | CHANGE COMPANY LOGO | MAS |

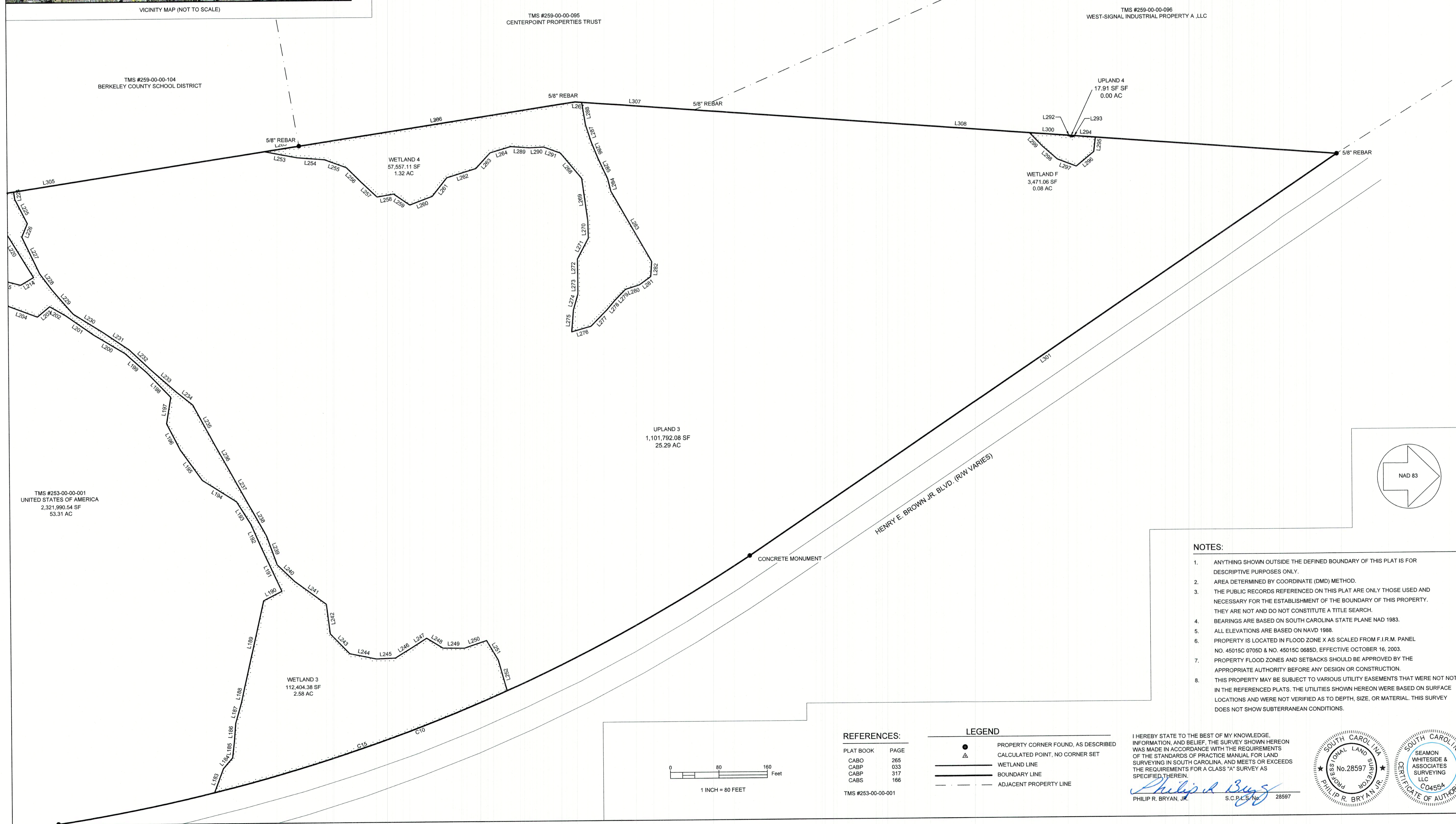
**SOUTHEASTERN LAND SURVEYING LLC**  
1035-B JENKINS ROAD  
CHARLESTON SC 29407  
(843)795-9330

A WETLAND DRAWING OF  
A PORTION OF TMS #253-00-00-001  
OWNED BY THE UNITED STATES OF AMERICA  
LOCATED IN THE CITY OF HANAHAN  
BERKELEY COUNTY, SOUTH CAROLINA

|        |            |
|--------|------------|
| DATE:  | 09-18-2018 |
| DRAWN: | MAS        |
| CHECK: | PRB        |
| CC:    | SB         |
| JOB:   | 18088      |
| DWG:   | 18088T&T   |
| SHEET: | 2 OF 3     |



VICINITY MAP (NOT TO SCALE)



TMS #259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS #259-00-00-095  
CENTERPOINT PROPERTIES TRUST

TMS #259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

TMS #253-00-00-001  
UNITED STATES OF AMERICA  
2,321,990.54 SF  
53.31 AC

WETLAND 4  
57,557.11 SF  
1.32 AC

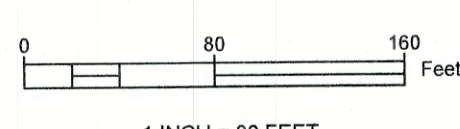
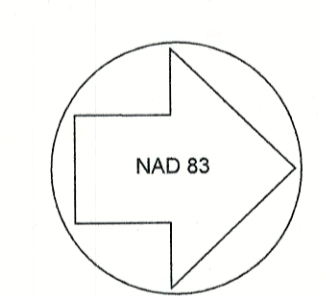
WETLAND F  
3,471.08 SF  
0.08 AC

UPLAND 4  
17.91 SF SF  
0.00 AC

UPLAND 3  
1,101,792.08 SF  
25.29 AC

WETLAND 3  
112,404.38 SF  
2.58 AC

HENRY E. BROWN JR BLVD. (R/W VARIES)



1 INCH = 80 FEET

REFERENCES:

| PLAT BOOK | PAGE |
|-----------|------|
| CABO      | 265  |
| CABP      | 033  |
| CABP      | 317  |
| CABS      | 166  |

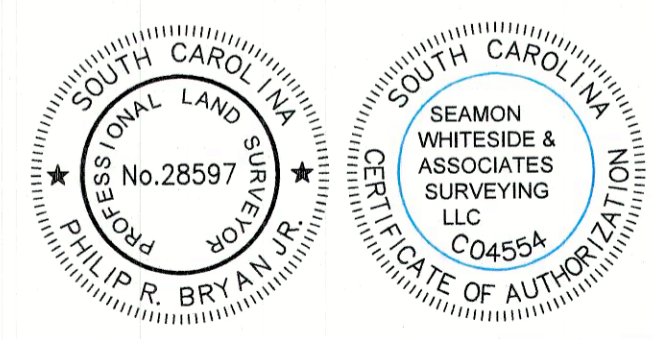
TMS #253-00-00-001

LEGEND

|  |                                     |
|--|-------------------------------------|
|  | PROPERTY CORNER FOUND, AS DESCRIBED |
|  | CALCULATED POINT, NO CORNER SET     |
|  | WETLAND LINE                        |
|  | BOUNDARY LINE                       |
|  | ADJACENT PROPERTY LINE              |

I HEREBY STATE TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED THEREIN.

*Philip R. Bryan, Jr.*  
PHILIP R. BRYAN, JR. S.C.P.L.S. No. 28597



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| NO. | DATE       | DESCRIPTION         | BY  |
|-----|------------|---------------------|-----|
| 1   | 05-07-2019 | REVISED WETLAND C   | MAS |
| 2   | 03-03-2021 | CHANGE COMPANY LOGO | MAS |

**SOUTHEASTERN**  
LAND SURVEYING LLC  
1035-B JENKINS ROAD  
CHARLESTON SC 29407  
(843)795-9330

A WETLAND DRAWING OF  
A PORTION OF TMS #253-00-00-001  
OWNED BY THE UNITED STATES OF AMERICA  
LOCATED IN THE CITY OF HANAHAN  
BERKELEY COUNTY, SOUTH CAROLINA

|        |            |
|--------|------------|
| DATE:  | 09-18-2018 |
| DRAWN: | MAS        |
| CHECK: | PRB        |
| CC:    | SB         |
| JOB:   | 18088      |
| DWG:   | 18088T&T   |
| SHEET: | 3 OF 3     |



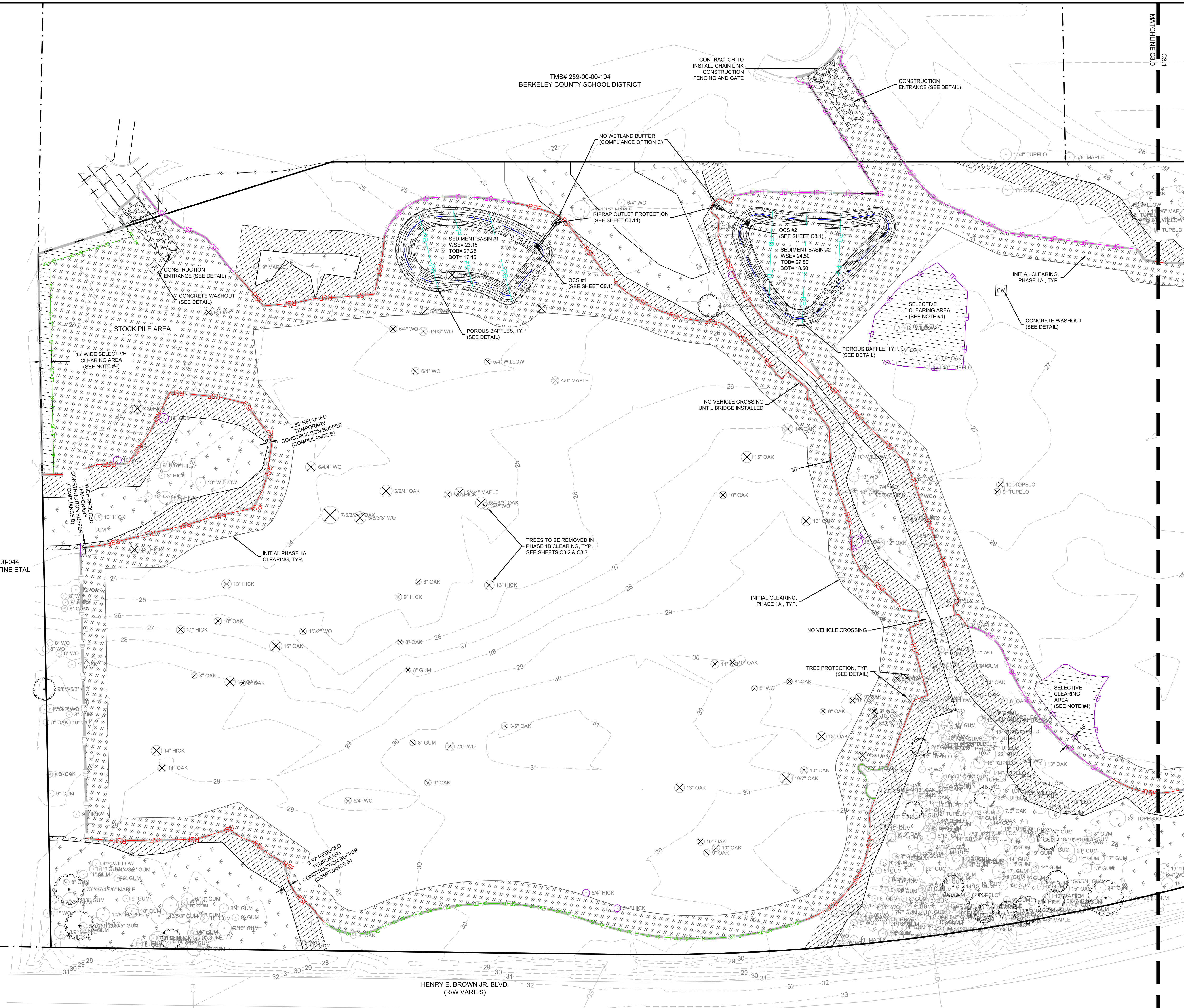
THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION

501 WANDO PARK BOULEVARD, SUITE 200 | MOUNT PLEASANT, SC 29464 | 508 RHETT STREET, SUITE 101 | GREENVILLE, SC 29601

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TMS# 259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS# 259-00-00-044  
MYERS CLEMENTINE ETAL



**LEGEND**

- SF—SF—SF— SILT FENCE
- RSF—RSF— REINFORCED SILT FENCE
- PB—PB—PB— POROUS BAFFLES
- LD—LD—LD— LIMIT OF DISTURBANCE
- SF-TP—SF-TP—SF-TP— SILT FENCE AND TREE PROTECTION
- TP—TP—TP— TREE PROTECTION
- SELECTIVE CLEARING (SEE GENERAL NOTES #4)
- AREA OF LAND DISTURBANCE
- WETLAND- DO NOT DISTURB
- WETLAND BUFFER- DO NOT DISTURB
- INITIAL PHASE 1A CLEARING LIMITS
- CONCRETE WASHOUT

- GENERAL NOTES:**
1. THE LOCATION OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. SUBSURFACE INVESTIGATION OF UTILITY LOCATIONS HAVE NOT BEEN FIELD VERIFIED BY THE OWNER OR HIS REPRESENTATIVES. EXISTING UTILITIES SHOWN DO NOT INCLUDE ALL UTILITIES THAT MAY EXIST.
  2. THE CONTRACTOR SHALL VERIFY THE EXISTING TOPOGRAPHIC WORK AND EXISTING UTILITY LINE LOCATIONS AND ELEVATIONS PRIOR TO BEGINNING WORK. SHOULD THE CONTRACTOR FIND AND DISCREPANCIES ON THE DRAWINGS PRIOR TO BEGINNING WORK OR DURING CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
  3. THE CONTRACTOR SHALL MAINTAIN AND BE SOLELY RESPONSIBLE FOR JOBSITE SAFETY.
  4. SELECTIVE CLEARING NOTE: THE CONTRACTOR SHALL PERFORM SELECTIVE CLEARING DURING SWPPP - PHASE 2 IN ACCORDANCE WITH SPECIFICATION SECTION 311000 - SITE CLEARING AND EROSION CONTROL. CONTRACTOR AREAS SHALL BE REVIEWED BY THE OWNER AND LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF SELECTIVE CLEARING ACTIVITIES.
  5. DO NOT DISTURB ANY ONSITE WETLANDS OR WETLAND BUFFER.

**NOTES:**

1. ALL SEDIMENT CONTROL BMP'S LOCATED IN THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1A SWPPP. BMP'S LOCATED OUTSIDE OF THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1B SWPPP.

TOTAL TREE INCHES REMOVED: 644"

SEE PLANTING PLANS FOR FINAL STABILIZATION

**DISTURBED ACREAGE**

40.0 ACRES

SEE SHEET C1.1 FOR LEGEND AND SHEETS C3.8 - C3.11 FOR SWPPP NOTES AND DETAILS.

**EXISTING UTILITY NOTE:**

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

Know what's below.  
Call before you dig.

**SEAMON WHITESIDE & ASSOCIATES, INC.**

MOUNT PLEASANT, SC 843.884.1667  
GREENVILLE, SC 864.298.0534  
SUMMERVILLE, SC 843.972.0710  
SPARTANBURG, SC 864.298.0534  
CHARLOTTE, NC 980.312.5450  
WWW.SEAMONWHITESIDE.COM

SOUTH CAROLINA  
SEAMON, WHITESIDE & ASSOCIATES, INC.  
No. C00472  
REGISTERED PROFESSIONAL ENGINEER  
STATE OF SOUTH CAROLINA

SOUTH CAROLINA  
REGISTERED PROFESSIONAL ENGINEER  
No. 20961  
3/10/21  
SEAMON, WHITESIDE & ASSOCIATES, INC.  
REGISTERED PROFESSIONAL ENGINEER  
STATE OF SOUTH CAROLINA

**HANAHAN RECREATION COMPLEX**

CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

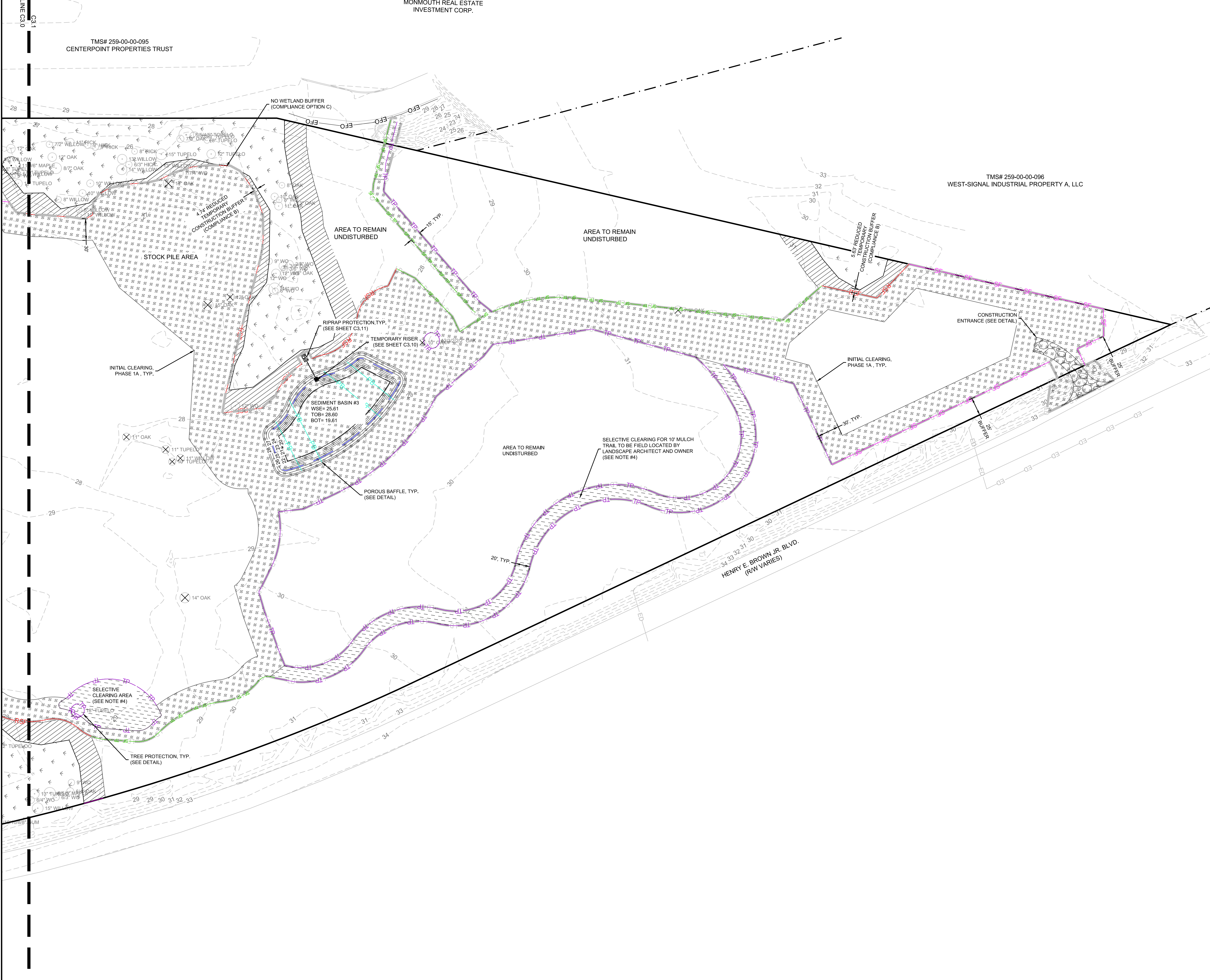
SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

SWPPP PLAN  
PHASE 1A

THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.  
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TMS# 259-00-00-097  
 MONMOUTH REAL ESTATE INVESTMENT CORP.  
 TMS# 259-00-00-095  
 CENTERPOINT PROPERTIES TRUST  
 TMS# 259-00-00-096  
 WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC



**LEGEND**

- SILT FENCE
- REINFORCED SILT FENCE
- POROUS BAFFLES
- LIMIT OF DISTURBANCE
- SILT FENCE AND TREE PROTECTION
- TREE PROTECTION
- SELECTIVE CLEARING (SEE GENERAL NOTES #4)
- AREA OF LAND DISTURBANCE
- WETLAND - DO NOT DISTURB
- WETLAND BUFFER - DO NOT DISTURB
- INITIAL PHASE 1A CLEARING LIMITS
- CONCRETE WASHOUT

- GENERAL NOTES:**
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  - DO NOT DISTURB ANY ONSITE WETLANDS OR WETLAND BUFFER.

**NOTES:**

- ALL SEDIMENT CONTROL BMP'S LOCATED IN THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1A SWPPP. BMP'S LOCATED OUTSIDE OF THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1B SWPPP.

TOTAL TREE INCHES REMOVED: 644

SEE PLANTING PLANS FOR FINAL STABILIZATION

**DISTURBED ACREAGE**

**40.0 ACRES**

SEE SHEET C1.1 FOR LEGEND AND SHEETS C3.8 - C3.11 FOR SWPPP NOTES AND DETAILS.

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**811**  
Know what's below.  
Call before you dig.

SCALE: 1" = 60'

**SEAMON WHITESIDE & ASSOCIATES, INC.**  
 MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
 CHARLOTTE, NC 980.312.5450  
 WWW.SEAMONWHITESIDE.COM

**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SOUTH CAROLINA PROFESSIONAL ENGINEER  
 No. C00472  
 SEAMON, WHITESIDE & ASSOCIATES, INC.  
 DATE: 3/10/21

SOUTH CAROLINA PROFESSIONAL LANDSCAPE ARCHITECT  
 No. 20961  
 DATE: 3/10/21

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

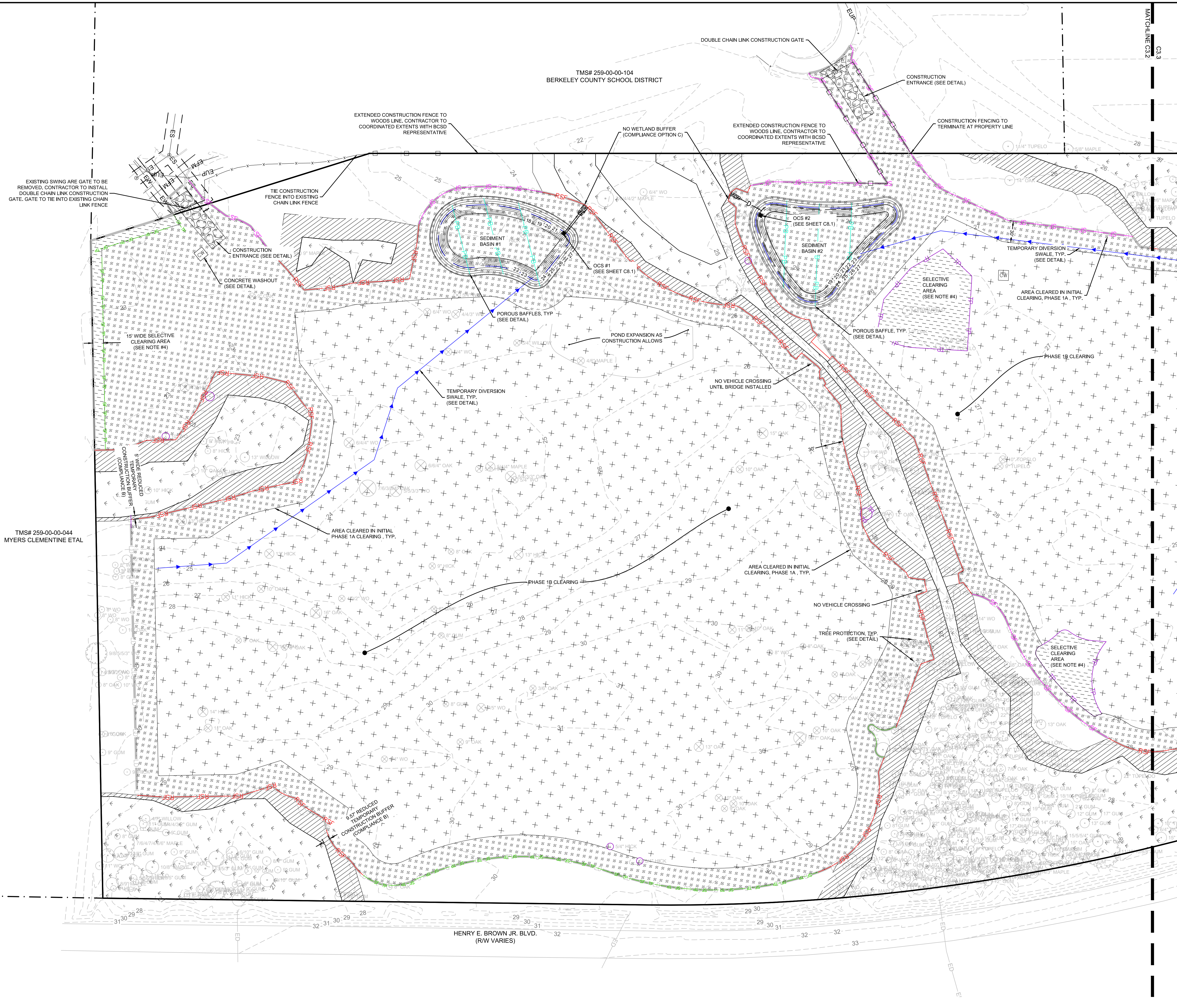
**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

SWPPP PLAN  
PHASE 1A

**C3.1**

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 COPYRIGHT © SEAMON, WHITESIDE & ASSOCIATES, INC.



**LEGEND**

- SILT FENCE
- REINFORCED SILT FENCE
- DIVERSION SWALE
- LIMIT OF DISTURBANCE
- SILT FENCE AND TREE PROTECTION
- TREE PROTECTION
- SELECTIVE CLEARING (SEE GENERAL NOTES #4)
- PHASE 1B CLEARING LIMITS
- WETLAND- DO NOT DISTURB
- WETLAND BUFFER- DO NOT DISTURB
- INITIAL PHASE 1A CLEARING LIMITS
- CONCRETE WASHOUT

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**DISTURBED ACREAGE**

**40.0 ACRES**

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 SEAMONWHITESIDE

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 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
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**SEAMON, WHITESIDE & ASSOCIATES, INC.**  
 No. C00472  
 STATE OF SOUTH CAROLINA  
 PROFESSIONAL ENGINEER  
 PA 12562

**SEAMON, WHITESIDE & ASSOCIATES, INC.**  
 No. 20961  
 STATE OF SOUTH CAROLINA  
 PROFESSIONAL LANDSCAPE ARCHITECT  
 PA 12562

**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

SWPPP PLAN  
 PHASE 1B

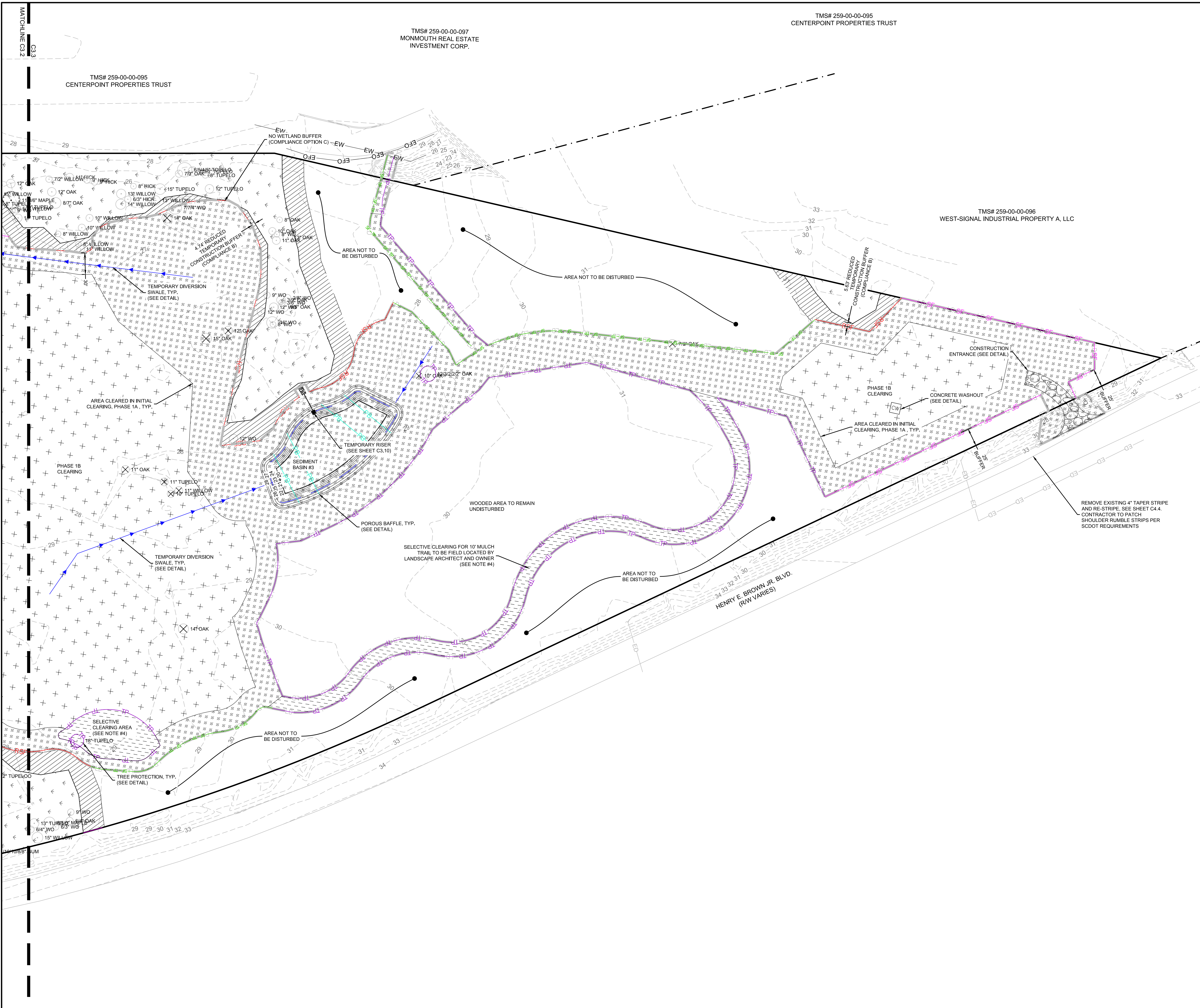
**C3.2**

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TMS# 259-00-00-097  
 MONMOUTH REAL ESTATE  
 INVESTMENT CORP.

TMS# 259-00-00-095  
 CENTERPOINT PROPERTIES TRUST

TMS# 259-00-00-096  
 WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC



**LEGEND**

- SILTS FENCE
- REINFORCED SILTS FENCE
- DIVERSION SWALE
- LIMIT OF DISTURBANCE
- SILTS FENCE AND TREE PROTECTION
- TREE PROTECTION
- SELECTIVE CLEARING (SEE GENERAL NOTES #4)
- PHASE 1B CLEARING LIMITS
- WETLAND- DO NOT DISTURB
- WETLAND BUFFER- DO NOT DISTURB
- INITIAL PHASE 1A CLEARING LIMITS
- CONCRETE WASHOUT

- GENERAL NOTES:**
1. THE LOCATION OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. SUBSURFACE INVESTIGATION OF UTILITY LOCATIONS HAVE NOT BEEN FIELD VERIFIED BY THE OWNER OR HIS REPRESENTATIVES. EXISTING UTILITIES SHOWN DO NOT INCLUDE ALL UTILITIES THAT MAY EXIST.
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  3. THE CONTRACTOR SHALL MAINTAIN AND BE SOLELY RESPONSIBLE FOR JOBSITE SAFETY.
  4. SELECTIVE CLEARING NOTE: THE CONTRACTOR SHALL PERFORM SELECTIVE CLEARING DURING SWPPP - PHASE 2 IN ACCORDANCE WITH SPECIFICATION SECTION 311000 - SITE CLEARING AND EROSION CONTROL. CONTRACTOR AREAS SHALL BE REVIEWED BY THE OWNER AND LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF SELECTIVE CLEARING ACTIVITIES.
  5. DO NOT DISTURB ANY ONSITE WETLANDS OR WETLAND BUFFER.

ALL SEDIMENT CONTROL BMP'S LOCATED IN THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1A SWPPP. BMP'S LOCATED OUTSIDE OF THE INITIAL CLEARING AND GRUBBING AREA SHALL BE INSTALLED AS PART OF THE PHASE 1B SWPPP.

TOTAL TREE INCHES REMOVED: 644

---

SEE PLANTING PLANS FOR FINAL STABILIZATION

---

**DISTURBED ACREAGE**

**40.0 ACRES**

---

SEE SHEET C1.1 FOR LEGEND AND SHEETS C3.8 - C3.11 FOR SWPPP NOTES AND DETAILS.

**EXISTING UTILITY NOTE:**

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

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SCALE: 1" = 60'

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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

| REV | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
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SWPPP PLAN  
 PHASE 1B

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TMS# 259-00-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS# 259-00-00-044  
MYERS CLEMENTINE ETAL

HENRY E. BROWN JR. BLVD.  
(R/W VARIES)



**LEGEND**

- SF SF SF SILT FENCE
- RSF RSF REINFORCED SILT FENCE
- TB TB TB TURBIDITY BARRIER
- LD LD LD LIMIT OF DISTURBANCE
- SF-TP SF-TP SF-TP SILT FENCE AND TREE PROTECTION
- TP TP TP TREE PROTECTION
- SELECTIVE CLEARING
- WETLAND - DO NOT DISTURB
- WETLAND BUFFER
- CW CONCRETE WASHOUT
- CURB INLET PROTECTION
- FILTER FABRIC INLET PROTECTION

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  - DO NOT DISTURB ANY ONSITE WETLANDS OR WETLAND BUFFER

- INLET PROTECTION NOTES:**
- CONVERT FILTER FABRIC INLET PROTECTION TO GRATE GATOR INLET PROTECTION FOR CURB INLETS AND CATCH BASINS ONCE CURB & ROCK HAVE BEEN PLACED. FILTER FABRIC INLET PROTECTION MAY BE REMOVED FROM JUNCTION BOXES ONCE TOPS ARE SET TO FINISHED GRADE & RING & COVER IS IN PLACE AND GROUTED.
  - ALL CURB INLETS & ALL CATCH BASINS IN PAVED AREAS SHALL HAVE TEMPORARY WEEP FILTERS PER DETAIL #6 ON SHEET C3.9. INSTALL WEEP FILTERS ON BOTH SIDES FOR ALL INLETS THAT RECEIVE DRAINAGE FROM BOTH SIDES.

SEE PLANTING PLANS FOR FINAL STABILIZATION

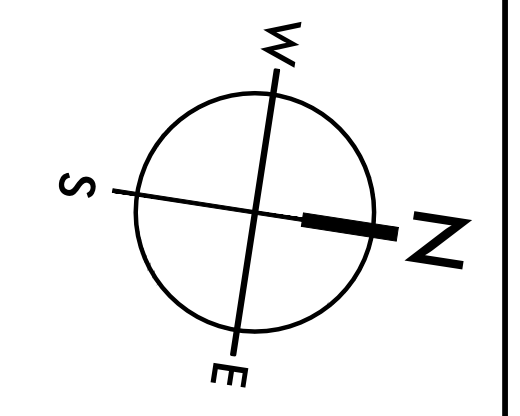
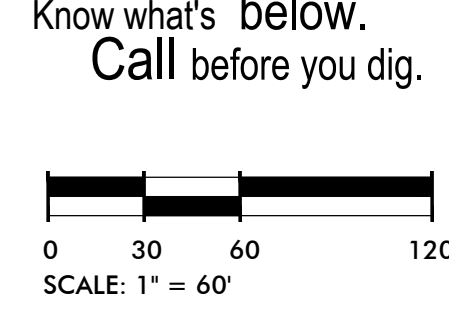
**DISTURBED ACREAGE**

**40.0 ACRES**

SEE SHEET C1.1 FOR LEGEND AND SHEETS C3.8 - C3.11 FOR SWPPP NOTES AND DETAILS.

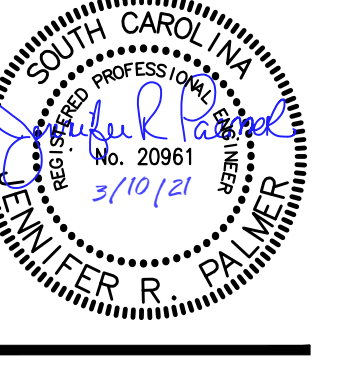
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**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

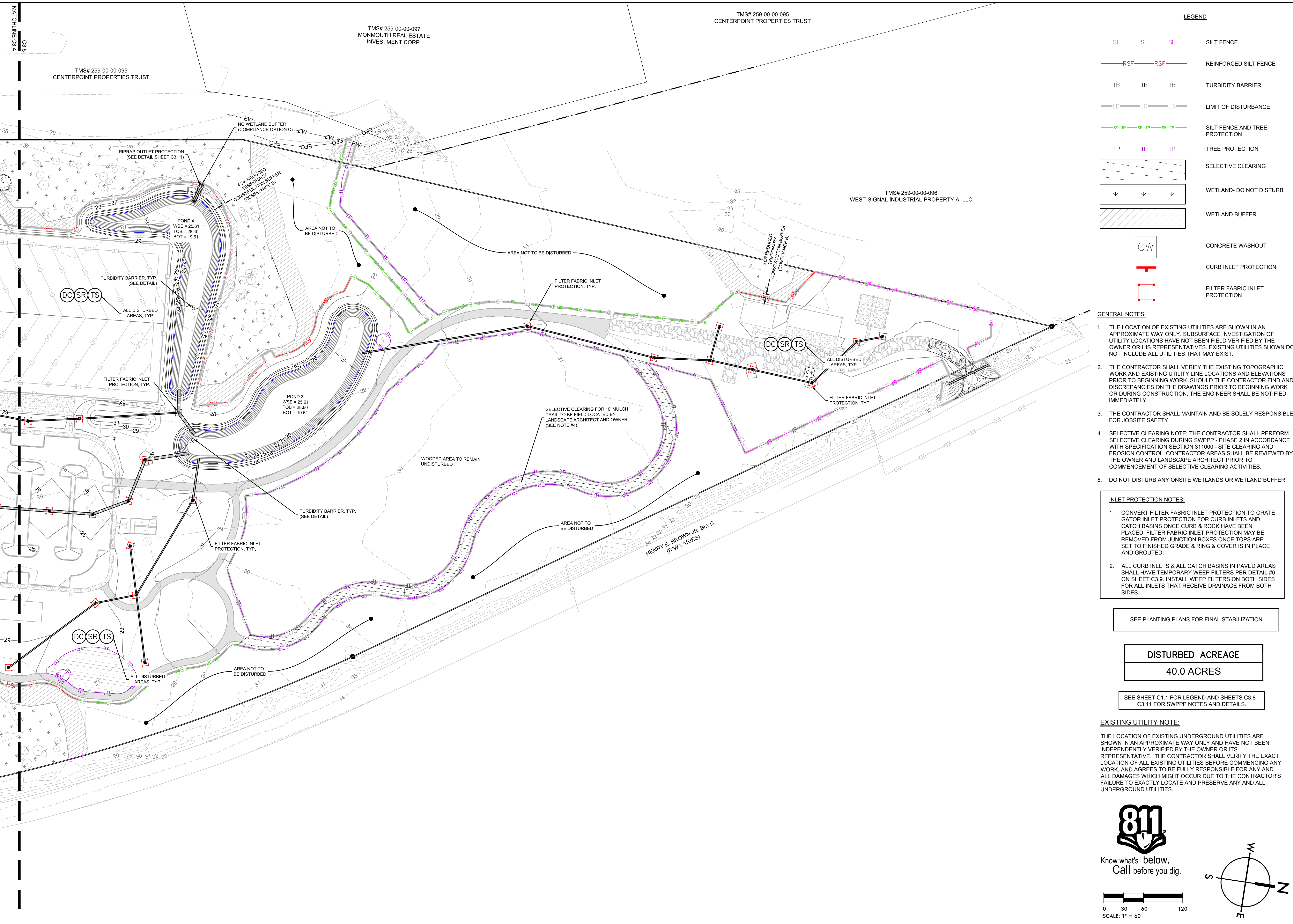
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CHECKED BY: JRP

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SWPPP PLAN PHASE 2

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MONMOUTH REAL ESTATE  
INVESTMENT CORP.

TMS# 259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

**LEGEND**

- SF — SF — SF — SILT FENCE
- RSF — RSF — REINFORCED SILT FENCE
- TB — TB — TB — TURBIDITY BARRIER
- LD — LD — LD — LIMIT OF DISTURBANCE
- SF-TP — SF-TP — SF-TP — SILT FENCE AND TREE PROTECTION
- TP — TP — TP — TREE PROTECTION
- SELECTIVE CLEARING
- WETLAND- DO NOT DISTURB
- WETLAND BUFFER
- CW CONCRETE WASHOUT
- CURB INLET PROTECTION
- FILTER FABRIC INLET PROTECTION

**GENERAL NOTES:**

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SEE PLANTING PLANS FOR FINAL STABILIZATION

**DISTURBED ACREAGE**  
 40.0 ACRES

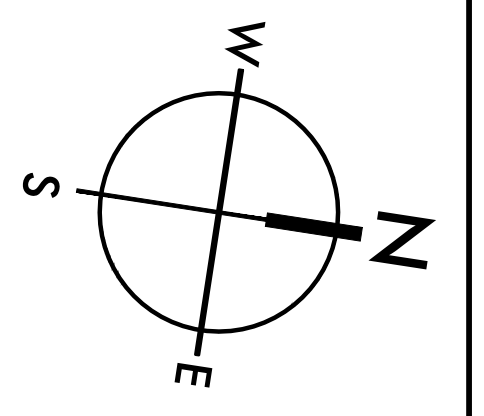
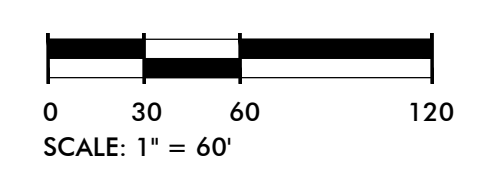
SEE SHEET C1.1 FOR LEGEND AND SHEETS C3.8 - C3.11 FOR SWPPP NOTES AND DETAILS.

**EXISTING UTILITY NOTE:**

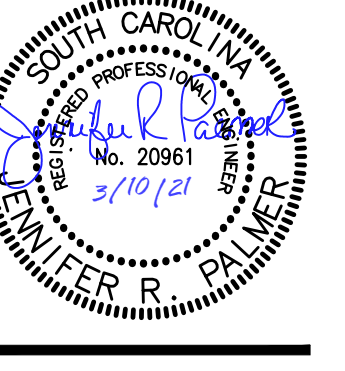
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**HANAHAN RECREATION  
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 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

| REVISION HISTORY |          |
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SWPPP PLAN  
PHASE 2

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TMS# 259-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

TMS# 259-00-00-044  
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**LEGEND**

- SF — SF — SF — SILT FENCE
- RSF — RSF — REINFORCED SILT FENCE
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- SF-TP — SF-TP — SF-TP — SILT FENCE AND TREE PROTECTION
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- PERMANENT STABILIZATION (SEE LANDSCAPE PLANS)
- WETLAND- DO NOT DISTURB
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- NOTES:**
1. SEE PLANTING PLAN FOR FINAL STABILIZATION.
  2. DANDY SACK INLET SEDIMENT CONTROL DEVICE OR APPROVED EQUAL IS TO BE INSTALLED IN ALL CATCH BASINS AFTER ROCK OR PAVEMENT IS INSTALLED ADJACENT TO THE CATCH BASIN.

**DISTURBED ACREAGE**  
**40.0 ACRES**

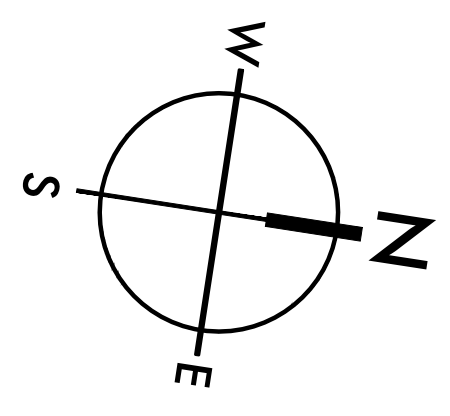
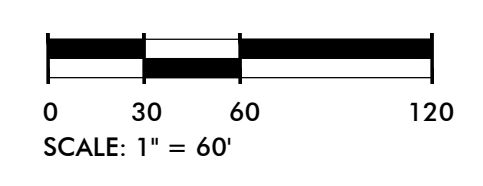
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**EXISTING UTILITY NOTE:**

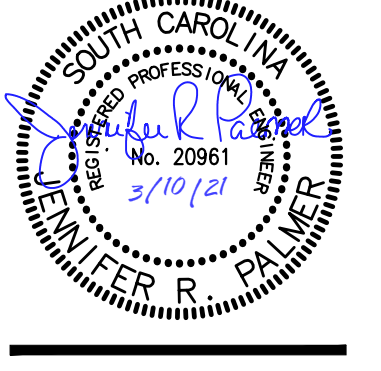
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 CHARLOTTE, NC 980.312.5450  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
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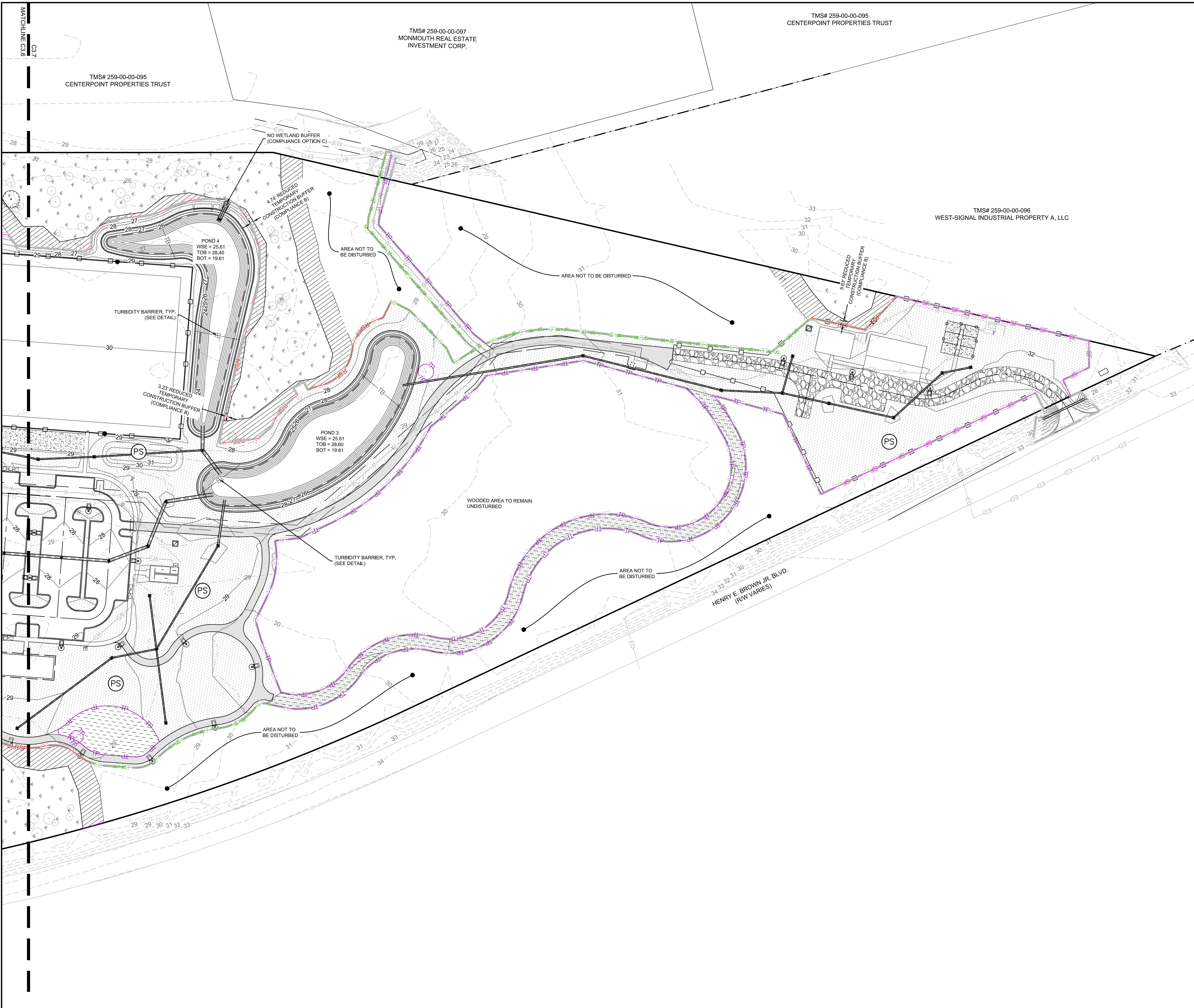
| REVISION HISTORY |          |
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SWPPP PLAN PHASE 3

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INVESTMENT CORP.

TMS# 259-00-00-095  
CENTERPOINT PROPERTIES TRUST

TMS# 259-00-00-096  
WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

**LEGEND**

- SF—SF—SF— SILT FENCE
- RSF—RSF— REINFORCED SILT FENCE
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**NOTES:**

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**DISTURBED ACREAGE**  
**40.0 ACRES**

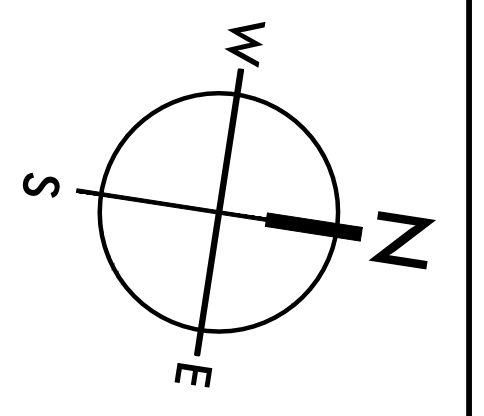
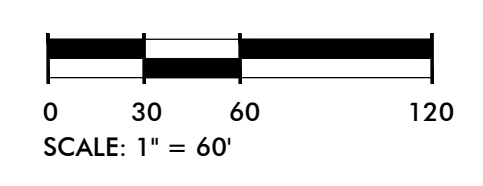
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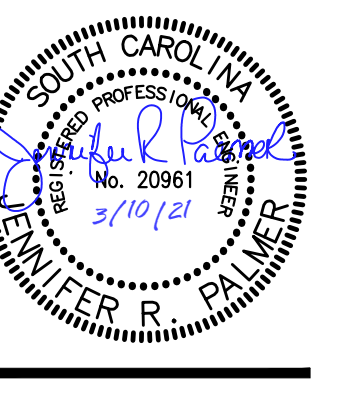


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CITY OF HANAHAN  
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**REVISION HISTORY**

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| D | 03/11/21 |

SWPPP PLAN  
PHASE 3



**DRAINAGE FACILITIES MAINTENANCE PLAN**

1. **TEMPORARY STORMWATER AND SEDIMENT CONTROLS (SSC'S):**
  - A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MAINTENANCE INCLUDING BUT NOT NECESSARILY LIMITED TO:
    - I. DURING CONSTRUCTION (UNTIL FINAL APPROVAL BY THE AUTHORITIES HAVING JURISDICTION AND THE OWNER):
      - (1) DAILY:
        - (A) OBSERVING PAVED AREAS THAT ARE UTILIZED FOR SITE ACCESS TO LOOK FOR SIGNS OF SOIL BEING TRACKED FROM THE SITE AND TAKING CORRECTIVE ACTION AS NECESSARY (SEE NOTE #6 UNDER "STORMWATER AND SEDIMENT CONTROL").
        - (B) CORRECTING ANY DAMAGE TO SSC'S AS SOON AS POSSIBLE WHEN IT OCCURS.
      - (2) WEEKLY (SEE NOTE #3 UNDER "STORMWATER AND SEDIMENT CONTROL"-CONTRACTOR SHALL COORDINATE WITH ENGINEER TO CONFIRM THAT ARRANGEMENTS ARE IN PLACE FOR REQUIRED INSPECTIONS AND LOG MANAGEMENT):
        - (A) INSPECTING SSC'S FOR DAMAGE AND ACCUMULATED SEDIMENT, REMOVING SEDIMENT AND REPAIRING OR REPLACING DAMAGED SSC'S AS NECESSARY.
        - (B) EVALUATING PERFORMANCE AND AMENDING, MODIFYING, IMPROVING, OR RELOCATING SSC'S AS NECESSARY.
        - (C) LOGGING INSPECTION OBSERVATIONS, RECOMMENDATIONS, REPAIRS, RELOCATIONS, AMENDMENTS, AND IMPROVEMENTS AS NECESSARY.
      - (3) BI-WEEKLY:
        - (A) EVALUATING SITE AND INSTALLING PERMANENT LANDSCAPING OR TEMPORARY SEEDING AS NECESSARY.
    - II. AT COMPLETION OF CONSTRUCTION (UPON FINAL APPROVAL BY AUTHORITIES HAVING JURISDICTION AND THE OWNER) REMOVAL OF ALL TEMPORARY SSC'S.

2. **POND(S) AND/OR DETENTION BASIN(S) AND DITCHES**
  - A. DURING CONSTRUCTION (UNTIL FINAL APPROVAL BY THE AUTHORITIES HAVING JURISDICTION AND THE OWNER):
    - I. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MAINTENANCE INCLUDING BUT NOT NECESSARILY LIMITED TO:
      - (1) REMOVING ACCUMULATED SEDIMENT.
      - (2) MAINTAINING POND AND DITCH BANKS INCLUDING PREVENTION AND REPAIR OF SLOPE EROSION.
      - (3) ESTABLISHING AND MAINTAINING TEMPORARY AND PERMANENT STABILIZATION (LANDSCAPING AND/OR GRASS AS INDICATED ON THE PLANS).
    - B. AFTER CONSTRUCTION:
      - I. THE OWNER OR HIS ASSIGNS SHALL BE RESPONSIBLE FOR PERPETUAL MAINTENANCE INCLUDING BUT NOT NECESSARILY LIMITED TO:
        - (1) MONTHLY (BI-WEEKLY DURING GROWING SEASON):
          - (A) AESTHETIC MAINTENANCE OF THE POND BANKS, PROJECT INTERNAL DITCHES AND SURROUNDING COMMON AREAS INCLUDING MOWING, LANDSCAPE MAINTENANCE, AND REMOVAL OF TRASH AND DEBRIS.
        - (2) EVERY 6 MONTHS:
          - (A) INSPECTION OF THE POND(S) AND ASSOCIATED OUTLET STRUCTURE(S) AND DITCHES.
          - (B) REMOVAL OF ANY BLOCKAGES AND ACCUMULATED DEBRIS AT THE OUTLET STRUCTURE(S).
          - (C) REPAIR AND STABILIZATION OF ANY BANK EROSION.
          - (D) REPAIR OR REPLACEMENT OF ANY DAMAGE TO THE OUTLET STRUCTURE(S).
        - (3) EVERY 12 MONTHS:
          - (A) TREATMENT, AS NECESSARY, FOR AQUATIC WEED CONTROL.
        - (4) EVERY 5 YEARS:
          - (A) INSPECTION OF SEDIMENT COLLECTION AND WHEN NECESSARY, REMOVAL AND PROPER DISPOSAL OF ACCUMULATED SEDIMENT. REMOVAL OF COLLECTED SEDIMENT IS NECESSARY WHEN THE DRAINAGE FLOW OF INLET/OUTLET PIPES OR STRUCTURES ARE IMPAIRED AND/OR DETENTION STORAGE CAPACITY IS REDUCED FROM THE ORIGINAL DESIGN PARAMETERS.
          - (B) MORE FREQUENT REMOVAL OF COLLECTED SEDIMENT MAY BE NECESSARY WHEN CONDITIONS REQUIRE.
      - II. THE OWNER OR HIS ASSIGNS SHALL BE RESPONSIBLE FOR COORDINATING WITH THE MS4 OPERATOR TO INSURE COMPLIANCE WITH OTHER INSPECTION PROCEDURES AND/OR DOCUMENTATION.

3. **DRAINAGE CULVERTS AND STRUCTURES:**
  - A. DURING CONSTRUCTION (UNTIL FINAL APPROVAL BY THE AUTHORITIES HAVING JURISDICTION AND THE OWNER):
    - I. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MAINTENANCE INCLUDING BUT NOT NECESSARILY LIMITED TO:
      - (1) PROTECTING THE CULVERTS AND STRUCTURES FROM DAMAGE.
      - (2) PREVENTING SEDIMENT FROM ENTERING THE CULVERTS AND STRUCTURES.
      - (3) REPAIR OF ANY DAMAGE AND REMOVAL OF SEDIMENT AS SOON AS POSSIBLE AFTER IT OCCURS.
    - B. AFTER CONSTRUCTION
      - I. FOR PUBLIC ROADWAY AND EASEMENT AREAS, THESE AREAS WILL BE DEDICATED TO AN OPERATING GOVERNMENTAL AUTHORITY UPON COMPLETION AND THAT AUTHORITY WILL PERFORM MAINTENANCE.
      - II. FOR PRIVATE PROPERTY AREAS, THE OWNER OR HIS ASSIGNS WILL BE RESPONSIBLE FOR MAINTENANCE IN PERPETUITY.
  - TEMPORARY BUFFER ZONE MANAGEMENT AND SURFACE WATER PROTECTION:

TEMPORARY (CONSTRUCTION) BUFFERS ARE NOT TO BE CONFUSED WITH PERMANENT BUFFERS THAT MAY BE SHOWN ELSEWHERE IN THE CONSTRUCTION PLANS. EXERCISE CARE TO DIFFERENTIATE BETWEEN TEMPORARY AND PERMANENT BUFFERS AND THEIR ASSOCIATED REQUIREMENTS.

ALL PERIMETER AND SEDIMENT CONTROL BMPs, SHALL BE INSTALLED PRIOR TO THE DISCHARGE OF STORMWATER RUNOFF INTO THE ADJACENT SURFACE WATER'S AND SHALL BE MAINTAINED UNTIL FINAL STABILIZATION.

AREAS CONTRIBUTING DIRECT RUNOFF TO TEMPORARY BUFFER AREAS SHALL BE STABILIZED PRIOR TO COMMENCING WORK WITHIN THE TEMPORARY BUFFER AREA.

ONCE CONSTRUCTION WITHIN AND ADJACENT TO TEMPORARY BUFFER AREAS IS COMPLETED, THE AREAS SHALL BE STABILIZED AS SOON AS PRACTICAL.

IN THE EVENT A BUFFER IS ACCIDENTALLY DISTURBED, THE CONTRACTOR SHALL STABILIZE THE AREA AS SOON AS POSSIBLE AND THE ENGINEER REGARDING REMEDIAL MEASURES OR EROSION CONTROL MEASURES.

NO DISTURBANCE SHALL OCCUR WITHIN CRITICAL AREAS (IE: SALTWATER MARSH).

COMPLIANCE OPTION "B":

IN AREAS NOTED ON SHEETS C3.0 - C3.7, A VARIABLE BUFFER ZONE AS SHOWN ON THE PLANS SHALL BE MAINTAINED ALONG THIS SURFACE WATER, AS DIRECTED BY COMPLIANCE OPTION B FROM THE CGP.

THIS TEMPORARY BUFFER ZONE IS TO BE IDENTIFIED ON THE SITE BY FLAGGING, INSTALLATION OF TREE PROTECTION FENCE OR OTHER PRACTICES TO MAKE IT READILY IDENTIFIABLE PRIOR TO IMPLEMENTATION OF OTHER PERIMETER BMPs AND COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

INSPECTION AND MAINTENANCE OF THE BUFFER ZONE IS TO BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED, OR AS OTHERWISE APPROVED. REFER TO SWPPP DETAILS FOR INDIVIDUAL BMP MAINTENANCE REQUIREMENTS.

COMPLIANCE OPTION "C":

IN AREAS NOTED ON SHEETS C3.0 - C3.7, NO BUFFER IS PROVIDED FROM CONSTRUCTION ACTIVITIES AND THE WETLANDS. REFER TO SWPPP DETAILS FOR INDIVIDUAL BMP MAINTENANCE REQUIREMENTS.

- PERMANENT SEEDING (TO BE USED WHERE PERMANENT TURF AND/OR LANDSCAPING IS INDICATED ON PLANTING PLANS AND/OR DETAILS, UNLESS OTHERWISE DEFINED ON THE PLANS, ALL AREAS DISTURBED MUST BE STABILIZED):
1. IN PARTICULAR, IT IS THE CONTRACTOR'S RESPONSIBILITY TO:
    - A. ESTABLISH A UNIFORM PERENNIAL STAND OF VEGETATION WITH A ROOT SYSTEM THAT IS SUFFICIENTLY DEVELOPED TO SURVIVE DRY PERIODS AND WINTER WEATHER AND BE CAPABLE OF RE-ESTABLISHMENT IN THE SPRING.
    - B. PROVIDE MINIMUM UNIFORM DENSITY COVERAGE OF 70% THROUGHOUT THE SEEDED AREA, IN ACCORDANCE WITH THE DEFINITION OF "FINAL STABILIZATION" AS DEFINED IN THE SCDHEC NPDES GENERAL PERMIT.
    - C. MAINTAIN THE STAND OF VEGETATION INCLUDING MOWING, FERTILIZING, WEED, DISEASE AND INSECT CONTROL; AND WATERING AS NECESSARY, UNTIL FINAL ACCEPTANCE BY THE OWNER AND/OR AUTHORITY HAVING JURISDICTION.
  2. ALL NECESSARY (GROUND BED) PREPARATION, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE LANDSCAPING SPECIFICATIONS FOR THE PROJECT OR, IN INSTANCES WHERE LANDSCAPING SPECIFICATIONS DO NOT EXIST, IN ACCORDANCE WITH APPLICABLE PORTIONS (INCLUDING BED PREPARATION, MULCH, FERTILIZERS, STIMULANTS, TACKIFIERS, ETC) OF SECTION 810 OF THE SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).
  3. FOR SEEDING INFORMATION REFER TO LANDSCAPE/ PLANTING PLANS.

- TEMPORARY SEEDING (TO BE USED ONLY FOR TEMPORARY STABILIZATION DURING CONSTRUCTION)
1. IN PARTICULAR THE CONTRACTOR SHALL:
    - A. ESTABLISH A STAND OF VEGETATION THAT IS CAPABLE TO PREVENT EROSION AND SEDIMENT LOSS, IN ACCORDANCE WITH THE DEFINITION OF "TEMPORARY STABILIZATION" AS DEFINED IN THE SCDHEC NPDES GENERAL PERMIT.
    - B. INITIATE TEMPORARY STABILIZATION EFFORTS AS REQUIRED IN NOTE 2 AND 12 OF THE "STORMWATER AND SEDIMENT CONTROL" NOTES LISTED ON THIS PAGE.
    - C. MAINTAIN THE STAND OF VEGETATION UNTIL REPLACED BY PERMANENT LANDSCAPING OR SUBSEQUENT CONSTRUCTION.
  2. ALL NECESSARY (GROUND BED) PREPARATION, INSTALLATION, AND MAINTENANCE OF TEMPORARY SEEDING SHALL BE IN ACCORDANCE WITH APPLICABLE PORTIONS (INCLUDING BED PREPARATION, MULCH, FERTILIZERS STIMULANTS, TACKIFIERS, ETC) OF SECTION 810 OF THE SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).
  3. UNLESS OTHERWISE INDICATED ON THIS SHEET OR IN SPECIFICATIONS, TEMPORARY SEED SHALL BE IN ACCORDANCE WITH APPENDIX C OF THE SOUTH CAROLINA DHEC STORM WATER MANAGEMENT BMP HANDBOOK. SEED SPECIES AND APPLICATION RATE SHALL BE AS INDICATED FOR THE PROJECT LOCATION, SOIL TYPE, AND DATE OF INSTALLATION.
  4. TEMPORARY SEED SELECTION (SELECTION METHOD BELOW FOLLOWS SCDOT RECOMMENDATIONS): FOR SHORT DURATION APPLICATIONS, SELECT A MINIMUM OF ONE (1) SEED SPECIES FROM TABLE 2 BELOW. FOR LONGER DURATION APPLICATIONS, SELECT A MINIMUM OF ONE (1) SEED SPECIES FROM TABLE 1 ABOVE (UNDER PERMANENT SEEDING) AND FROM TABLE 2 BELOW, AND APPLY AT THE RATES SPECIFIED.

| Species         | Nurse Crop Lbs/Ac | Temp. Cover | Annual Seed |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |  |
|-----------------|-------------------|-------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|--|--|--|
|                 |                   |             | Jan         | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |  |  |  |  |  |  |  |  |
| Browntop Millet | 15                | 60          |             |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |  |
| Ryegrass        | 75                | 200         |             |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |  |

█ = UPPER STATE  
█ = LOWER STATE

- PERMITTING NOTES
1. THESE PLANS HAVE BEEN PREPARED TO MEET THE INITIAL REQUIREMENTS OF A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR COVERAGE UNDER THE NPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES (NPDES). THE OWNER AND CONTRACTOR(S) ARE ADVISED THAT ADDITIONAL REQUIREMENTS, WHICH ARE BEYOND THE SCOPE OF THESE PLANS, MUST BE MET IN ORDER TO ASSURE CONTINUED COVERAGE UNDER THE NPDES.
  2. COVERAGE UNDER THE NPDES IS INITIATED BY THE SC DEPT. OF HEALTH AND ENVIRONMENTAL CONTROL'S (SCDHEC) APPROVAL OF THE PROJECT FOR CONSTRUCTION. THE OWNER'S SUBMITTAL OF AN ENVIRONMENTAL PROTECTION AGENCY (EPA) NOTICE OF INTENT (NOI) SERVES AS THE OWNER'S CERTIFICATION THAT HE HAS PREPARED, AND WILL IMPLEMENT AND MAINTAIN, A SWPPP THROUGHOUT THE CONSTRUCTION PERIOD. FURTHERMORE, IT CERTIFIES THAT HE WILL DOCUMENT AND WHERE REQUIRED, REPORT SITE CONDITIONS, REMEDIAL EFFORTS, SWPPP MODIFICATIONS, AND OTHER STORMWATER RELATED ACTIVITIES IN ACCORDANCE WITH NPDES REQUIREMENTS. COVERAGE UNDER THE NPDES IS TERMINATED UPON THE OWNER'S SUBMITTAL OF AN EPA NOTICE OF TERMINATION (NOT) WHEN SCDHEC APPROVAL OF THE COMPLETED PROJECT HAS BEEN RECEIVED.
  3. THE OWNER IS ADVISED THAT SWA'S SCOPE OF SERVICES DOES NOT NECESSARILY INCLUDE EFFORTS TO DOCUMENT AND REPORT ACTIVITIES IN ACCORDANCE WITH NPDES REQUIREMENTS. WHILE SWA CAN PERFORM THESE SERVICES UPON REQUEST, THEY CAN ALSO BE PROVIDED BY THIRD PARTY FIRMS WHO SPECIALIZE IN DOCUMENTATION AND REPORTING OF NPDES RELATED ACTIVITIES. REGARDLESS, THESE ACTIVITIES MUST BE ACCOMPLISHED, DOCUMENTED, AND WHERE REQUIRED, REPORTED THROUGHOUT THE CONSTRUCTION PERIOD IN ORDER TO AVOID AN NPDES VIOLATION.
  4. ADDITIONAL PARTIES WHO ARE ASSOCIATED WITH A PROJECT THAT HAS RECEIVED NPDES COVERAGE ARE REQUIRED TO ADHERE TO THE REQUIREMENTS OF THE PROJECT SWPPP FOR THOSE PORTIONS THAT PERTAIN TO THEIR ACTIVITIES (REFER TO SECTIONS 2.1 & 2.2 OF THE STATE GENERAL PERMIT). IN ADDITION, PARTIES WHO ARE ASSOCIATED WITH ACTIVITIES THAT ARE PART OF A "LARGER COMMON PLAN" (LCP) THAT HAS RECEIVED NPDES COVERAGE MAY ALSO SHARE RESPONSIBILITY FOR COMPLIANCE AS A "SECONDARY PERMITTEE" (REFER TO SECTIONS 2.2.2 OF THE STATE GENERAL PERMIT). ALL PARTIES ASSOCIATED WITH ANY CONSTRUCTION ACTIVITIES ARE ADVISED TO CLARIFY THEIR RESPONSIBILITIES FOR COMPLIANCE WITH THE STATE GENERAL PERMIT AND THE PROJECT'S NPDES PERMIT AND SWPPP.
  5. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS ARE REQUIRED TO SUBMIT AN "INDIVIDUAL LOT NOTICE OF INTENT" MEETING THE REQUIREMENTS OF SECTION 2.3.2 AT LEAST SEVEN (7) BUSINESS DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES. REFER TO SECTION 2.2.2 AND SECTION 2.3.2 OF THE STATE GENERAL PERMIT.

- SWPPP PHASE 1 - INITIAL LAND DISTURBANCE PHASE - SEQUENCE OF CONSTRUCTION:
- RECEIVE NPDES COVERAGE FROM DHEC.
  - CONDUCT PRE-CONSTRUCTION MEETING (AS DEFINED IN SECTION 4.1 OF THE STATE GENERAL PERMIT OR AS SPECIFIED IN THE PROJECTS NPDES PERMIT).
  - NOTIFY DHEC EQC OFFICE OR DHEC-OCRM AND THE MS 4 OPERATOR 48 HOURS PRIOR TO BEGINNING LAND DISTURBING ACTIVITIES.
  - SEQUENCE 1A - INITIATE LAND DISTURBANCE ACTIVITIES AND INSTALLATION/CONSTRUCTION OF ALL EROSION CONTROL MEASURES DEFINED WITHIN AREA 1A ON SWPPP PHASE 1A PLAN SHEET.
  - SEQUENCE 1B - LAND DISTURBING ACTIVITIES FOR THE REMAINDER OF THE SITE, DEFINED AS AREA 1B ON SWPPP PHASE 1B PLAN SHEET, MAY BEGIN WITH COMPLETION OF THE EROSION CONTROL MEASURES WITHIN AREA 1A.
  - FULL POND EXCAVATION AND OTHER MASS GRADING ACTIVITIES MAY ALSO BEGIN WITH COMPLETION OF ALL EROSION CONTROL AS DEFINED WITHIN AREA 1A.

- SWPPP PHASE 1 - INITIAL LAND DISTURBANCE PHASE - NOTES:
- THE FOLLOWING EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING THE INITIAL LAND DISTURBANCE PHASE.
- INLET SEDIMENT PROTECTION MEASURES SHALL BE INSTALLED ON ALL EXISTING STORM DRAINAGE STRUCTURES AS INDICATED.
  - STONE CHECK DAMS OR OTHER APPROPRIATE BMP'S SHALL BE INSTALLED IN AREAS OF CONCENTRATED FLOWS OR DITCHES WHERE INDICATED ON PLANS OR IN OTHER AREAS WHERE NEEDED.
  - CONTRACTOR SHALL PERFORM DE-WATERING WITH APPROPRIATE BMP'S IN A MANNER THAT MEETS LOCAL AND STATE REGULATIONS WITH REGARD TO DISPOSAL OF WATER AND REMOVED SEDIMENT.
  - TREE PROTECTION FENCING SHALL BE INSTALLED PRIOR TO THE START OF ANY LAND DISTURBANCE AND SHALL BE MAINTAINED UNTIL FINAL LANDSCAPING IS INSTALLED. ANY FAILURES OF FENCING SHALL BE REPAIRED IMMEDIATELY.
  - NO BURN OR BURY PITS SHALL BE PERMITTED ON THE CONSTRUCTION SITE WITHOUT PERMISSION OF THE AUTHORITIES HAVING JURISDICTION, THE OWNER, AND THE ENGINEER.
  - THE CONSTRUCTION ENTRANCE / EXIT SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF MUD ONTO PAVED AREAS.
  - THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF ALL EROSION CONTROL MEASURES INCLUDING REPLACING OR REPAIRING ANY DAMAGED DEVICES.
  - THE LOCATION OF SOME EROSION CONTROL DEVICES MAY NEED TO BE ALTERED FROM THAT SHOWN ON THE PLANS IF DRAINAGE PATTERNS DEVIATE FROM THOSE PROPOSED. IT IS THE CONTRACTORS RESPONSIBILITY TO ACCOMPLISH EROSION CONTROL FOR ALL DRAINAGE PATTERNS CREATED AT VARIOUS STAGES DURING CONSTRUCTION. ANY DIFFICULTY IN CONTROLLING EROSION DURING ANY PHASE OF CONSTRUCTION SHALL BE REPORTED TO THE ENGINEER.
  - FOLLOW ALL "STORMWATER AND SEDIMENT CONTROL" NOTES LISTED ON THIS PAGE.

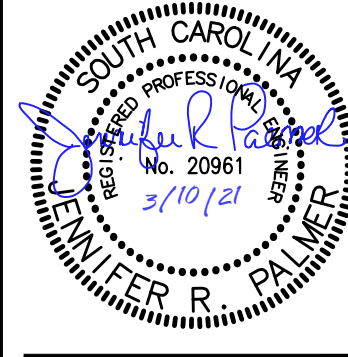
- SWPPP PHASE 2 - CONSTRUCTION PHASE - SEQUENCE OF CONSTRUCTION:
- START OR CONTINUE WITH POND EXCAVATION AND MASS GRADING ACTIVITIES. THESE OPERATIONS MAY BEGIN AS SOON AS NECESSARY AREAS ARE CLEARED.
  - CONTINUALLY MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL FINAL STABILIZATION IS ACHIEVED.
  - COMPLETION TIME FRAME AND LOCATIONS OF POND EXCAVATIONS, MASS GRADING OPERATIONS, AND ROUGH GRADING MAY VARY DURING THE PHASE 2 SEQUENCE.
  - INSTALLATION OF WATER, SEWER, AND STORM DRAINAGE SYSTEMS MAY BEGIN PRIOR TO COMPLETION OF FULL POND EXCAVATION, BUT NOT BEFORE REQUIRED SEDIMENT BASINS DEFINED IN SEQUENCE 1A.
  - INSTALL STORM DRAINAGE SYSTEM INCLUDING SEDIMENT PROTECTION AS EACH STRUCTURE IS INSTALLED.
  - WHEN APPLICABLE, DRY UTILITIES AND ANY VERTICAL CONSTRUCTION MAY BEGIN DURING PHASE 2.

- SWPPP PHASE 2 - CONSTRUCTION PHASE - NOTES:
- THE FOLLOWING EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING THE CONSTRUCTION PHASE.
- STORM DRAIN OUTLET PROTECTION (RIP RAP, TURF REINFORCING FABRICS, CHECK DAMS, ETC) AS DEFINED ON THE PLANS, SHALL BE PLACED AT ALL OUTLETS AS THEY ARE INSTALLED.
  - APPROPRIATE MEASURES ARE TO BE IMPLEMENT AS REQUIRED TO PREVENT SEDIMENT FROM ENTERING INLET PIPES AND BOXES. EACH PROTECTIVE MEASURE IS TO BE IN PLACE AS SOON AS POSSIBLE, AND PRIOR TO ANY RAIN EVENT, AFTER PIPE, STRUCTURE, ETC. IS INSTALLED. ACCUMULATED SEDIMENT SHALL BE REMOVED AND PLACED ON-SITE IN SUCH A MANNER THAT IT DOES NOT ACCUMULATE AGAIN.
  - FINAL CUT AND FILL SLOPES ARE TO FOLLOW THE CONSTRUCTION PLANS. TEMPORARY CUT AND FILL SLOPES SHALL NOT EXCEED 2H:1V. 3H:1V OR BETTER IS PREFERRED IN ALL LOCATIONS UNLESS INFEASIBLE.
  - FOLLOW ALL "STORMWATER AND SEDIMENT CONTROL" NOTES LISTED ON THIS PAGE.

- SWPPP PHASE 3 - STABILIZATION PHASE - SEQUENCE OF CONSTRUCTION:
- CONTINUE MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL ALL FINAL STABILIZATION MEASURES ARE IN PLACE AND REMOVAL OF CONTROLS IS APPROVED BY THE ENGINEER, AT WHICH TIME THEY SHALL BE PROMPTLY REMOVED.
  - COMPLETE ALL UTILITIES AND SITE SURFACE IMPROVEMENTS AS APPLICABLE, INCLUDING BUT NOT NECESSARILY LIMITED TO: WATER, SEWER, DRAINAGE, POWER, COMMUNICATIONS, GAS, BUILDING SHELL, CURBS, WALKS, PAVEMENT, COURTYARDS, PLAZAS, FOUNTAINS, MONUMENTS, TRAILS, SITE LIGHTING, ETC.
  - INSTALL LANDSCAPING AND/OR ESTABLISH PERMANENT SOIL STABILIZATION.
  - WHEN APPLICABLE, CLEAN, RE-GRADE, AND RE-ESTABLISH SOIL STABILIZATION FOR DETENTION BASINS/PONDS; MODIFY DETENTION BASIN/POND STRUCTURES AS DEFINED ON PLANS TO CONVERT IT TO THE PERMANENT OUTLET.
  - REMOVE TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES AFTER THE ENTIRE AREA FLOWING TO EACH MEASURE IS PERMANENTLY STABILIZED AND APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE ALL TEMPORARY EROSION CONTROL MEASURES, UNLESS OTHERWISE NOTED.
  - PERFORM AS-BUILT SURVEYS OF THE DRAINAGE SYSTEM, AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, AND SUBMIT TO THE OWNER AND ENGINEER FOR REVIEW AND SUBMITTAL TO DHEC AND/OR THE MS4 FOR REVIEW AND APPROVAL.
  - SUBMITTAL NOTICE OF TERMINATION (NOT) TO DHEC, BY THE OWNER AND ENGINEER.

- SWPPP PHASE 3 - STABILIZATION PHASE - NOTES:
- AFTER CURBING, AGGREGATE BASE AND PAVING HAS BEEN COMPLETED, ALL INLET SEDIMENT TRAPS INSTALLED ON CURB INLETS SHALL BE REMOVED AND REPLACED WITH INLET FILTER PROTECTION. PROTECTION DEVICES MAY BE REMOVED ONCE AREA DRAINING TO EACH INLET HAS BEEN FULLY STABILIZED.
  - FOLLOW ALL "STORMWATER AND SEDIMENT CONTROL" NOTES LISTED ON THIS PAGE.

- STORMWATER AND SEDIMENT CONTROL  
UNLESS OTHERWISE NOTED, CONTRACTOR SHALL PROVIDE FOR ALL OF THE REQUIREMENTS LISTED BELOW, AS APPLICABLE, AS PART OF HIS WORK INCLUDED IN HIS BASE BID.
1. IF NECESSARY, SLOPES THAT EXCEED 8 VERTICAL FEET IN HEIGHT SHALL BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS. IN ADDITION TO SEEDING, TEMPORARY SLOPE DRAINS AND/OR BERMS SHALL BE INSTALLED AS NECESSARY UNTIL FINAL GRADE AND STABILIZATION IS ESTABLISHED.
  2. STABILIZATION MEASURES (EITHER PERMANENT LANDSCAPING OR TEMPORARY SEEDING) SHALL BE INSTALLED AS SOON AS PRACTICAL ON PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER CONSTRUCTION HAS CEASED, EXCEPT AS STATED BELOW:
    - A. WHERE STABILIZATION BEFORE THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INSTALLED AS SOON AS PRACTICABLE.
    - B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE HAS TEMPORARILY CEASED AND LAND DISTURBING ACTIVITIES WILL RESUME WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.
  3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP IS INAPPROPRIATE, OR HAS BEEN INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.
  4. PROVIDE SILT FENCE AND/OR OTHER EROSION CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED AND STABILIZED BY PERMANENT SEEDING, OR OTHER MEASURES WHERE INDICATED ON THE PLANS, IMMEDIATELY AFTER UTILITY CONSTRUCTION IS COMPLETE UNLESS ADDITIONAL CONSTRUCTION IS TO TAKE PLACE. BACKFILLING OF THE TRENCH AT THE END OF EACH DAY IS MANDATORY AND TEMPORARY SEEDING IS RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER ADDITION SHALL BE FILTERED TO REMOVE SEDIMENT BEFORE BEING PUMPED INTO ANY WATERS OF THE STATE.
  5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION ON/OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
  6. THE CONTRACTOR SHALL TAKE NECESSARY ACTIONS TO PREVENT TRACKING OF SOIL ONTO PAVED AREAS THAT ARE UTILIZED FOR ACCESS TO THE SITE AND TO MINIMIZE THE GENERATION OF DUST. SHOULD TRACKING OCCUR THE CONTRACTOR SHALL IMMEDIATELY CEASE OR MODIFY CAUSAL OPERATIONS. THE CONTRACTOR SHALL DAILY REMOVE SOIL FROM PAVEMENT AS MAY BE REQUIRED.
  7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C. REG. 72-300 ET SEQ. AND SCR100000.
  8. TEMPORARY DIVERSION BERMS AND/OR DITCHES SHALL BE INSTALLED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.
  9. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE (OR PROTECTION AS OTHERWISE REQUIRED BY AUTHORITY HAVING JURISDICTION) SHALL BE INSTALLED IN ALL AREAS WHERE A 50 FT BUFFER CANNOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND THE WOS. IN ADDITION, A 10 FT BUFFER SHALL BE MAINTAINED BETWEEN THE NEAREST ROW OF SILT FENCE AND THE WOS.
  10. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, CHEMICALS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) SHALL BE PREVENTED FROM ENTERING OR OTHERWISE POLLUTING STORMWATER DISCHARGES.
  11. A COPY OF THE SWPPP, INSPECTION RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES UNTIL THE DATE THAT FINAL STABILIZATION IS ACHIEVED.
  12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.
  13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.
  14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASHING, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.
  15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH THE APPROPRIATE BMP'S (SEDIMENT BASIN, FILTER BAG, ETC.).
  16. THE FOLLOWING DISCHARGES FROM THE SITE ARE PROHIBITED:
    - A. WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;
    - B. WASTEWATER FROM WASHOUT AND CLEANING OF STUCCO, PAINT, PAINT, FORM RELEASE OILS, CURING COMPOUNDS, AND OTHER CONSTRUCTION MATERIALS;
    - C. FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATIONS AND MAINTENANCE; AND
    - D. SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.
  17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTION MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS ACHIEVED ON ALL AREAS OF THE CONSTRUCTION SITE.
  18. IF EXISTING BMP'S NEED TO BE MODIFIED OR IF ADDITIONAL BMP'S ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC'S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMP'S MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.
  19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE AND SHALL INCLUDE REVIEW OF THE APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.
  20. THE CONSTRUCTION EXIT SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PAVED AREAS. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO PAVED AREAS OR INTO STORM DRAINAGE SHALL BE REMOVED AS SOON AS REASONABLY POSSIBLE.
  21. THE SILT FENCE SHALL BE KEPT ERECT AT ALL TIMES AND REPAIRED WHEN REQUESTED BY THE SITE INSPECTOR OR ENGINEER. SILT SHALL BE REMOVED WHEN ACCUMULATION REACHES 1/3 HEIGHT OF THE BARRIER. THE PERIMETER SILT FENCE SHALL BE INSPECTED REGULARLY ONCE EVERY WEEK AND WITHIN 24 HOURS OF A RAIN EVENT THAT PRODUCES 1/2" OR MORE OF PRECIPITATION.
  22. SILT FENCE SHALL BE PLACED AT THE TOE OF OF ALL DIRT STOCK PILE AREAS (ON THE LOW SIDE WHERE SEDIMENT CAN BE WASHED AWAY).
  23. THE CONTRACTOR SHALL MAINTAIN ALL PONDS, SEDIMENT BASINS, AND EROSION CONTROL MEASURES UNTIL PERMANENT GROUND COVER IS ESTABLISHED. SEDIMENT SHALL BE REMOVED FROM BASINS WHEN IT REACHES THE HALFWAY POINT ON THE RISER.



**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |
|                  |          |
|                  |          |

SWPPP NOTES

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### SILT FENCE INSTALLATION

**PLAN SYMBOL**  
—SF—SF—

**FLAT-BOTTOM TRENCH DETAIL**

**V-SHAPED TRENCH DETAIL**

**POST INSTALLATION DETAIL**

**FILTER FABRIC INSTALLATION DETAIL**

**PLAN SYMBOL**

**South Carolina Department of Health and Environmental Control**  
**SILT FENCE**  
STANDARD DRAWING NO. SC-03 Page 1 of 2  
NOT TO SCALE FEBRUARY 2014 DATE

#### SILT FENCE — GENERAL NOTES

- Do not place silt fence across channels or in other areas subject to concentrated flows. Silt fence should not be used as a velocity control BMP. Concentrated flows are any flows greater than 0.5 cfs.
- Maximum sheet or overlaid flow path length to the silt fence shall be 100-feet.
- Maximum slope steepness (normal [perpendicular] to the fence line) shall be 2:1.
- Silt fence joints, when necessary, shall be completed by one of the following options:
  - Wrap each fabric together at a support post with both ends fastened to the post, with a 1-foot minimum overlap.
  - Overlap silt fence by installing 3-feet passed the support post to which the new silt fence roll is attached. Attach old roll to new roll with heavy-duty plastic ties or.
  - Overlap entire width of each silt fence roll from one support post to the next support post.
- Attach filter fabric to the steel posts using heavy-duty plastic ties that are evenly spaced within the top 8-inches of the fabric.
- Install the silt fence perpendicular to the direction of the stormwater flow and place the silt fence the proper distance from the toe of steep slopes to provide sediment storage and access for maintenance and cleanout.
- Install Silt Fence Checks (Tie-Backs) every 50-100 feet, dependent on slope, along silt fence that is installed with slope and where concentrated flows are expected or are documented along the proposed/installed silt fence.

#### SILT FENCE — POST REQUIREMENTS

- Silt fence posts must be 48-inch long steel posts that meet, at a minimum, the following physical characteristics:
  - Composed of a high strength steel with a minimum yield strength of 50,000 psi.
  - Include a standard "T" section with a nominal face width of 1.38-inches and a nominal "T" length of 1.48-inches.
  - Weight 1.25 pounds per foot (± 8%).
- Posts shall be equipped with projections to aid in fastening of filter fabric.
- Steel posts may need to have a metal soil stabilization plate welded near the bottom when installed along steep slopes or installed in loose soils. The plate should have a minimum cross section of 17-square inches and be composed of 15 gauge steel, at a minimum. The metal soil stabilization plate should be completely buried.
- Install posts to a minimum of 24-inches. A minimum height of 1- to 2-inches above the fabric shall be maintained, and a maximum height of 3 feet shall be maintained above the ground.
- Post spacing shall be at a maximum of 6-feet on center.

#### SILT FENCE — FABRIC REQUIREMENTS

- Silt fence must be composed of woven geotextile filter fabric that consists of the following requirements:
  - Composed of fibers consisting of long chain synthetic polymers of at least 85% by weight of polyolefins, polyesters, or polyamides that are formed into a network such that the filaments or yarns retain dimensional stability relative to each other.
  - Free of any treatment or coating which might adversely alter its physical properties after installation.
  - Free of any defects or flaws that significantly affect its physical and/or filtering properties; and
  - Have a minimum width of 36-inches.
- Use only fabric appearing on SC DOT's Qualified Products Listing (QPL), Approval Sheet #34, meeting the requirements of the most current edition of the SC DOT Standard Specifications for Highway Construction.
- 12-inches of the fabric should be placed within excavated trench and toed in when the trench is backfilled.
- Filter fabric shall be purchased in continuous rolls and cut to the length of the barrier to avoid joints.
- Filter fabric shall be installed at a minimum of 24-inches above the ground.

#### SILT FENCE — INSPECTION & MAINTENANCE

- The key to functional silt fence is weekly inspections, routine maintenance, and regular sediment removal.
- Regular inspections of silt fence shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
- Attention to sediment accumulations along the silt fence is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
- Remove accumulated sediment when it reaches 1/3 the height of the silt fence.
- Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
- Check for areas where stormwater runoff has eroded a channel beneath the silt fence, or where the fence has sagged or collapsed due to runoff overtopping the silt fence. Install checks/tie-backs and/or reinstall silt fence, as necessary.
- Check for tears within the silt fence, areas where silt fence has begun to decompose, and for any other circumstance that may render the silt fence ineffective. Removed damaged silt fence and reinstall new silt fence immediately.
- Silt fence should be removed within 30 days after final stabilization is achieved and once it is removed, the resulting disturbed area shall be permanently stabilized.

### FLAT-BOTTOM TRENCH DETAIL

### V-SHAPED TRENCH DETAIL

### POST INSTALLATION DETAIL

### FILTER FABRIC INSTALLATION DETAIL

**PLAN SYMBOL**

**South Carolina Department of Health and Environmental Control**  
**Type A**  
**FILTER FABRIC INLET PROTECTION**  
STANDARD DRAWING NO. SC-07 PAGE 1 of 2  
NOT TO SCALE FEBRUARY 2014 DATE

#### TYPE A — FILTER FABRIC REQUIREMENTS

- Silt fence must be composed of woven geotextile filter fabric that consists of the following requirements:
  - Composed of fibers consisting of long chain synthetic polymers of at least 85% by weight of polyolefins, polyesters, or polyamides that are formed into a network such that the filaments or yarns retain dimensional stability relative to each other.
  - Free of any treatment or coating which might adversely alter its physical properties after installation.
  - Free of any defects or flaws that significantly affect its physical and/or filtering properties; and
  - Have a minimum width of 36-inches.
- Use only fabric appearing on SC DOT's Qualified Products Listing (QPL), Approval Sheet #34, meeting the requirements of the most current edition of the SC DOT Standard Specifications for Highway Construction.
- 12-inches of the fabric should be placed within excavated trench and toed in when the trench is backfilled.
- Filter fabric shall be purchased in continuous rolls and cut to the length of the barrier to avoid joints.
- Filter fabric shall be installed at a minimum of 24-inches above the ground.

#### TYPE A — POST REQUIREMENTS

- Silt fence posts must be 48-inch long steel posts that meet, at a minimum, the following physical characteristics:
  - Composed of a high strength steel with a minimum yield strength of 50,000 psi.
  - Include a standard "T" section with a nominal face width of 1.38-inches and a nominal "T" length of 1.48-inches.
  - Weight 1.25 pounds per foot (± 8%).
- Posts shall be equipped with projections to aid in fastening of filter fabric.
- Install posts to a minimum of 24-inches. A minimum height of 1- to 2-inches above the fabric shall be maintained, and a maximum height of 3 feet shall be maintained above the ground.
- Post spacing shall be at a maximum of 3-feet on center.

#### TYPE A — INSPECTION & MAINTENANCE

- The key to functional inlet protection is weekly inspections, routine maintenance, and regular sediment removal.
- Regular inspections of inlet protection shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
- Attention to sediment accumulations along the filter fabric is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
- Remove accumulated sediment when it reaches 1/3 the height of the filter fabric. When a sump is installed in front of the fabric, sediment should be removed when it fills approximately 1/3 the depth of the sump.
- Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
- Check for areas where stormwater runoff has eroded a channel beneath the filter fabric, or where the fabric has sagged or collapsed due to runoff overtopping the inlet protection.
- Check for tears within the filter fabric, areas where fabric has begun to decompose, and for any other circumstance that may render the inlet protection ineffective. Removed damaged fabric and reinstall new filter fabric immediately.
- Inlet protection structures should be removed after all the disturbed areas are permanently stabilized. Remove all construction material and sediment, and dispose of them properly. Grade the disturbed area to the elevation of the drop inlet structure crest. Stabilize all bare areas immediately.

### CONSTRUCTION ENTRANCE

**PLAN SYMBOL**

| SPECIFICATION       | SIZE           |
|---------------------|----------------|
| ROCK PAD THICKNESS  | 6 INCHES       |
| ROCK PAD WIDTH      | 24 FEET        |
| ROCK PAD LENGTH     | 100 FEET       |
| ROCK PAD STONE SIZE | D = 2-3 INCHES |

**South Carolina Department of Health and Environmental Control**  
**CONSTRUCTION ENTRANCE**  
STANDARD DRAWING NO. SC-06 PAGE 1 of 2  
NOT TO SCALE FEBRUARY 2014 DATE

#### CONSTRUCTION ENTRANCE — GENERAL NOTES

- Stabilized construction entrances should be used at all points where traffic will egress/ingress a construction site onto a public road or any impervious surfaces, such as parking lots.
- Install a non-woven geotextile fabric prior to placing any stone.
- Install a culvert pipe across the entrance when needed to provide positive drainage.
- The entrance shall consist of 2-inch to 3-inch D50 stone placed at a minimum depth of 6-inches.
- Minimum dimensions of the entrance shall be 24-feet wide by 100-feet long, and may be modified as necessary to accommodate site constraints.
- The edges of the entrance shall be tapered out towards the road to prevent tracking at the edge of the entrance.
- Divert all surface runoff and drainage from the stone pad to a sediment trap or basin or other sediment trapping structure.
- Limestone may not be used for the stone pad.

#### CONSTR. ENTRANCE — INSPECTION & MAINTENANCE

- The key to functional construction entrances is weekly inspections, routine maintenance, and regular sediment removal.
- Regular inspections of construction entrances shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
- During regular inspections, check for mud and sediment buildup and pad integrity. Inspection frequencies may need to be more frequent during long periods of wet weather.
- Reshape the stone pad as necessary for drainage and runoff control.
- Wash or replace stones as needed and as directed by site inspector. The stone in the entrance should be washed or replaced whenever the entrance fails to reduce the amount of mud being carried off-site by vehicles. Frequent washing will extend the useful life of stone pad.
- Immediately remove mud and sediment tracked or washed onto adjacent impervious surfaces by brushing or sweeping. Flushing should only be used when the water can be discharged to a sediment trap or basin.
- During maintenance activities, any broken pavement should be repaired immediately.
- Construction entrances should be removed after the site has reached final stabilization. Permanent vegetation should replace areas from which construction entrances have been removed, unless area will be converted to an impervious surface to serve post-construction.

**South Carolina Department of Health and Environmental Control**  
**SILT FENCE**  
STANDARD DRAWING NO. SC-03 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

**South Carolina Department of Health and Environmental Control**  
**Type A**  
**FILTER FABRIC INLET PROTECTION**  
STANDARD DRAWING NO. SC-07 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

**South Carolina Department of Health and Environmental Control**  
**CONSTRUCTION ENTRANCE**  
STANDARD DRAWING NO. SC-06 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

### REINFORCED SILT FENCE

**PLAN SYMBOL**  
—RSF—RSF—

**South Carolina Department of Health and Environmental Control**  
**SILT FENCE**  
STANDARD DRAWING NO. SC-03 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

### CURB INLET SEDIMENT FILTER

**PLAN SYMBOL**

**South Carolina Department of Health and Environmental Control**  
**Type A**  
**FILTER FABRIC INLET PROTECTION**  
STANDARD DRAWING NO. SC-07 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

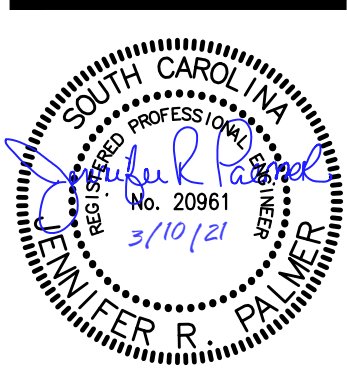
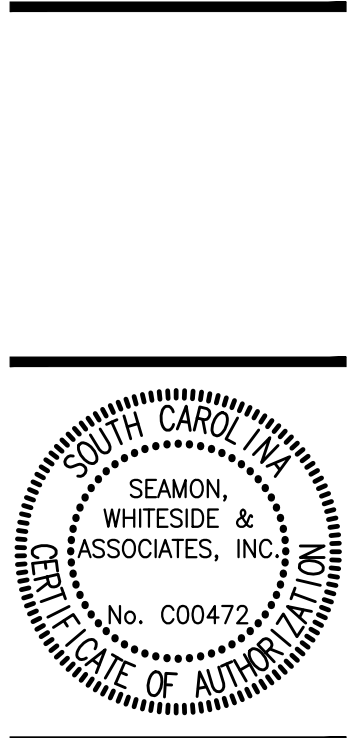
### DRAINAGE INLET WEEP FILTER

**PLAN SYMBOL**

**South Carolina Department of Health and Environmental Control**  
**CONSTRUCTION ENTRANCE**  
STANDARD DRAWING NO. SC-06 PAGE 2 of 2  
GENERAL NOTES FEBRUARY 2014 DATE

**SW**  
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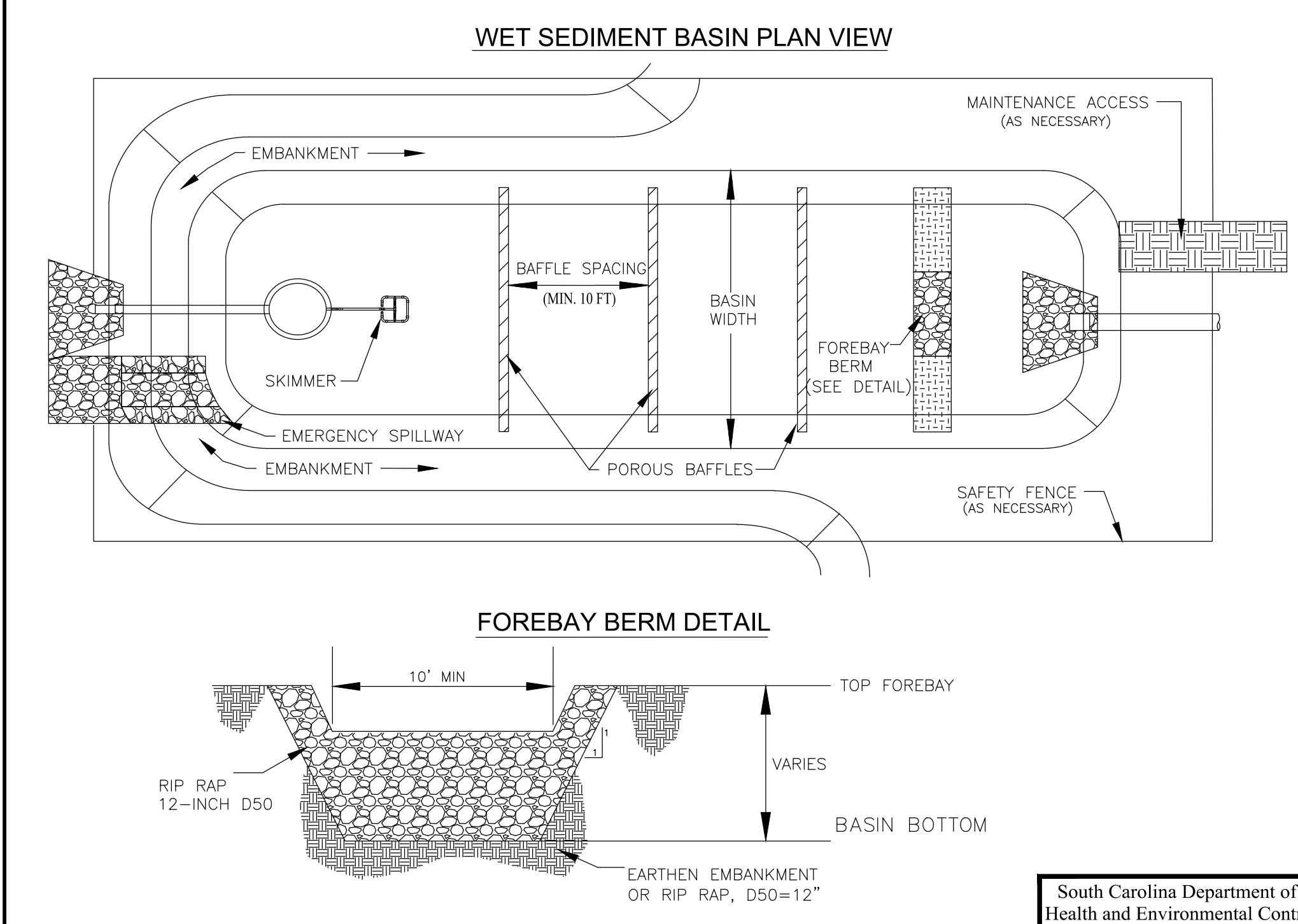
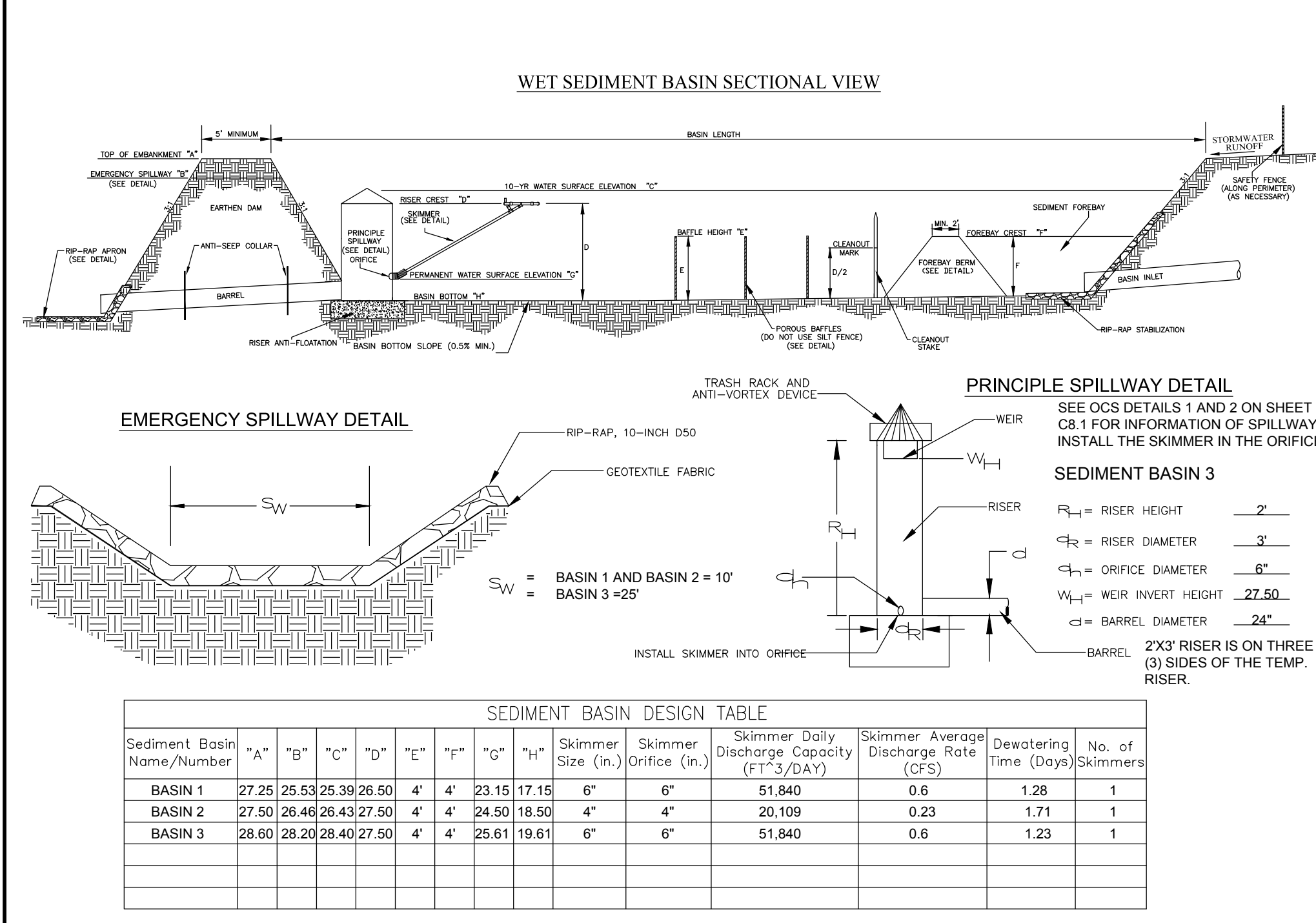
**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

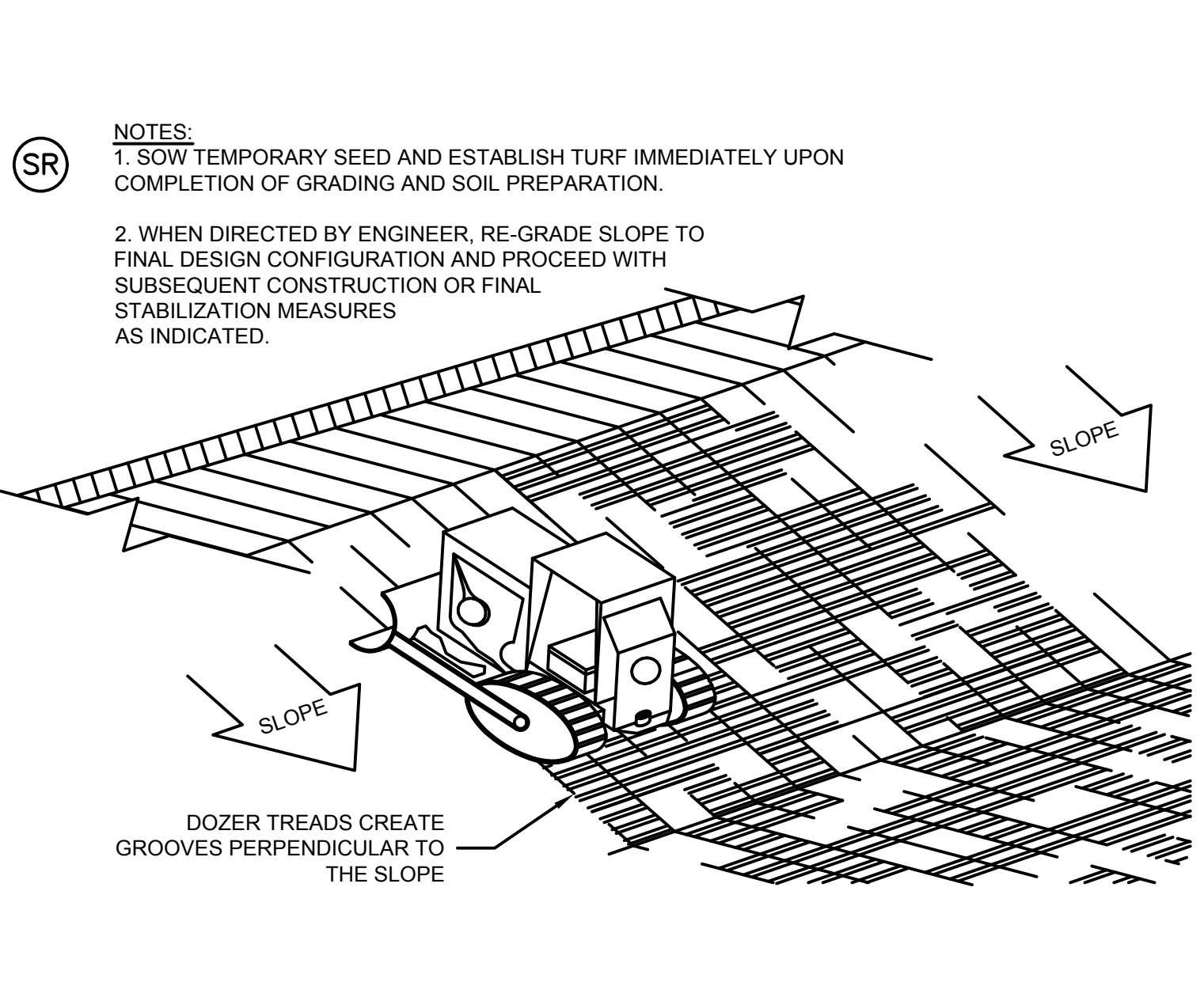
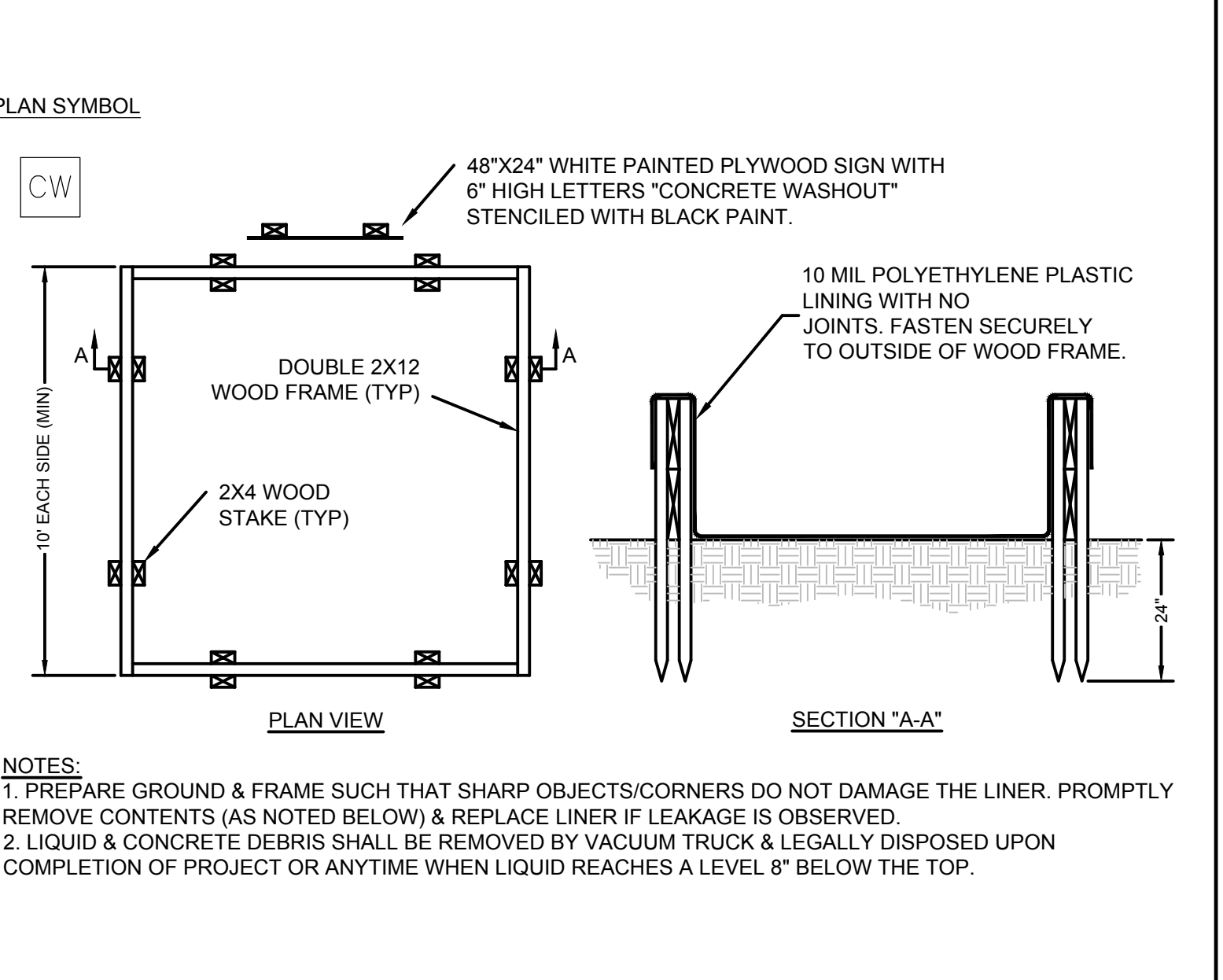
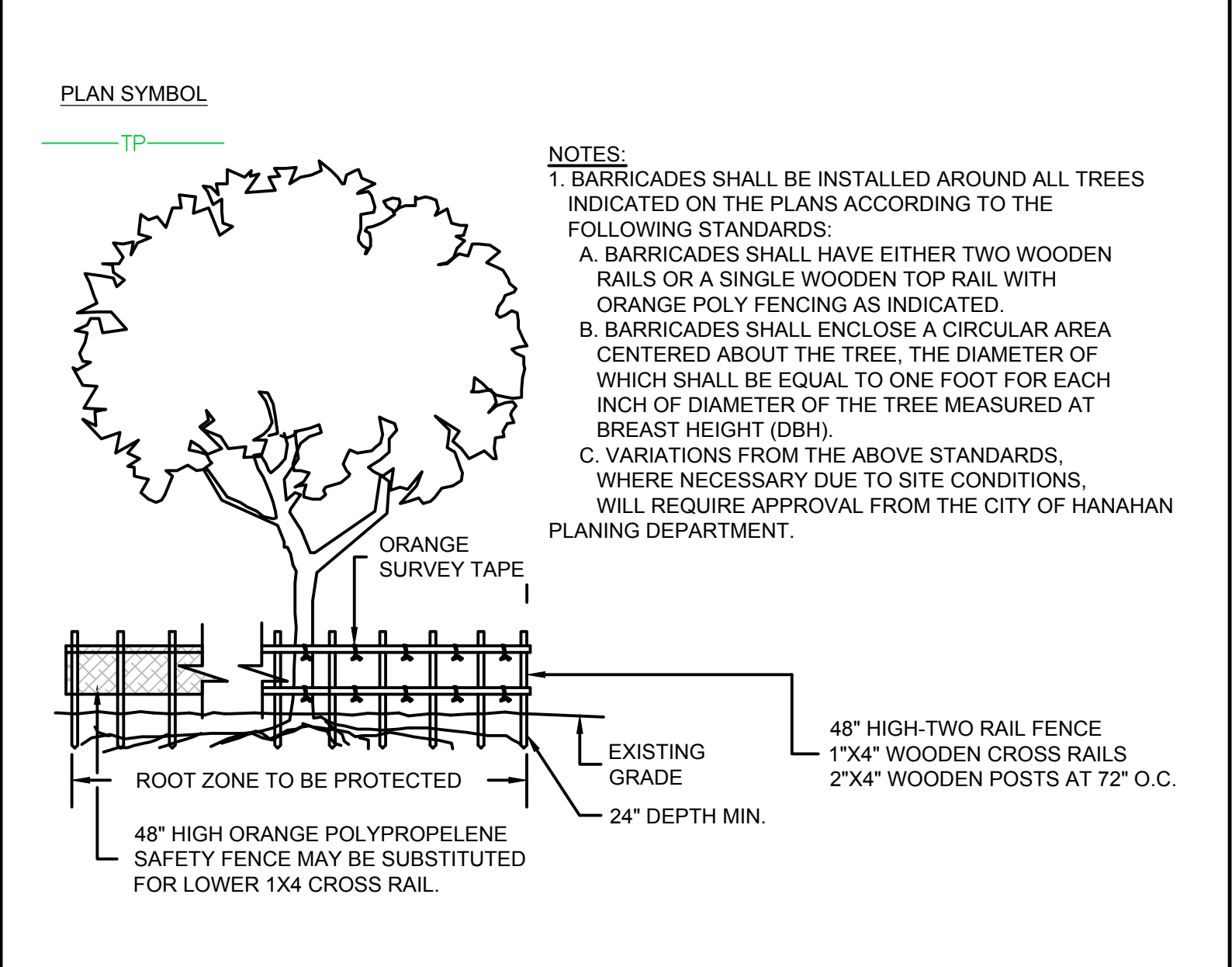
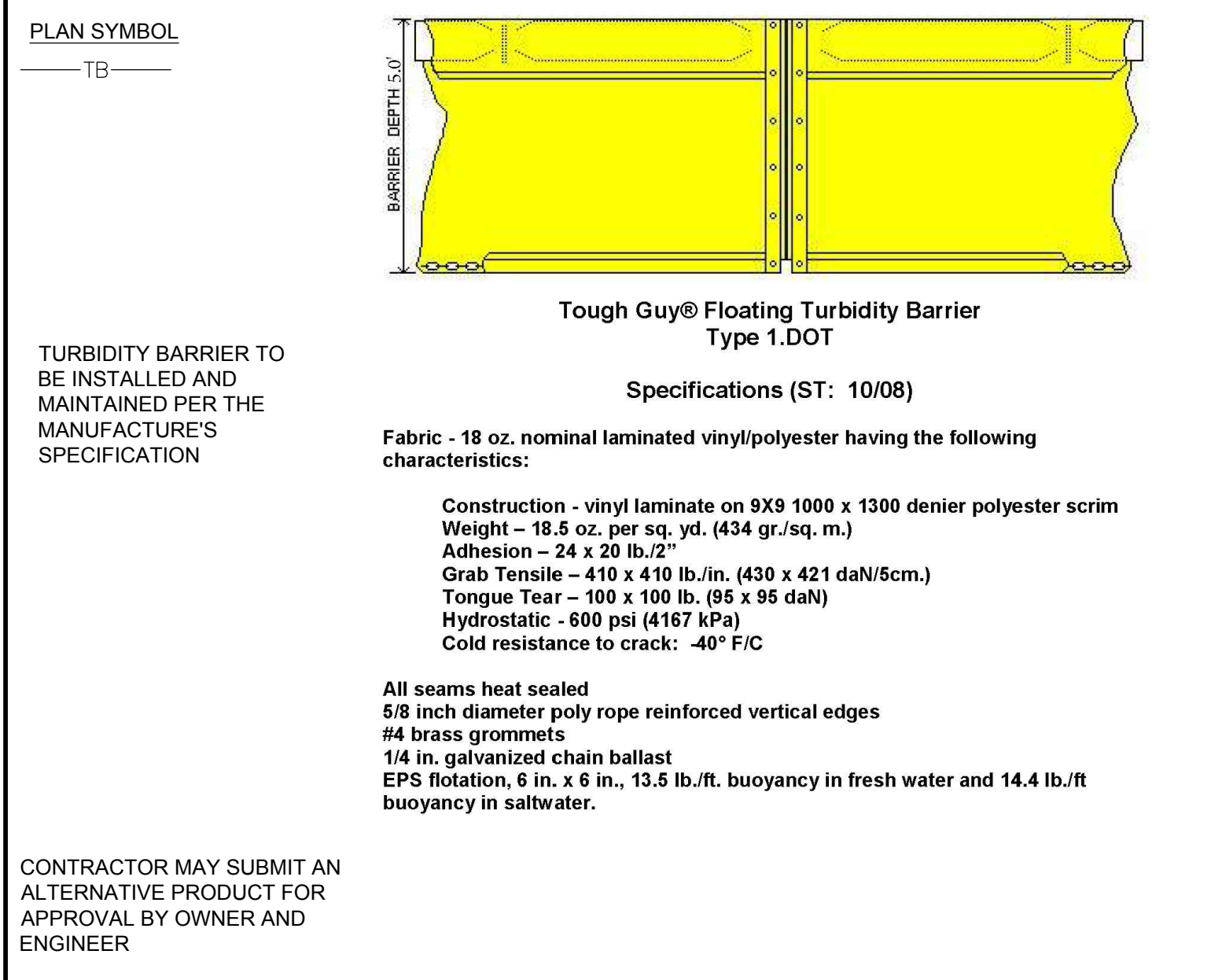
SWPPP DETAILS

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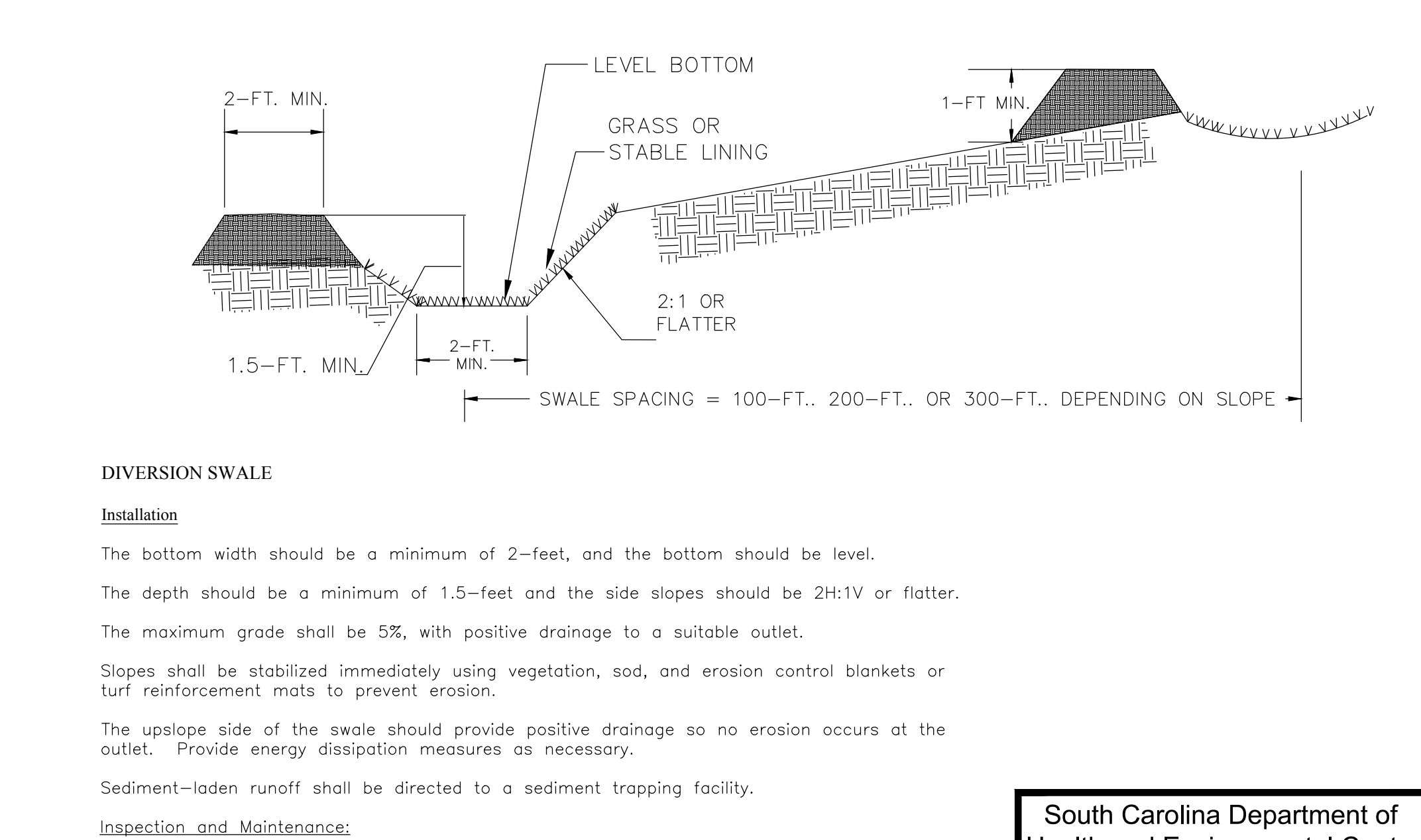
1 WET SEDIMENT BASIN (NOT TO SCALE)

South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-01A  
 FEBRUARY 2004



- ### WET SEDIMENT BASIN - GENERAL NOTES
- Sediment basins should not be placed in Waters of the State or USGS blue-line streams (unless approved by Federal Authorities).
  - Sediment basin's side slopes shall be seeded and, when necessary, stabilized with vegetative or synthetic matting to prevent the formation of rills and gullies.
  - Install three (3) rows of porous baffles with a minimum spacing of 10 feet. Baffles should ultimately be placed to maximize the space between each row of baffles and the basin's inlets/outlets. Only two (2) rows of baffles are necessary for basins that are less than 50 feet in length.
  - Porous Baffles should be composed of coir-based materials or TRMs with a light penetration (open spaces) between 10-35%. These materials should not have loose straw. Silt Fence may not be used as Porous Baffles.
  - Each porous baffle shall be installed across the entire width of the basin and along the basin's side slope until the height of the baffle intersects the slope.
  - Install skimmer and coupling (as necessary) to riser structure at orifice along bottom of the principle spillway's riser structure. (Refer to skimmer manufacturer for installation procedures and skimmer specifications.)
  - Skimmer should be equipped with a mechanism, such as a rope, to allow easy access to skimmer to unclogged orifice or perform other necessary maintenance.
  - Stormwater runoff entering the basin must be directed into proper BMPs to prevent erosion along side slopes and to prevent scour at the basin's inlets.
  - The forebay berm should consist of riprap, gabion, or an earthen berm with a rock filled outlet that is constructed across the bottom of the basin's width.
  - An additional cleanout stake for the forebay area is recommended and should be marked for cleanout at 50% of provided sediment storage.
  - The elevation of the emergency spillway should be at least 1 foot below the top of the embankment. The emergency spillway should not be located on fill material, when possible. Riprap and geotextile liner should be placed on all spillways that must be located on fill material.

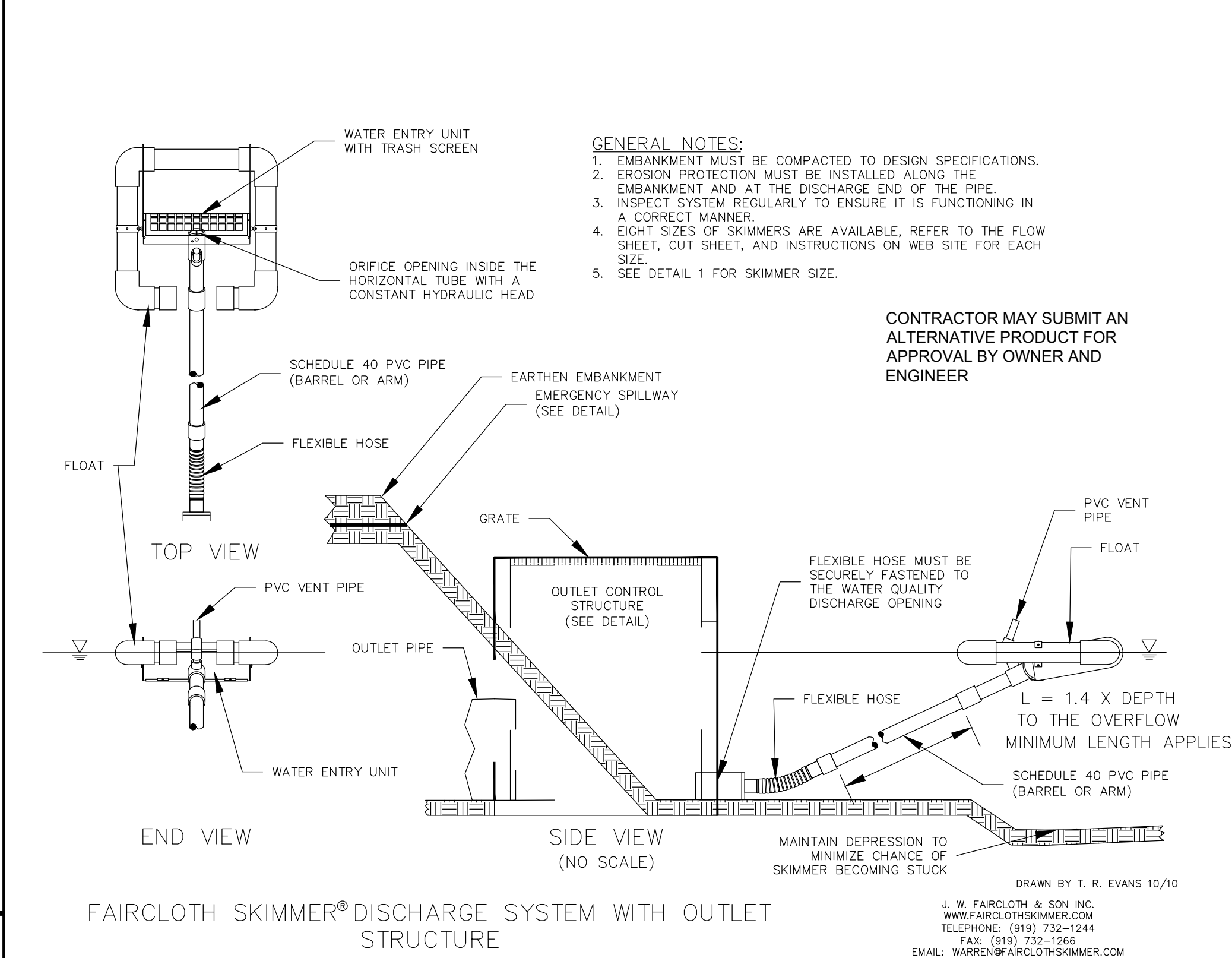
- ### WET SEDIMENT BASIN - INSPECTION AND MAINTENANCE
- The key to a functional sediment basin is weekly inspections, routine maintenance, and regular sediment removal.
  - Attention to sediment accumulations within the basin is extremely important. Accumulated sediment deposition should be continually checked and removed when necessary.
  - Remove accumulated sediment when it reaches 50% of the design sediment storage volume or 1/2 the height of the riser structure, whichever is reached first.
  - Removed sediment from the basin shall be placed in stockpile storage areas or spread thinly across the disturbed area. Stabilize the removed sediment after it is relocated.
  - Inspections of sediment basins should be conducted once every calendar week and, as recommended, within 24-hours of each rainfall event that produces 1/2-inch or more of precipitation.
  - All temporary sediment basins, which are not to be converted to a detention basin post-construction, should be removed within 30 days after final site stabilization is achieved.
  - Disturbed areas resulting from the removal of the sediment basin should be permanently stabilized and additional BMPs, such as silt fence, should be utilized to accept stormwater runoff from this disturbed area until final stabilization is reached.



3 DIVERSION SWALE (NOT TO SCALE)

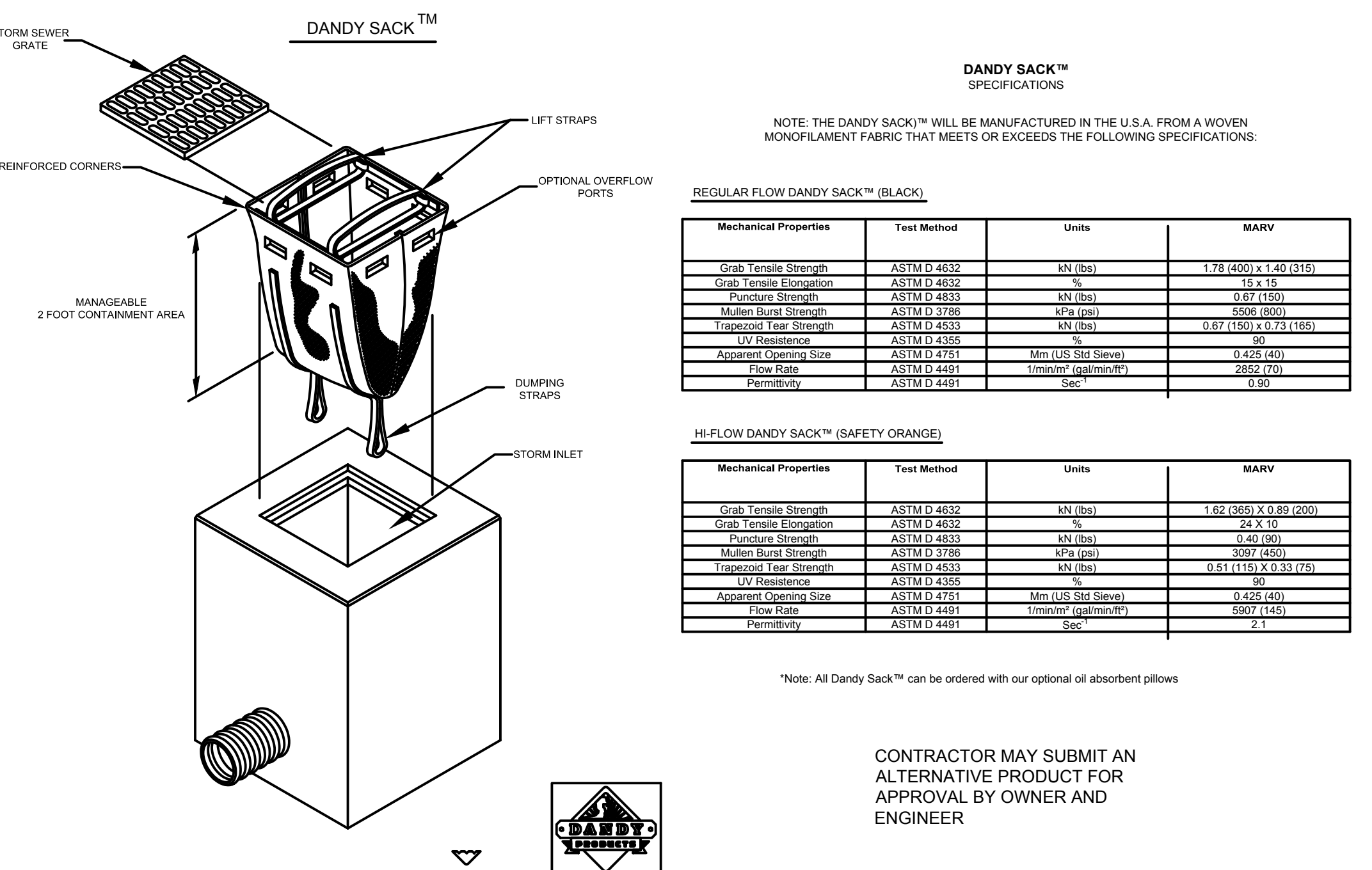
South Carolina Department of Health and Environmental Control  
 WET SEDIMENT BASIN  
 SC-01A Page 3 of 3  
 GENERAL NOTES FEBRUARY 2004

South Carolina Department of Health and Environmental Control  
 DIVERSION SWALE  
 STANDARD DRAWING NO. RC-03  
 NOT TO SCALE JULY 31, 2005 DATE



2 FAIRCLOTH SKIMMER (NOT TO SCALE)

South Carolina Department of Health and Environmental Control  
 WET SEDIMENT BASIN  
 SC-01A  
 FEBRUARY 2004



4 DANDY BAGS (NOT TO SCALE)

South Carolina Department of Health and Environmental Control  
 WET SEDIMENT BASIN  
 SC-01A  
 FEBRUARY 2004

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3/10/21

**HANAHAN RECREATION COMPLEX**

CITY OF HANAHAN

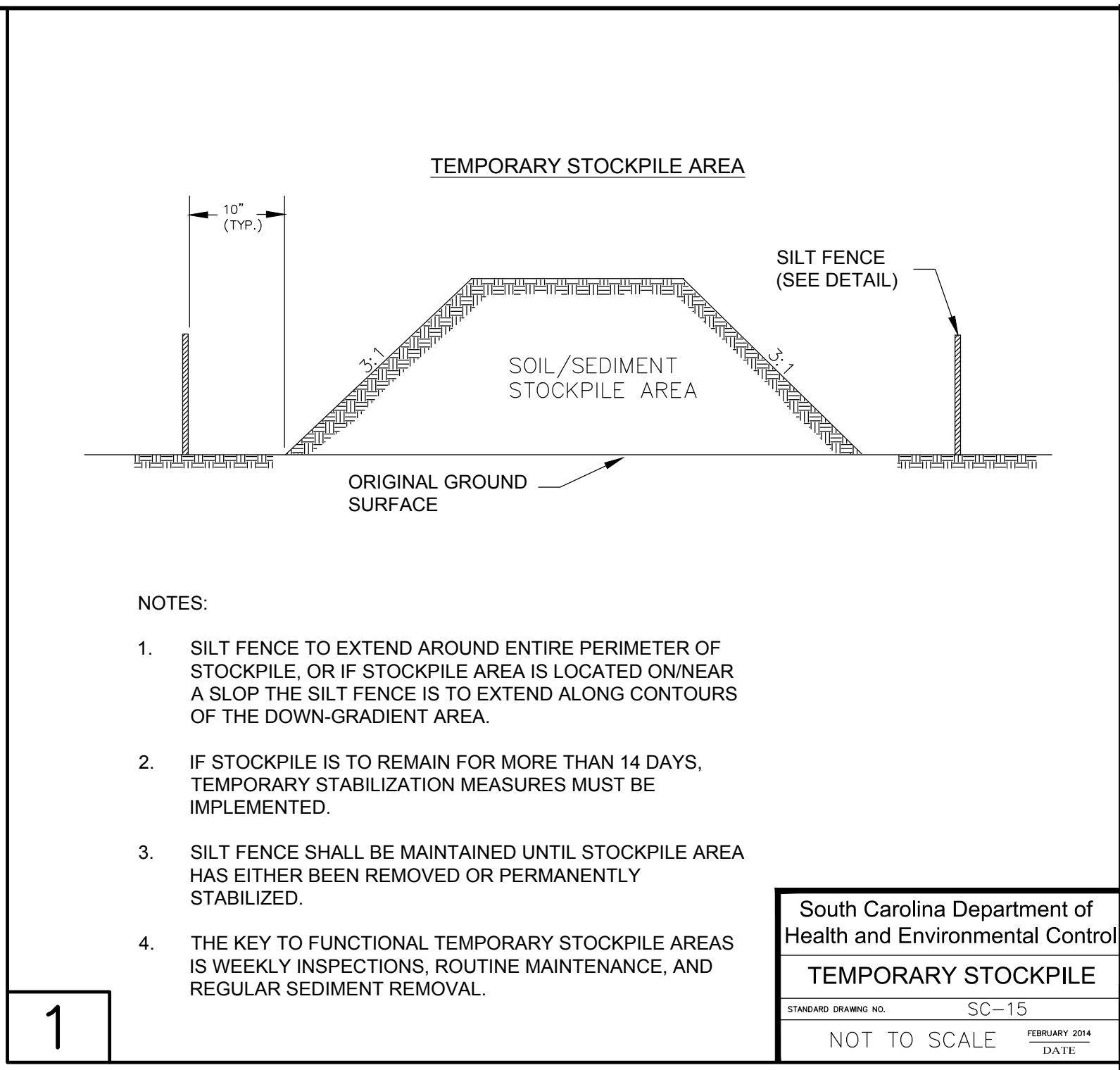
HANAHAN, SOUTH CAROLINA

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|-------------------------|----------|
| SW+ PROJECT:            | 7867     |
| DATE:                   | 06/12/20 |
| DRAWN BY:               | BET      |
| CHECKED BY:             | JRP      |
| <b>REVISION HISTORY</b> |          |
| A                       | 6/12/20  |
| B                       | 10/29/20 |
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| D                       | 03/11/21 |

SWPPP DETAILS

C3.10

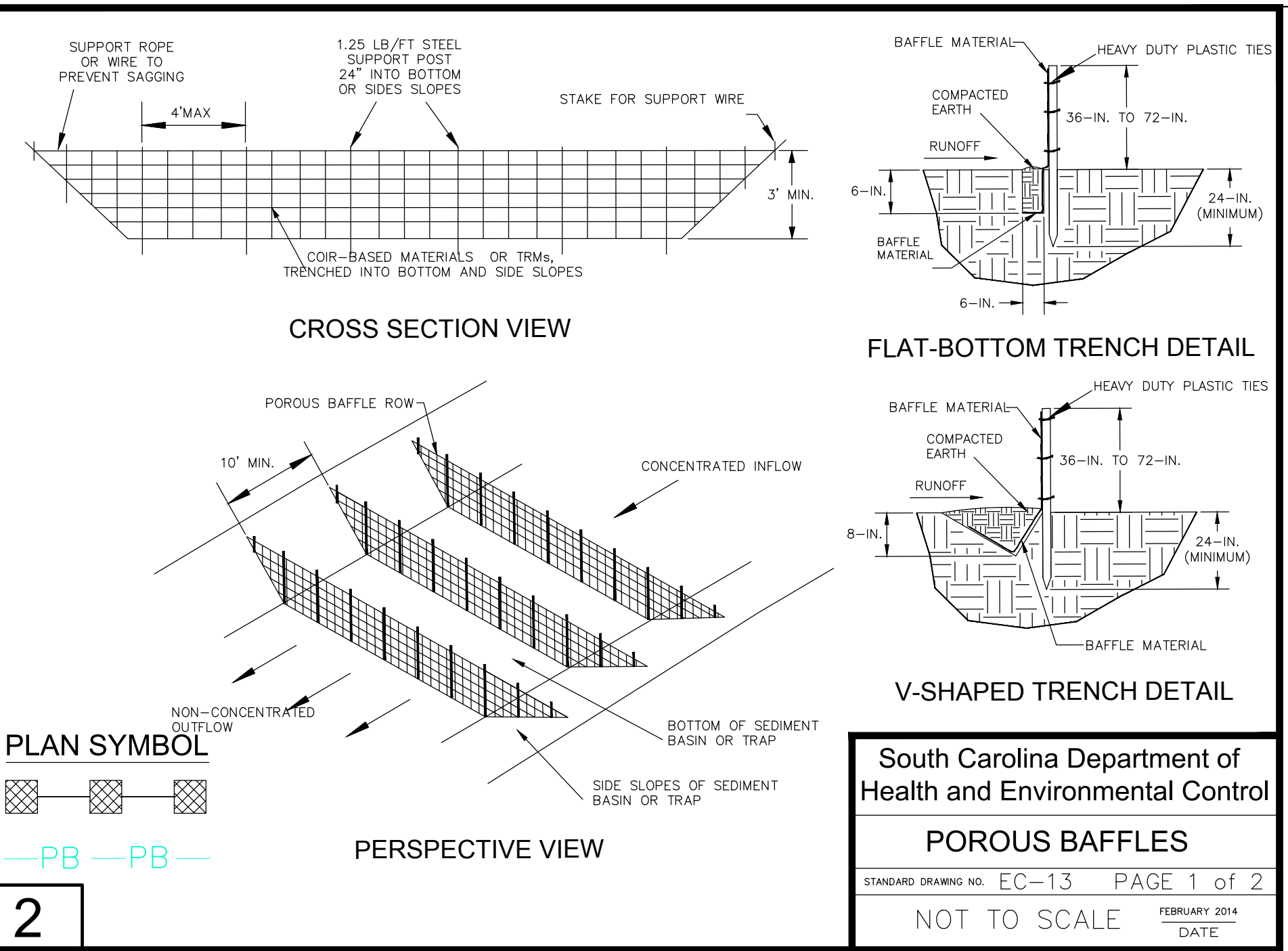
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- NOTES:**
- SILT FENCE TO EXTEND AROUND ENTIRE PERIMETER OF STOCKPILE, OR IF STOCKPILE AREA IS LOCATED ON/NEAR A SLOPE THE SILT FENCE IS TO EXTEND ALONG CONTOURS OF THE DOWN-GRADIENT AREA.
  - IF STOCKPILE IS TO REMAIN FOR MORE THAN 14 DAYS, TEMPORARY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

South Carolina Department of Health and Environmental Control  
**TEMPORARY STOCKPILE**  
 STANDARD DRAWING NO. SC-15  
 FEBRUARY 2014 DATE  
 NOT TO SCALE

1



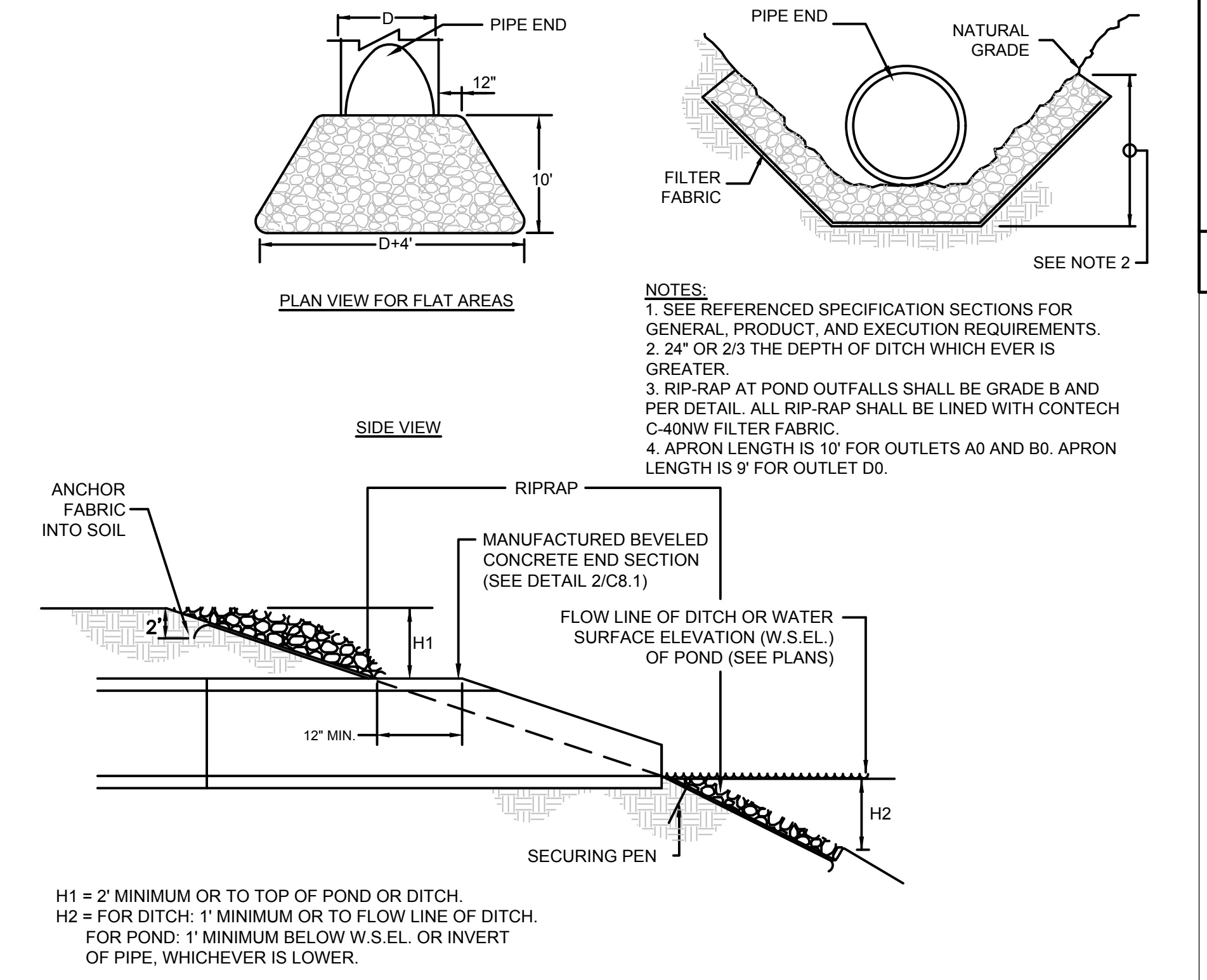
South Carolina Department of Health and Environmental Control  
**POROUS BAFFLES**  
 STANDARD DRAWING NO. EC-13 PAGE 1 of 2  
 FEBRUARY 2014 DATE  
 NOT TO SCALE

2

- BAFFLES — POST REQUIREMENTS**
- Porous baffle posts must be 60-inch to 96-inch long steel posts that meet, at a minimum, the following physical characteristics:
    - Composed of a high strength steel with a minimum yield strength of 50,000 psi.
    - Include a standard "T" section with a nominal face width of 1.38-inches and a nominal "T" length of 1.48-inches.
    - Weight 1.25 pounds per foot (± 8%).
  - Posts shall be equipped with projections to aid in fastening of baffle material.
  - Install posts to a minimum of 24-inches. A minimum height of 1- to 2-inches above the fabric shall be maintained, and a maximum height of 3 feet shall be maintained above the ground.
  - Post spacing shall be at a maximum of 4-feet on center.
- BAFFLES — MATERIAL REQUIREMENTS**
- Baffle material must be composed of coir-based materials or Turf Reinforcement Matting (TRM) that consists of the following requirements:
    - Have a light penetration (% openings) between 10–35%;
    - Free of loose straw material;
    - Have a minimum tensile strength of 145 lb/ft; and,
    - Have a minimum width of 48-inches.
  - 12-inches of the fabric should be placed within excavated trench and toed in when the trench is backfilled or baffle material may be stapled into ground by using 12-inch staples with a maximum spacing of 12-inches.
  - Baffle material shall be purchased in continuous rolls and cut to the width of the sediment basin or trap to avoid joints.
- BAFFLES — GENERAL NOTES**
- Attach baffle to the steel posts using heavy-duty plastic ties that are evenly spaced along the above ground portion of each post.
  - Install the baffle rows perpendicular to the direction of the stormwater flow and place each baffle the proper distance from inlet and outlets to allow access for maintenance and clean-out.

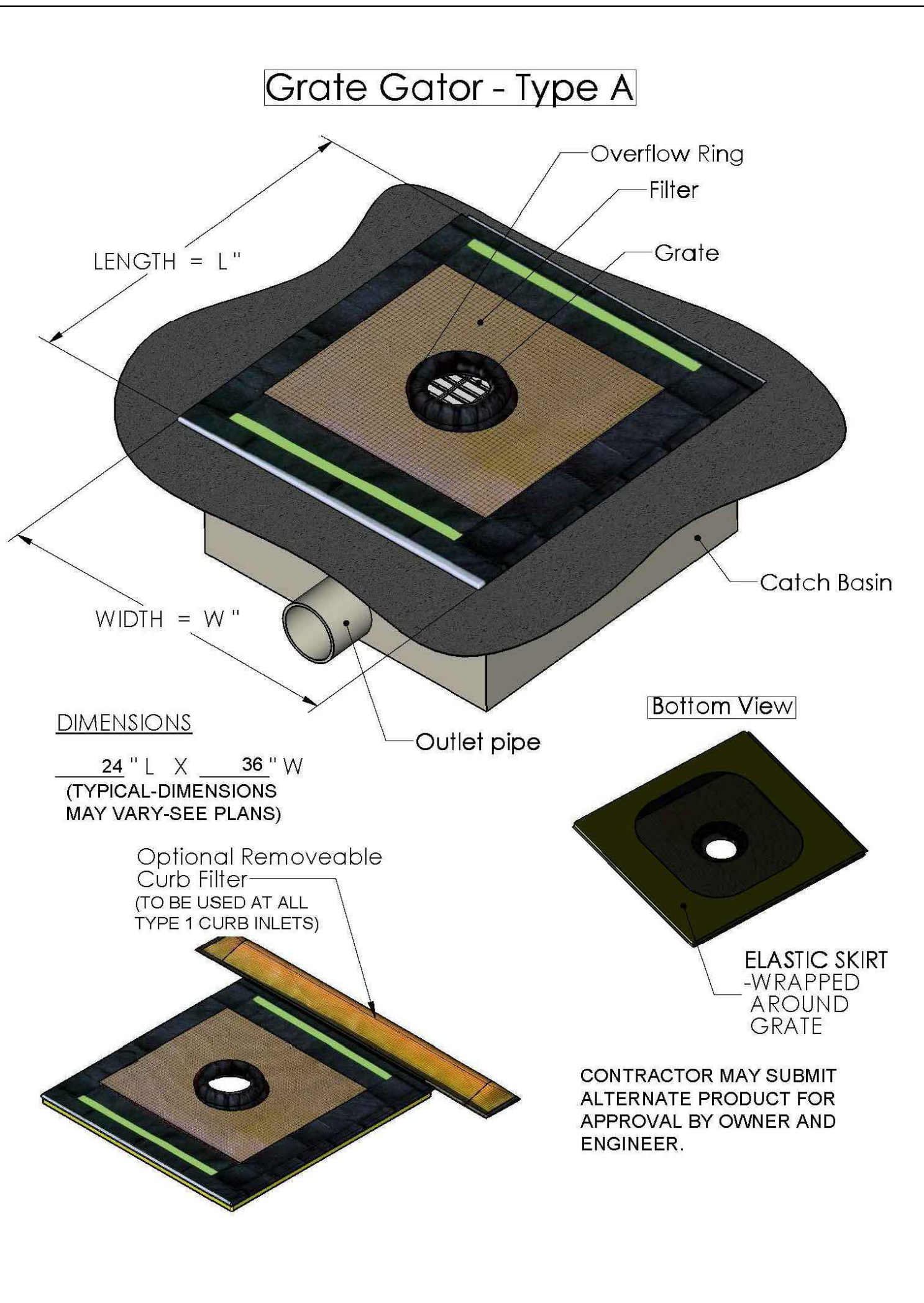
- BAFFLES — INSPECTION & MAINTENANCE**
- The key to functional porous baffles is weekly inspection, routine maintenance, and regular sediment removal.
  - Regular inspections of porous baffles shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
  - Attention to sediment accumulations along each row of baffles is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
  - Remove accumulated sediment when it reaches 1/3 the height of the baffle row or when it reaches the clean-out height of the sediment basin or trap, whichever is reached first.
  - Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
  - Check for areas where stormwater runoff has eroded a channel beneath each row of baffles, or where the baffle has sagged or collapsed due to runoff overtopping the baffle.
  - Check for tears/rips within the baffles, areas where the baffle has begun to decompose, and for any other circumstances that may render the baffle ineffective. Removed damaged baffles and reinstall new baffles immediately.
  - Porous baffles should be removed within 30 days after final stabilization is achieved and once it is removed, the resulting disturbed area shall be permanently stabilized.

South Carolina Department of Health and Environmental Control  
**POROUS BAFFLES**  
 STANDARD DRAWING NO. SC-13 PAGE 2 of 2  
 FEBRUARY 2014 DATE  
 GENERAL NOTES



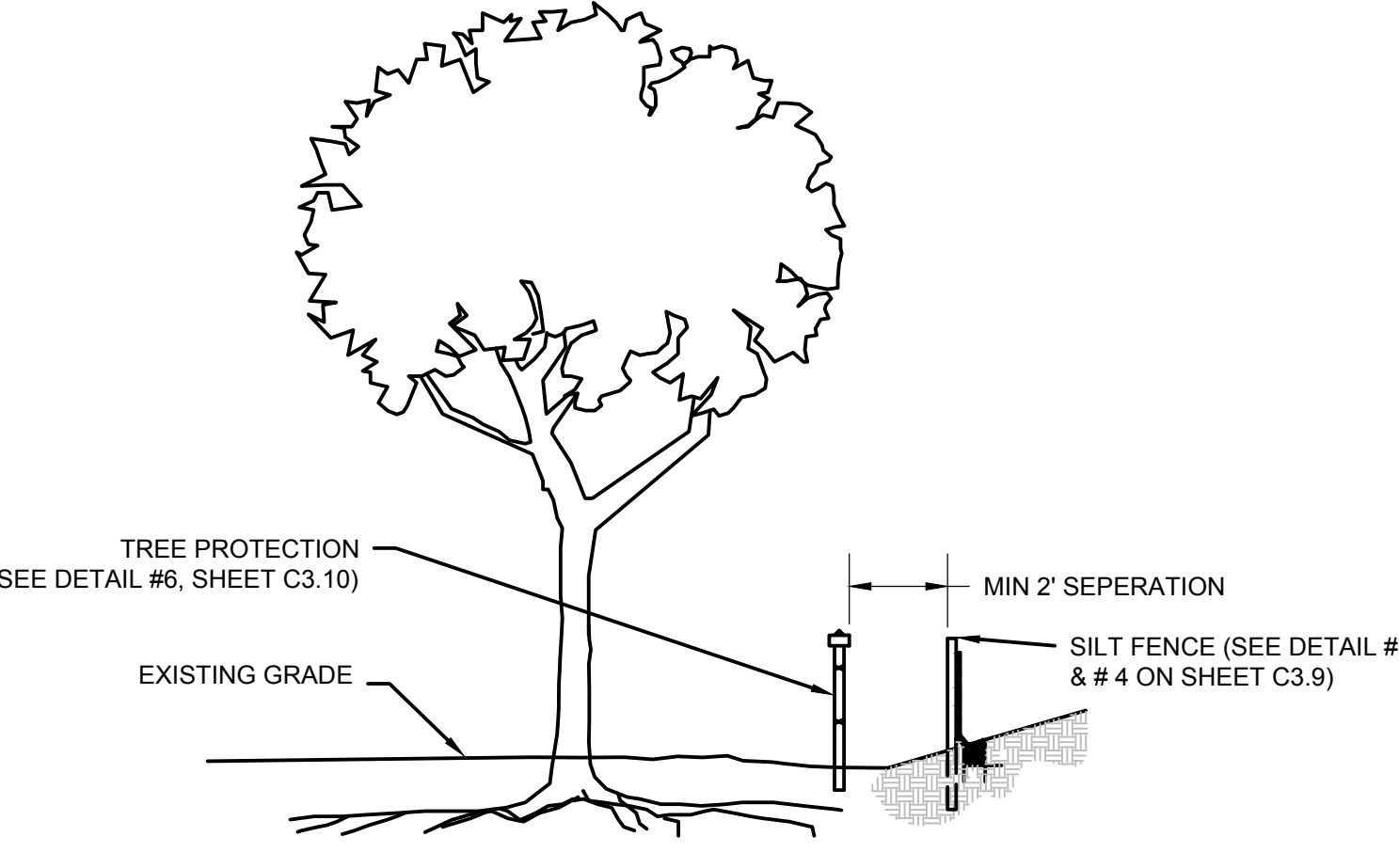
5 **RIP RAP APRON AT BEVELED PIPE ENDS**  
 (NOT TO SCALE)

5



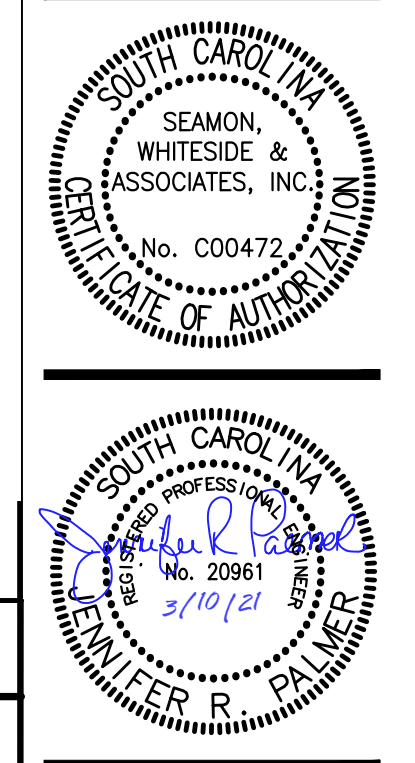
- GRATE GATOR - Type A**
- LENGTH = L"  
 WIDTH = W"
- DIMENSIONS**  
 24" L X 36" W  
 (TYPICAL-DIMENSIONS MAY VARY-SEE PLANS)
- Optional Removeable Curb Filter (TO BE USED AT ALL TYPE 1 CURB INLETS)
- ELASTIC SKIRT - WRAPPED AROUND GRATE
- CONTRACTOR MAY SUBMIT ALTERNATE PRODUCT FOR APPROVAL BY OWNER AND ENGINEER.

3 **GRATE GATOR INLET PROTECTION**  
 (NOT TO SCALE)



4 **COMBINED SILT FENCE/TREE PROTECTION**  
 (NOT TO SCALE)

**SW** SEAMON WHITESIDE  
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 GREENVILLE, SC 864.298.0534  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
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| D | 03/11/21 |

SWPPP DETAILS

C3.11

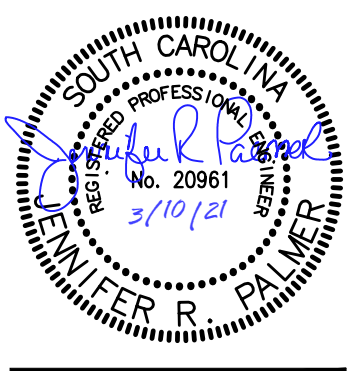
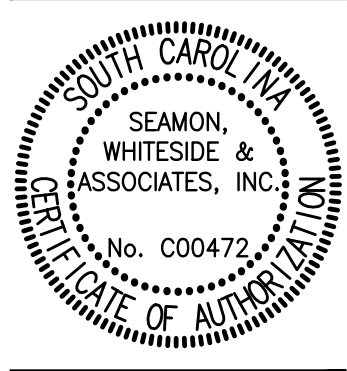
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|------------------|----------|
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| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

OVERALL SITE PLAN

C4.0

**SITE COVERAGE**

|                                     |          |
|-------------------------------------|----------|
| PROPERTY AREA:                      | 53.31 AC |
| NEW IMPERVIOUS AREA:                | 6.55 AC  |
| WET POND AREA:                      | 2.25 AC  |
| <b>IMPERVIOUS COVERAGE %: 16.5%</b> |          |

**SIDEWALKS TRAILS:**

|                               |
|-------------------------------|
| 44,470 LF (CONCRETE SIDEWALK) |
| 43,870 LF (ASPHALT TRAIL)     |
| 1,000 LF (MULCH TRAIL)        |
| <b>49,340 LF (TOTAL)</b>      |

**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN SURVEYING, DATED SEPTEMBER 18, 2018.  
 PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).

**FLOOD ZONE INFORMATION:** BASED ON INFORMATION PROVIDED ON THE INDICATED FIRM MAP, THE PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE 'X'. SEE COMMUNITY PANELS 45015C0705E AND 45015C0685E, DATED DECEMBER 7, 2018.

**TOTAL SITE ACREAGE:** 53.31 ACRES  
**TOTAL LAND DISTURBANCE:** 40.0 ACRES

**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

**PARKING CALCULATIONS:**  
 NEW STANDARD SPACES: 309  
 OVERFLOW PARKING: +/- 99  
 HANDICAP SPACES: 14  
 TOTAL: 422

SEE SHEET C1.1 FOR LEGEND, AND SHEETS C5.0 - C5.2 FOR SITE DETAILS

**EXISTING UTILITY NOTE:**  
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**CONSTRUCTION TRAFFIC NOTE:**  
 NO CONSTRUCTION TRAFFIC FROM 6:30AM - 8:00AM AND 1:30PM - 2:30 PM

- NOTES:**
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO BEGINNING CONSTRUCTION. ALL DIMENSIONS ARE MEASURED FROM FACE OF CURB OR EDGE OF ASPHALT, WITH THE EXCEPTION OF SIDEWALKS, WHICH ARE MEASURED FROM BACK OF CURB, UNLESS OTHERWISE NOTED.
  - WETLANDS ARE NOT TO BE DISTURBED.
  - SEE ARCHITECTURE PLANS FOR BUILDING DIMENSIONS.
  - ALL SITE ROADWAYS TO BE STANDARD DUTY ASPHALT UNLESS OTHERWISE NOTED.
  - SEE ELECTRICAL PLANS FOR LIGHTING.
  - SIDEWALKS ADJACENT TO HEAD IN PARKING TO BE 6' UNLESS OTHERWISE NOTED.
  - THE CONTRACTOR SHALL CONSULT WITH THE OWNER AND LANDSCAPE ARCHITECT PRIOR TO WORK IN SELECTIVE CLEARING AREAS AND REFER TO SPECIFICATION 311000- SITE CLEARING AND EROSION CONTROL.

SHEET C4.4

SHEET C4.3

SHEET C4.2

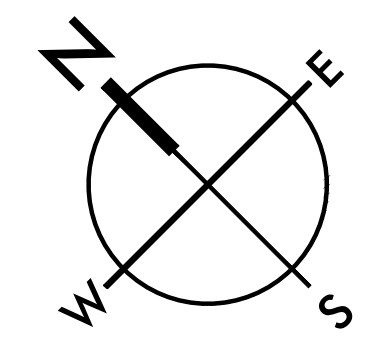
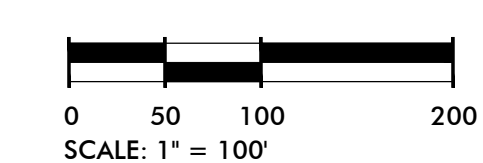
SHEET C4.1

- KEY**
- MULTIPURPOSE FIELDS
  - SYNTHETIC TURF FIELD
  - BASKETBALL COURT
  - SAND VOLLEYBALL COURT
  - DOG PARK
  - ASPHALT TENNIS COURTS
  - PLAYGROUND AREA
  - PAVILION
  - RESTROOM BUILDING
  - RECREATION BUILDING
  - MAINTENANCE AREA

**LEGEND**

|  |                                |
|--|--------------------------------|
|  | WETLAND- DO NOT DISTURB        |
|  | WETLAND BUFFER- DO NOT DISTURB |
|  | SELECTIVE CLEARING             |
|  | CONCRETE SIDEWALKS             |
|  | ASPHALT TRAIL                  |
|  | MULCH TRAIL                    |
|  | GABC ROAD                      |
|  | RETAINING WALL                 |

- OWNER FURNISHED, OWNER INSTALLED (OFO) ITEMS**
- PLAYGROUND EQUIPMENT
  - OUTDOOR BLEACHERS
  - MAINTENANCE SHELTER
  - POLE BARN (STRUCTURE AND SLAB)
  - DOG POUND ROOF STRUCTURE

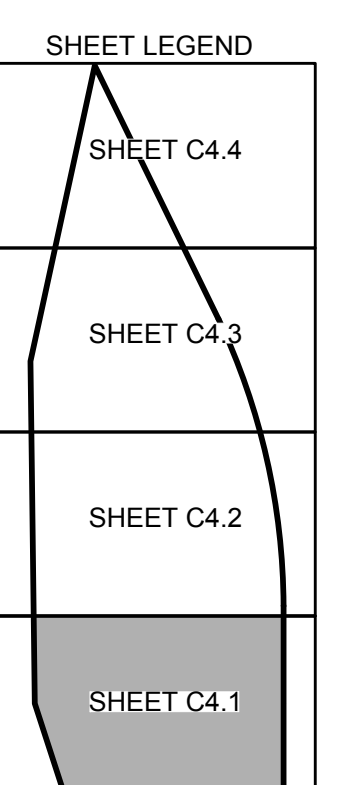
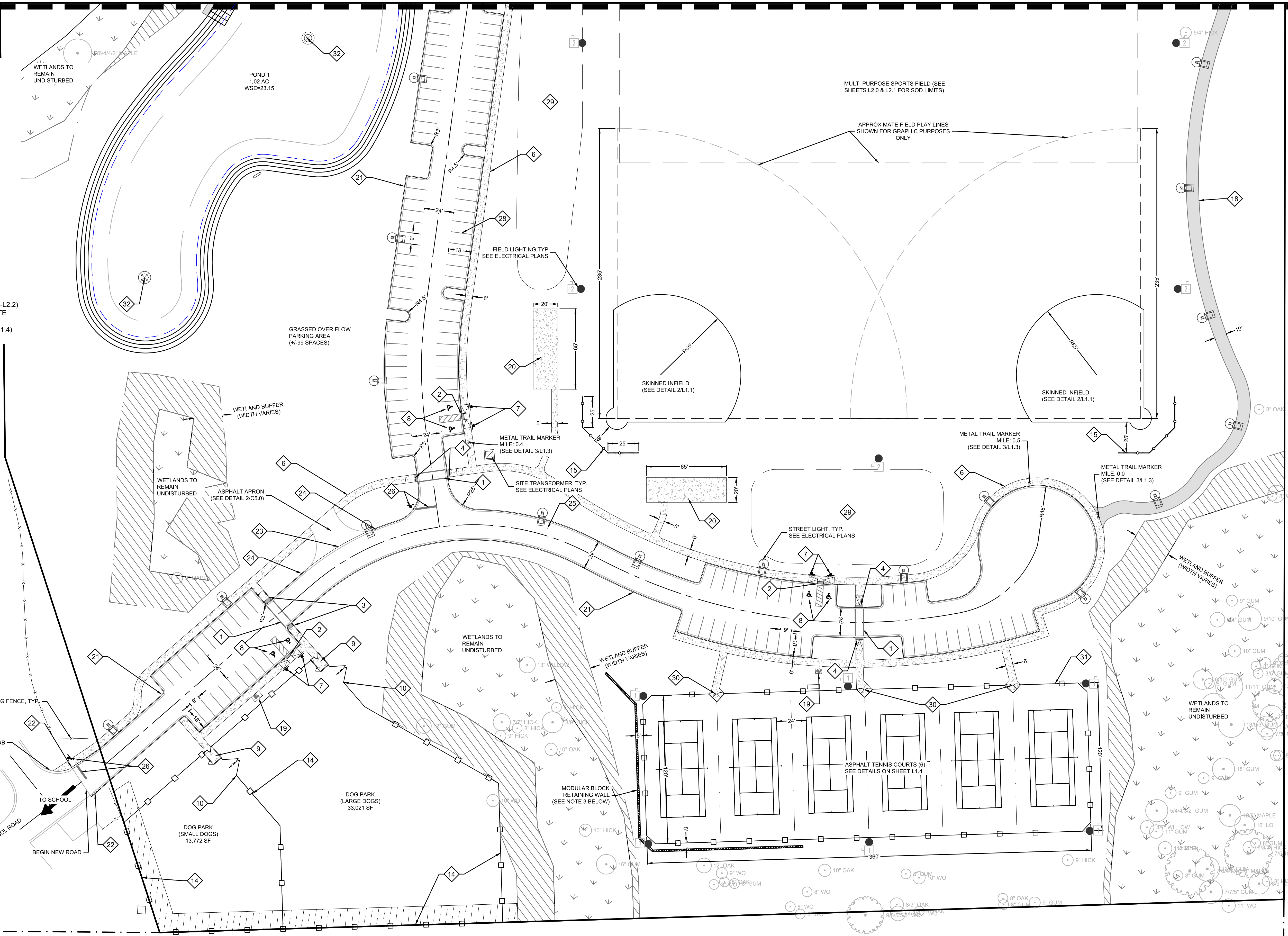


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- KEYNOTE LEGEND**
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  - SIDEWALK RAMP TYPE A (11/C5.1)
  - SIDEWALK RAMP TYPE P (12/C5.1)
  - SIDEWALK RAMP TYPE O (8/C5.1)
  - SIDEWALK RAMP TYPE Z (2/C5.1)
  - 6" CONCRETE SIDEWALK (7/C5.0)
  - ADA PARKING SIGN (5/C5.1)
  - ADA PARKING SPACE (10/C5.1)
  - DOG PARK ENTRANCE (1/L1.3)
  - 6" HT CHAIN LINK 17' DOUBLE WIDE GATE (2/L1.0)
  - 4" HT CHAIN LINK SINGLE GATE (3/L1.0)
  - 4" HT CHAIN LINK DOUBLE GATE (2/L1.0)
  - 4" HT CHAIN LINK FENCE (1/L1.0)
  - 6" HT CHAIN LINK FENCE (1/L1.0)
  - 28" TALL CHAIN LINK BACKSTOP (1/L1.1)
  - DOUBLE ARM SWING GATE (7/C5.2)
  - SINGLE ARM SWING GATE (4/C5.2)
  - ASPHALT TRAIL (1/C5.2)
  - DRINKING FOUNTAIN (11/L1.2)
  - CONCRETE BLEACHER PAD (11/C5.0)
  - 18" STRAIGHT CURB & GUTTER (6/C5.0)
  - DEPRESSED CURB END (3/C5.1)
  - 18" ROLLED CURB AND GUTTER (5/C5.0)
  - TRANSITION FROM 18" STRAIGHT CURB AND GUTTER TO 18" ROLLED CURB
  - ASPHALT PAVING (2/C5.0)
  - STOP SIGN & BAR (4.7/C5.1)
  - "ONE WAY ONLY" SIGN (2/C5.2)
  - 4" PAINTED WHITE PARKING STRIPE
  - GRASS SEATING BERM (SHEETS C6.0-C6.4 & L2.0-L2.2)
  - TENNIS COURT AND BASKETBALL PEDESTRIAN GATE (4/L1.4)
  - 10' HT TENNIS AND BASKETBALL COURT FENCE (6/L1.4)
  - POND FOUNTAIN (3/L1.1)



**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN SURVEYING, DATED SEPTEMBER 18, 2018. PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).

**FLOOD ZONE INFORMATION:** BASED ON INFORMATION PROVIDED ON THE INDICATED FIRM MAP. THE PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE "X". SEE COMMUNITY PANELS 45015C0705E AND 45015C0685E, DATED DECEMBER 7, 2018.

**TOTAL SITE ACREAGE:** 53.31 ACRES

**TOTAL LAND DISTURBANCE:** 40.0 ACRES

**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

SEE SHEET C1.1 FOR LEGEND, AND SHEETS C5.0 - C5.2 FOR SITE DETAILS

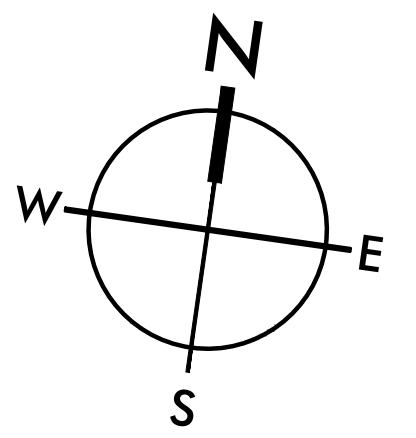
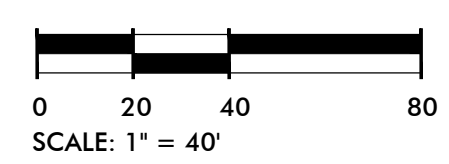
SEE SHEETS L1.0 - L1.4 FOR HARDSCAPE AND RECREATION ELEMENT DETAILS

**NOTES:**

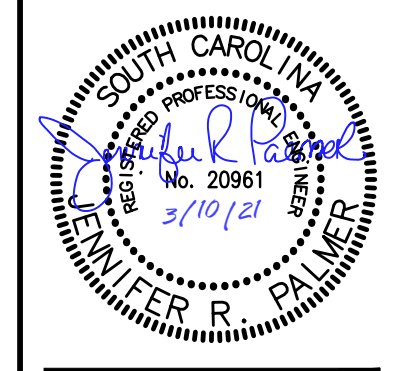
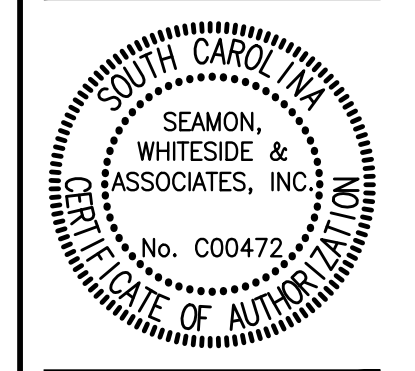
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- SEE LANDSCAPE DETAILS FOR TENNIS COURT FENCING AND STRIPING DETAILS.
- RETAINING WALL(S) SHOWN IS FOR GENERAL INFORMATION ONLY AND IS NOT TO BE INTERPRETED AS A FINAL DESIGN TO BE USED FOR CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE COMPLETE DESIGN DRAWINGS (INCLUDING GEOTECHNICAL INVESTIGATIONS AS REQUIRED) PREPARED AND STAMPED BY A SC REGISTERED STRUCTURAL ENGINEER. THE WALL(S) IS TO BE DESIGNED WITH CONSIDERATION OF ALL APPURTENANT AND ADJOINING IMPROVEMENTS SHOWN AND UTILIZING MATERIALS INDICATED IN THESE CONSTRUCTION DOCUMENTS (IF SPECIFIC MATERIALS ARE NOT INDICATED, CONTRACTOR SHALL COORDINATE WITH OWNER AND ENGINEER FOR MATERIAL SELECTION). CONTRACTOR SHALL PROVIDE THE REQUIRED DRAWINGS TO SW+ AND THE OWNER FOR REVIEW PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.

**EXISTING UTILITY NOTE:**

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 CHARLOTTE, NC 980.312.5450  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

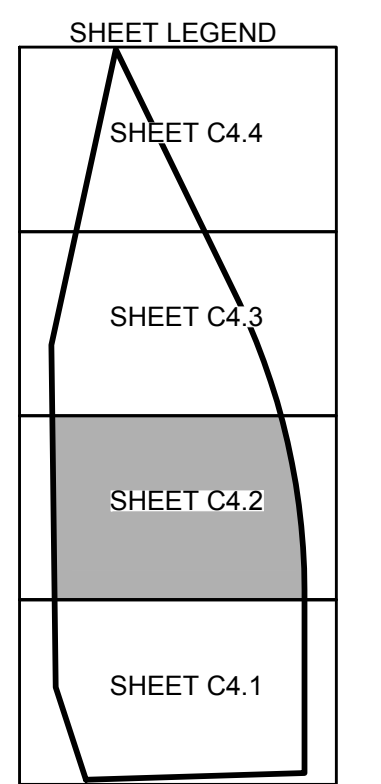
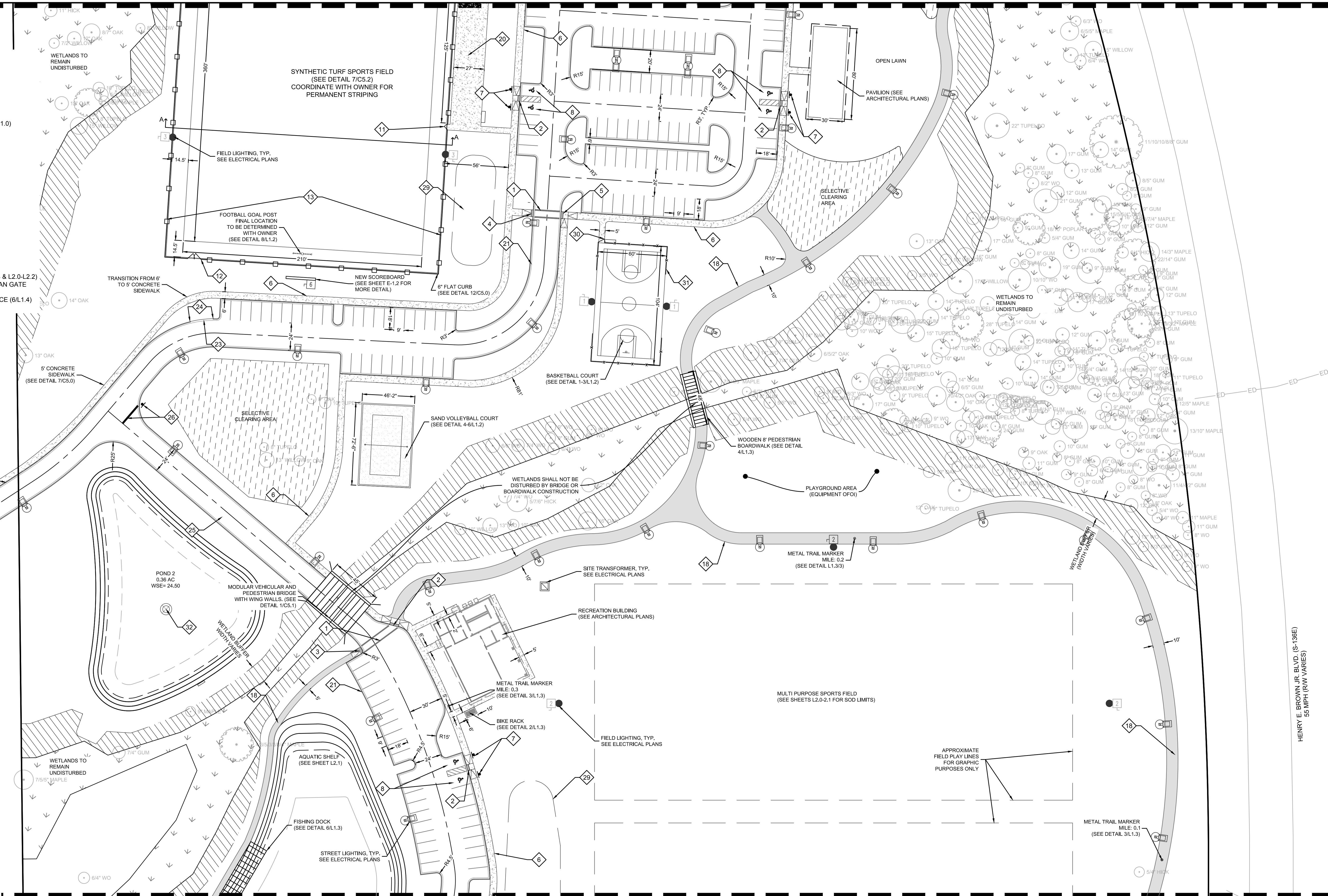
**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

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**KEYNOTE LEGEND**

1. CROSSWALK (10/C5.1)
2. SIDEWALK RAMP TYPE A (11/C5.1)
3. SIDEWALK RAMP TYPE P (12/C5.1)
4. SIDEWALK RAMP TYPE O (8/C5.1)
5. SIDEWALK RAMP TYPE Z (2/C5.1)
6. 6" CONCRETE SIDEWALK (7/C5.0)
7. ADA PARKING SIGN (5/C5.1)
8. ADA PARKING SPACE (10/C5.1)
9. DOG PARK ENTRANCE (11/L1.3)
10. 6' HT CHAIN LINK 17' DOUBLE WIDE GATE (2/L1.0)
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12. 4' HT CHAIN LINK DOUBLE GATE (2/L1.0)
13. 4' HT CHAIN LINK FENCE (1/L1.0)
14. 6' HT CHAIN LINK FENCE (1/L1.0)
15. 28" TALL CHAIN LINK BACKSTOP (1/L1.1)
16. DOUBLE ARM SWING GATE (7/C5.2)
17. SINGLE ARM SWING GATE (4/C5.2)
18. ASPHALT TRAIL (1/C5.2)
19. DRINKING FOUNTAIN (11/L1.2)
20. CONCRETE BLEACHER PAD (11/C5.0)
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26. STOP SIGN & BAR (4/7/C5.1)
27. "ONE WAY ONLY" SIGN (2/C5.2)
28. 4" PAINTED WHITE PARKING STRIPE
29. GRASSED SEATING BERM (SHEETS C6.0-C6.4 & L2.0-L2.2)
30. TENNIS COURT AND BASKETBALL PEDESTRIAN GATE (4/L1.4)
31. 10' HT TENNIS AND BASKETBALL COURT FENCE (6/L1.4)
32. POND FOUNTAIN (3/L1.1)



**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN SURVEYING, DATED SEPTEMBER 18, 2018. PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).

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**TOTAL SITE ACREAGE:** 53.31 ACRES

**TOTAL LAND DISTURBANCE:** 40.0 ACRES

**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

SEE SHEET C1.1 FOR LEGEND, AND SHEETS C5.0 - C5.2 FOR SITE DETAILS

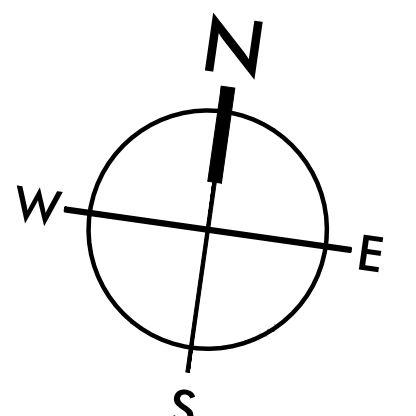
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**NOTES:**

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2. CONSTRUCTION TRAFFIC ACROSS MODULAR BRIDGE MUST BE COORDINATED WITH MANUFACTURER FOR WEIGHT LIMITS.

**EXISTING UTILITY NOTE:**

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**SW SEAMONWHITESIDE**

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 CHARLOTTE, NC 980.312.5450  
 WWW.SEAMONWHITESIDE.COM

**SOUTH CAROLINA**

SEAMON, WHITESIDE & ASSOCIATES, INC.  
 No. C00472  
 LICENSED PROFESSIONAL ENGINEER  
 STATE OF SOUTH CAROLINA

**SOUTH CAROLINA**

Professional Engineer  
 No. 20961  
 3/10/21  
 HANAHAN, SOUTH CAROLINA

**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

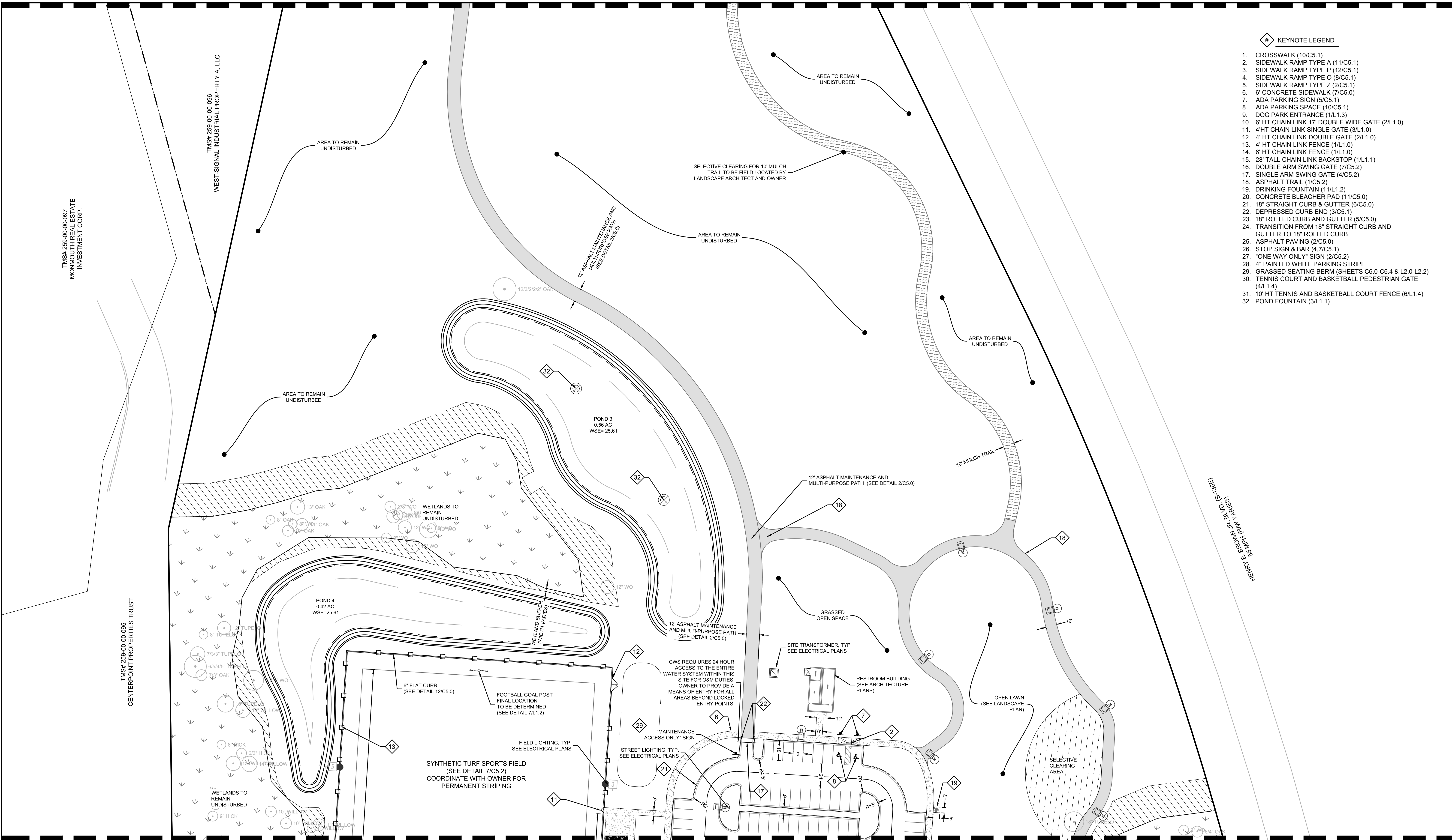
SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

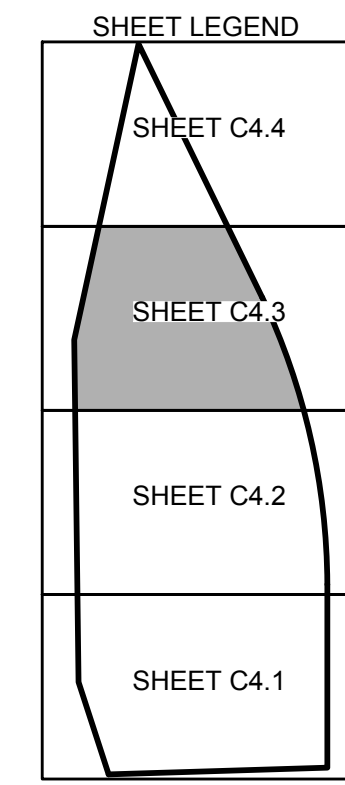
| REV | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
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| D   | 03/11/21 |             |

**SITE PLAN**

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  - 28' TALL CHAIN LINK BACKSTOP (1/L1.1)
  - DOUBLE ARM SWING GATE (7/C5.2)
  - SINGLE ARM SWING GATE (4/C5.2)
  - ASPHALT TRAIL (1/C5.2)
  - DRINKING FOUNTAIN (11/L1.2)
  - CONCRETE BLEACHER PAD (11/C5.0)
  - 18" STRAIGHT CURB & GUTTER (6/C5.0)
  - DEPRESSED CURB END (3/C5.1)
  - 18" ROLLED CURB AND GUTTER (5/C5.0)
  - TRANSITION FROM 18" STRAIGHT CURB AND GUTTER TO 18" ROLLED CURB
  - ASPHALT PAVING (2/C5.0)
  - STOP SIGN & BAR (4/7/C5.1)
  - "ONE WAY ONLY" SIGN (2/C5.2)
  - 4" PAINTED WHITE PARKING STRIPE
  - GRASSED SEATING BERM (SHEETS C6.0-C6.4 & L2.0-L2.2)
  - TENNIS COURT AND BASKETBALL PEDESTRIAN GATE (4/L1.4)
  - 10' HT TENNIS AND BASKETBALL COURT FENCE (6/L1.4)
  - POND FOUNTAIN (3/L1.1)



**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN SURVEYING, DATED SEPTEMBER 18, 2018. PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).

**FLOOD ZONE INFORMATION:** BASED ON INFORMATION PROVIDED ON THE INDICATED FIRM MAP, THE PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE 'X'. SEE COMMUNITY PANELS 45015C0705E AND 45015C0685E, DATED DECEMBER 7, 2018.

**TOTAL SITE ACREAGE:** 53.31 ACRES  
**TOTAL LAND DISTURBANCE:** 40.0 ACRES

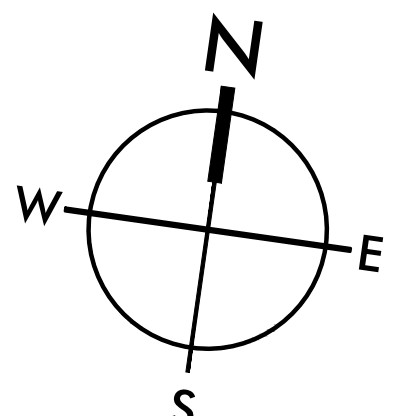
**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

SEE SHEET C1.1 FOR LEGEND, AND SHEETS C5.0 - C5.2 FOR SITE DETAILS

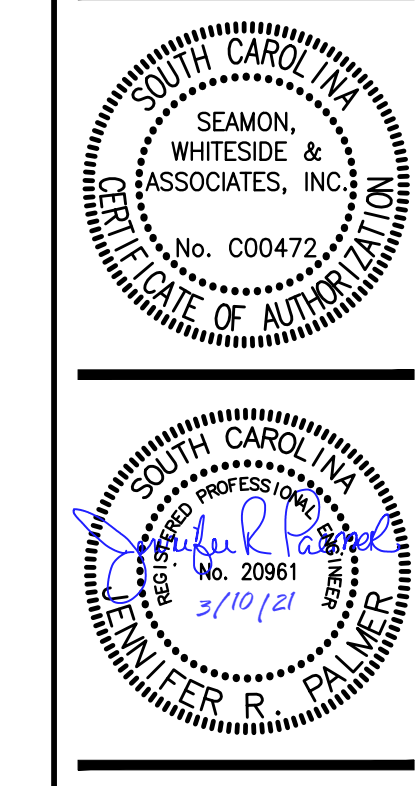
SEE SHEETS L1.0 - L1.4 FOR HARDSCAPE AND RECREATION ELEMENT DETAILS

**NOTES:**  
 1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO BEGINNING CONSTRUCTION. ALL DIMENSIONS ARE MEASURED FROM FACE OF CURB OR EDGE OF ASPHALT, WITH THE EXCEPTION OF SIDEWALKS, WHICH ARE MEASURED FROM BACK OF CURB.

**EXISTING UTILITY NOTE:**  
 THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.



MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
 CHARLOTTE, NC 980.312.5450  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

| REV | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

SITE PLAN



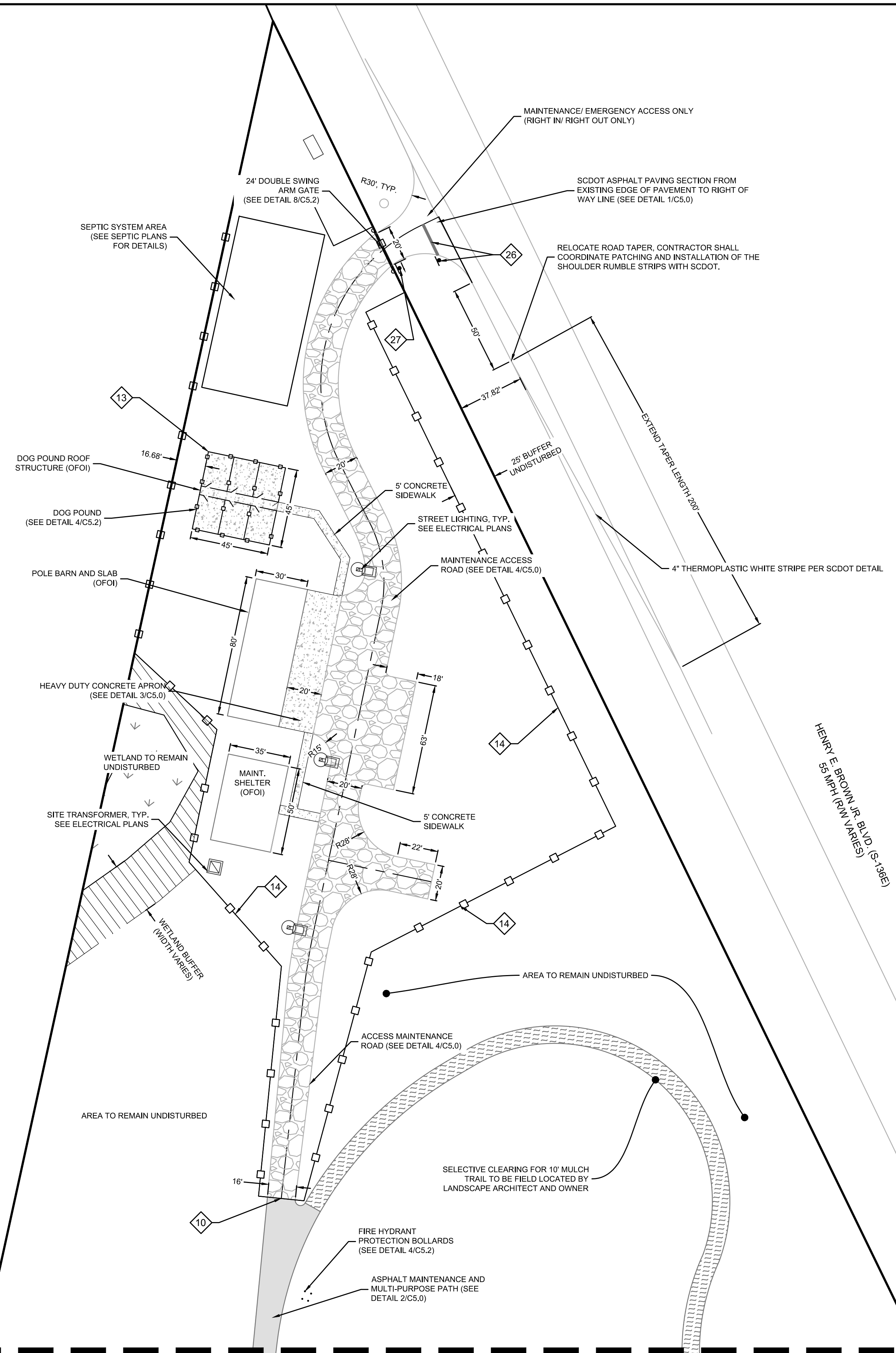
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 CHARLOTTE, NC 980.312.5450  
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- KEYNOTE LEGEND**
- CROSSWALK (10/C5.1)
  - SIDEWALK RAMP TYPE A (11/C5.1)
  - SIDEWALK RAMP TYPE P (12/C5.1)
  - SIDEWALK RAMP TYPE O (8/C5.1)
  - SIDEWALK RAMP TYPE Z (2/C5.1)
  - 6" CONCRETE SIDEWALK (7/C5.0)
  - ADA PARKING SIGN (5/C5.1)
  - ADA PARKING SPACE (10/C5.1)
  - DOG PARK ENTRANCE (1/L1.3)
  - 6' HT CHAIN LINK 17' DOUBLE WIDE GATE (2/L1.0)
  - 4' HT CHAIN LINK SINGLE GATE (3/L1.0)
  - 4' HT CHAIN LINK DOUBLE GATE (2/L1.0)
  - 4' HT CHAIN LINK FENCE (1/L1.0)
  - 6' HT CHAIN LINK FENCE (1/L1.0)
  - 28" TALL CHAIN LINK BACKSTOP (1/L1.1)
  - DOUBLE ARM SWING GATE (7/C5.2)
  - SINGLE ARM SWING GATE (4/C5.2)
  - ASPHALT TRAIL (1/C5.2)
  - DRINKING FOUNTAIN (11/L1.2)
  - CONCRETE BLEACHER PAD (11/C5.0)
  - 18" STRAIGHT CURB & GUTTER (6/C5.0)
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  - 18" ROLLED CURB AND GUTTER (5/C5.0)
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  - ASPHALT PAVING (2/C5.0)
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  - "ONE WAY ONLY" SIGN (2/C5.2)
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  - GRASSED SEATING BERM (SHEETS C6.0-C6.4 & L2.0-L2.2)
  - TENNIS COURT AND BASKETBALL PEDESTRIAN GATE (4/L1.4)
  - 10' HT TENNIS AND BASKETBALL COURT FENCE (6/L1.4)
  - POND FOUNTAIN (3/L1.1)

TMS# 259-00-00-086  
 WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC



**SHEET LEGEND**

|            |
|------------|
| SHEET C4.4 |
| SHEET C4.3 |
| SHEET C4.2 |
| SHEET C4.1 |

**SURVEY INFORMATION:** BOUNDARY, TREE, AND TOPOGRAPHIC INFORMATION PROVIDED BY SOUTHEASTERN SURVEYING, DATED SEPTEMBER 18, 2018. PER SURVEY, ALL ELEVATIONS ARE BASED ON A NAVD 1988 VERTICAL DATUM. HORIZONTAL DATUM IS STATE PLANE NAD 1983 (NAD 83).  
**FLOOD ZONE INFORMATION:** BASED ON INFORMATION PROVIDED ON THE INDICATED FIRM MAP, THE PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE "X". SEE COMMUNITY PANELS 45015C0705E AND 45015C0685E, DATED DECEMBER 7, 2018.  
**TOTAL SITE ACREAGE:** 53.31 ACRES  
**TOTAL LAND DISTURBANCE:** 40.0 ACRES  
**TAX MAP INFORMATION:** THIS PROPERTY IS DEPICTED ON TMS #259-00-00-189

SEE SHEET C1.1 FOR LEGEND, AND SHEETS C5.0 - C5.2 FOR SITE DETAILS

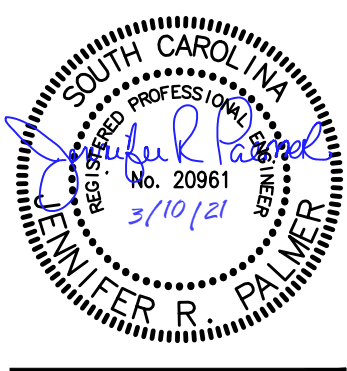
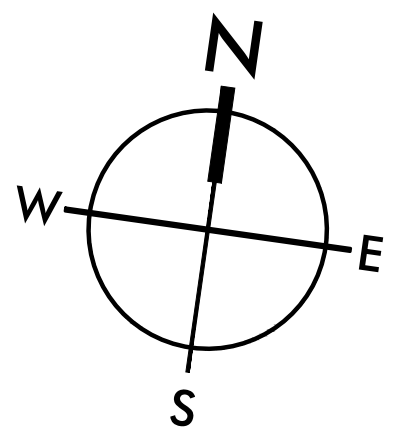
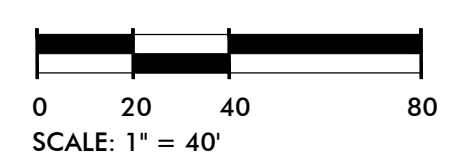
SEE SHEETS L1.0 - L1.4 FOR HARDSCAPE AND RECREATION ELEMENT DETAILS

**NOTES:**  
 1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO BEGINNING CONSTRUCTION. ALL DIMENSIONS ARE MEASURED FROM FACE OF CURB OR EDGE OF ASPHALT, WITH THE EXCEPTION OF SIDEWALKS, WHICH ARE MEASURED FROM BACK OF CURB.

**EXISTING UTILITY NOTE:**  
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Know what's below. Call before you dig.



**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

SITE PLAN

THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.

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| ITEM:                        | MATERIAL:                                      | SCDOT SPECIFICATION SECTION: |
|------------------------------|--|------------------------------|
| SUBGRADE                     | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL    | SECTION 208                  |
| BASE COURSE                  | HOT MIX ASPHALT AGGREGATE BASE COURSE (TYPE A) | SECTION 310                  |
| TACK COAT                    | ASPHALT BINDER OR EMULSIFIED ASPHALT           | SECTION 401                  |
| INTERMEDIATE (BINDER) COURSE | HOT MIX ASPHALT INTERMEDIATE COURSE (TYPE B)   | SECTION 402                  |
| SURFACE COURSE               | HOT MIX ASPHALT SURFACE COURSE (TYPE B)        | SECTION 403                  |

**NOTES:**  
 1. SEE REFERENCED SCDOT STANDARD SPECIFICATION SECTIONS FOR MATERIAL, EQUIPMENT, AND CONSTRUCTION REQUIREMENTS.  
 2. CONTRACTOR IS ADVISED THAT PAVING DESIGN RECOMMENDED BY GEOTECHNICAL ENGINEER IS BASED ON PREDICTED TRAFFIC LOADING AND ESTABLISHED STRENGTHS FOR PROPERLY INSTALLED PAVEMENTS. CONTRACTOR MUST COORDINATE REQUIRED GEOTECHNICAL TESTING & INSPECTION TO ENSURE THAT SUBGRADE AND PAVEMENT STRENGTH REQUIREMENTS ARE MET.

| ITEM:          | MATERIAL:                                   | SWA SPECIFICATION SECTION NAME: |
|----------------|---|---------------------------------|
| SUBGRADE       | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL | EARTH MOVING                    |
| BASE COURSE    | GRADED AGGREGATE BASE COURSE                | EARTH MOVING                    |
| SURFACE COURSE | HOT MIX ASPHALT SURFACE COURSE (TYPE C)     | ASPHALT PAVING                  |

**NOTE:**  
 1. CONTRACTOR IS ADVISED THAT PAVING DESIGN RECOMMENDED BY GEOTECHNICAL ENGINEER IS BASED ON PREDICTED TRAFFIC LOADING AND ESTABLISHED STRENGTHS FOR PROPERLY INSTALLED PAVEMENTS. CONTRACTOR MUST COORDINATE REQUIRED GEOTECHNICAL TESTING & INSPECTION TO ENSURE THAT SUBGRADE AND PAVEMENT STRENGTH REQUIREMENTS ARE MET.

| ITEM:             | MATERIAL:                                   | SWA SPECIFICATION SECTION NAME: |
|-------------------|---|---------------------------------|
| SUBGRADE          | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL | EARTH MOVING                    |
| BASE COURSE       | GRADED AGGREGATE BASE COURSE                | EARTH MOVING                    |
| CONCRETE PAVEMENT | CAST-IN-PLACE CONCRETE                      | CONCRETE PAVING                 |

**NOTES:**  
 1. WHERE SHOWN, SEE PLAN FOR EXPANSION AND CONTROL JOINT LOCATIONS. OTHERWISE, SEE SPECS FOR REQUIRED LOCATION AND SPACING.  
 2. CONTRACTOR IS ADVISED THAT PAVING DESIGN RECOMMENDED BY GEOTECHNICAL ENGINEER IS BASED ON PREDICTED TRAFFIC LOADING AND ESTABLISHED STRENGTHS FOR PROPERLY INSTALLED PAVEMENTS. CONTRACTOR MUST COORDINATE REQUIRED GEOTECHNICAL TESTING & INSPECTION TO ENSURE THAT SUBGRADE AND PAVEMENT STRENGTH REQUIREMENTS ARE MET.

| ITEM:       | MATERIAL:                                   | SWA SPECIFICATION SECTION NAME: |
|-------------|---|---------------------------------|
| SUBGRADE    | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL | EARTH MOVING                    |
| BASE COURSE | GRADED AGGREGATE BASE COURSE                | EARTH MOVING                    |

**1 ASPHALT PAVING WITHIN SCDOT R/W**  
(NOT TO SCALE)

**2 ASPHALT PAVING SECTION**  
(NOT TO SCALE)

**3 HEAVY DUTY CONCRETE PAVING SECTION**  
(NOT TO SCALE)

**4 MAINTENANCE ACCESS ROAD PAVING SECTION**  
(NOT TO SCALE)

**NOTES:**  
 1. ALTERNATE SECTION TO BE USED ONLY WHEN DRAINING AWAY FROM CURB.  
 2. UNLESS OTHERWISE SHOWN ON DRAWINGS, LOCATE CONTROL JOINTS AT 10' INTERVALS AND EXPANSION JOINTS AT 50' INTERVALS. WHERE CURB IS ADJACENT TO CONCRETE WALK, JOINTS SHALL COINCIDE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

**TYPICAL DOWNSLOPE SECTION**      **ALTERNATE UPSLOPE SECTION**

**NOTES:**  
 1. ALTERNATE UPSLOPE SECTION TO BE USED ONLY WHEN DRAINING AWAY FROM CURB.  
 2. UNLESS OTHERWISE SHOWN ON DRAWINGS, LOCATE CONTROL JOINTS AT 10' INTERVALS AND EXPANSION JOINTS AT 50' INTERVALS. WHERE CURB IS ADJACENT TO CONCRETE WALK, JOINTS SHALL COINCIDE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

**TYPICAL DOWNSLOPE SECTION**      **ALTERNATE UPSLOPE SECTION**

**NOTES:**  
 1. SIDEWALK CROSS SLOPE NOT TO EXCEED 2%.  
 2. SIDEWALK TO HAVE LIGHT BROOM FINISH, PERPENDICULAR TO DIRECTION OF TRAVEL.  
 3. SEE PLAN FOR SIDEWALK WIDTH.  
 4. UNLESS OTHERWISE SHOWN ON DRAWINGS, SPACE CONTROL JOINTS AT TWICE THE SIDEWALK WIDTH, NOT TO EXCEED 10'. SPACE EXPANSION JOINTS TO COINCIDE WITH CONTROL JOINTS, NOT TO EXCEED 50'. WHERE CURB IS ADJACENT TO CONCRETE WALK, JOINTS SHALL COINCIDE. SEE SPECIFICATIONS FOR ADDITIONAL INFO.

**CONTROL JOINT (SEE NOTE #4)**      **EXPANSION JOINT (SEE NOTE #4)**

**NOTES:**  
 1. SEE SIDEWALK SECTION DETAIL FOR CONTROL AND EXPANSION JOINT INFORMATION.  
 2. SIDEWALK JOINTS SHALL COINCIDE WITH CURB JOINTS UNLESS OTHERWISE NOTED.  
 3. SIDEWALK TO HAVE LIGHT BROOM FINISH, PERPENDICULAR TO DIRECTION OF TRAVEL.

**CONCRETE CURB AND GUTTER (SEE DETAIL)**

**5 18" ROLL CURB AND GUTTER**  
(NOT TO SCALE)

**6 18" STRAIGHT CURB AND GUTTER**  
(NOT TO SCALE)

**7 SIDEWALK SECTION**  
(NOT TO SCALE)

**8 CONCRETE SIDEWALK ADJACENT TO CURB**  
(NOT TO SCALE)

**NOTES:**  
 1. CROSS SLOPE OF SIDEWALK NOT TO EXCEED 2%.  
 2. SIDEWALK AND CURB SPACING VARIES, SEE PLAN FOR SIDEWALK LOCATION.

**INVERTED PARABOLIC CROWN VARIES SEE GRADING PLAN**

**NOTES:**  
 1. CROSS SLOPE OF SIDEWALK NOT TO EXCEED 2%.  
 2. SIDEWALK AND CURB SPACING VARIES, SEE PLAN FOR SIDEWALK LOCATION.

**9 TYPICAL INVERTED CROWN SECTION - WITH PARKING**  
(NOT TO SCALE)

**10 TYPICAL CROWN CROSS SECTION WITH PARKING**  
(NOT TO SCALE)

| ITEM:             | MATERIAL:                                   | SWA SPECIFICATION SECTION NAME: |
|-------------------|---|---------------------------------|
| SUBGRADE          | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL | EARTH MOVING                    |
| CONCRETE PAVEMENT | CAST-IN-PLACE CONCRETE                      | CONCRETE PAVING                 |

**NOTES:**  
 1. WHERE SHOWN, SEE PLAN FOR EXPANSION AND CONTROL JOINT LOCATIONS. OTHERWISE, SEE SPECS FOR REQUIRED LOCATION AND SPACING.  
 2. CONTRACTOR IS ADVISED THAT PAVING DESIGN RECOMMENDED BY GEOTECHNICAL ENGINEER IS BASED ON PREDICTED TRAFFIC LOADING AND ESTABLISHED STRENGTHS FOR PROPERLY INSTALLED PAVEMENTS. CONTRACTOR MUST COORDINATE REQUIRED GEOTECHNICAL TESTING & INSPECTION TO ENSURE THAT SUBGRADE AND PAVEMENT STRENGTH REQUIREMENTS ARE MET.  
 3. 5" THICK PAVING SECTION FOR BLEACHER PAD. 4" THICK PAVING SECTION FOR BASKETBALL COURT.

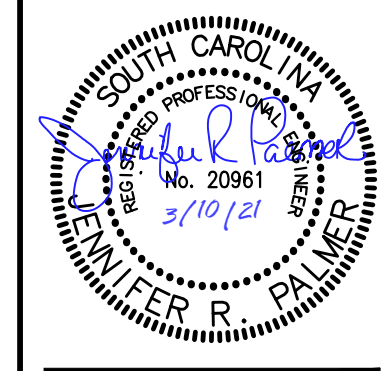
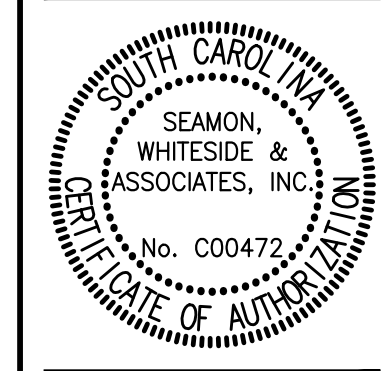
**11 CONCRETE PAVING SECTION**  
(NOT TO SCALE)

**NOTES:**  
 1. CONTRACTOR MUST INSTALL CURB AND SYNTHETIC TURF PER MANUFACTURER SPECIFICATIONS.

**12 6" CONCRETE FLAT CURB**  
(NOT TO SCALE)

**SEAMON WHITESIDE**  
**SEAMONWHITESIDE**

MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
 CHARLOTTE, NC 980.312.5450  
 WWW.SEAMONWHITESIDE.COM



**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

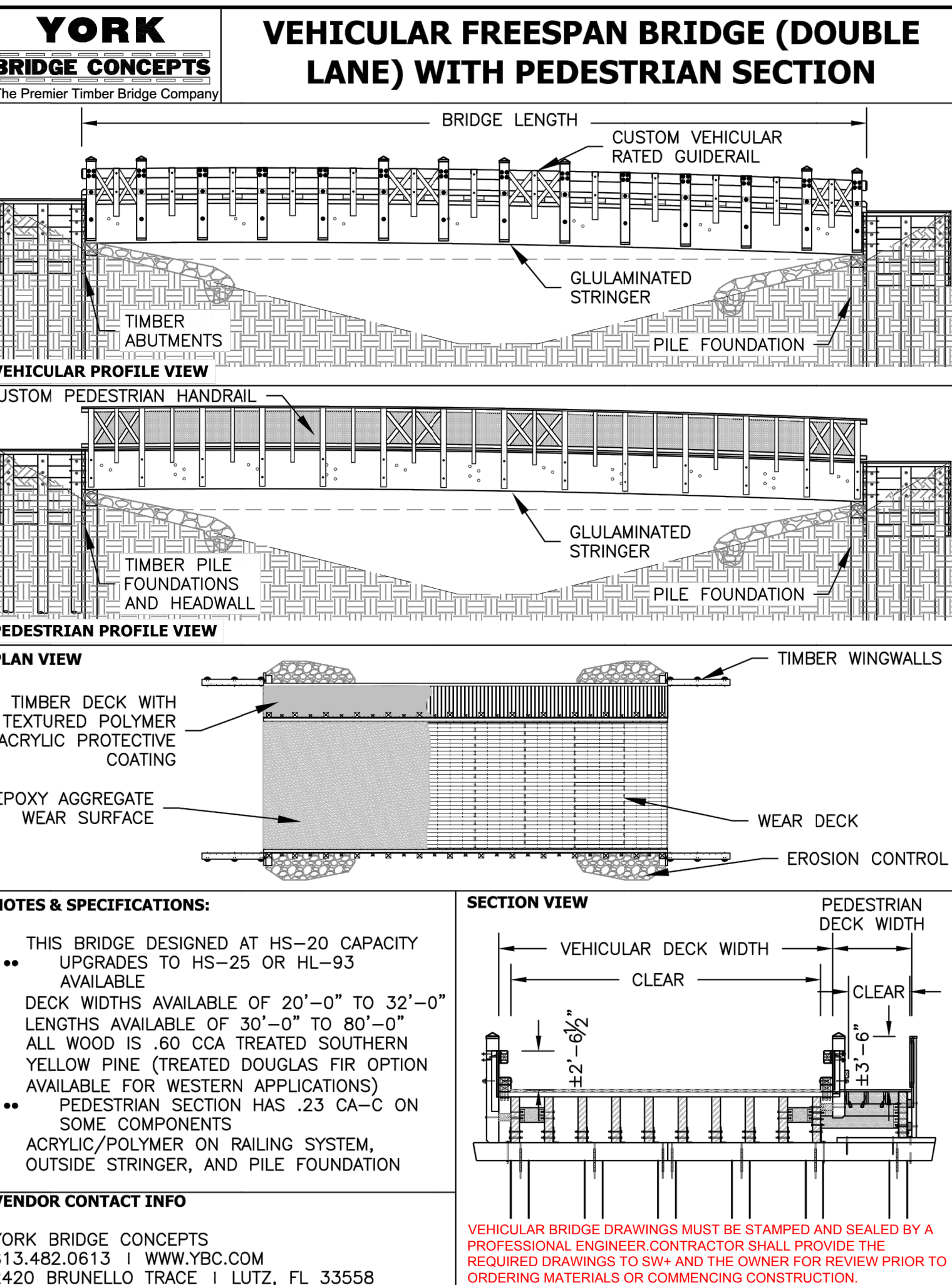
SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

**SITE DETAILS**

**C5.0**

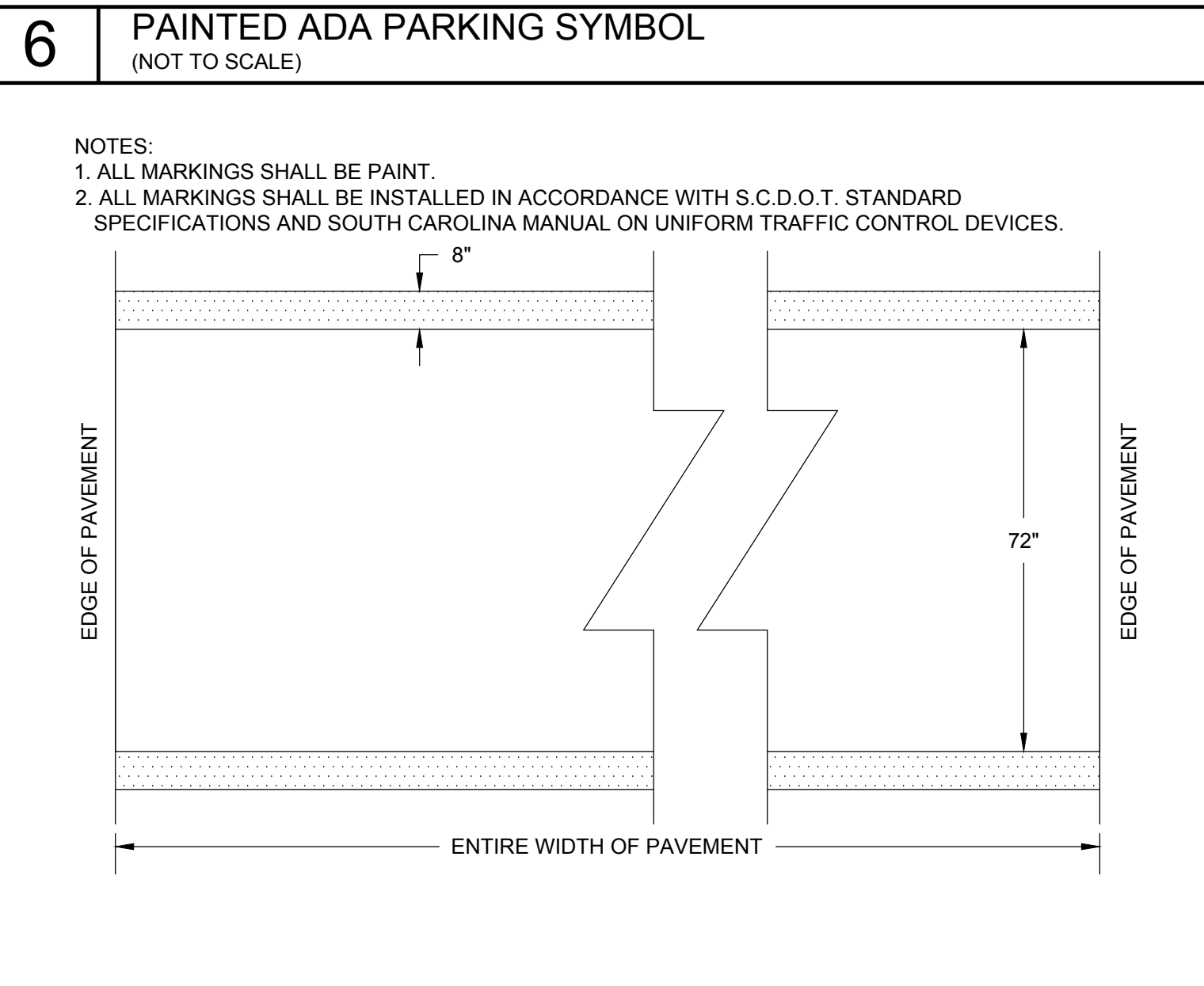
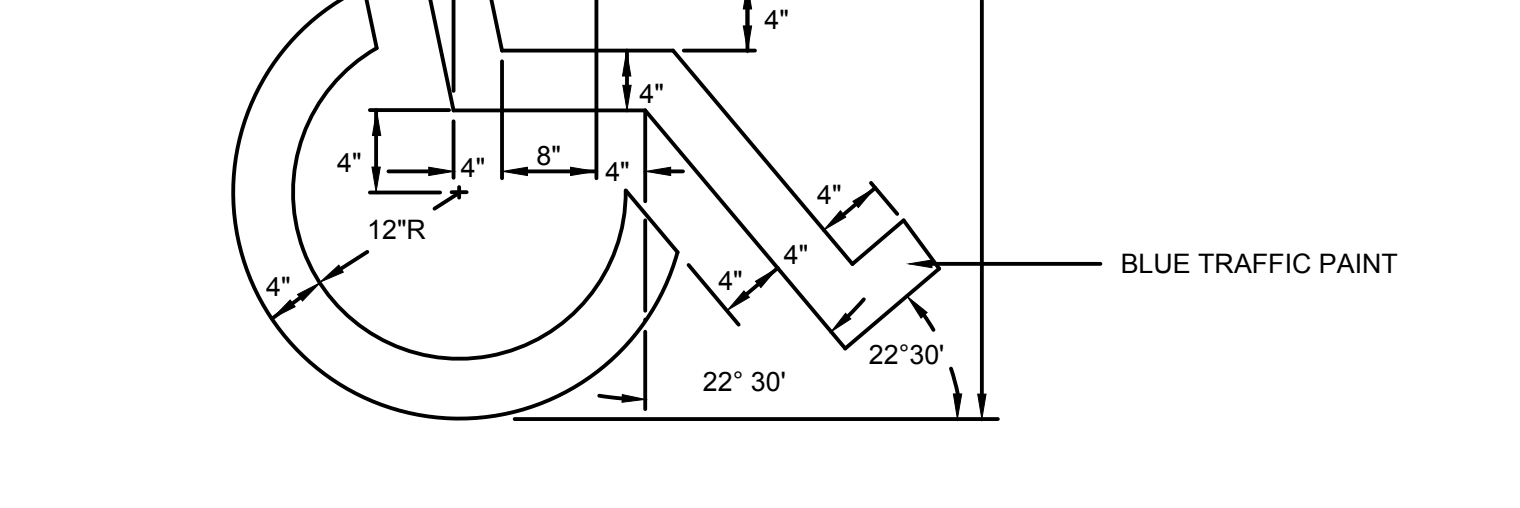
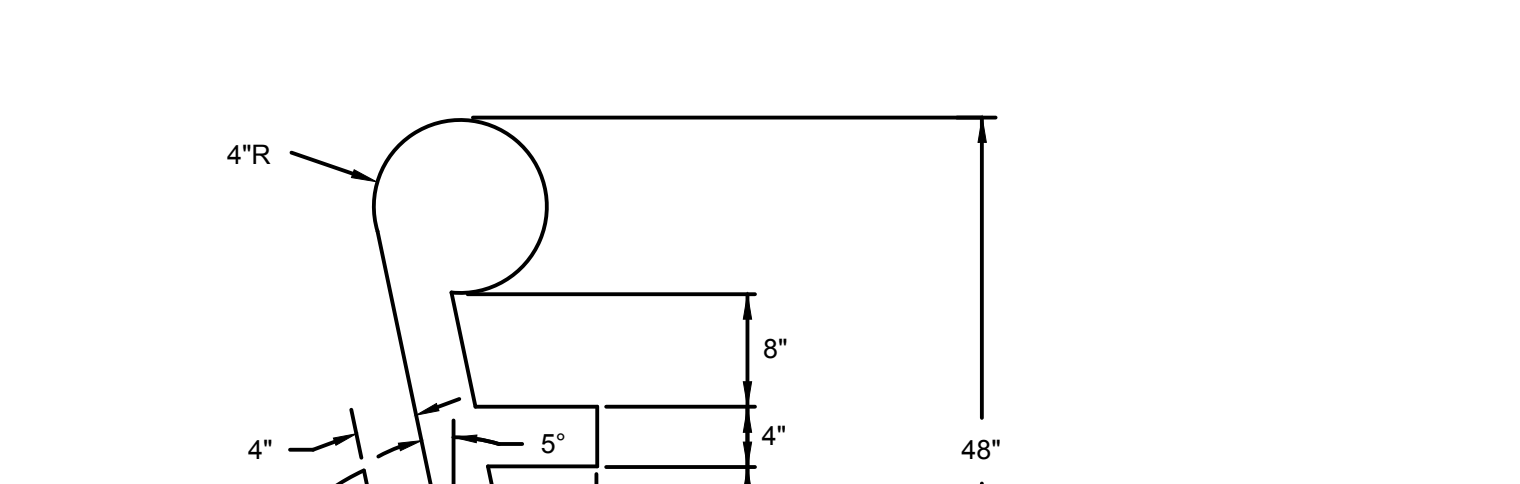
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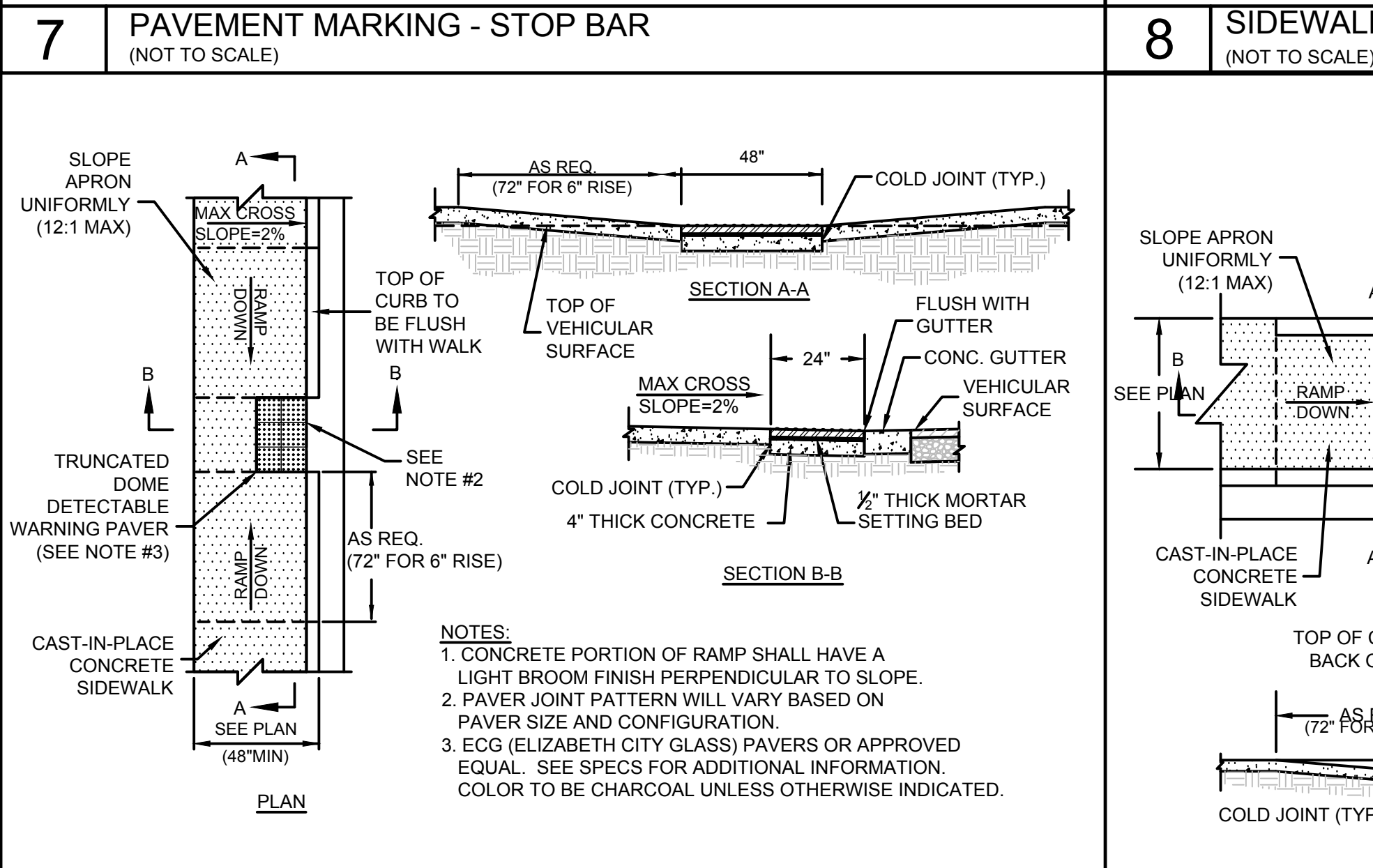
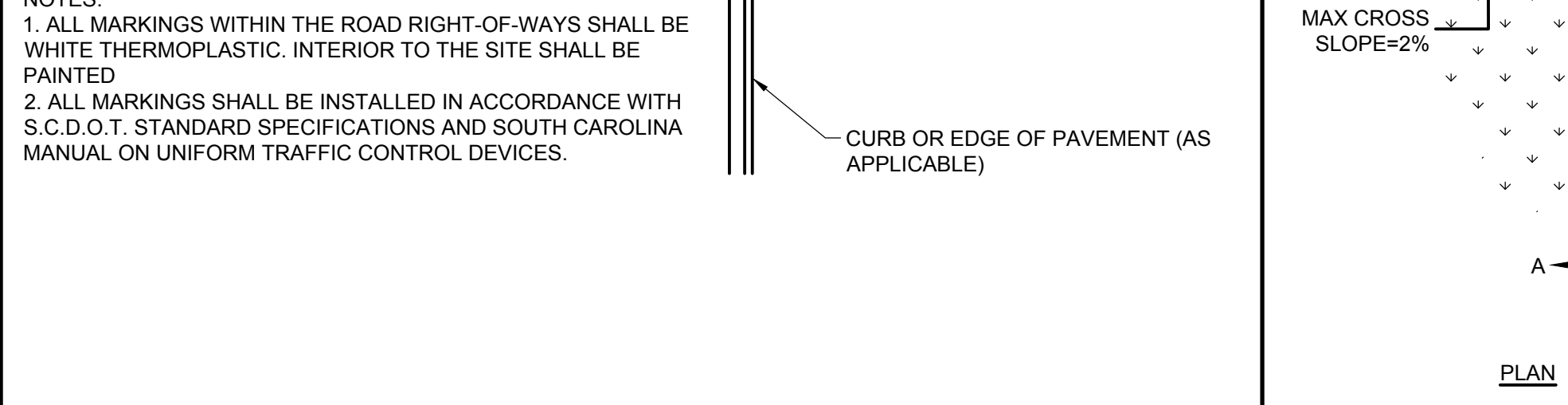
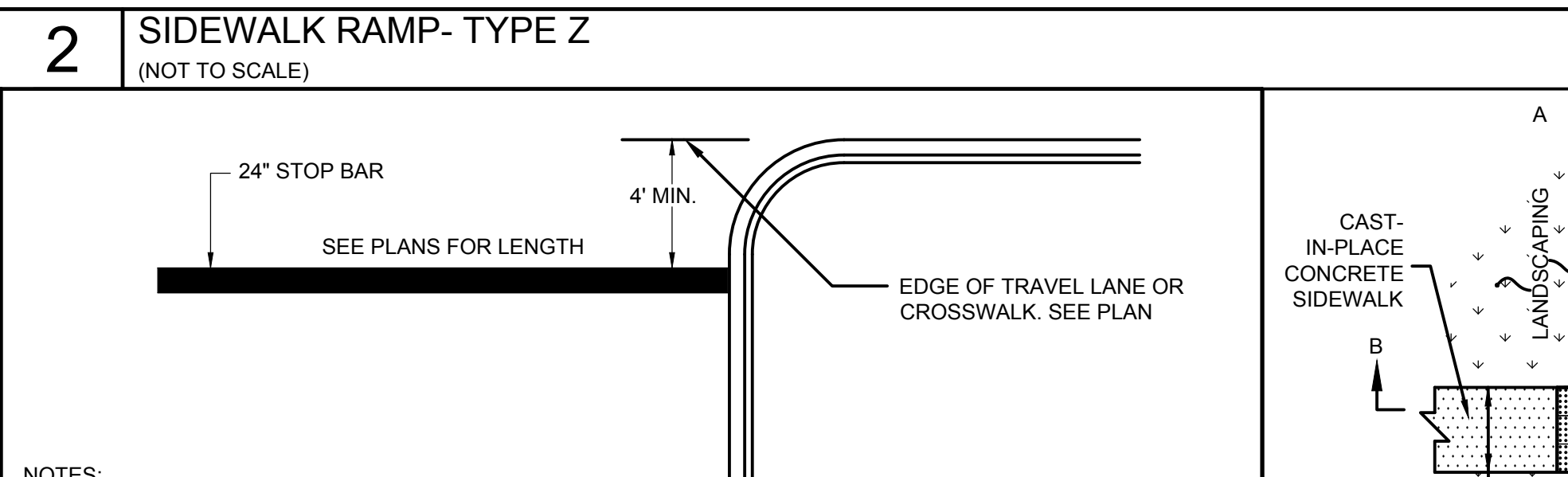
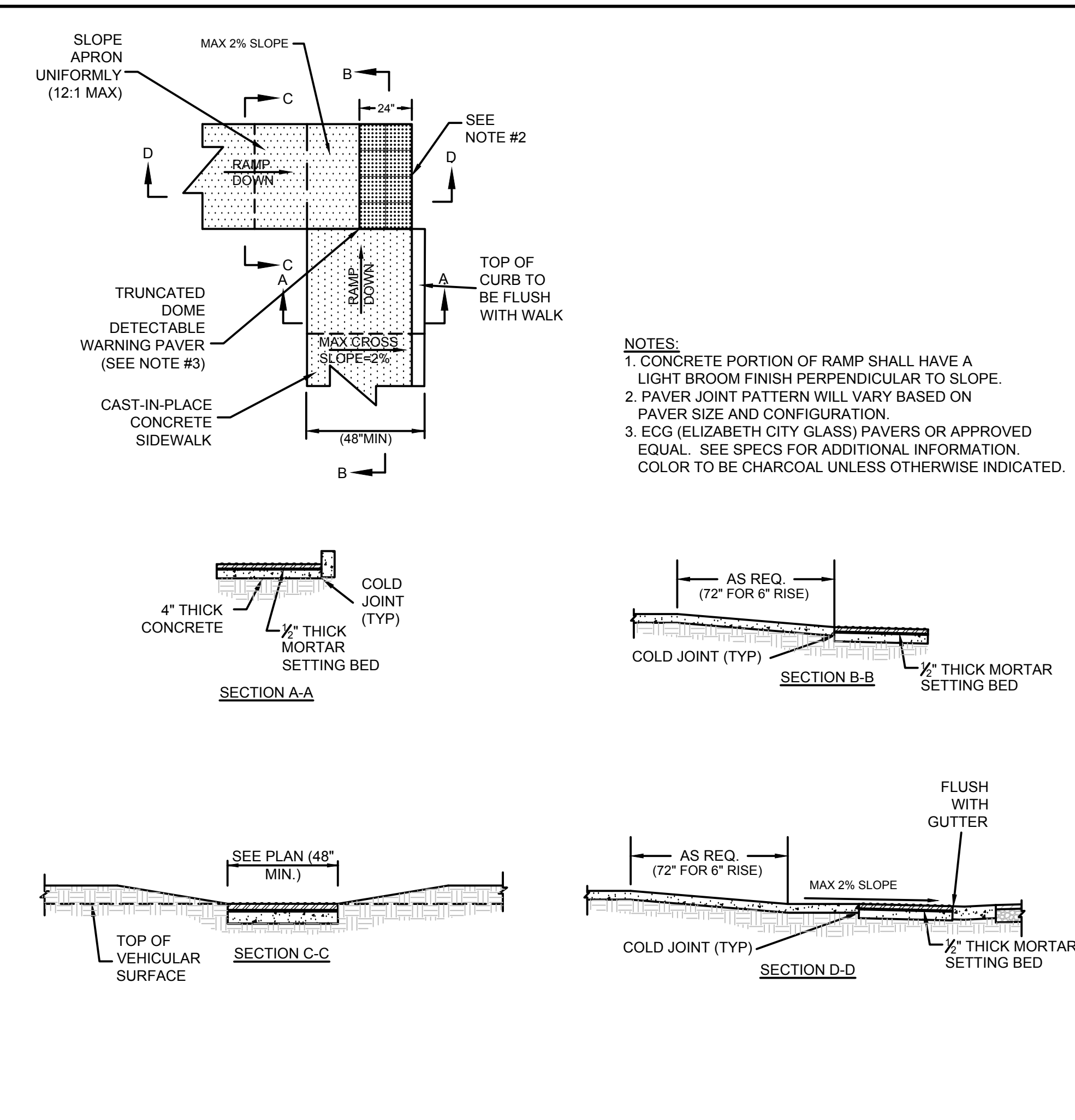
**NOTES & SPECIFICATIONS:**

- THIS BRIDGE DESIGNED AT HS-20 CAPACITY UPGRADES TO HS-25 OR HL-93 AVAILABLE
- DECK WIDTHS AVAILABLE OF 20'-0" TO 32'-0"
- LENGTHS AVAILABLE OF 30'-0" TO 80'-0"
- ALL WOOD IS .60 CCA TREATED SOUTHERN YELLOW PINE (TREATED DOUGLAS FIR OPTION AVAILABLE FOR WESTERN APPLICATIONS)
- PEDESTRIAN SECTION HAS .23 CA-C ON SOME COMPONENTS
- ACRYLIC/POLYMER ON RAILING SYSTEM, OUTSIDE STRINGER, AND PILE FOUNDATION

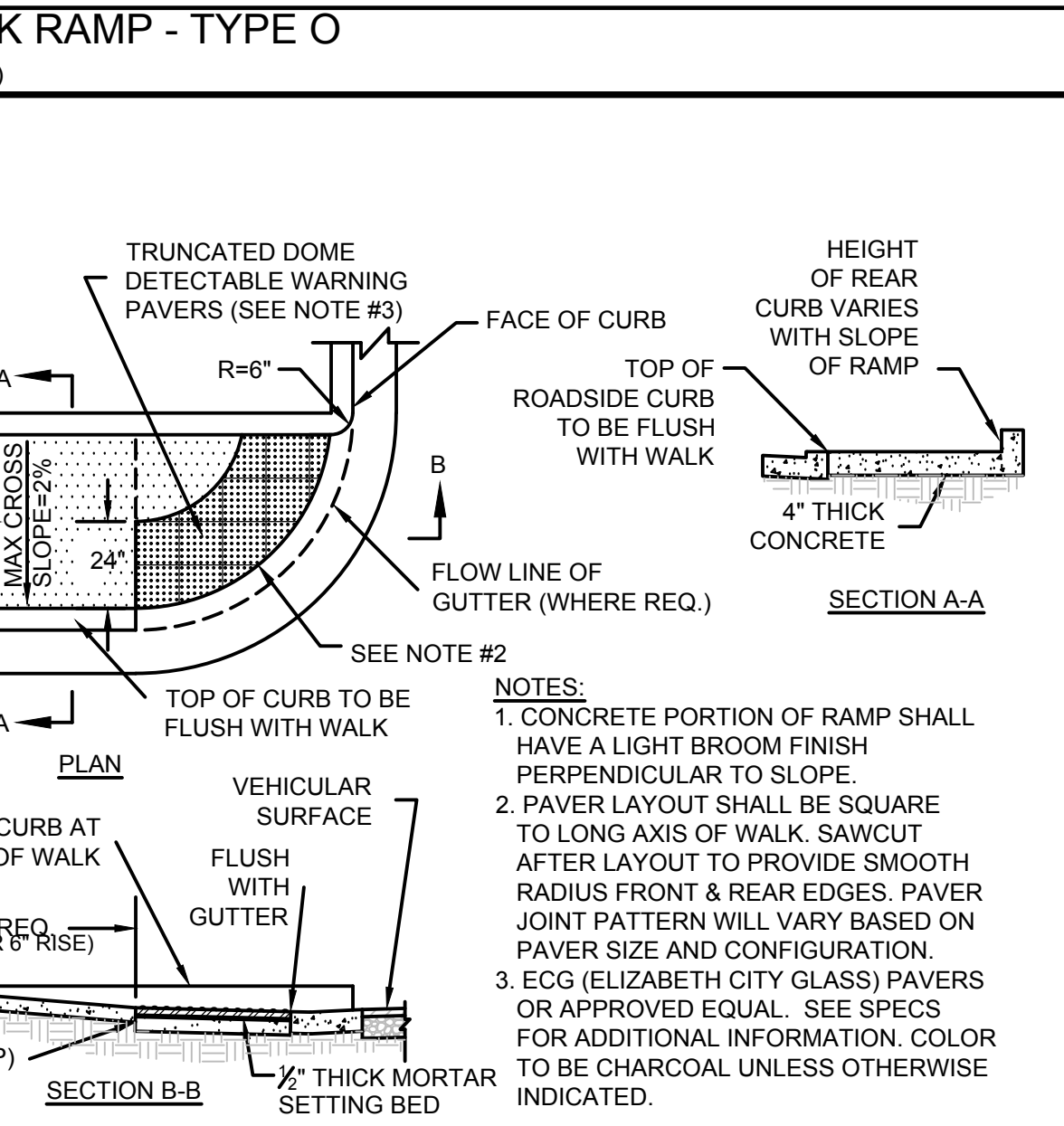
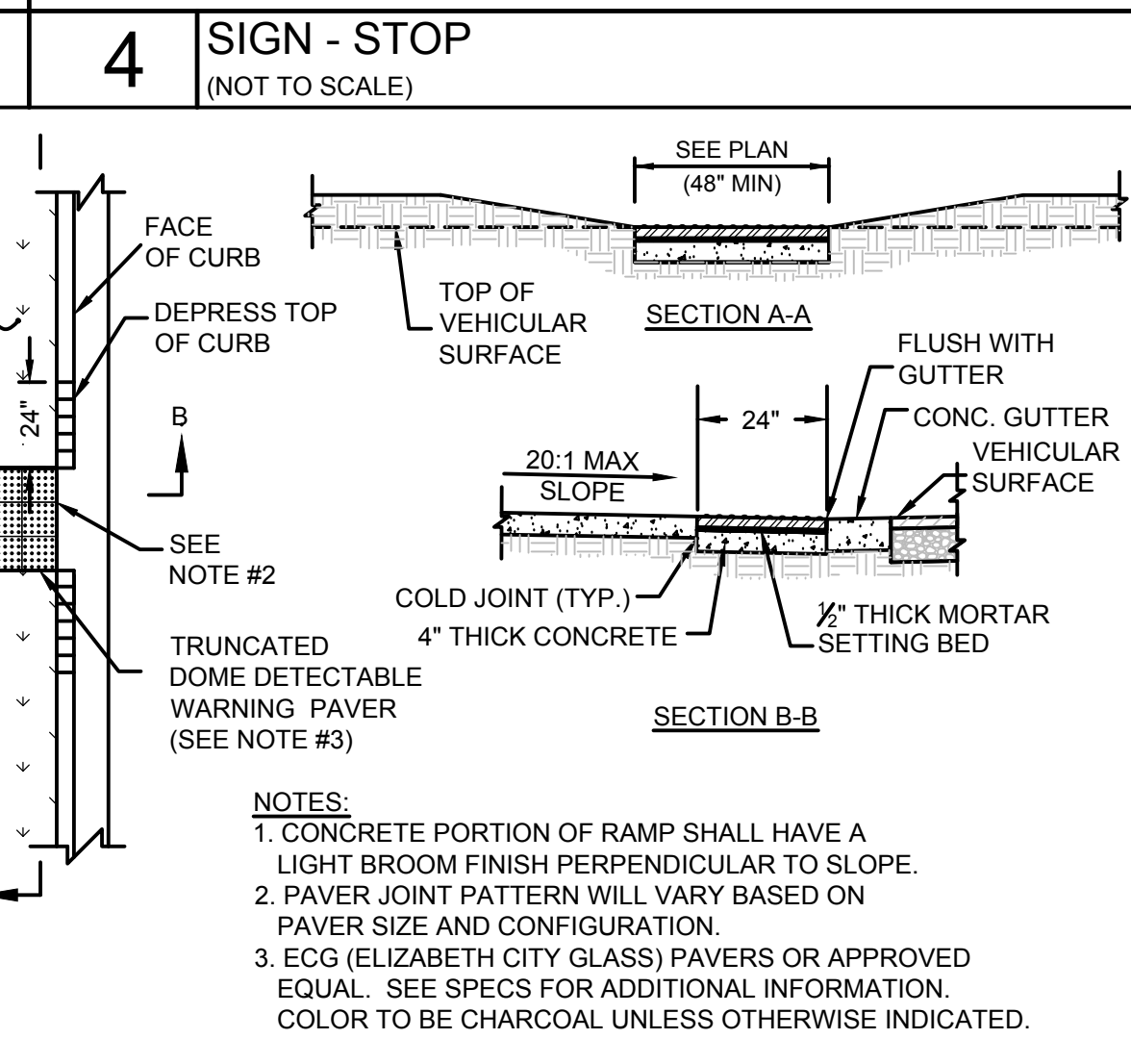
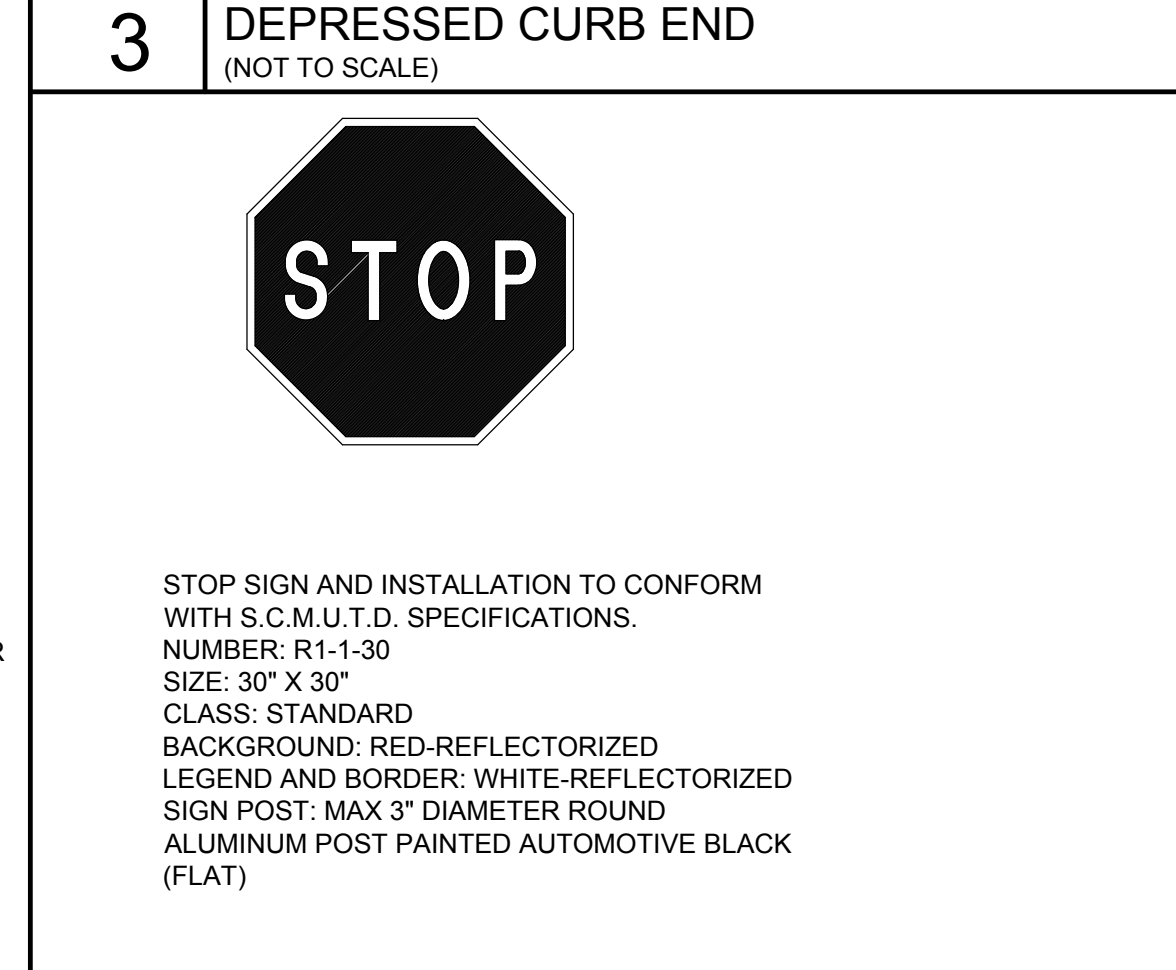
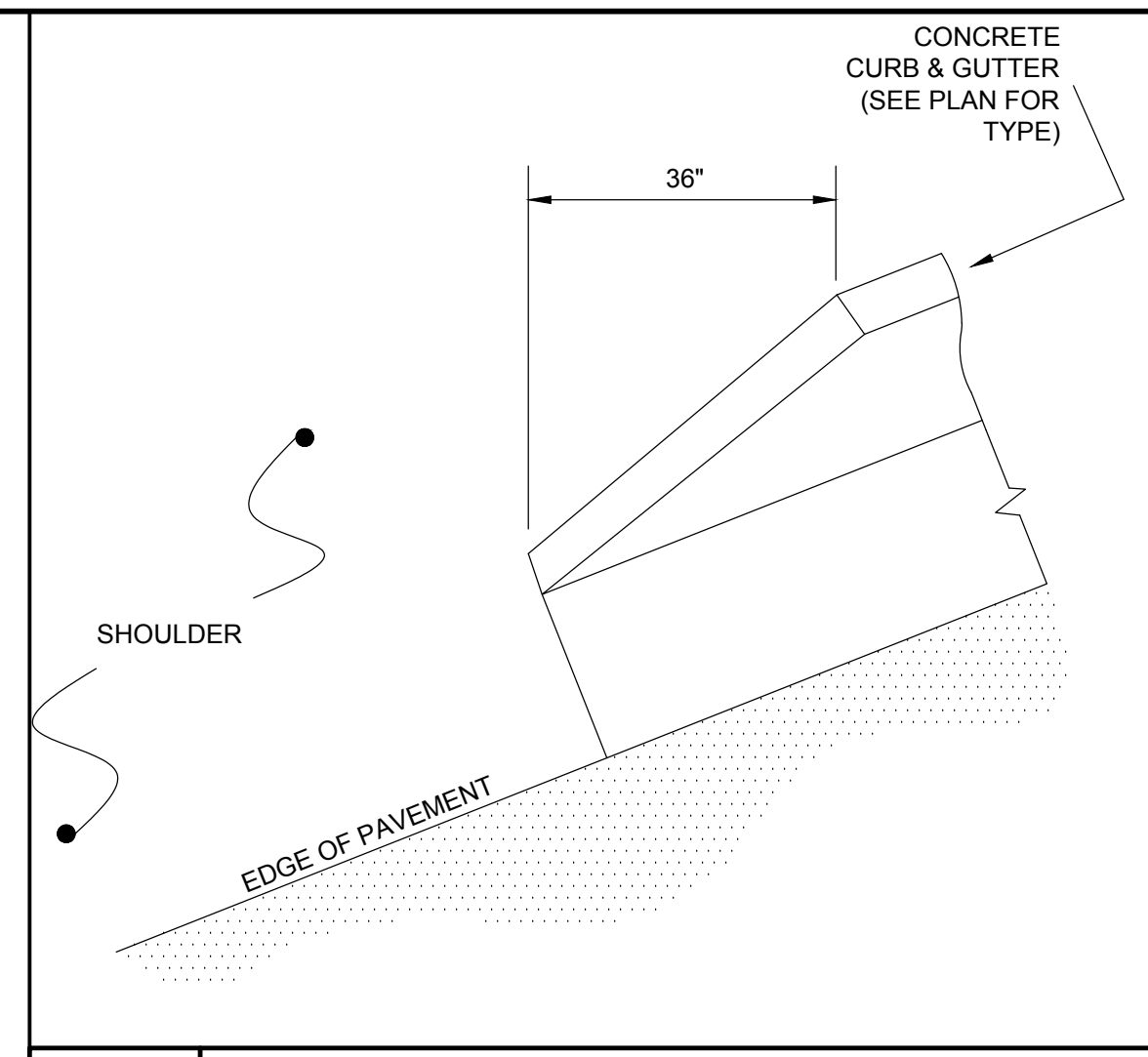
**VENDOR CONTACT INFO**  
 YORK BRIDGE CONCEPTS  
 913.482.0613 | WWW.YBC.COM  
 2420 BRUNELLO TRACE | LUTZ, FL 33558



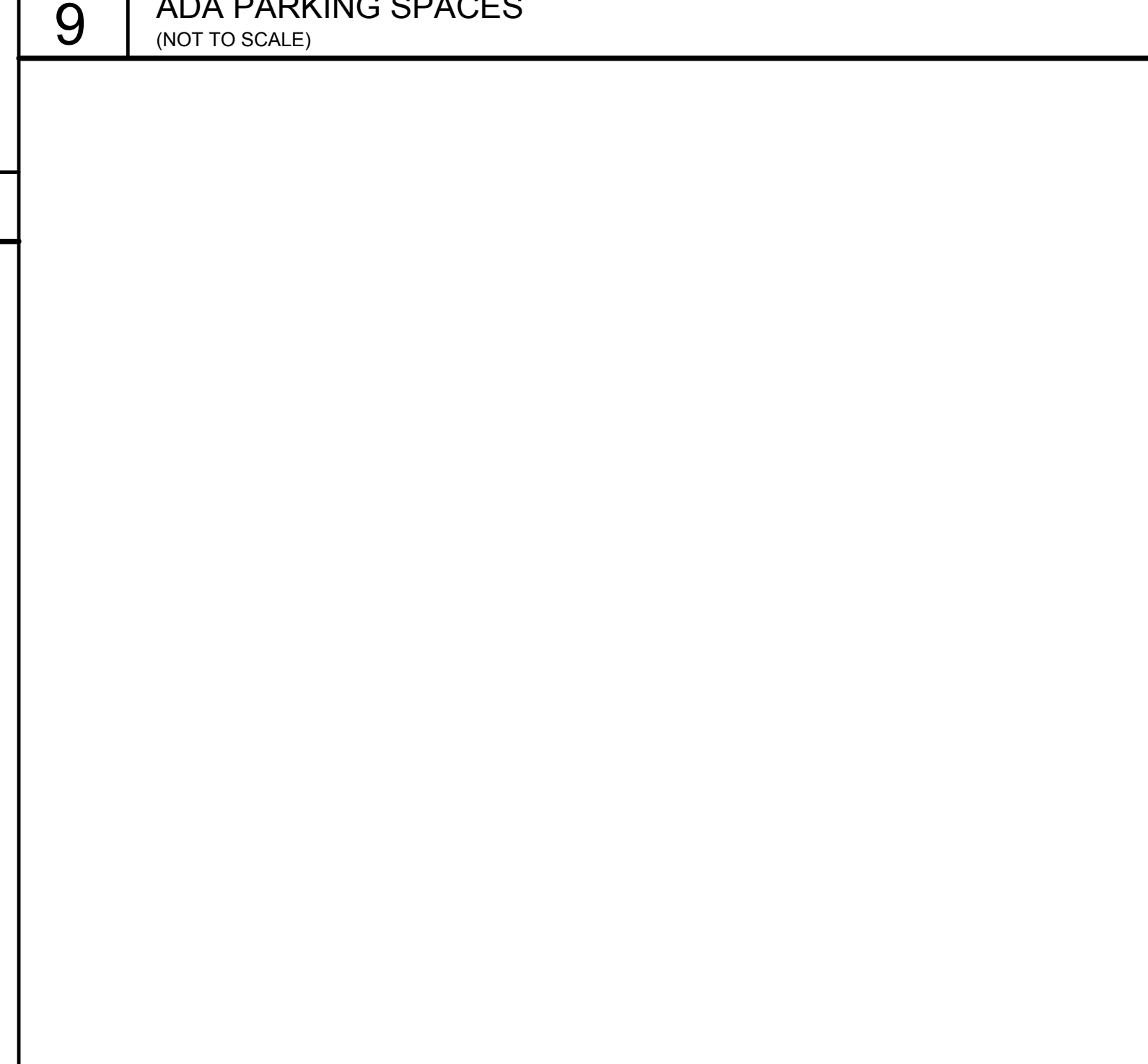
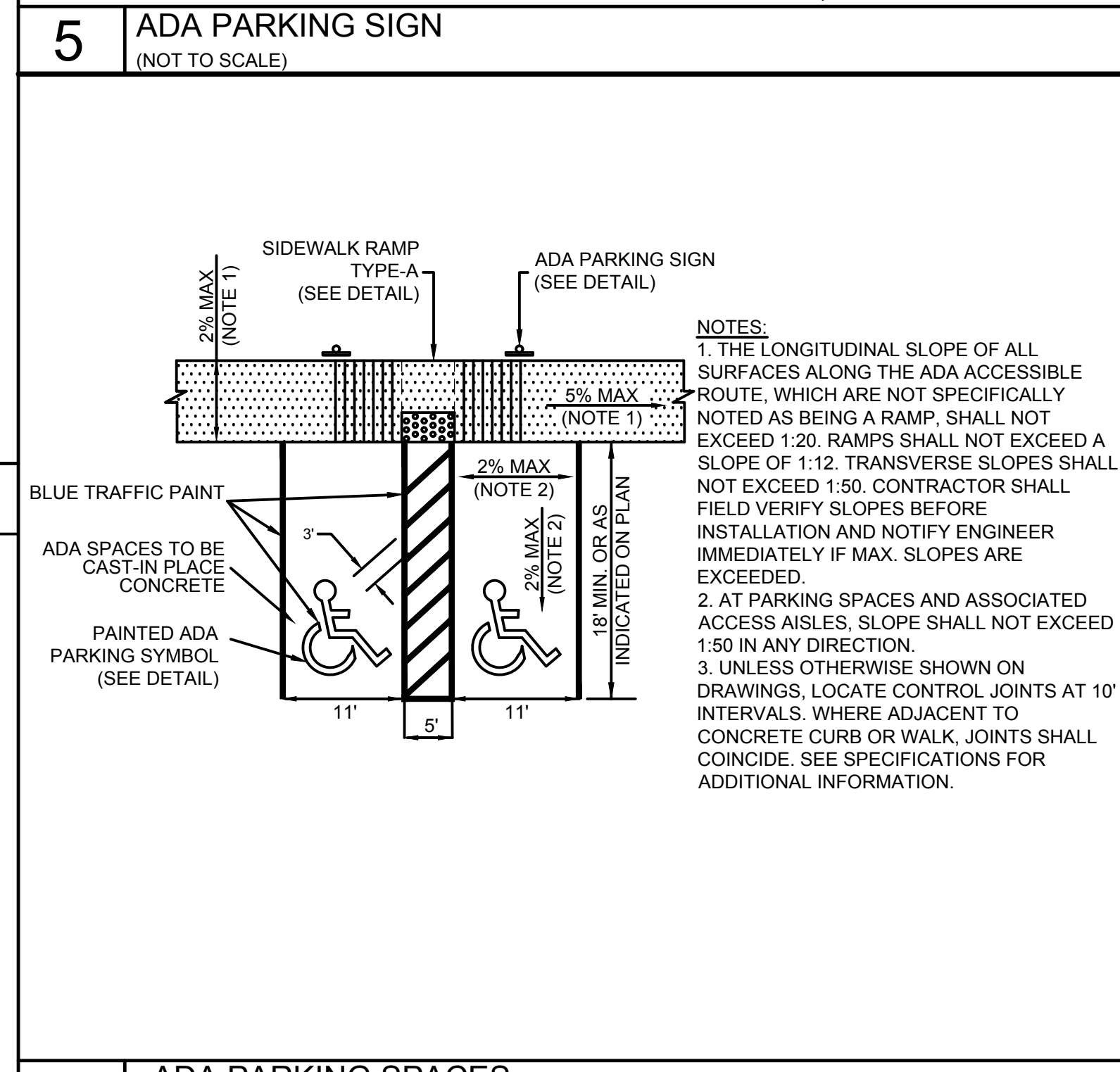
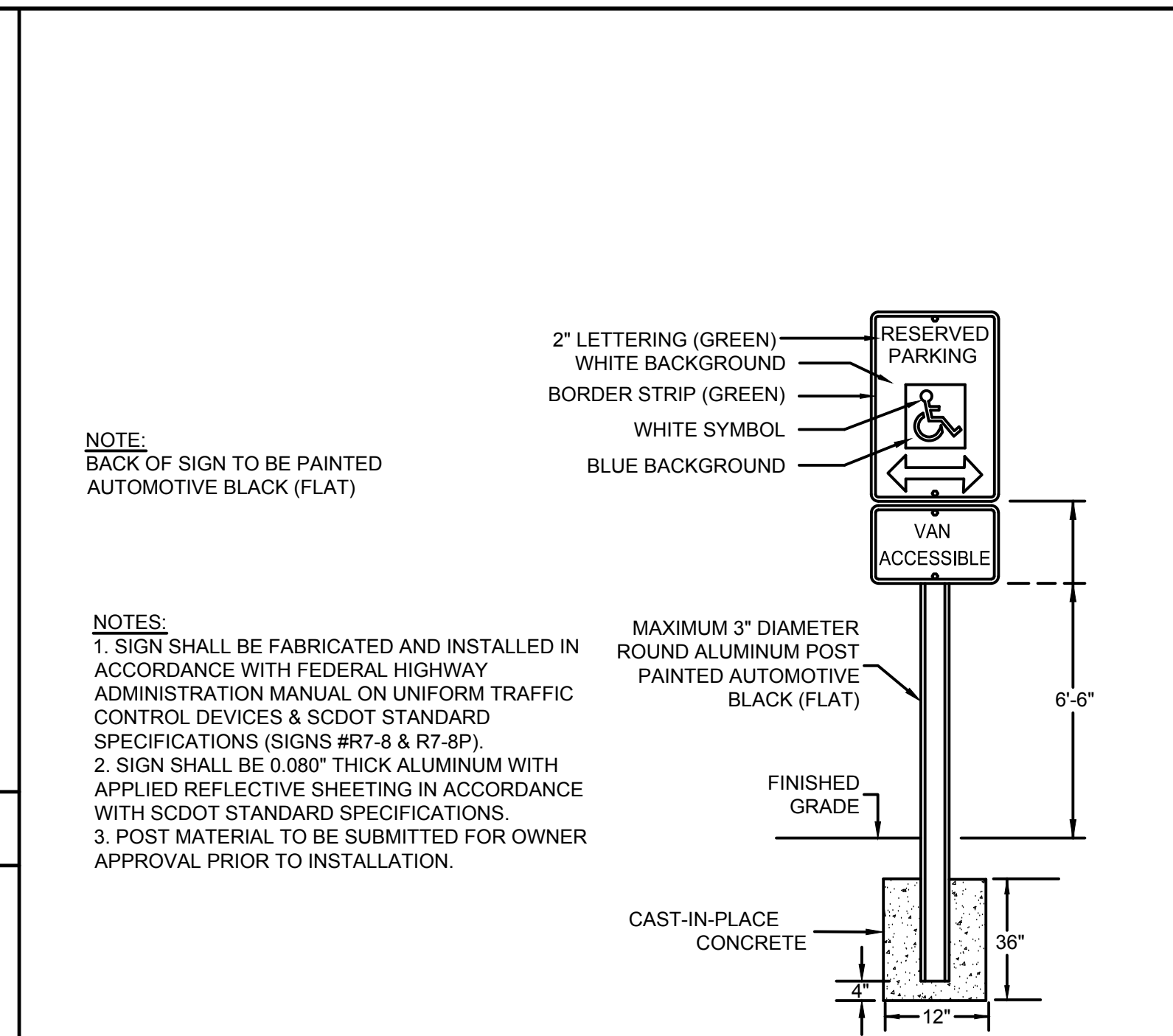
**11 SIDEWALK RAMP - TYPE A**  
 (NOT TO SCALE)



**12 SIDEWALK RAMP - TYPE P**  
 (NOT TO SCALE)

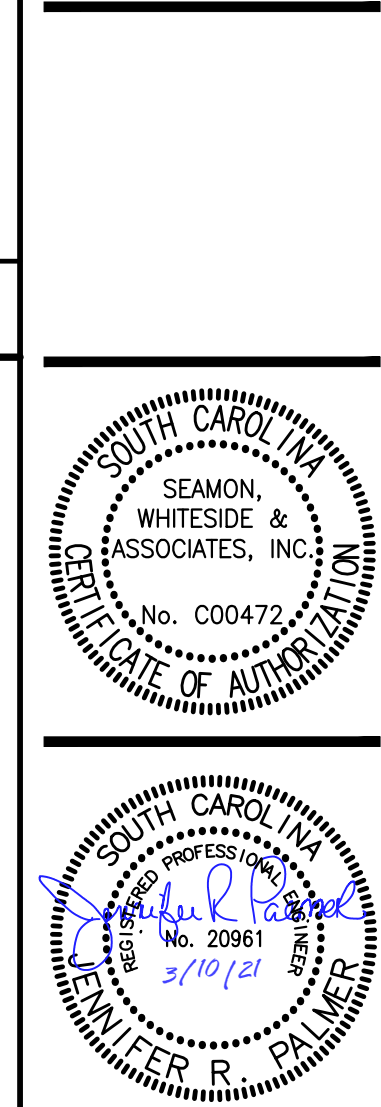


**9 ADA PARKING SPACES**  
 (NOT TO SCALE)



**12 SIDEWALK RAMP - TYPE P**  
 (NOT TO SCALE)

**SEAMON WHITESIDE**  
 SEAMONWHITESIDE  
 MOUNT PLEASANT, SC 29464  
 GREENVILLE, SC 29601  
 SUMMERVILLE, SC 29586  
 SPARTANBURG, SC 29176  
 CHARLOTTE, NC 28203  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

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**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

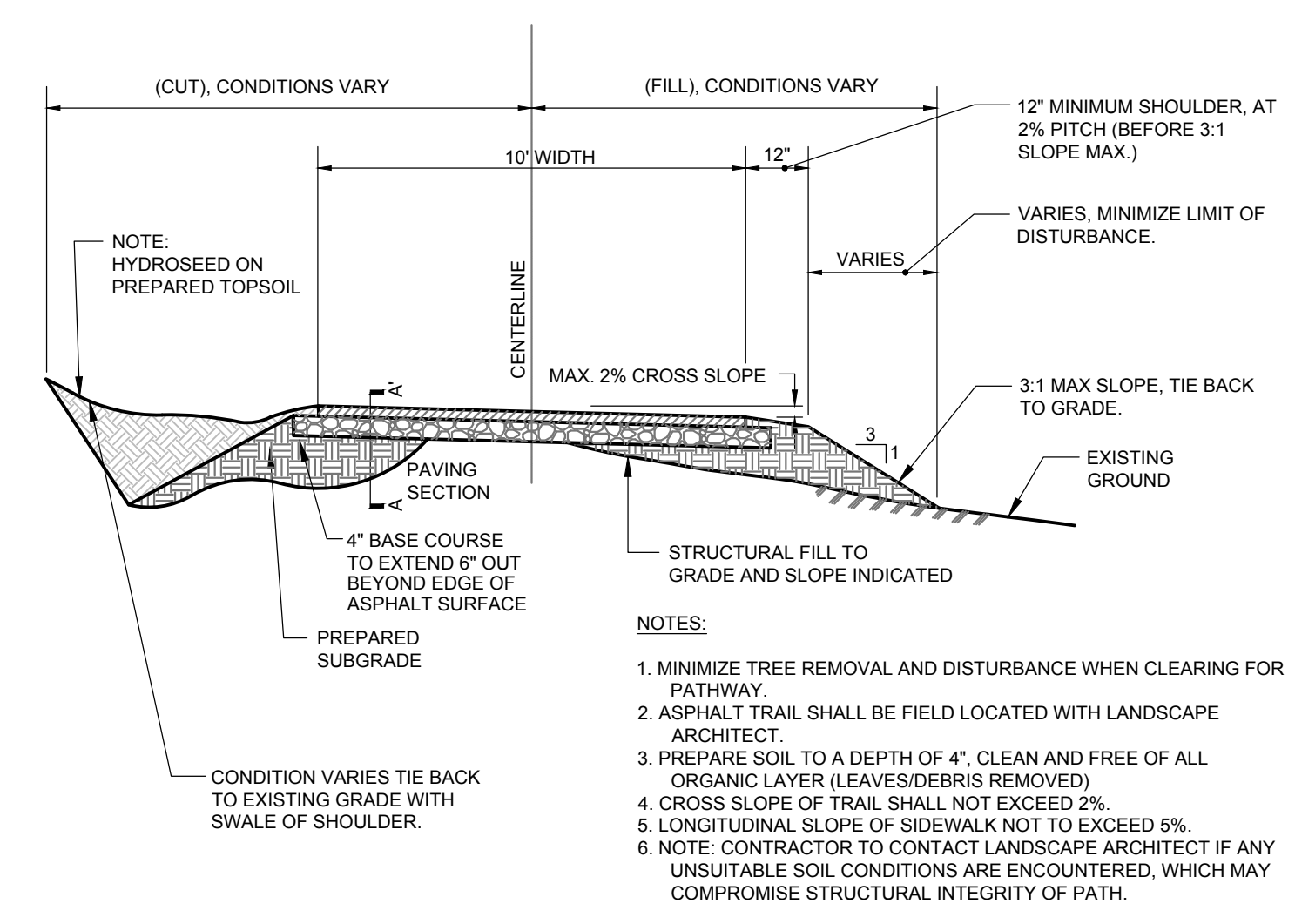
**SITE DETAILS**

C5.1

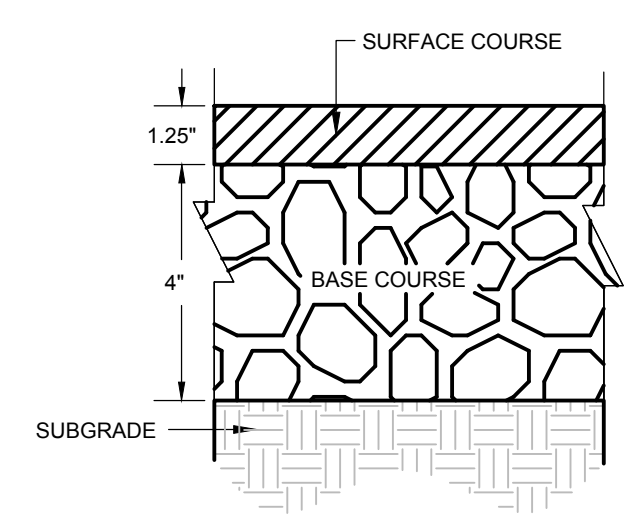
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| ITEM:          | MATERIAL:                                   | SWA SPECIFICATION SECTION NAME: |
|----------------|---|---------------------------------|
| SUBGRADE       | PREPARED IN-SITU SUBSOIL OR STRUCTURAL FILL | EARTH MOVING                    |
| BASE COURSE    | GRADED AGGREGATE BASE COURSE                | EARTH MOVING                    |
| SURFACE COURSE | HOT MIX ASPHALT SURFACE COURSE (TYPE C)     | ASPHALT PAVING                  |



PAVING SECTION A-A'

NOTE:  
 1. CONTRACTOR IS ADVISED THAT PAVING DESIGN RECOMMENDED BY GEOTECHNICAL ENGINEER IS BASED ON PREDICTED TRAFFIC LOADING AND ESTABLISHED STRENGTHS FOR PROPERLY INSTALLED PAVEMENTS. CONTRACTOR MUST COORDINATE REQUIRED GEOTECHNICAL TESTING & INSPECTION TO ENSURE THAT SUBGRADE AND PAVEMENT STRENGTH REQUIREMENTS ARE MET.

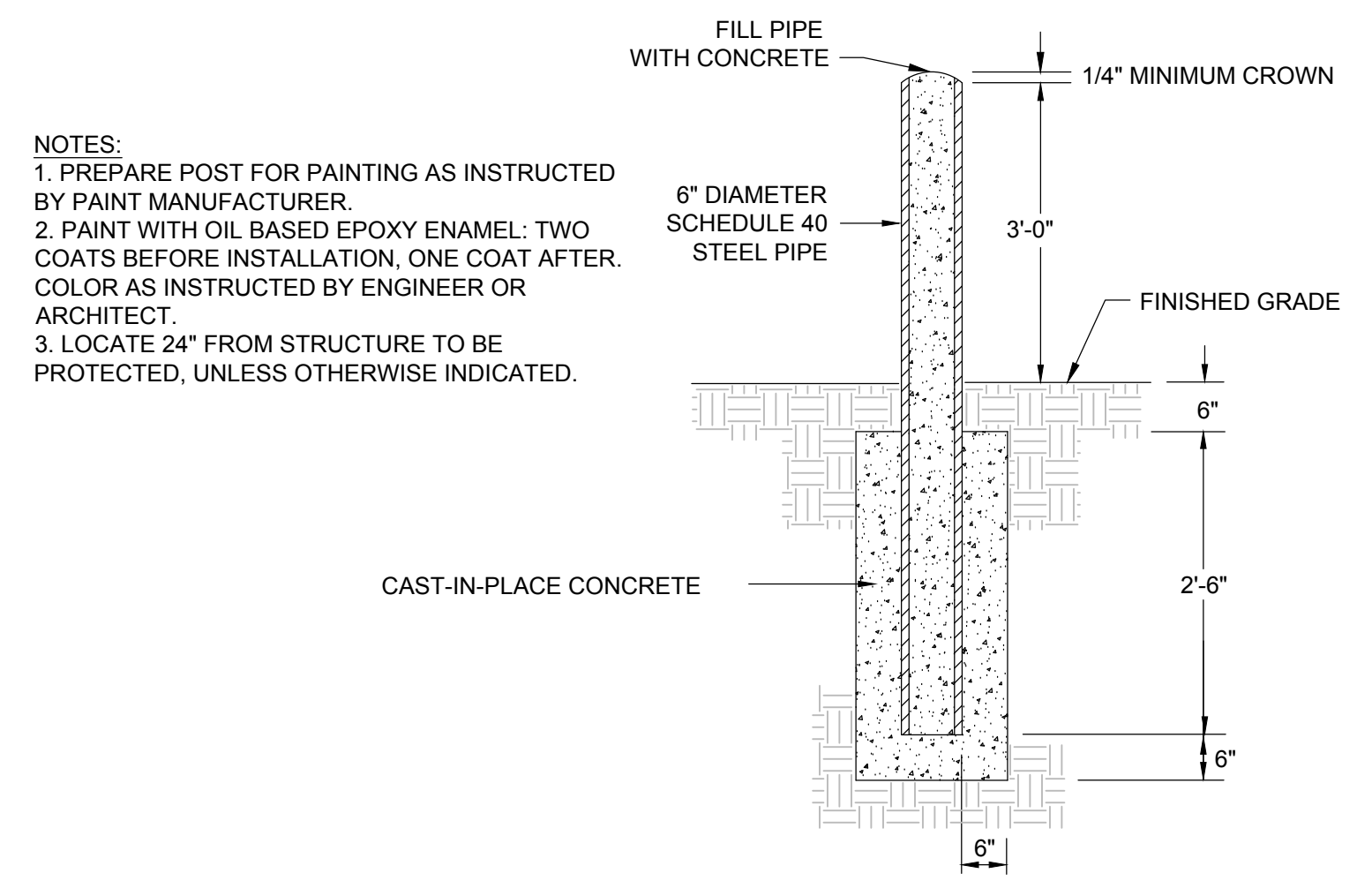


NUMBER: R6-1R-36

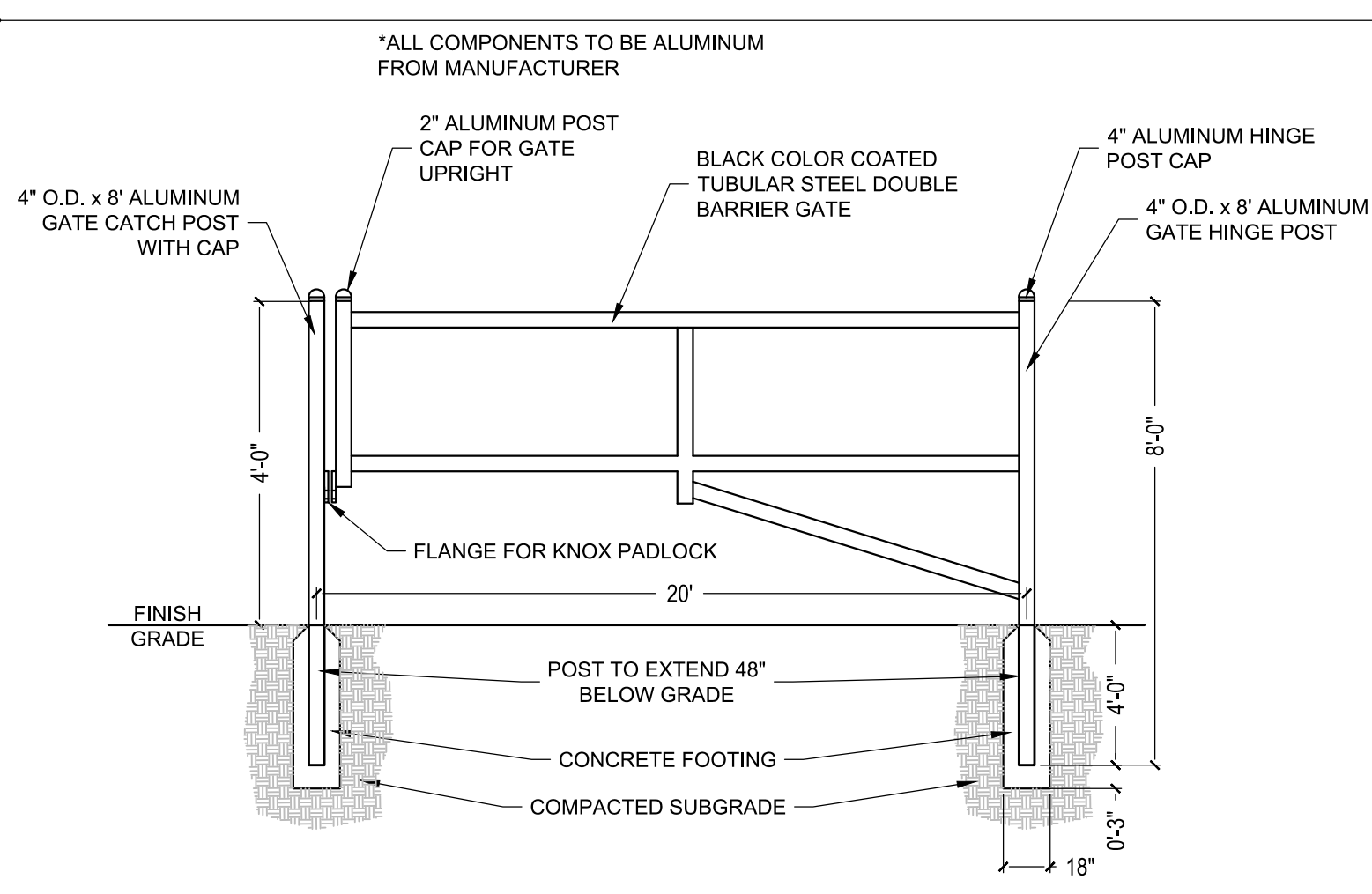
ONE-WAY SIGNS AND INSTALLATION TO CONFORM WITH M.U.T.C.D. SPECIFICATIONS.  
 SIZE: 36" X 12"  
 CLASS: STANDARD  
 BACKGROUND AND WORDS: BLACK  
 ARROW AND BORDER: WHITE-REFLECTORIZED  
 SIGN POST: GALVANIZED U-CHANNEL PER SCOTD SPECIFICATIONS

1 ASPHALT TRAIL  
(NOT TO SCALE)

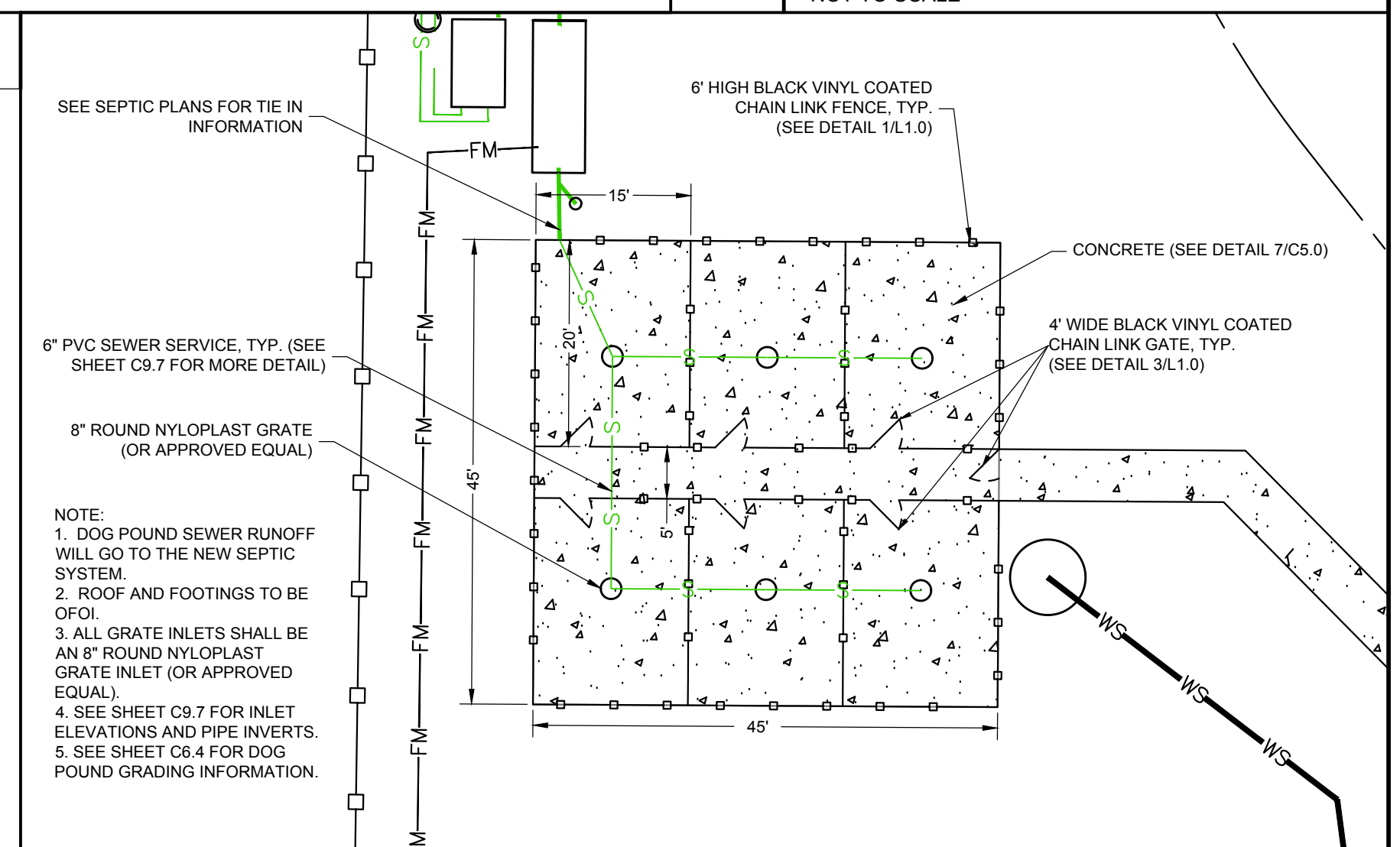
2 SIGN - ONE - WAY  
(NOT TO SCALE)



NOTES:  
 1. PREPARE POST FOR PAINTING AS INSTRUCTED BY PAINT MANUFACTURER.  
 2. PAINT WITH OIL BASED EPOXY ENAMEL: TWO COATS BEFORE INSTALLATION, ONE COAT AFTER. COLOR AS INSTRUCTED BY ENGINEER OR ARCHITECT.  
 3. LOCATE 24" FROM STRUCTURE TO BE PROTECTED, UNLESS OTHERWISE INDICATED.



NOTES:  
 1. GATE SHALL BE 4' HIGH H-SERIES TUBULAR ALUMINUM SINGLE BARRIER GATE KIT MANUFACTURED BY HOOVER FENCES OR APPROVED EQUAL.  
 2. SEE MANUFACTURER'S SPECS FOR DETAILS AND INSTALLATION.  
 3. COORDINATE POST LOCATIONS WITH UTILITIES. LOCATE POST NO CLOSER THAN 24" TO B.O.C.  
 4. GATE CATCH POSTS SHALL INCLUDE FLANGES TO RECEIVE KNOX PADLOCK.  
 5. GATE SHALL BE SECURED TO CATCH POST WITH KNOX PADLOCK.  
 6. ALL COMPONENTS TO BE PAINTED BLACK WITH TNEPEC SERIES 73 PAINT.



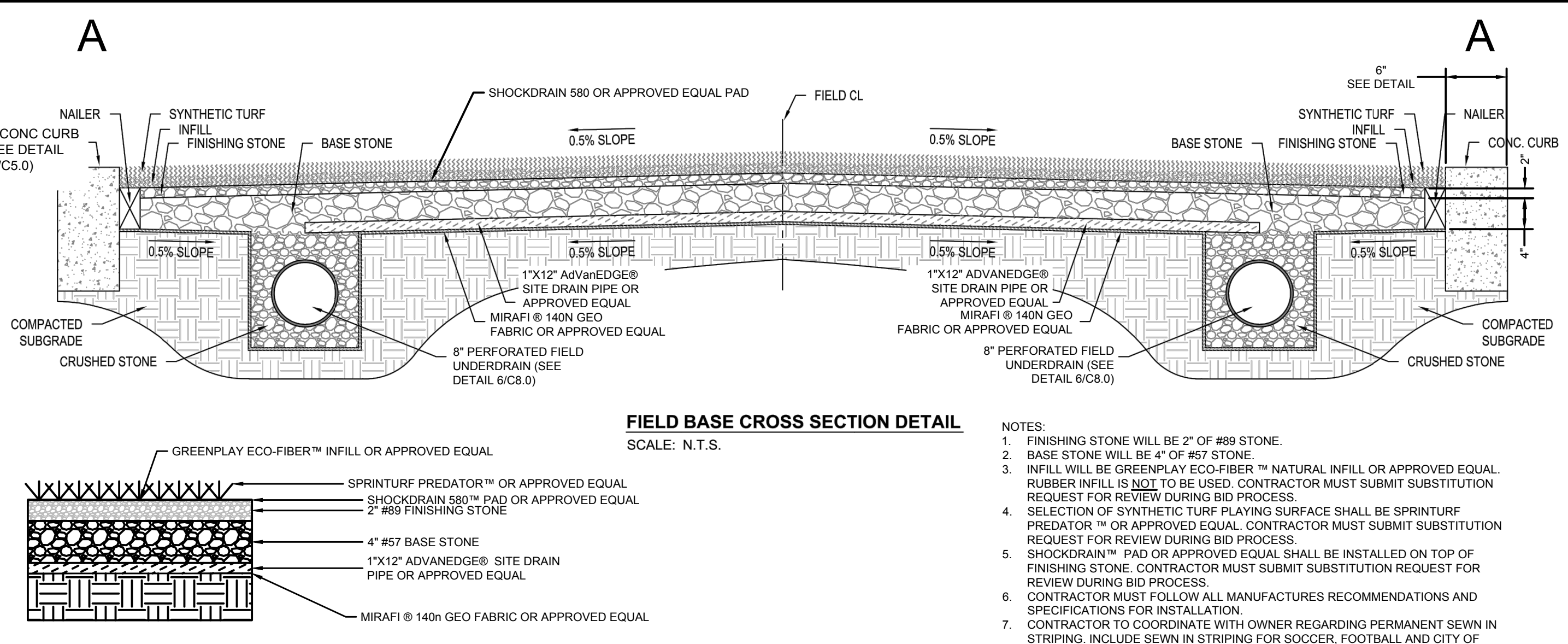
5 DOG POUND  
(NOT TO SCALE)

NOTE:  
 1. SEE MANUFACTURER'S SPECS FOR DETAILS AND INSTALLATION.  
 2. COORDINATE POST LOCATION WITH UTILITIES. LOCATE POST NO CLOSER THAN 24" TO B.O.C. UNLESS OTHERWISE NOTED.  
 3. (2) 4" O.D. 8' GALVANIZED GATE CATCH POSTS TO RECEIVE KNOX PADLOCK. CATCH POST SHALL BE 17" MAX. FROM EACH HINGE POST.  
 4. GATES SHALL BE SECURED TO CATCH POST WITH KNOX PADLOCK.  
 5. THE GATES SHALL BE MAINTAINED OPERATIONAL BY EMERGENCY PERSONNEL AT ALL TIMES.  
 6. ALL COMPONENTS TO BE PAINTED BLACK WITH TNEPEC SERIES 73 PAINT.

3 GUARD BOLLARD  
(NOT TO SCALE)

4 SINGLE ARM BARRIER GATE  
(NOT TO SCALE)

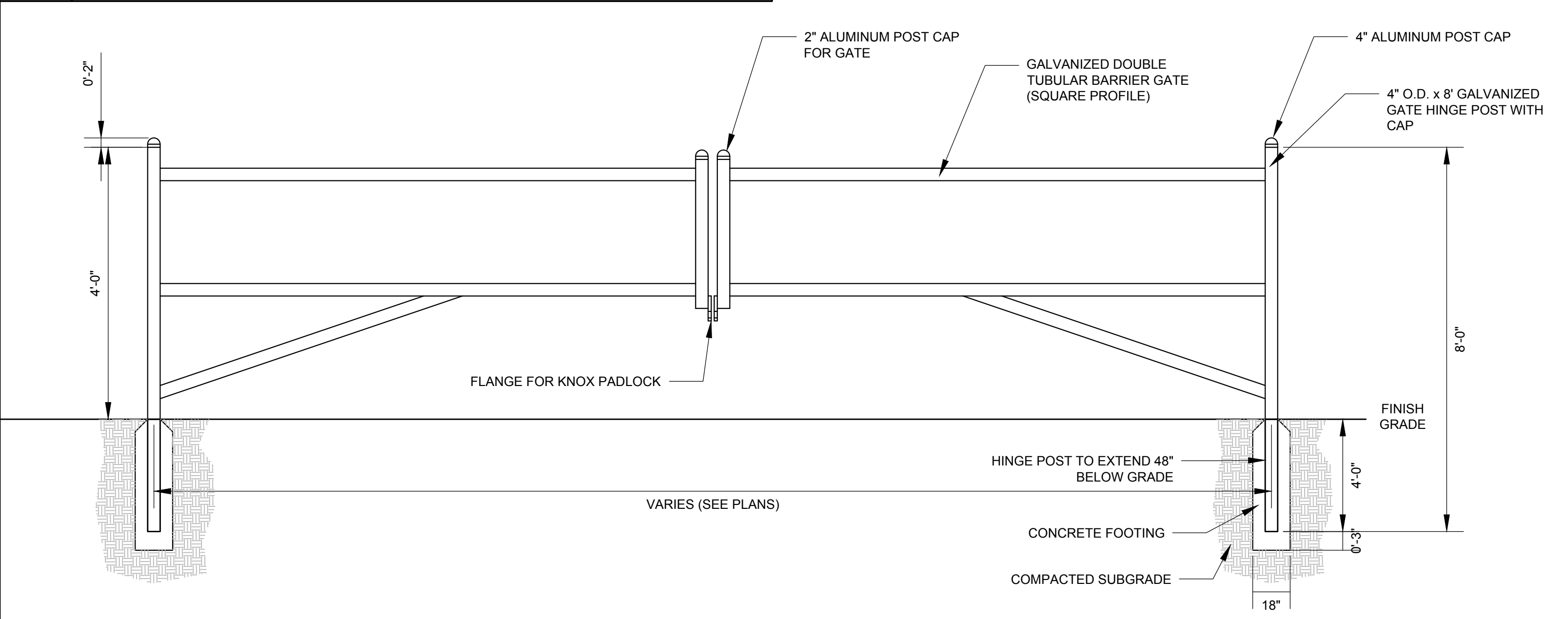
5 DOG POUND  
(NOT TO SCALE)



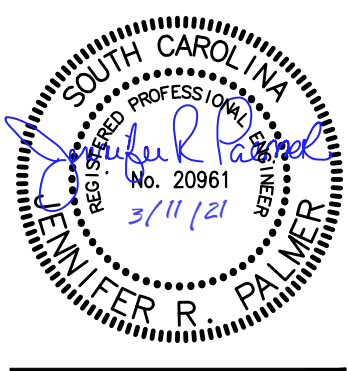
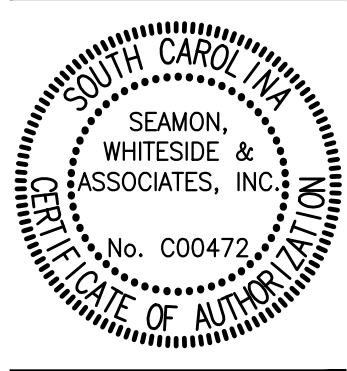
FIELD BASE CROSS SECTION DETAIL  
SCALE: N.T.S.

NOTES:  
 1. FINISHING STONE WILL BE 2" OF #89 STONE.  
 2. BASE STONE WILL BE 4" OF #57 STONE.  
 3. INFILL WILL BE GREENPLAY ECO-FIBER™ NATURAL INFILL OR APPROVED EQUAL. RUBBER INFILL IS NOT TO BE USED. CONTRACTOR MUST SUBMIT SUBSTITUTION REQUEST FOR REVIEW DURING BID PROCESS.  
 4. SELECTION OF SYNTHETIC TURF PLAYING SURFACE SHALL BE SPRINTURF PREDATOR™ OR APPROVED EQUAL. CONTRACTOR MUST SUBMIT SUBSTITUTION REQUEST FOR REVIEW DURING BID PROCESS.  
 5. SHOCKDRAIN™ PAD OR APPROVED EQUAL SHALL BE INSTALLED ON TOP OF FINISHING STONE. CONTRACTOR MUST SUBMIT SUBSTITUTION REQUEST FOR REVIEW DURING BID PROCESS.  
 6. CONTRACTOR MUST FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS FOR INSTALLATION.  
 7. CONTRACTOR TO COORDINATE WITH OWNER REGARDING PERMANENT SEWN IN STRIPING. INCLUDE SEWN IN STRIPING FOR SOCCER, FOOTBALL AND CITY OF HANAHAN "H" LOGO AT MIDFIELD. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR OWNER REVIEW AND APPROVAL.

6 SYNTHETIC TURF FIELD CROSS SECTION  
(NOT TO SCALE)



7 DOUBLE SWING ARM BARRIER GATE  
(NOT TO SCALE)



SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
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| D                | 03/11/21 |

SITE DETAILS

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SHEET C6.4

SHEET C6.3

SHEET C6.2

SHEET C6.1

- NOTES:
1. ALL ELEVATIONS ARE BASED ON THE NAVD 1988 DATUM.
  2. BOUNDARY DATA AND TOPO SURVEY PROVIDED BY SOUTHEASTERN LAND SURVEYING.
  3. CONTRACTOR SHALL VERIFY EXISTING ROAD GRADES AND NOTIFY ENGINEER IF DIFFERENT THAN SHOWN ON PLANS.
  4. CONTRACTOR SHALL EMPLOY ANY NECESSARY EROSION CONTROL METHODS AVAILABLE TO PREVENT SEDIMENT FROM ENTERING FRESHWATER WETLANDS.
  5. REFERENCE SCDOT DETAILS FOR RCP INSTALLATION.

SEE SHEET C1.1 FOR LEGEND, SHEETS C7.0 - C7.7 FOR DRAINAGE PLANS AND PROFILES AND SHEETS C8.0 - C8.1 FOR GRADING & DRAINAGE DETAILS.

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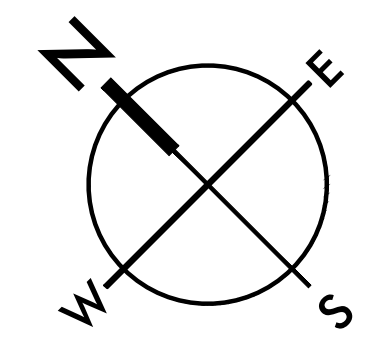
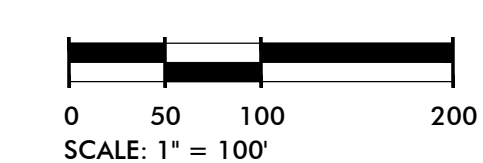
MOUNT PLEASANT, SC 843.884.1667  
GREENVILLE, SC 864.298.0534  
SUMMERVILLE, SC 843.972.0710  
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HANAHAN RECREATION COMPLEX  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
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OVERALL GRADING PLAN



\\s01bbs\3\70\2021\4111.PLM, BY Taylor Holt, NC\1981\2019\000 - 00\3\183\20\Grading & Drainage Plans.dwg

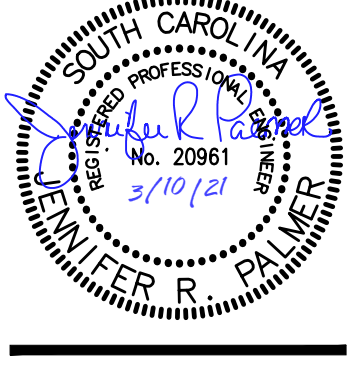
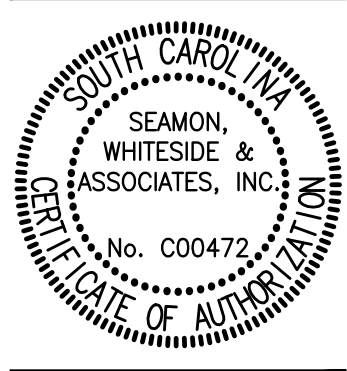
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MATCHLINE C6.2

MATCHLINE C6.2



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**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

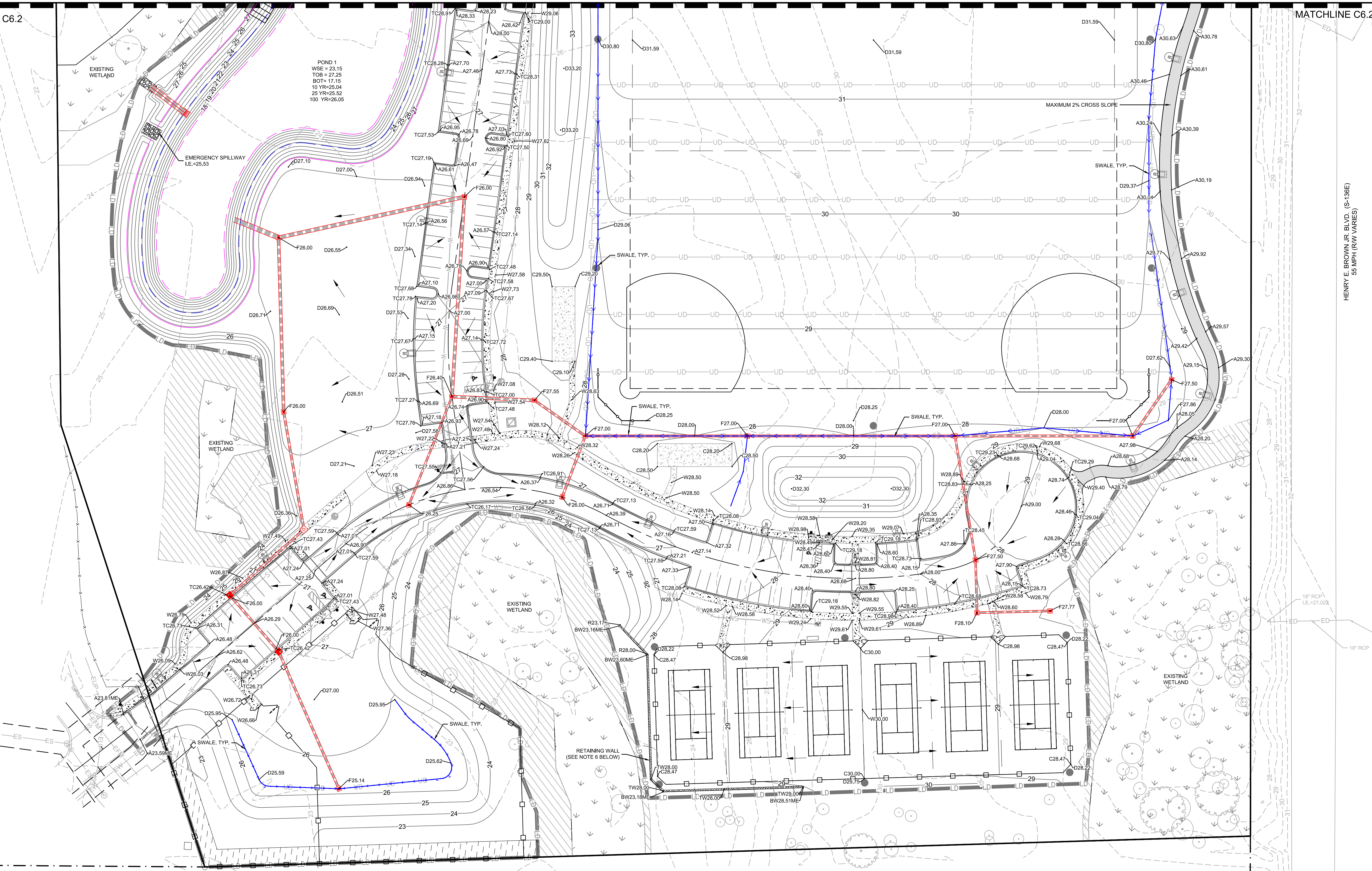
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DATE: 06/12/20  
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CHECKED BY: JRP

REVISION HISTORY

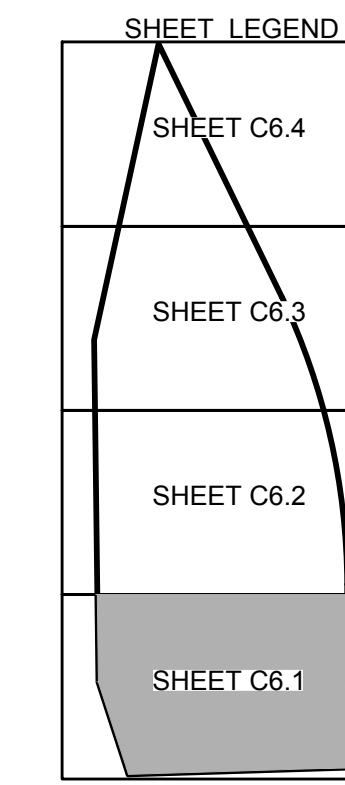
|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
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GRADING PLAN

C6.1



POND 1  
WSE = 23.15  
TOB = 27.25  
BOT = 17.15  
10 YR = 25.04  
25 YR = 25.52  
100 YR = 26.05



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  5. REFERENCE SCDOT DETAILS FOR RCP INSTALLATION.
  6. RETAINING WALL(S) SHOWN IS FOR GENERAL INFORMATION ONLY AND IS NOT TO BE INTERPRETED AS A FINAL DESIGN TO BE USED FOR CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE COMPLETE DESIGN DRAWINGS (INCLUDING GEOTECHNICAL INVESTIGATIONS AS REQUIRED) PREPARED AND STAMPED BY A SC REGISTERED STRUCTURAL ENGINEER. THE WALL(S) IS TO BE DESIGNED WITH CONSIDERATION OF ALL APPURTENANT AND ADJOINING IMPROVEMENTS SHOWN AND UTILIZING MATERIALS INDICATED IN THESE CONSTRUCTION DOCUMENTS (IF SPECIFIC MATERIALS ARE NOT INDICATED, CONTRACTOR SHALL COORDINATE WITH OWNER AND ENGINEER FOR MATERIAL SELECTION). CONTRACTOR SHALL PROVIDE THE REQUIRED DRAWINGS TO SW+ AND THE OWNER FOR REVIEW PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.

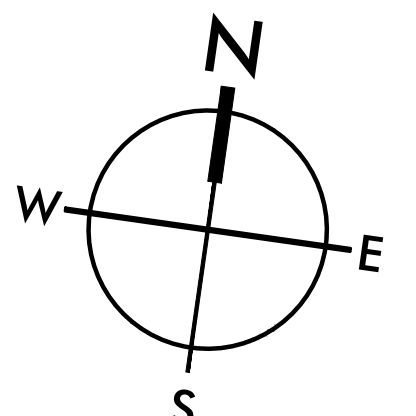
**SPOT ELEV KEY (FINISHED GRADING)**

|    |   |
|----|---|
| A  | (ASPHALT) SURFACE OF FINISHED ASPHALT ROADWAY OR WALKING PATH   |
| C  | (CONCRETE) CONCRETE PAVING  |
| D  | (DIRT) FINISHED GROUND ELEVATION  |
| F  | (FLOW) ELEVATION AT WHICH SURFACE WATER FLOWS INTO DRAINAGE STRUCTURE   |
| G  | (GUTTER) SURFACE OF FINISHED GUTTER AT LOWEST POINT (ALONG WATER FLOW PATH)   |
| W  | (WALK) SURFACE OF FINISHED CONCRETE OR INTERLOCKING PAVER SIDEWALK, PATIO, PLAZA, OR SLAB                             |
| TC | TOP OF CURB ELEVATION   |
| BC | BOTTOM OF CURB ELEVATION  |
| TS | TOP OF STAIRS ELEVATION   |
| BS | BOTTOM OF STAIRS ELEVATION  |
| TW | FINISHED GRADE ELEVATION AT TOP OF WALL   |
| BW | FINISHED GRADE ELEVATION AT BOTTOM OF WALL  |
| ME | (MATCH EXISTING) FOLLOWING ELEVATION NUMBER - INDICATES TO MATCH ELEVATION OF EXISTING SURFACE AT POINT OF CONNECTION |

EXAMPLE: A12.56ME MEANS THAT THE SURFACE OF NEW ASPHALT IS TO BE AT ELEVATION 12.56 WHICH SHOULD MATCH THE ELEVATION OF THE EXISTING ASPHALT SURFACE AT THE JOINT

SEE SHEET C1.1 FOR LEGEND, SHEETS C7.0 - C7.7 FOR DRAINAGE PLANS AND PROFILES AND SHEETS C8.0 - C8.1 FOR GRADING & DRAINAGE DETAILS.

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BOWENS CORNER ELEMENTARY  
TMS# 255-00-104  
BERKELEY COUNTY SCHOOL DISTRICT

HENRY E. BROWN JR. BLVD. (S-136E)  
55 MPH (ROW VARIES)

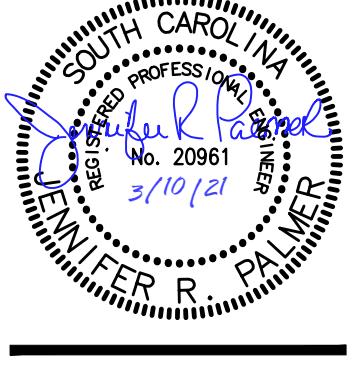
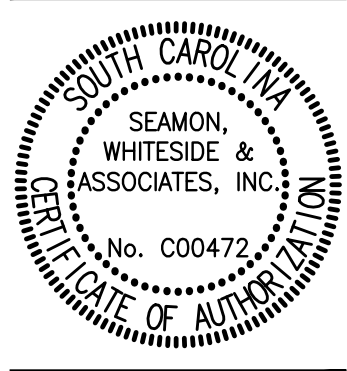
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MATCHLINE C6.3

MATCHLINE C6.3



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# HANAHAN RECREATION COMPLEX

CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

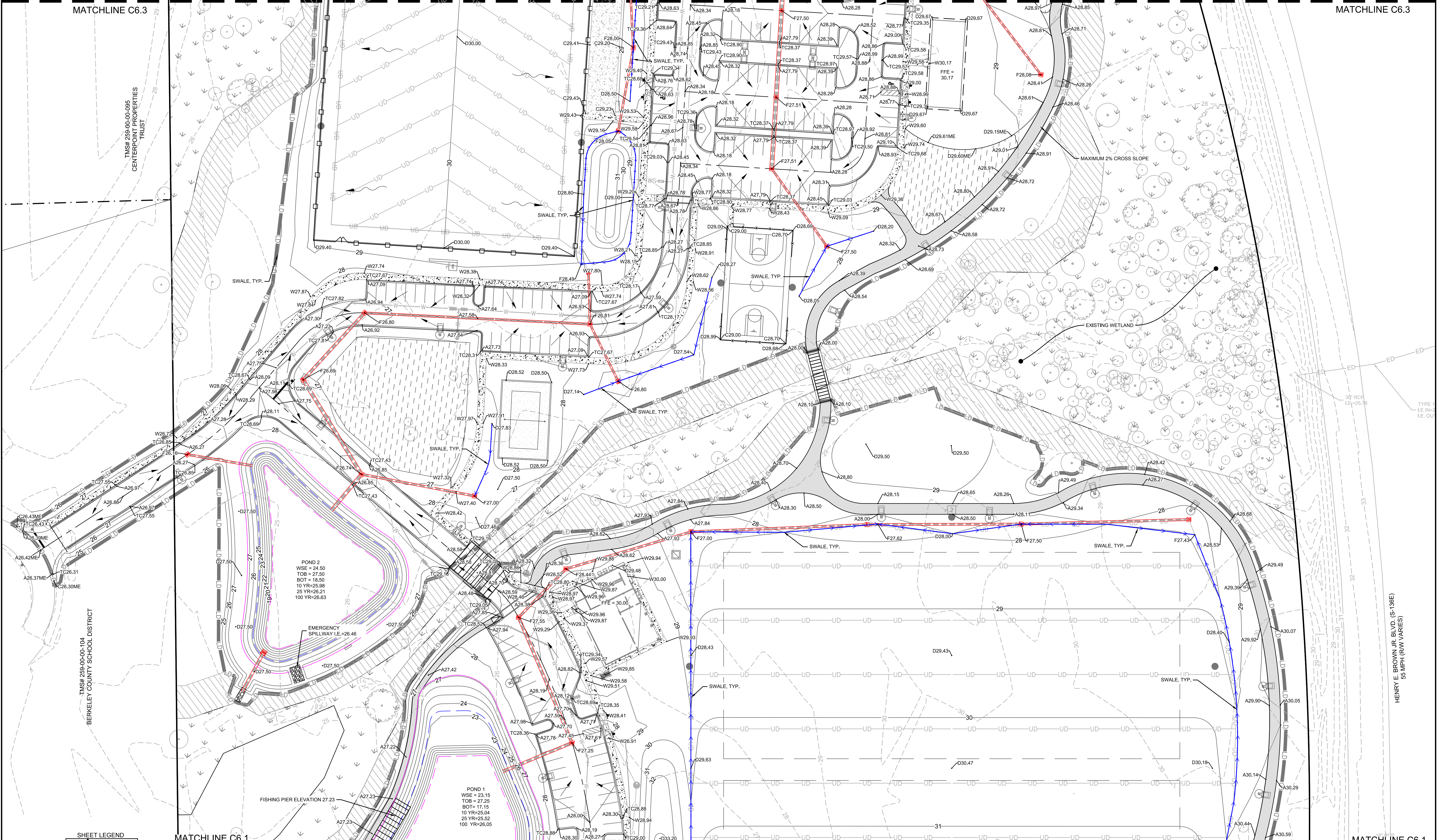
SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

REVISION HISTORY

| NO. | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
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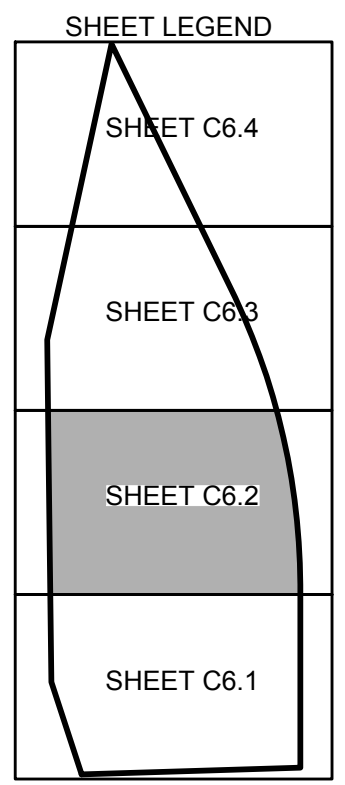
## GRADING PLAN

C6.2



MATCHLINE C6.1

MATCHLINE C6.1



- NOTES:
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  - REFERENCE SCDOT DETAILS FOR RCP INSTALLATION.

### SPOT ELEV KEY (FINISHED GRADING)

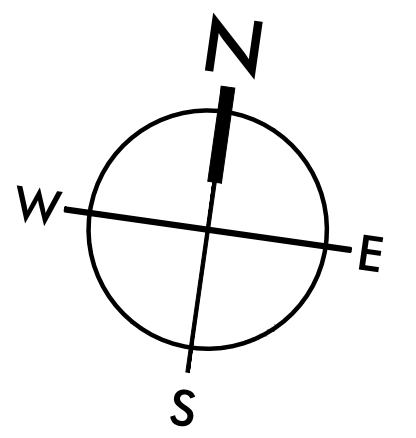
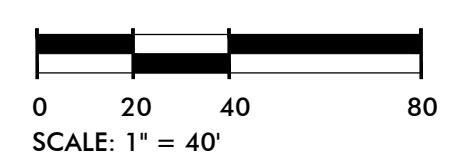
- A- ASPHALT SURFACE OF FINISHED ASPHALT ROADWAY OR WALKING PATH
  - C- (CONCRETE) CONCRETE PAVING
  - D- (DIRT) FINISHED GROUND ELEVATION
  - F- (FLOW) ELEVATION AT WHICH SURFACE WATER FLOWS INTO DRAINAGE STRUCTURE
  - G- SURFACE OF ASPHALT ADJACENT TO THROAT OR GRATE AT CURB INLET
  - I- SURFACE OF ACCESS COVER FOR JUNCTION OR ISOLATION BOX
  - J- SURFACE OF GRATE AT OUTSIDE EDGE FOR CATCH BASIN, GUTTER INLET, OR GRATED POND STRUCTURE
  - FFE- FINISHED FLOOR ELEVATION
  - G- (GUTTER) SURFACE OF FINISHED GUTTER AT LOWEST POINT (ALONG WATER FLOW PATH)
  - W- (WALK) SURFACE OF FINISHED CONCRETE OR INTERLOCKING PAVER SIDEWALK, PATIO, PLAZA, OR SLAB
  - TC- TOP OF CURB ELEVATION
  - BC- BOTTOM OF CURB ELEVATION
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  - BS- BOTTOM OF STAIRS ELEVATION
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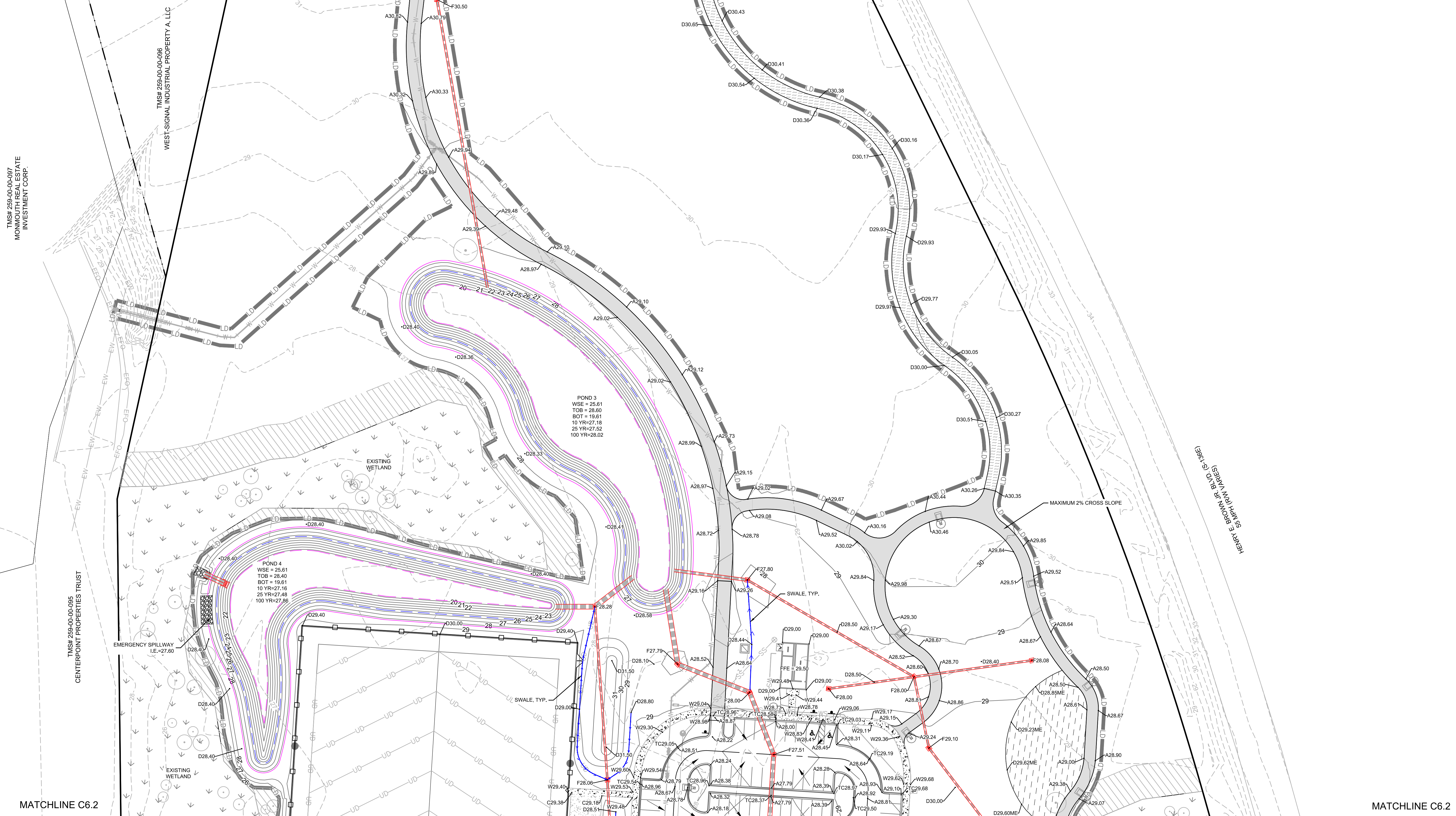
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Call before you dig.



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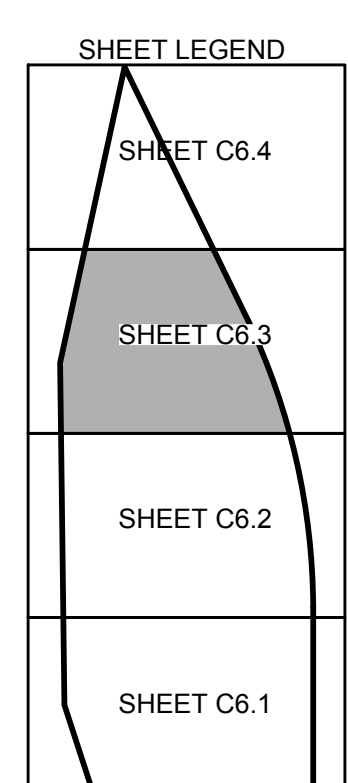
MATCHLINE C6.4

MATCHLINE C6.4



MATCHLINE C6.2

MATCHLINE C6.2



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**SPOT ELEV KEY (FINISHED GRADING)**

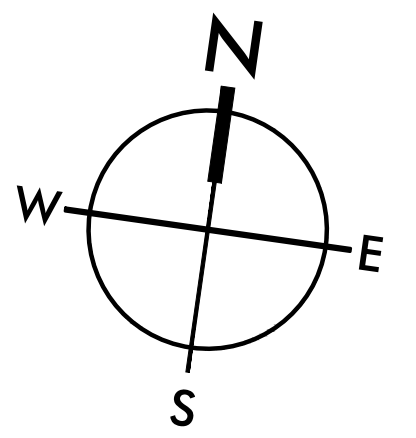
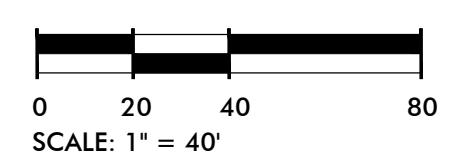
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 F - SURFACE OF ASPHALT ADJACENT TO THROAT OR GRATE AT CURB INLET  
 - SURFACE OF ACCESS COVER FOR JUNCTION OR ISOLATION BOX  
 - SURFACE OF GRATE AT OUTSIDE EDGE FOR CATCH BASIN, GUTTER INLET, OR GRATED POND STRUCTURE  
 FFE - FINISHED FLOOR ELEVATION  
 G-(GUTTER) SURFACE OF FINISHED GUTTER AT LOWEST POINT (ALONG WATER FLOW PATH)  
 W-(WALK) SURFACE OF FINISHED CONCRETE OR INTERLOCKING PAVEMENT SIDEWALK, PATIO, PLAZA, OR SLAB  
 TC - TOP OF CURB ELEVATION  
 BC - BOTTOM OF CURB ELEVATION  
 TS - TOP OF STAIRS ELEVATION  
 BS - BOTTOM OF STAIRS ELEVATION  
 TW - FINISHED GRADE ELEVATION AT TOP OF WALL  
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SEE SHEET C1.1 FOR LEGEND, SHEETS C7.0 - C7.7 FOR DRAINAGE PLANS AND PROFILES AND SHEETS C8.0 - C8.1 FOR GRADING & DRAINAGE DETAILS.

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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

GRADING PLAN



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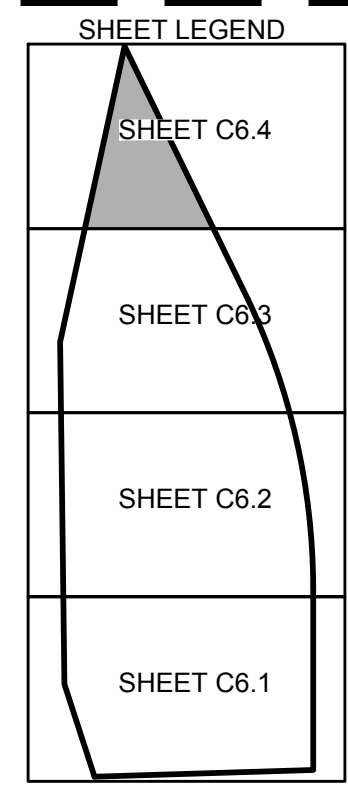
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WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

MATCHLINE C6.3

MATCHLINE C6.3



- NOTES:**
1. ALL ELEVATIONS ARE BASED ON THE NAVD 1988 DATUM.
  2. BOUNDARY DATA AND TOPO SURVEY PROVIDED BY SOUTHEASTERN LAND SURVEYING.
  3. CONTRACTOR SHALL VERIFY EXISTING ROAD GRADES AND NOTIFY ENGINEER IF DIFFERENT THAN SHOWN ON PLANS. CONTRACTOR SHALL EMPLOY ANY NECESSARY EROSION CONTROL METHODS AVAILABLE TO PREVENT SEDIMENT FROM ENTERING FRESHWATER WETLANDS.
  4. REFERENCE SCDOT DETAILS FOR RCP INSTALLATION.

**SPOT ELEV KEY (FINISHED GRADING)**

- A-(ASPHALT) SURFACE OF FINISHED ASPHALT ROADWAY OR WALKING PATH
- C-(CONCRETE) CONCRETE PAVING
- D-(DIRT) FINISHED GROUND ELEVATION
- F-(FLOW) ELEVATION AT WHICH SURFACE WATER FLOWS INTO DRAINAGE STRUCTURE
- G-(GUTTER) SURFACE OF FINISHED GUTTER AT LOWEST POINT (ALONG WATER FLOW PATH)
- W-(WALK) SURFACE OF FINISHED CONCRETE OR INTERLOCKING PAVEMENT SIDEWALK, PATIO, PLAZA, OR SLAB
- TC - TOP OF CURB ELEVATION
- BC - BOTTOM OF CURB ELEVATION
- TS - TOP OF STAIRS ELEVATION
- BS - BOTTOM OF STAIRS ELEVATION
- TW - FINISHED GRADE ELEVATION AT TOP OF WALL
- BW - FINISHED GRADE ELEVATION AT BOTTOM OF WALL
- ME-(MATCH EXISTING) FOLLOWING ELEVATION NUMBER - INDICATES TO MATCH ELEVATION OF EXISTING SURFACE AT POINT OF CONNECTION

EXAMPLE: A12.58ME MEANS THAT THE SURFACE OF NEW ASPHALT IS TO BE AT ELEVATION 12.58 WHICH SHOULD MATCH THE ELEVATION OF THE EXISTING ASPHALT SURFACE AT THE JOINT

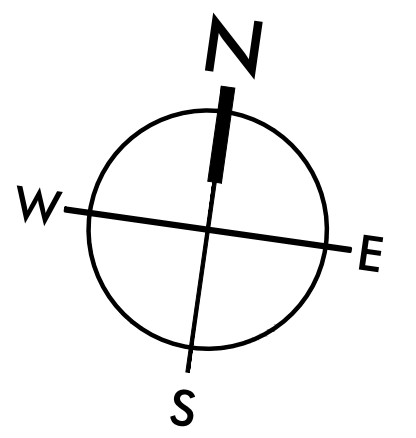
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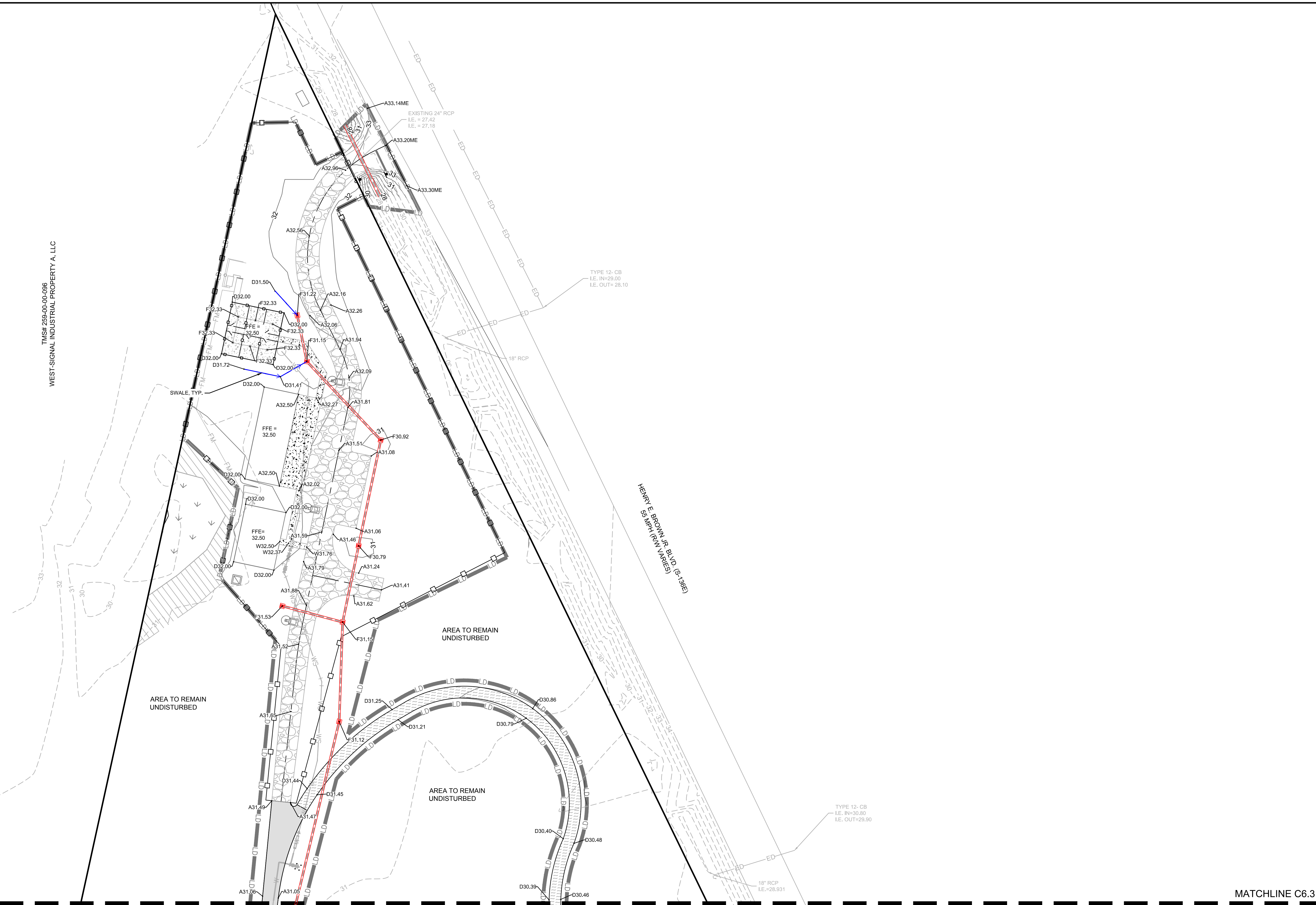
811  
Know what's below.  
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0 20 40 80  
SCALE: 1" = 40'



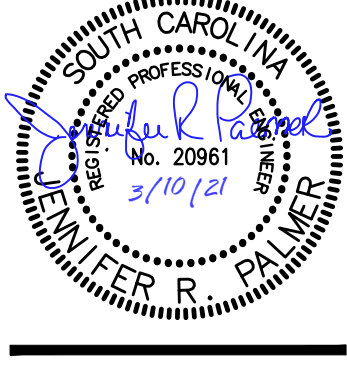
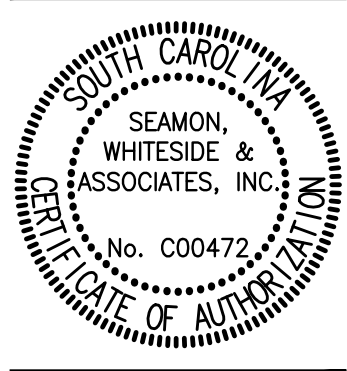
**GRADING PLAN**

C6.4



**SW SEAMON WHITESIDE**

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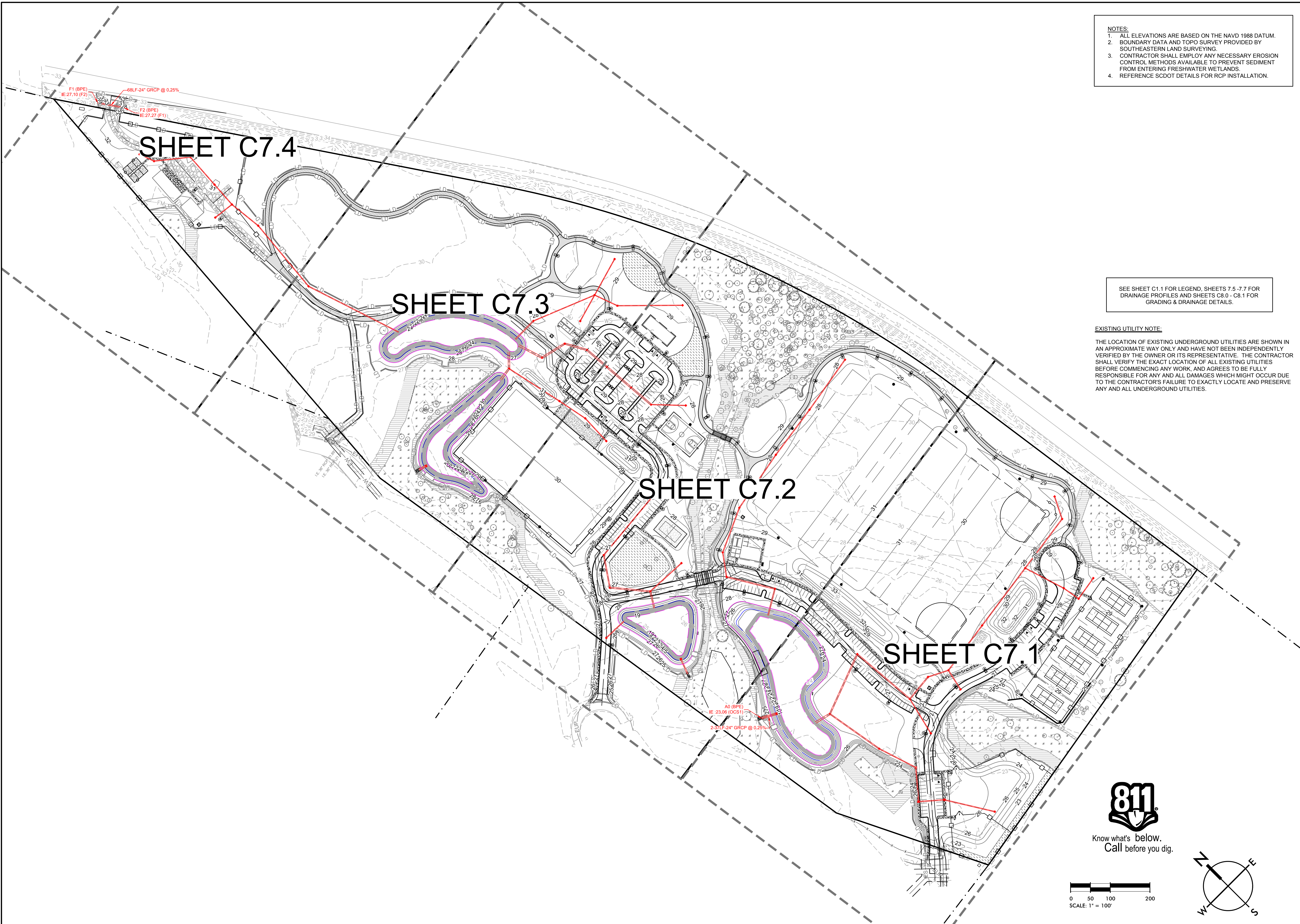
**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

**REVISION HISTORY**

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| A | 6/12/20  |
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| D | 03/11/21 |

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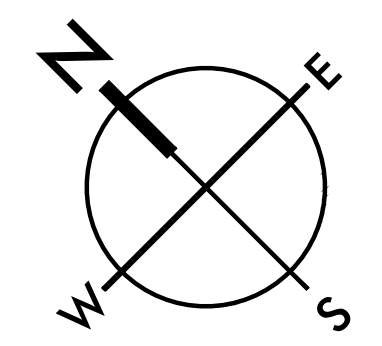
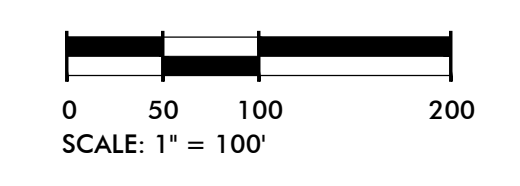
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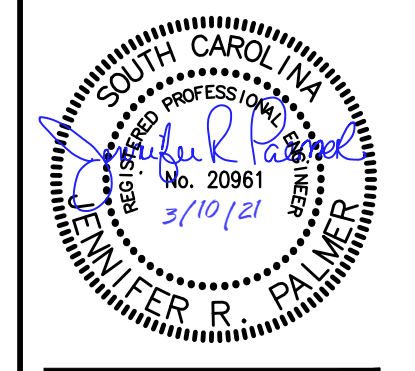
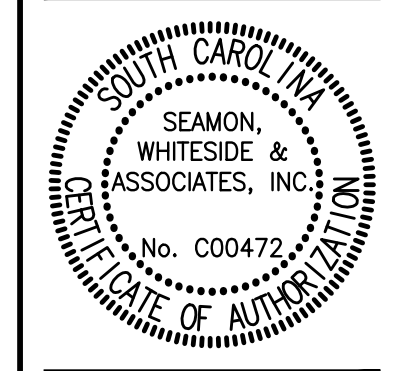
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**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
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OVERALL DRAINAGE PLAN

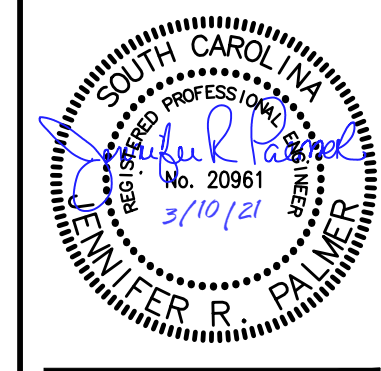
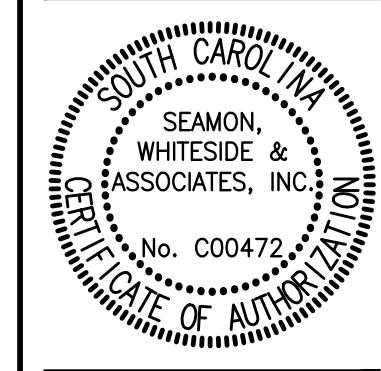
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MATCHLINE C7.1

MATCHLINE C7.1



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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

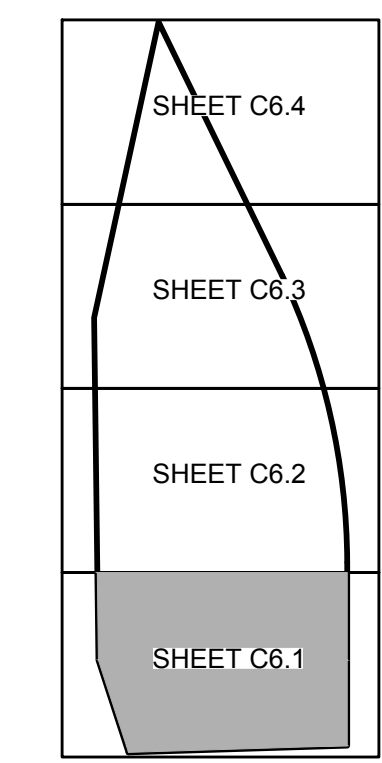
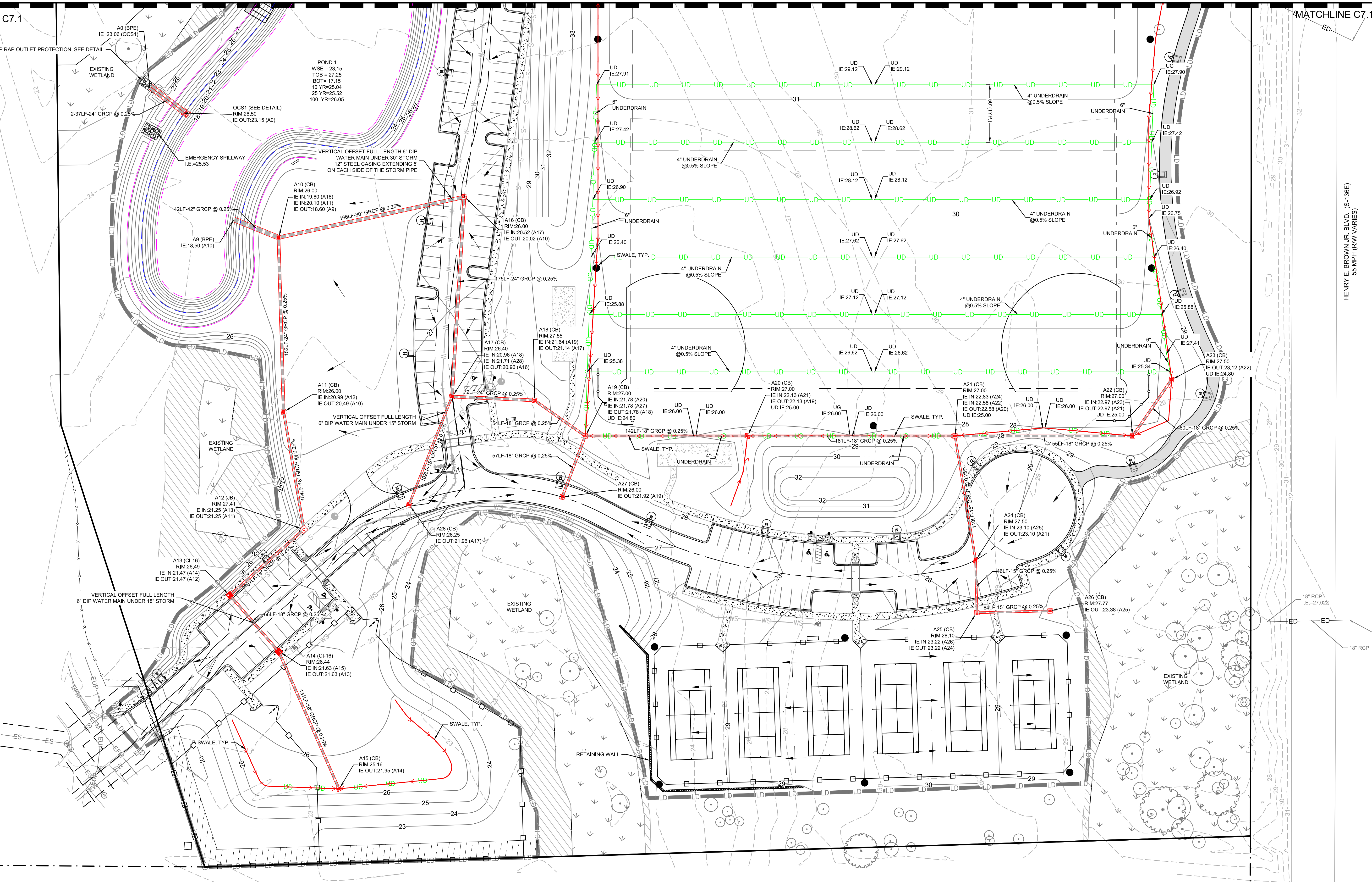
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**REVISION HISTORY**

| NO. | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

**DRAINAGE PLAN**

C7.1



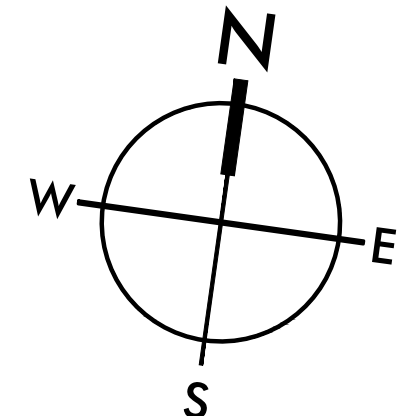
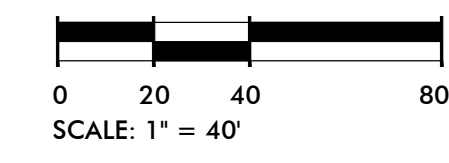
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  - REFERENCE SCDOT DETAILS FOR RCP INSTALLATION.

- LEGEND**
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  - SRCP - REINFORCED CONCRETE PIPE: ASTM C 76, CLASS III, WALL B WITH SEALANT JOINTS (ASTM C 900)
  - PVC - POLYVINYL CHLORIDE PLASTIC PIPE: ASTM D 3034, SDR 26 WITH WATER-TIGHT, GASKETED JOINTS (ASTM D 3212).
- DRAINAGE STRUCTURE ABBREVIATIONS (SEE SPECS AND DETAILS FOR ADDITIONAL INFORMATION)**
- CB - CATCH BASIN
  - CI-16 - CURB INLET SCDOT TYPE 16
  - JB - JUNCTION BOX
  - PE - PIPE END
  - BPE - BEVELED PIPE END
  - UNDERDRAIN
  - SWALE

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MATCHLINE C7.2

MATCHLINE C7.2

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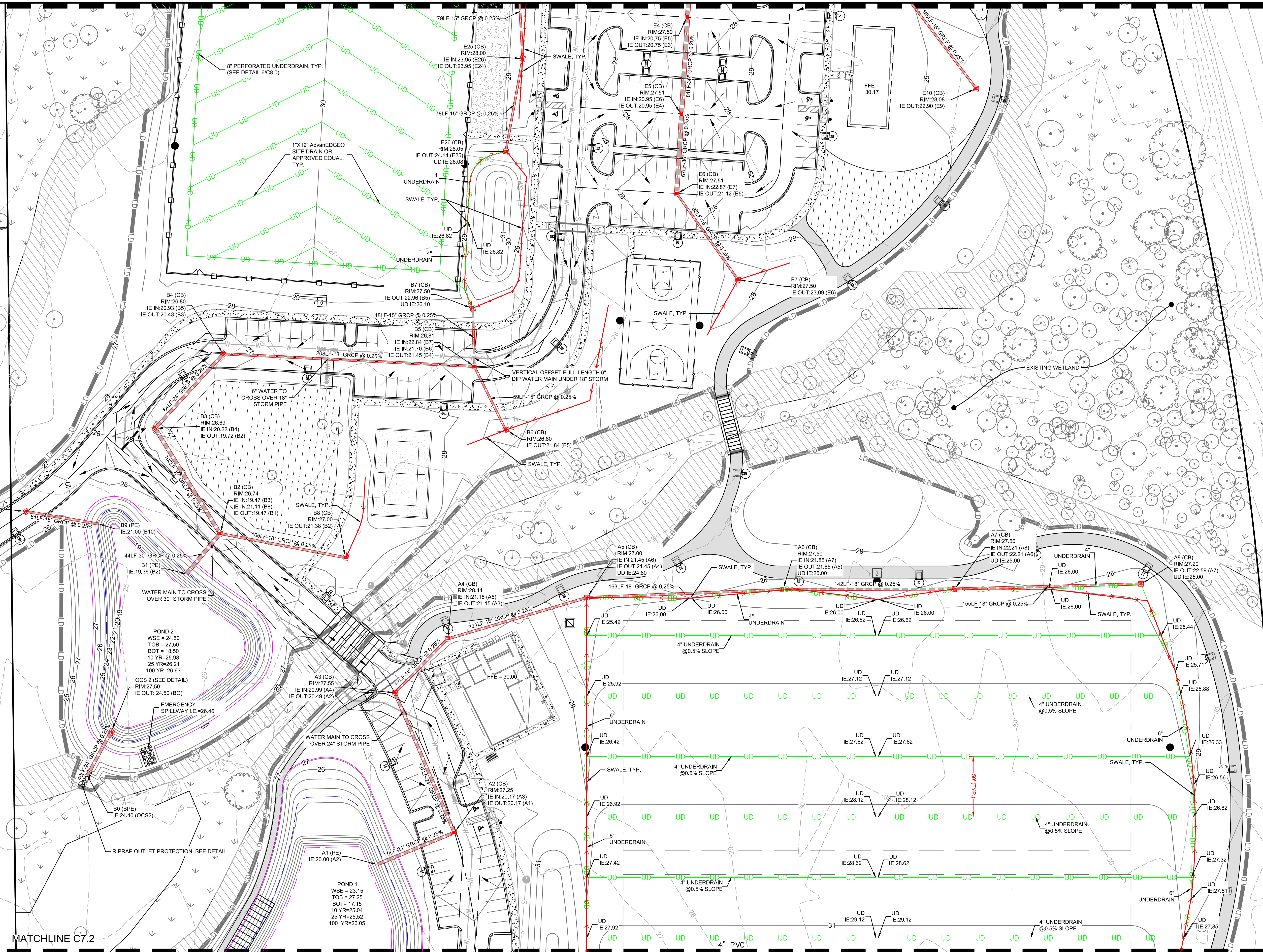
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No. C00477  
No. 20961  
3/10/21

**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
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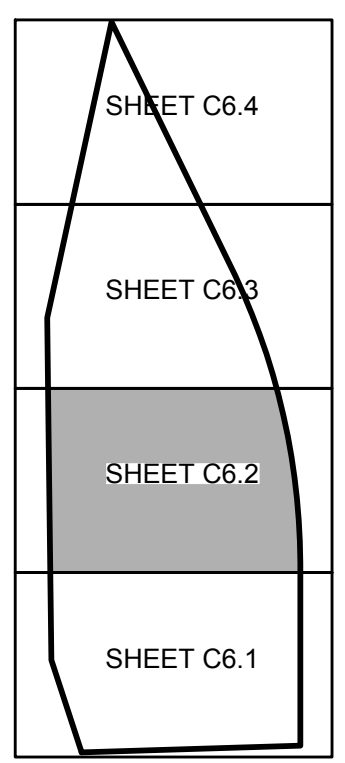
| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
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| D                | 03/11/21 |

**DRAINAGE PLAN**



MATCHLINE C7.2

MATCHLINE C7.2



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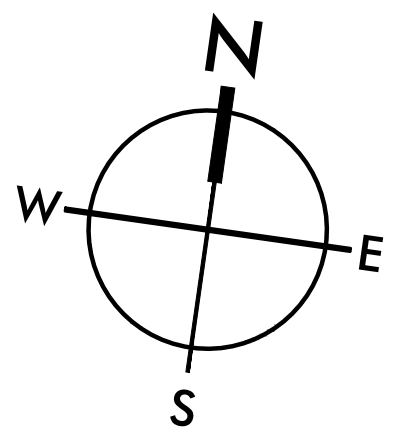
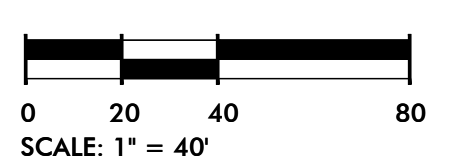
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MATCHLINE C7.3

MATCHLINE C7.3

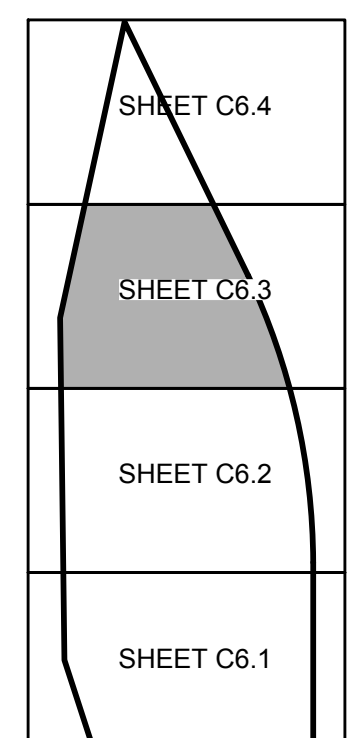
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TMS# 259-00-00-096  
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TMS# 259-00-00-095  
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MATCHLINE C7.3

MATCHLINE C7.3



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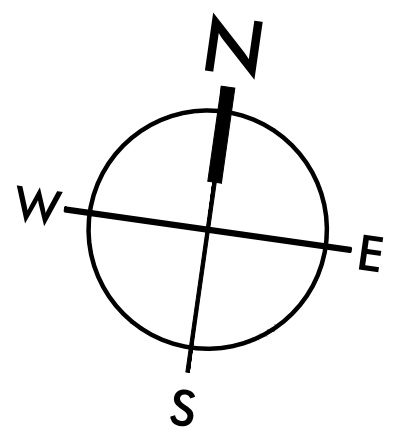
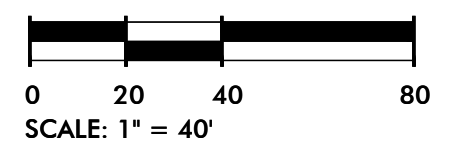
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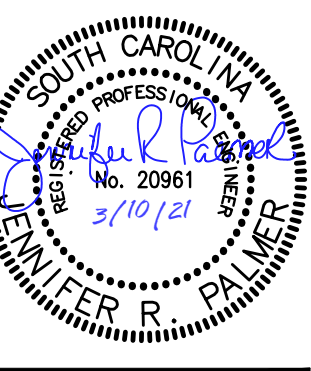
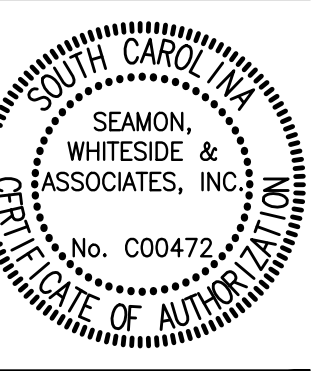
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**DRAINAGE PLAN**

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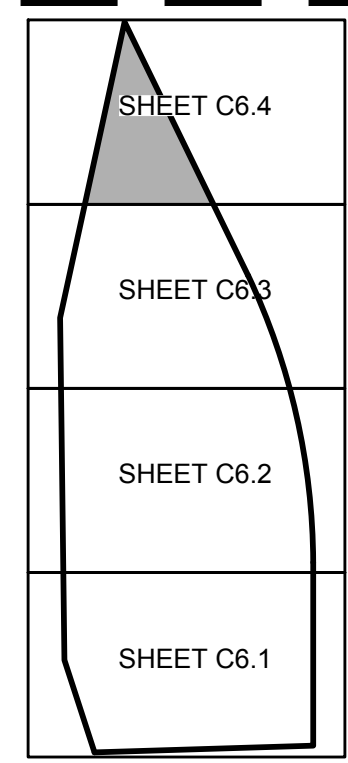


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 WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC

TMS# 259-00-00-097  
 MONMOUTH REAL ESTATE  
 INVESTMENT CORP.

MATCHLINE C6.4

MATCHLINE C7.4



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  - UNDERDRAIN
  - SWALE

SEE SHEET C1.1 FOR LEGEND, SHEETS C7.5 - C7.7 FOR DRAINAGE PROFILES AND SHEETS C8.0 - C8.1 FOR GRADING & DRAINAGE DETAILS.

**EXISTING UTILITY NOTE:**

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

**811**  
 Know what's below.  
 Call before you dig.

SCALE: 1" = 40'

MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
 CHARLOTTE, NC 980.312.5450  
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SOUTH CAROLINA  
 SEAMON, WHITESIDE & ASSOCIATES, INC.  
 No. C0047  
 STATE OF SOUTH CAROLINA  
 ENGINEER  
 SOUTH CAROLINA  
 PROFESSIONAL ENGINEER  
 No. 20961  
 3/10/21  
 SEAMON, WHITESIDE & ASSOCIATES, INC.  
 PALMETTO

**HANAHAN RECREATION  
 COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

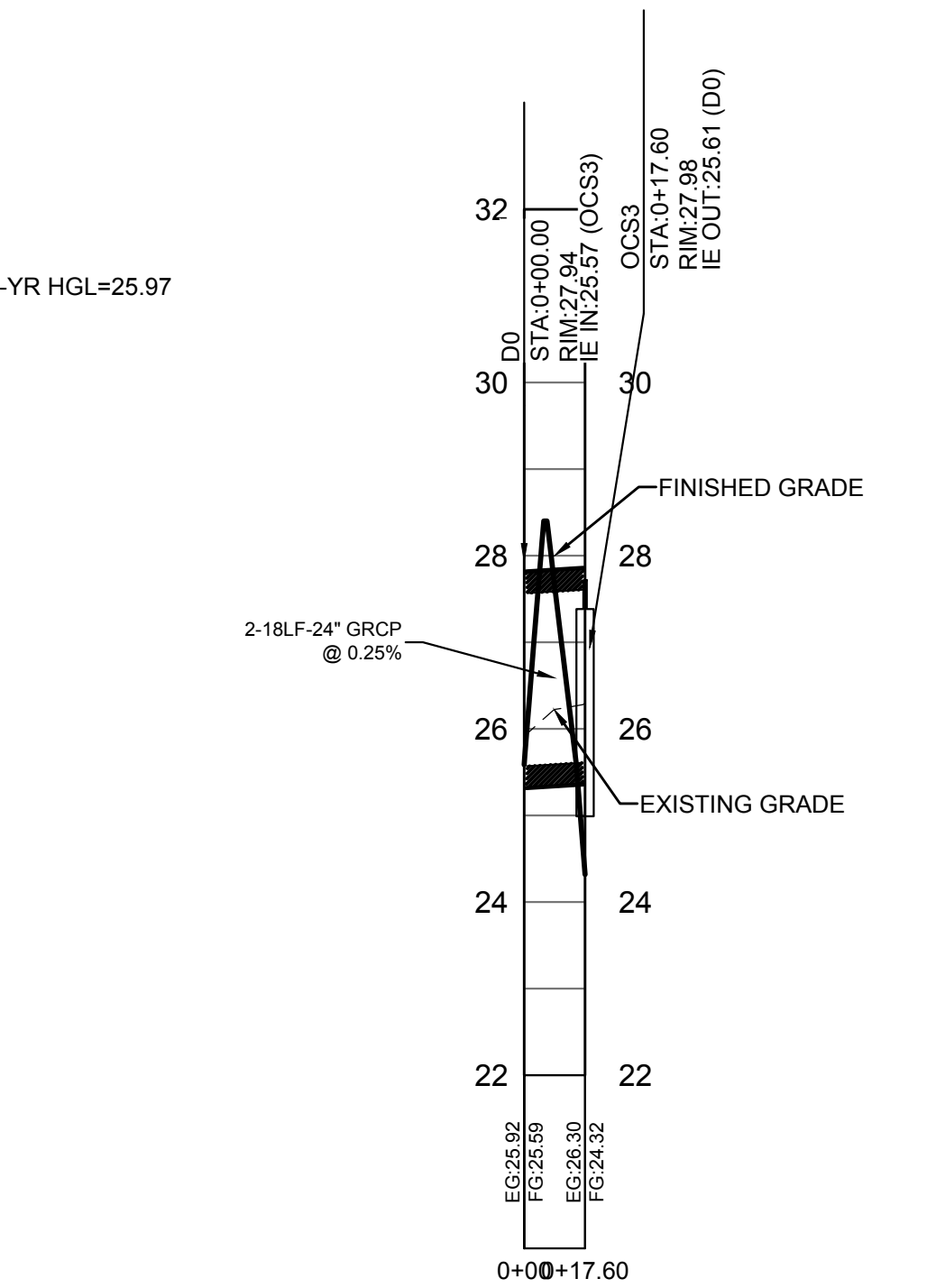
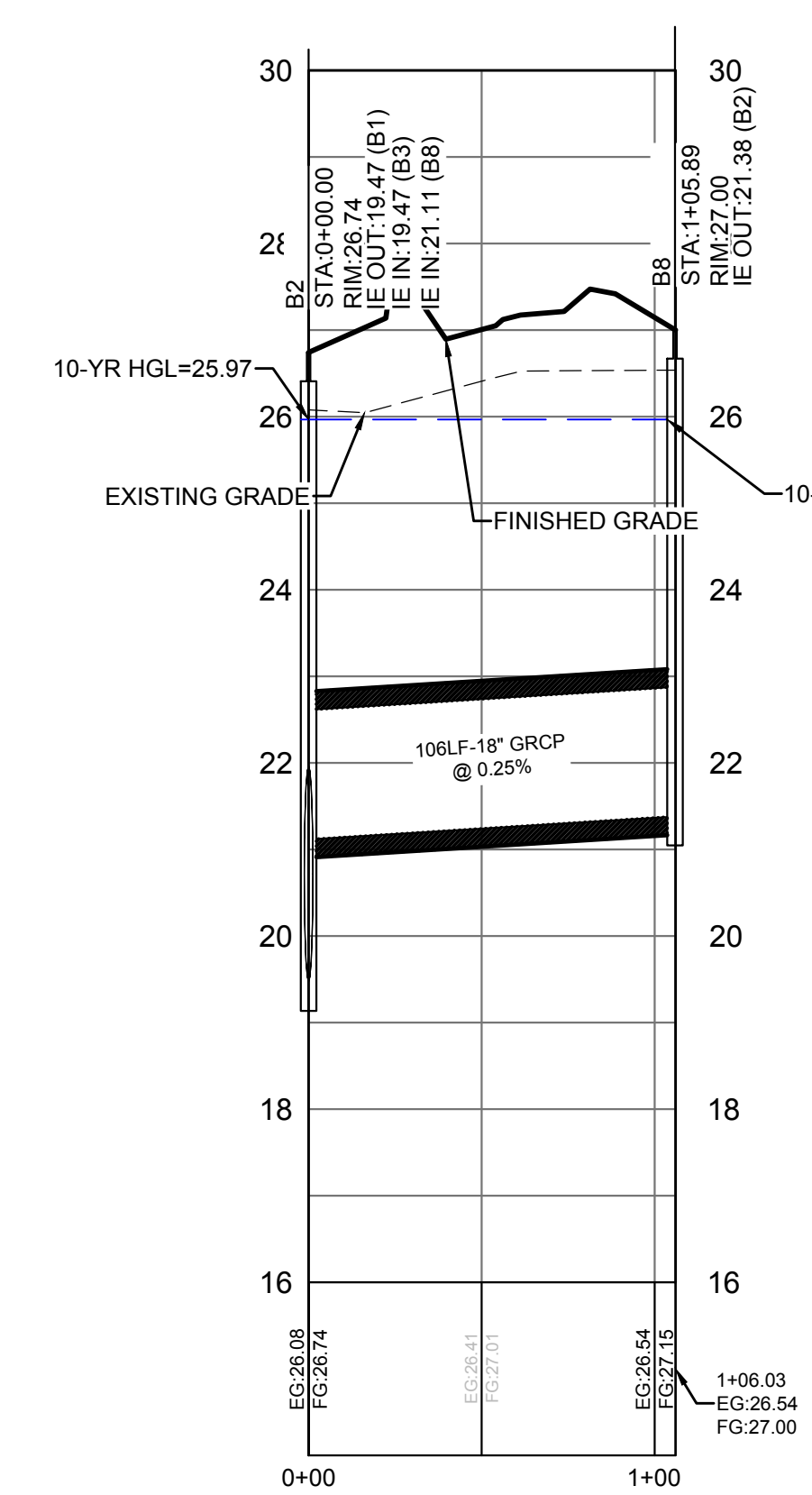
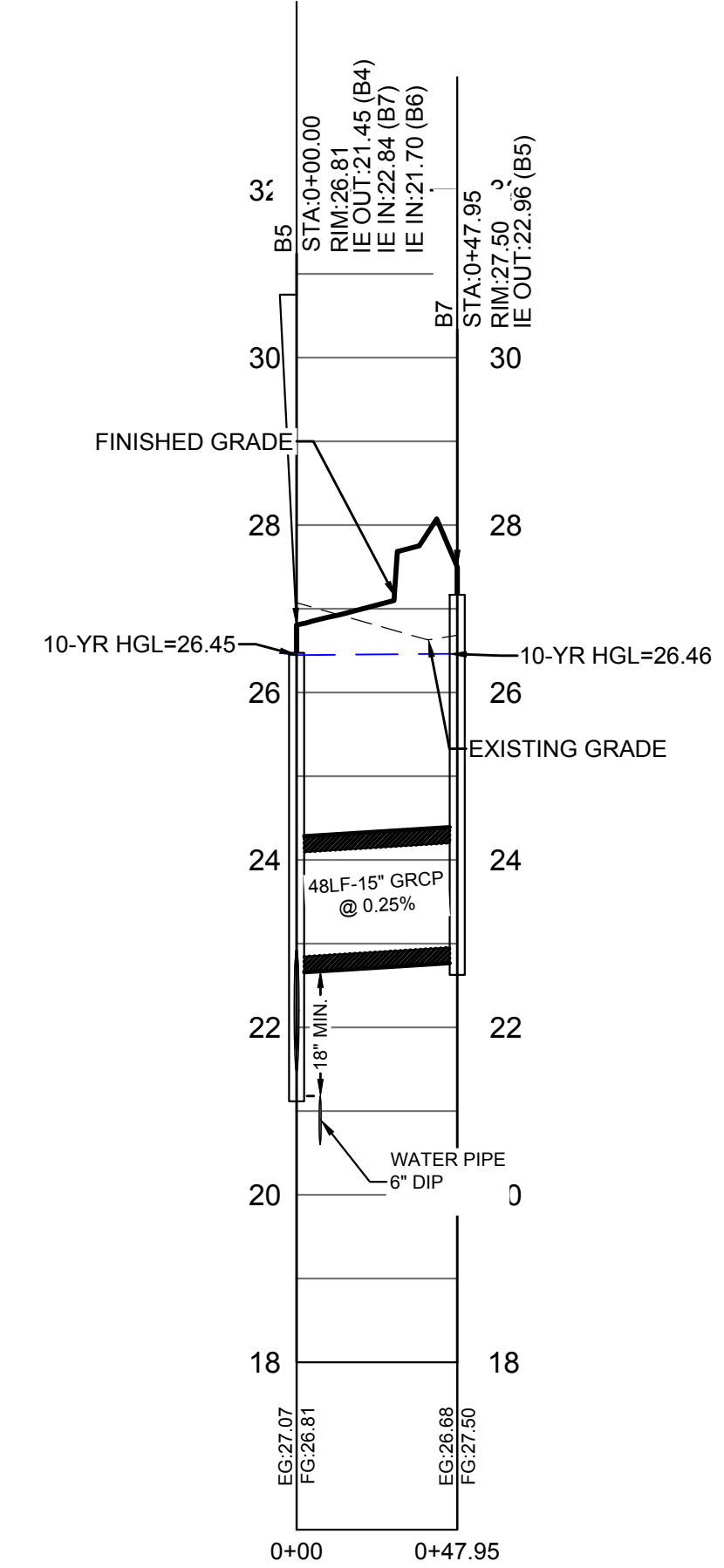
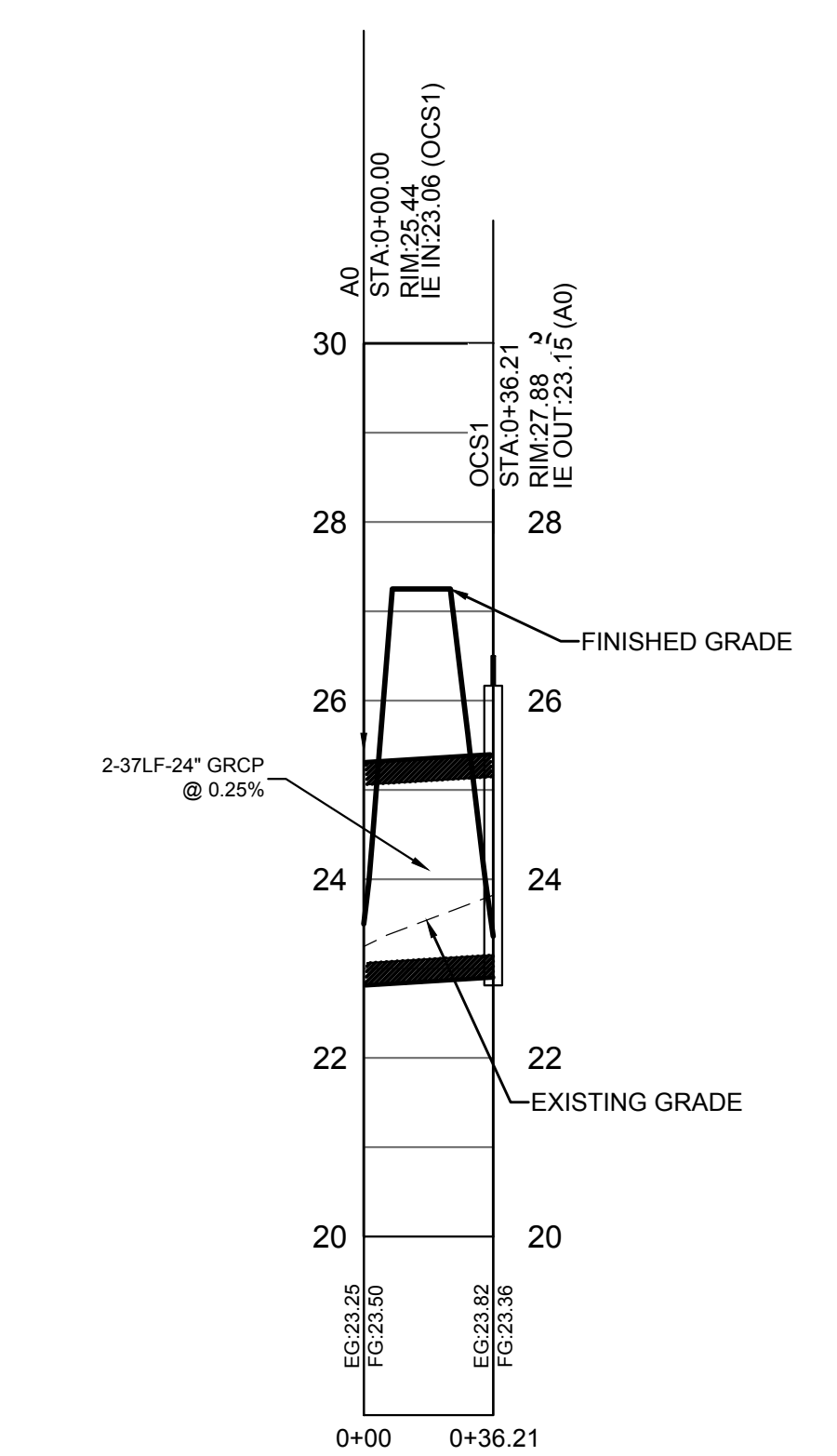
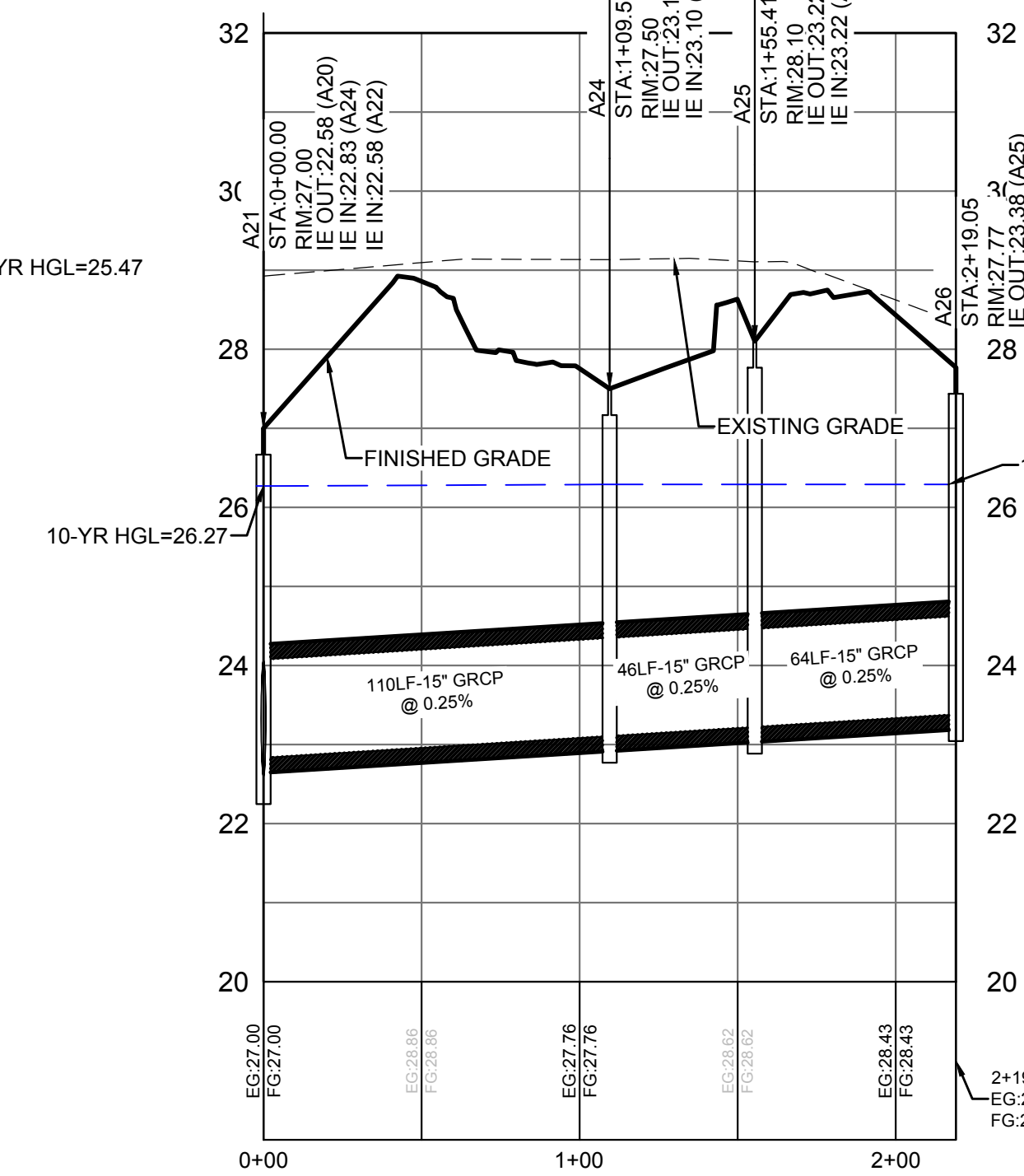
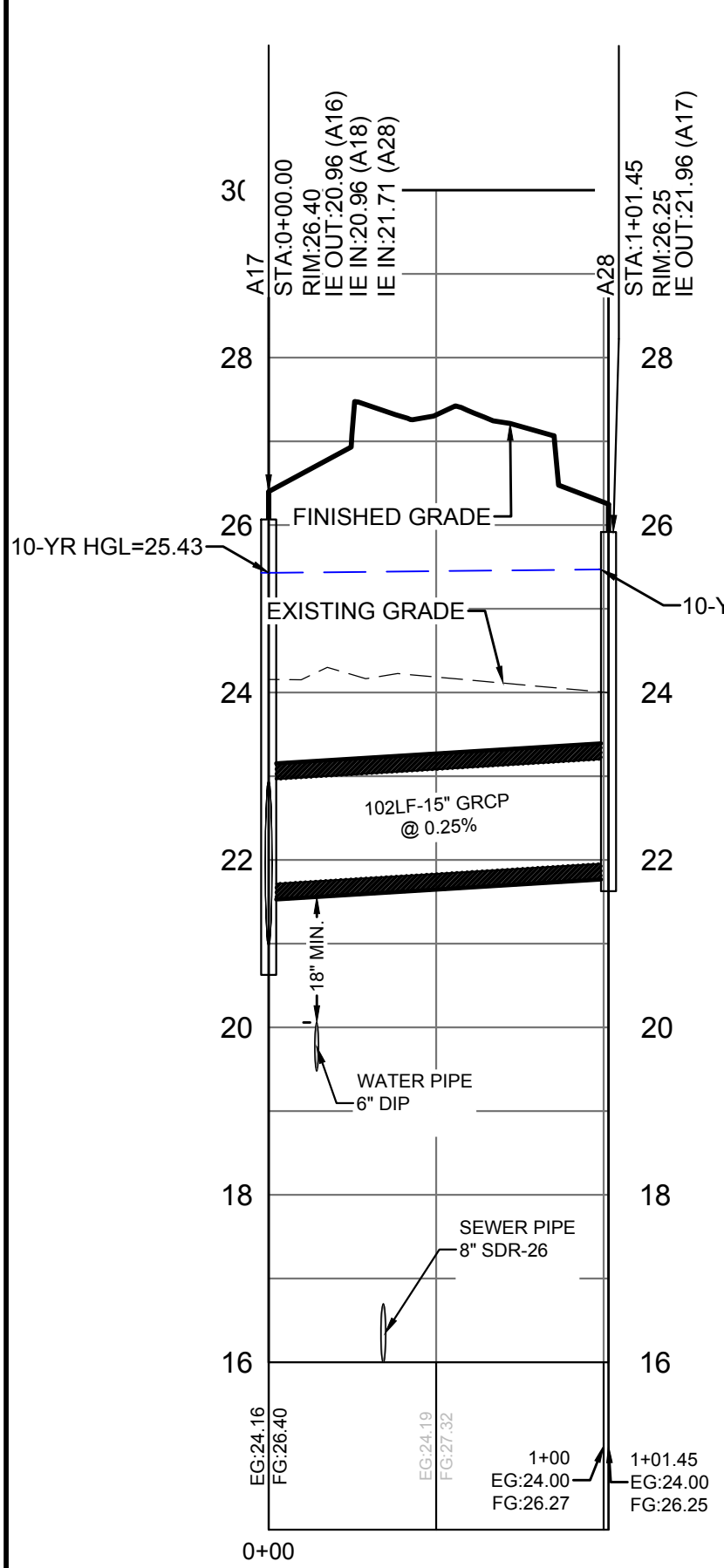
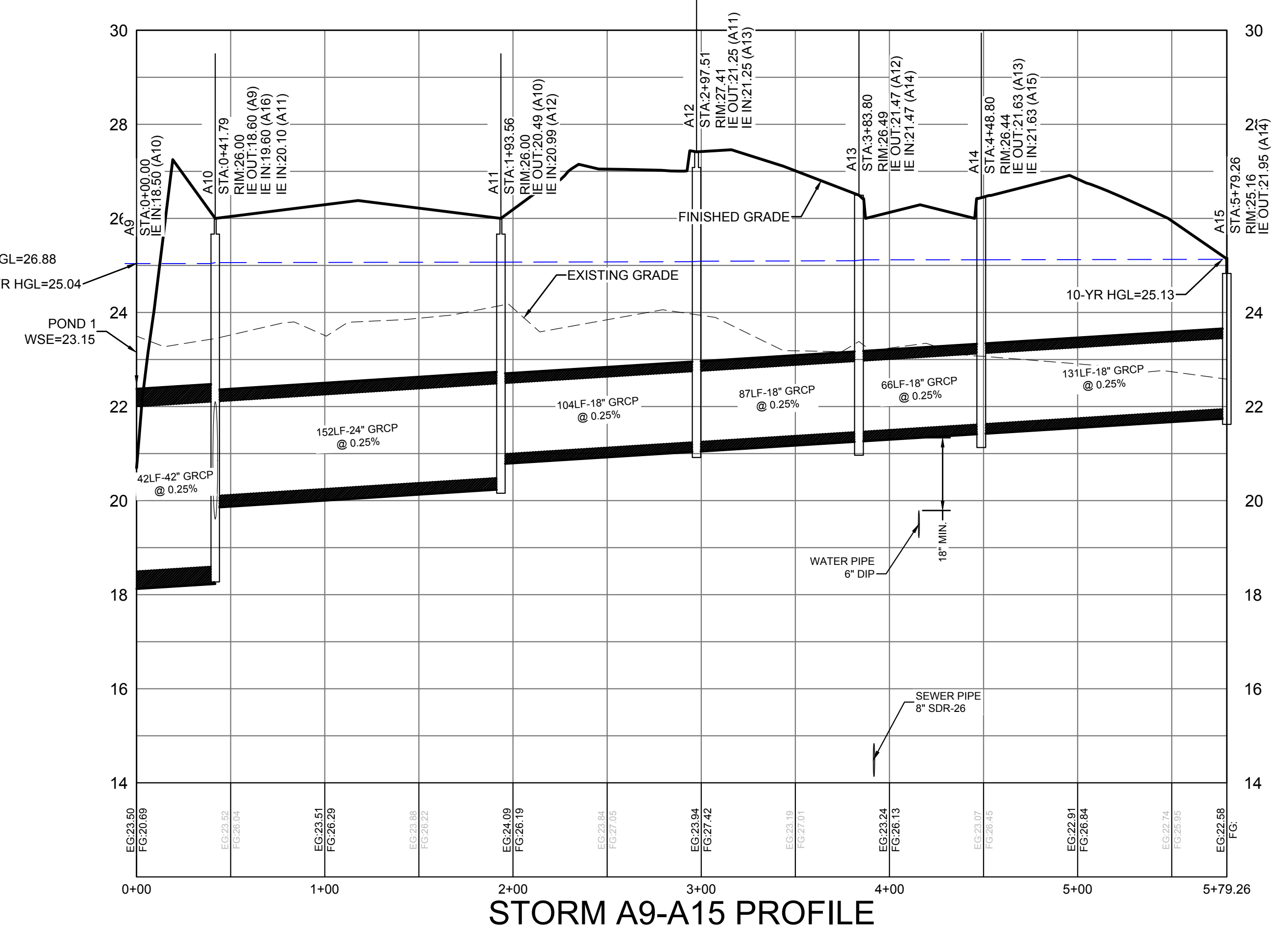
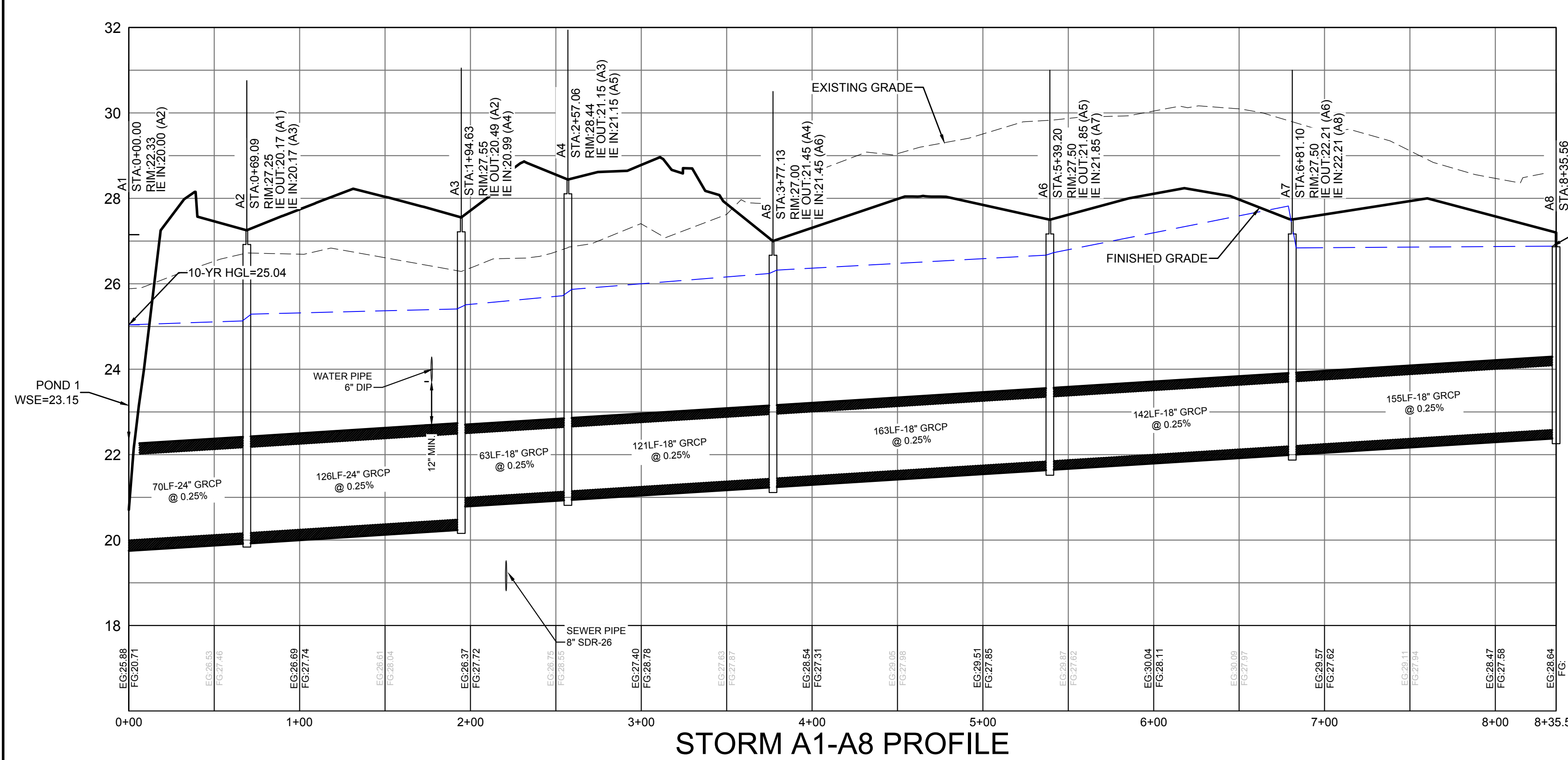
| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

DRAINAGE PLAN

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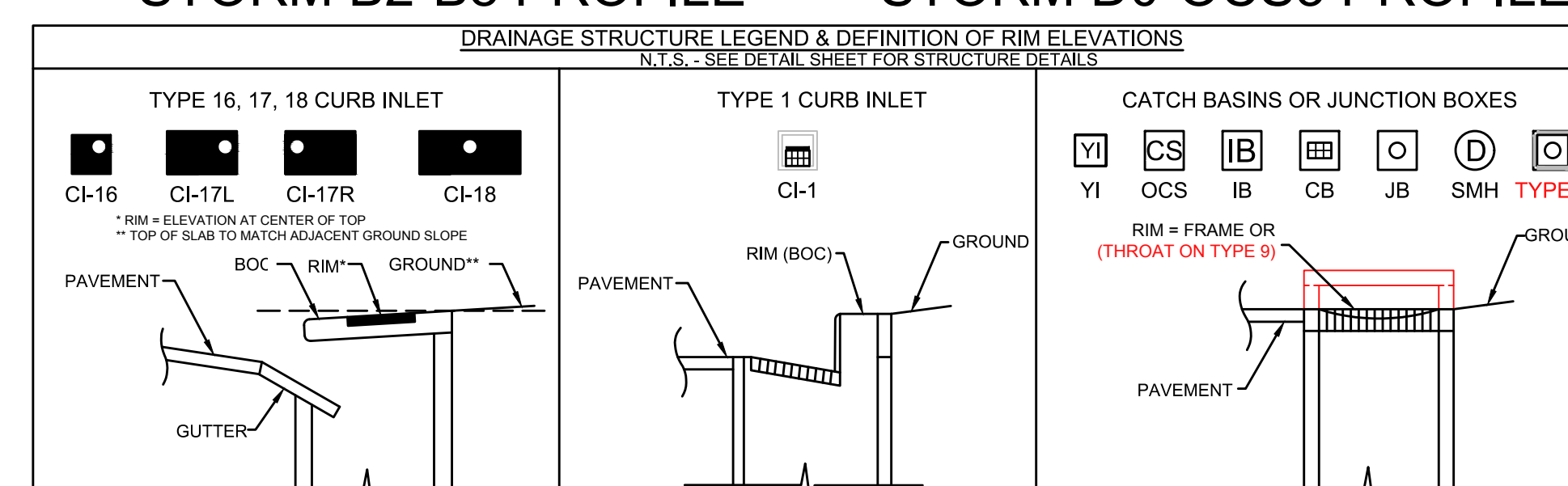
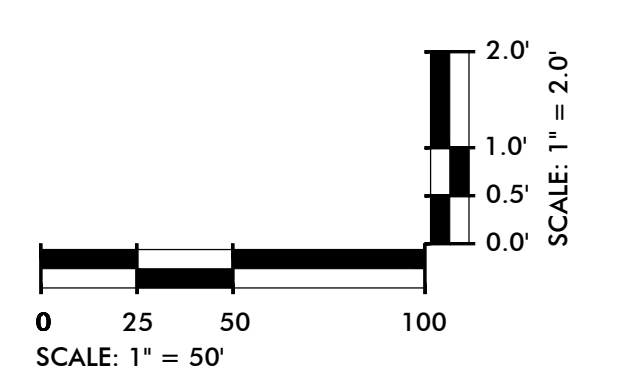
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**LINETYPE LEGEND**

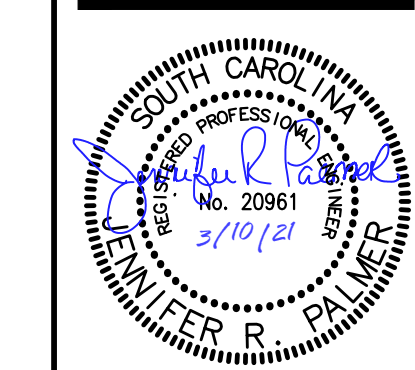
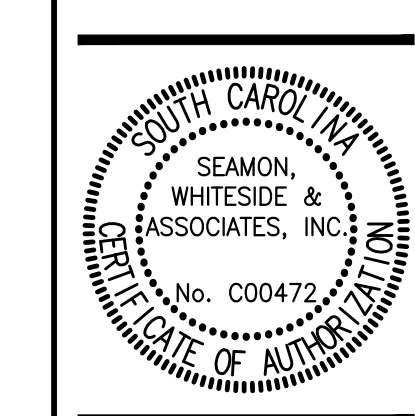
|  |                      |
|--|----------------------|
|  | FINISHED GRADE       |
|  | EXISTING GROUND      |
|  | HYDRAULIC GRADE LINE |
|  | 25 YEAR STORM EVENT  |



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**HANAHAN RECREATION COMPLEX**

CITY OF HANAHAN

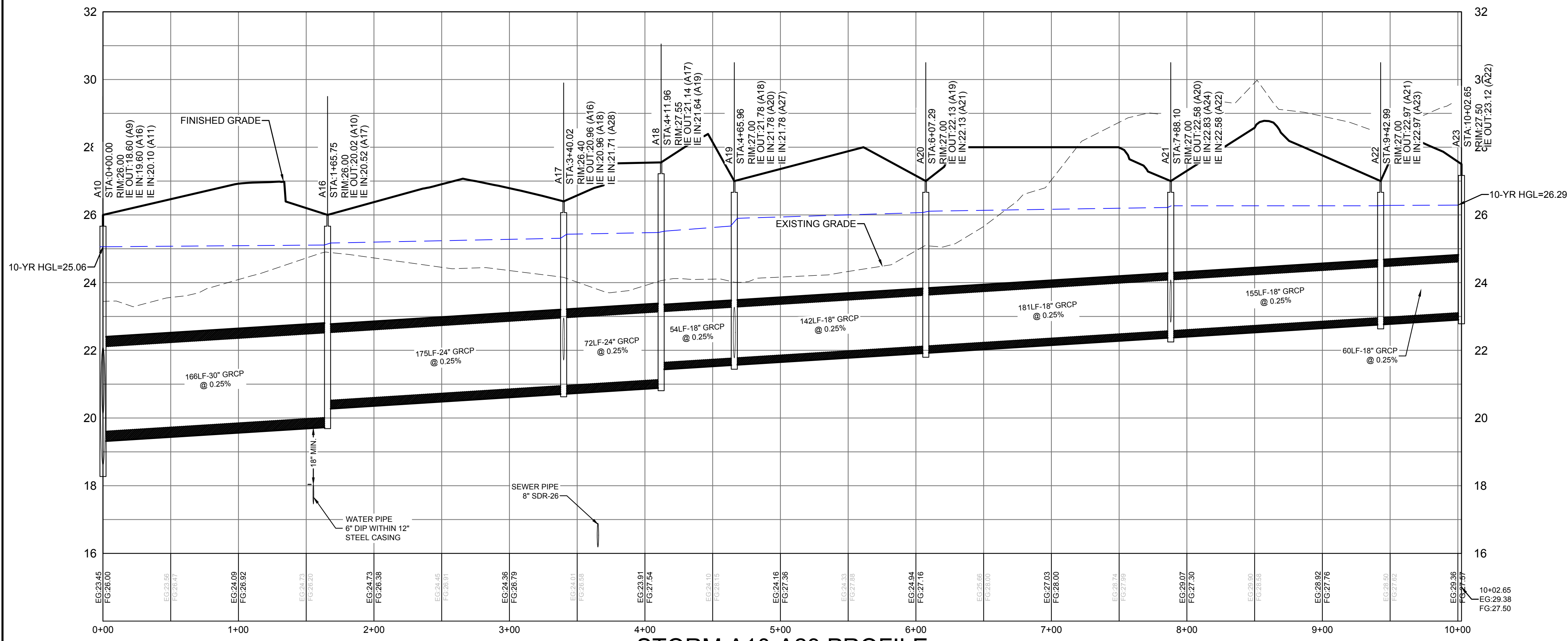
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
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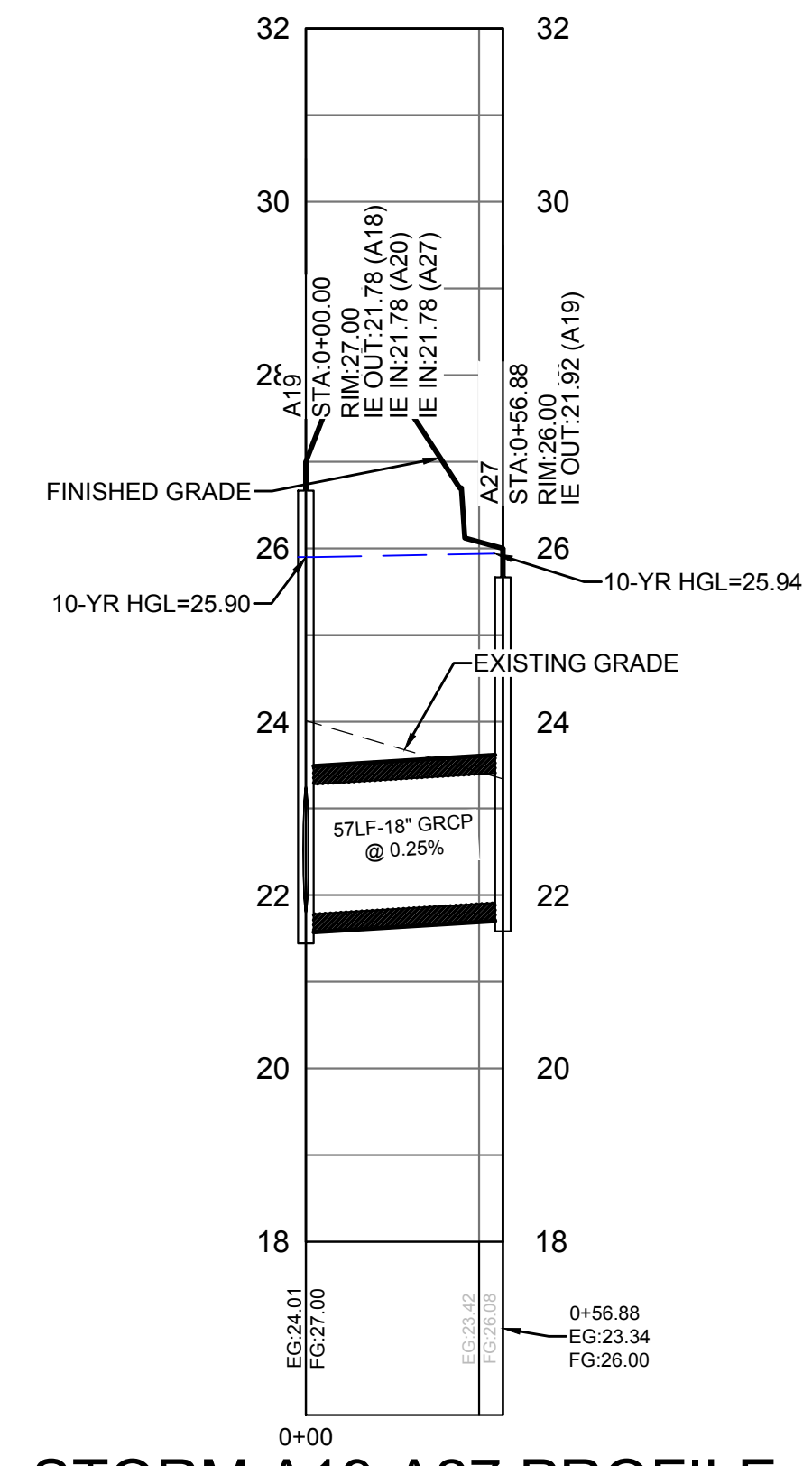
**REVISION HISTORY**

|   |          |
|---|----------|
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| D | 03/11/21 |

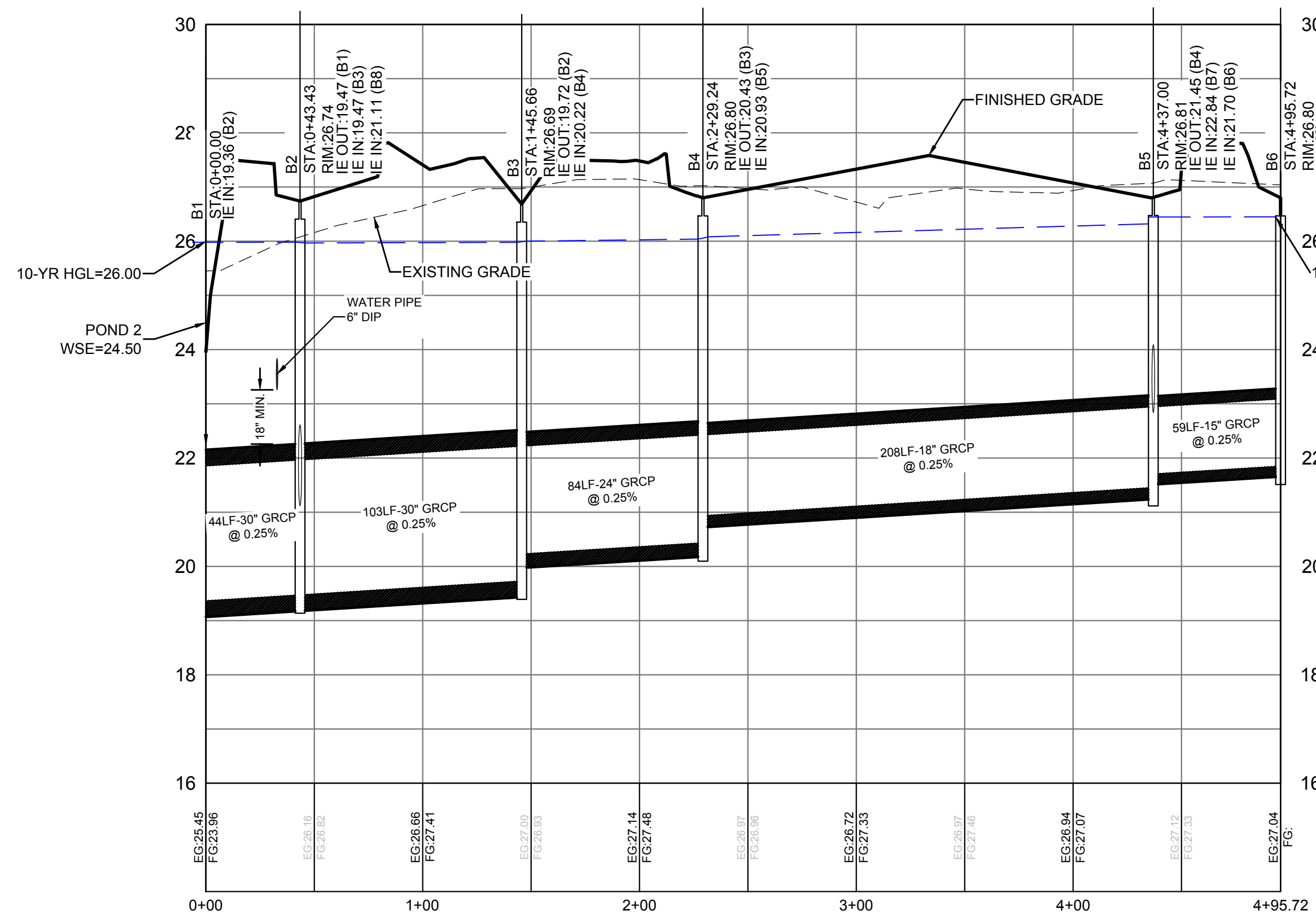
**DRAINAGE PROFILES**



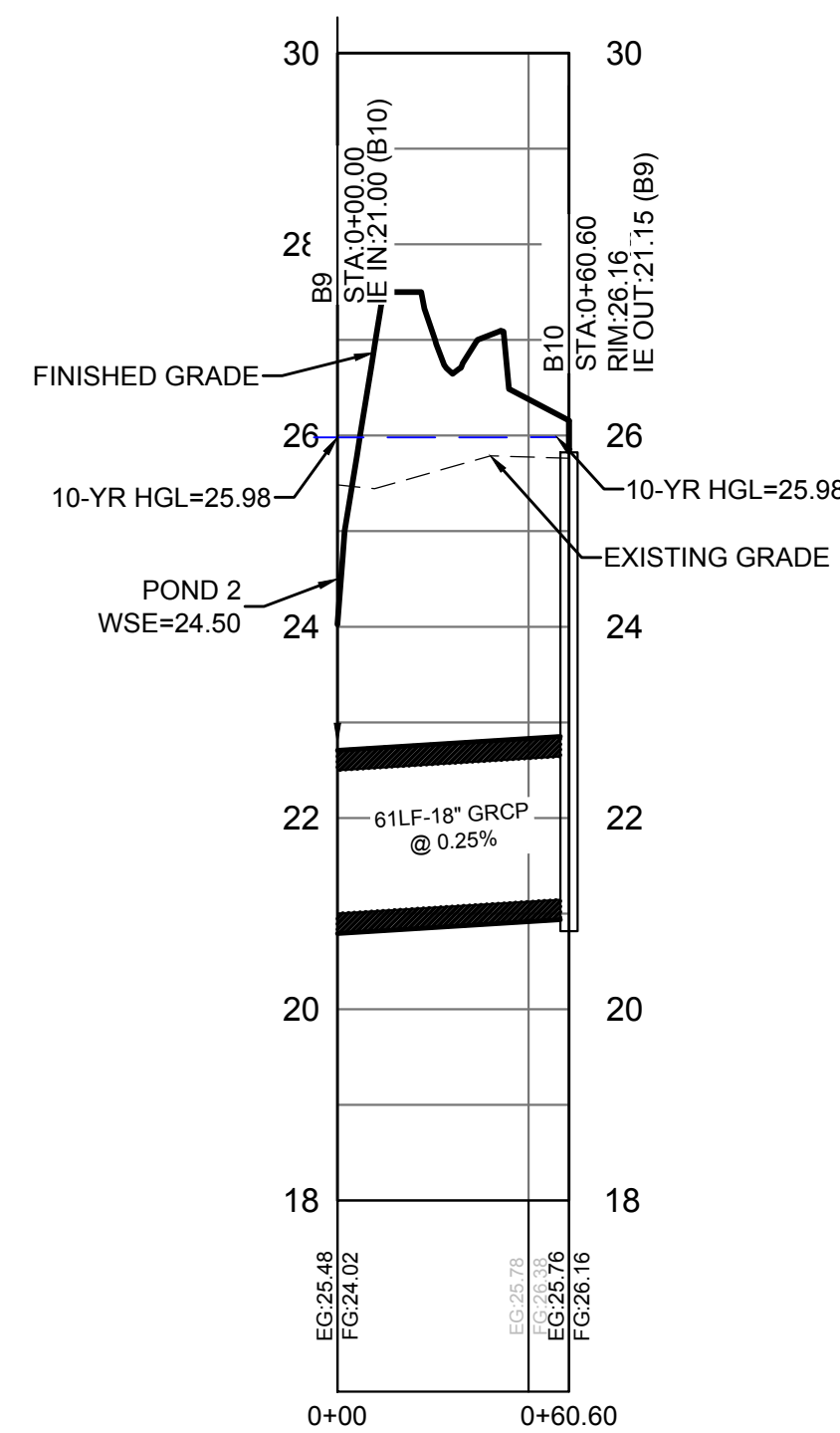
**STORM A10-A23 PROFILE**



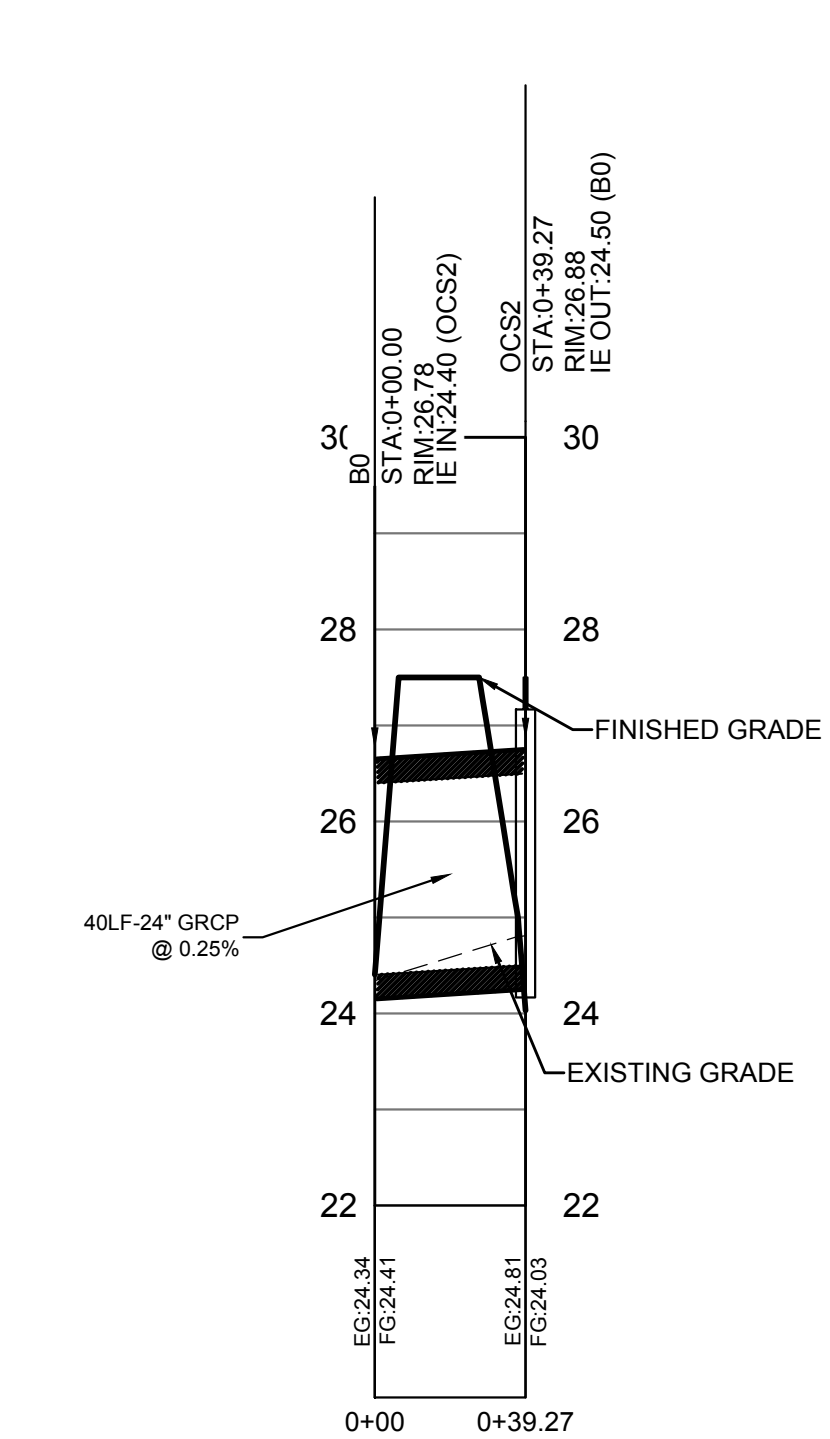
**STORM A19-A27 PROFILE**



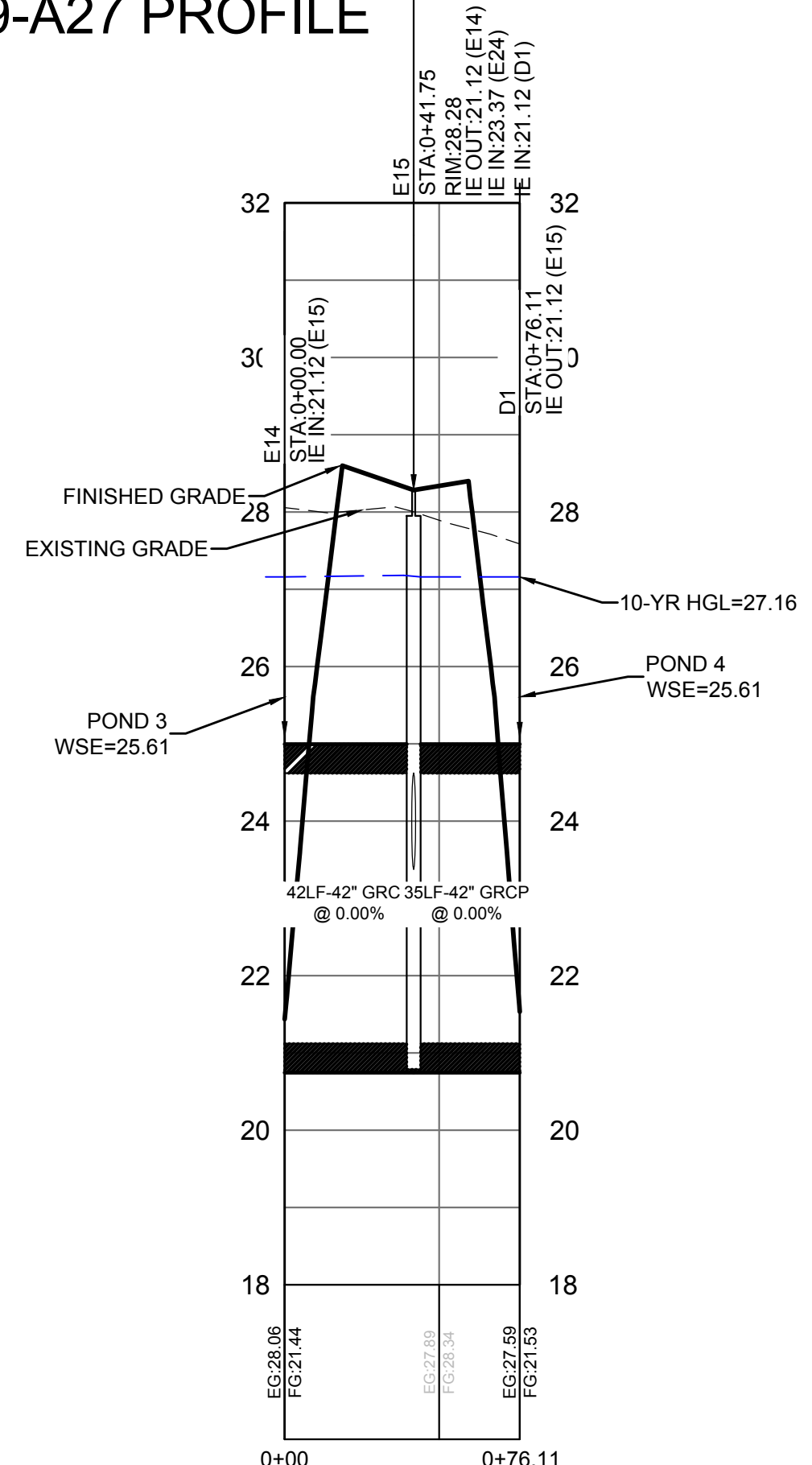
**STORM B1-B6 PROFILE**



**STORM B9-B10 PROFILE**



**STORM B0-OCS2 PROFILE**

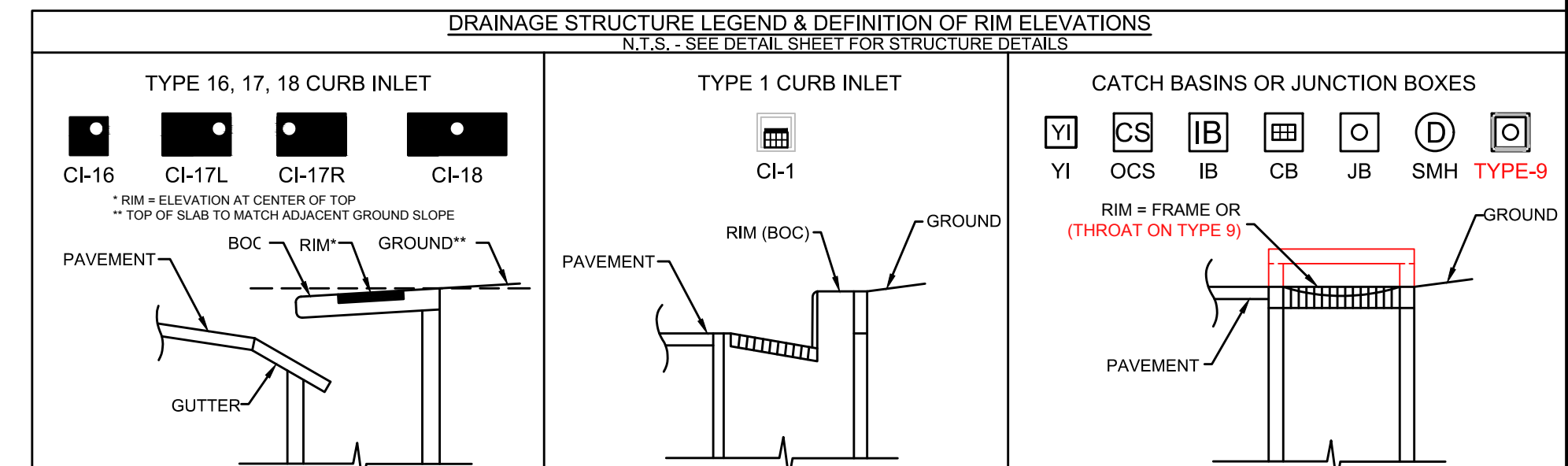
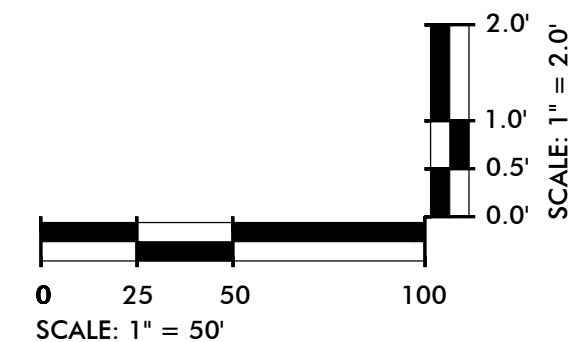


**STORM E13-D1 PROFILE**

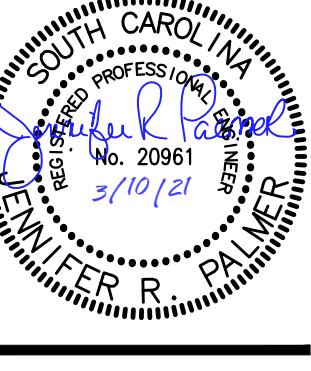
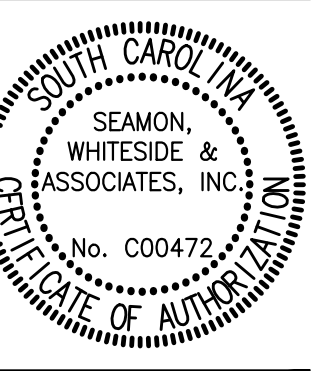
| LINETYPE LEGEND |   |
|-----------------|---|
|                 | FINISHED GRADE                              |
|                 | EXISTING GROUND                             |
|                 | HYDRAULIC GRADE LINE<br>25 YEAR STORM EVENT |

**STANDARD DRAINAGE PROFILE SHEET NOTES**

- PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXISTING CONDITIONS, INCLUDING BUT NOT LIMITED TO TOPOGRAPHIC, TREE, STORM DRAINAGE FACILITIES, AND ALL UTILITIES. EXISTING UTILITIES SHOWN ARE APPROXIMATE AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ENGINEER. THEREFORE, THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE EXACT VERTICAL AND HORIZONTAL LOCATIONS OF ALL EXISTING UTILITIES. ANY DISCREPANCIES OR CONFLICTS IDENTIFIED DURING VERIFICATION OF EXISTING CONDITIONS AND UTILITIES SHALL BE REPORTED TO THE OWNER AND ENGINEER. ANY COSTS ASSOCIATED WITH CORRECTIVE WORK OR DAMAGES THAT ARE A RESULT OF THE CONTRACTOR NOT VERIFYING EXISTING CONDITIONS AND THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UTILITIES WILL BE THE CONTRACTOR'S RESPONSIBILITY.
- DRAINAGE PIPE LENGTHS PROVIDED REPRESENT DISTANCES FROM CENTER OF BOX TO CENTER OF BOX. DRAINAGE PIPES ARE TO TERMINATE INSIDE THE DRAINAGE STRUCTURES IN ACCORDANCE WITH GOVERNING AUTHORITY REQUIREMENTS, BUT IN NO CASE SHALL PROTRUDE MORE THAN 6" BEYOND THE INTERIOR WALLS.
- UNLESS OTHERWISE NOTED, GASKETED REINFORCED CONCRETE PIPE (GRCP) SHALL BE IN ACCORDANCE WITH ASTM C76, CLASS III, WALL B WITH GASKETED JOINTS (ASTM C443) PER SCDOT SPECIFICATIONS.



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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

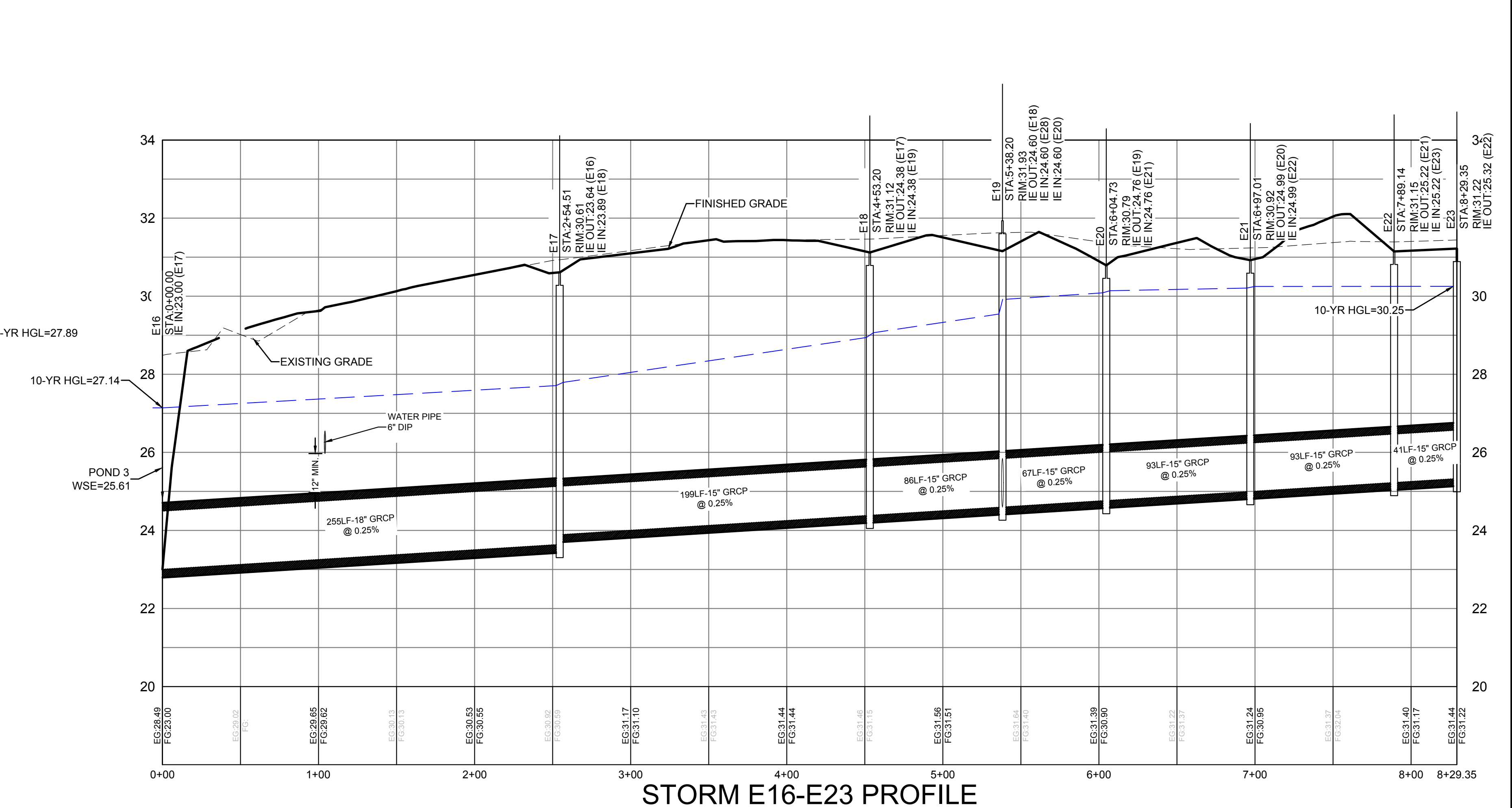
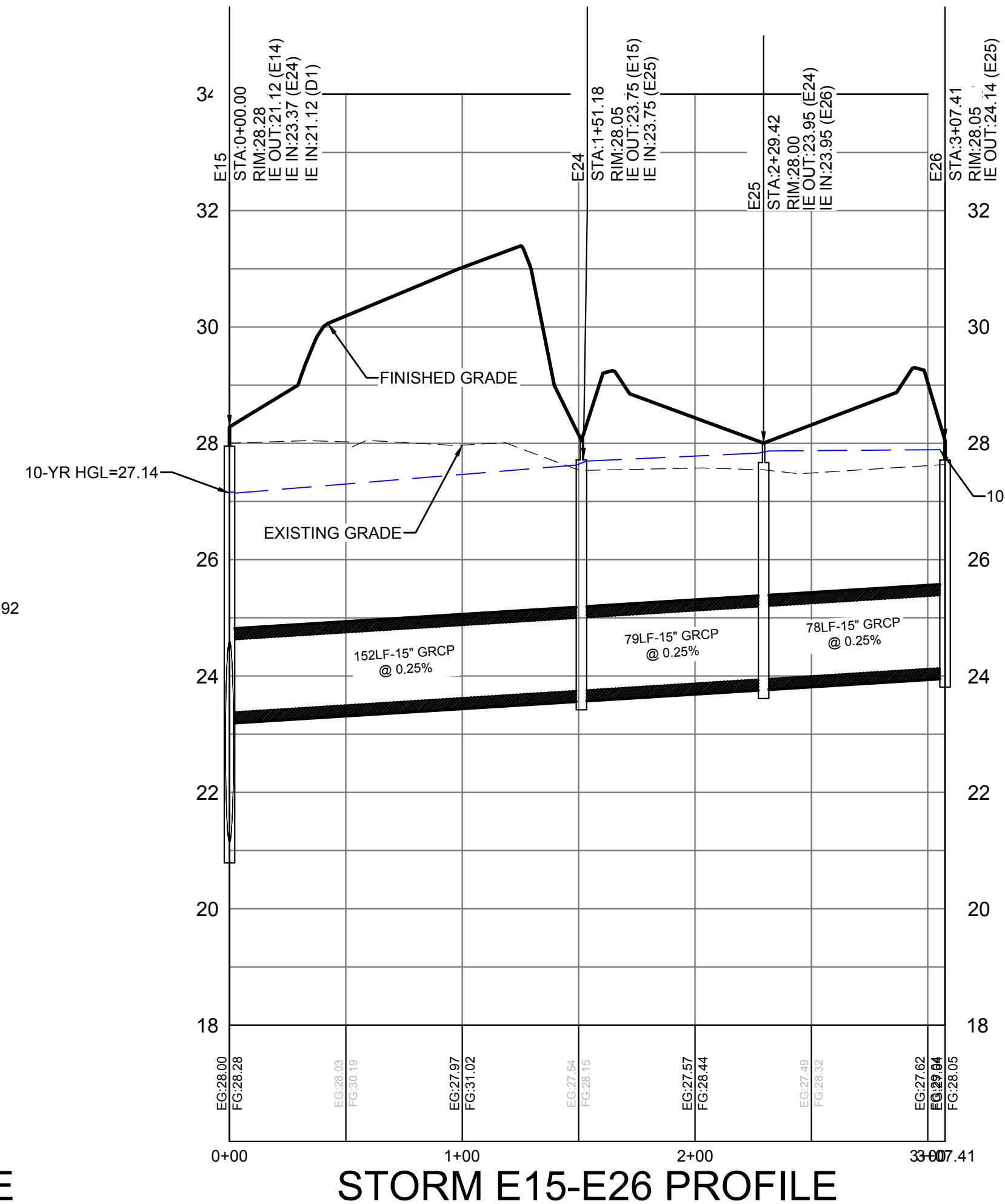
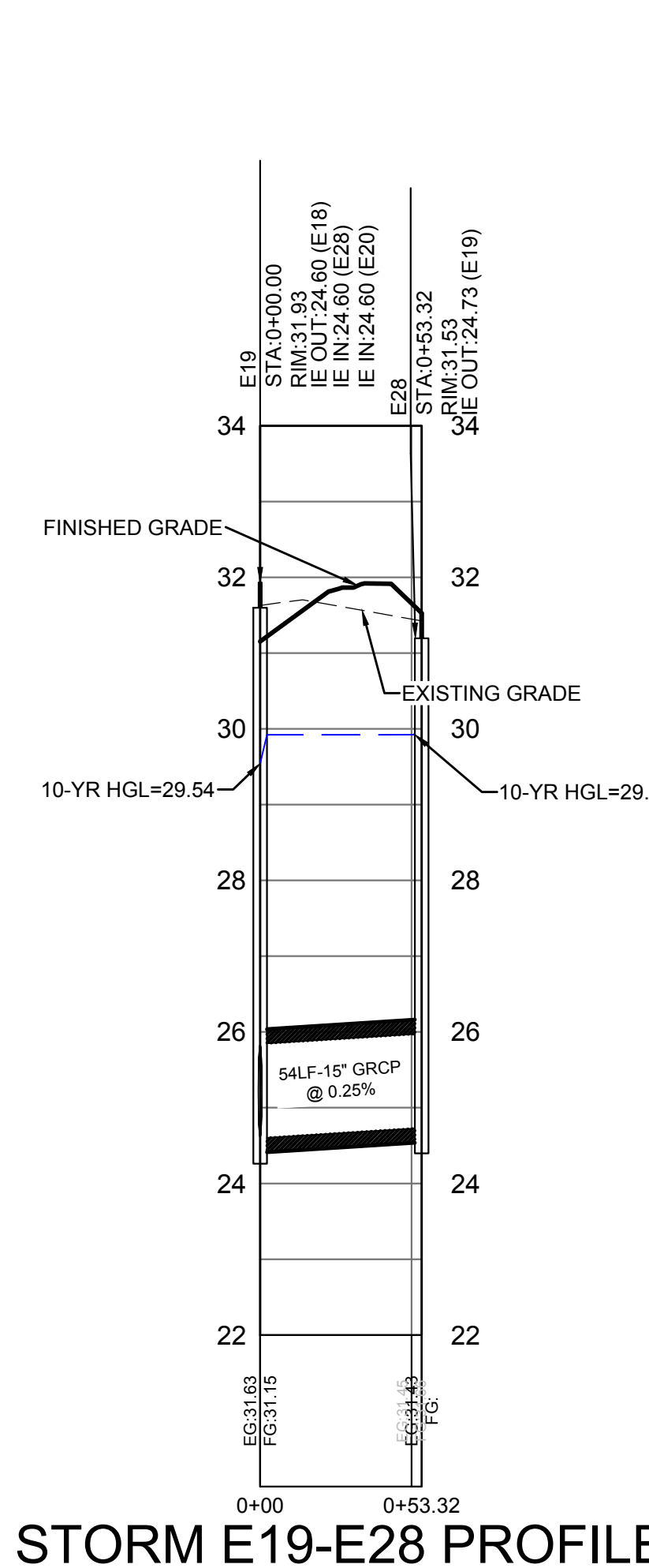
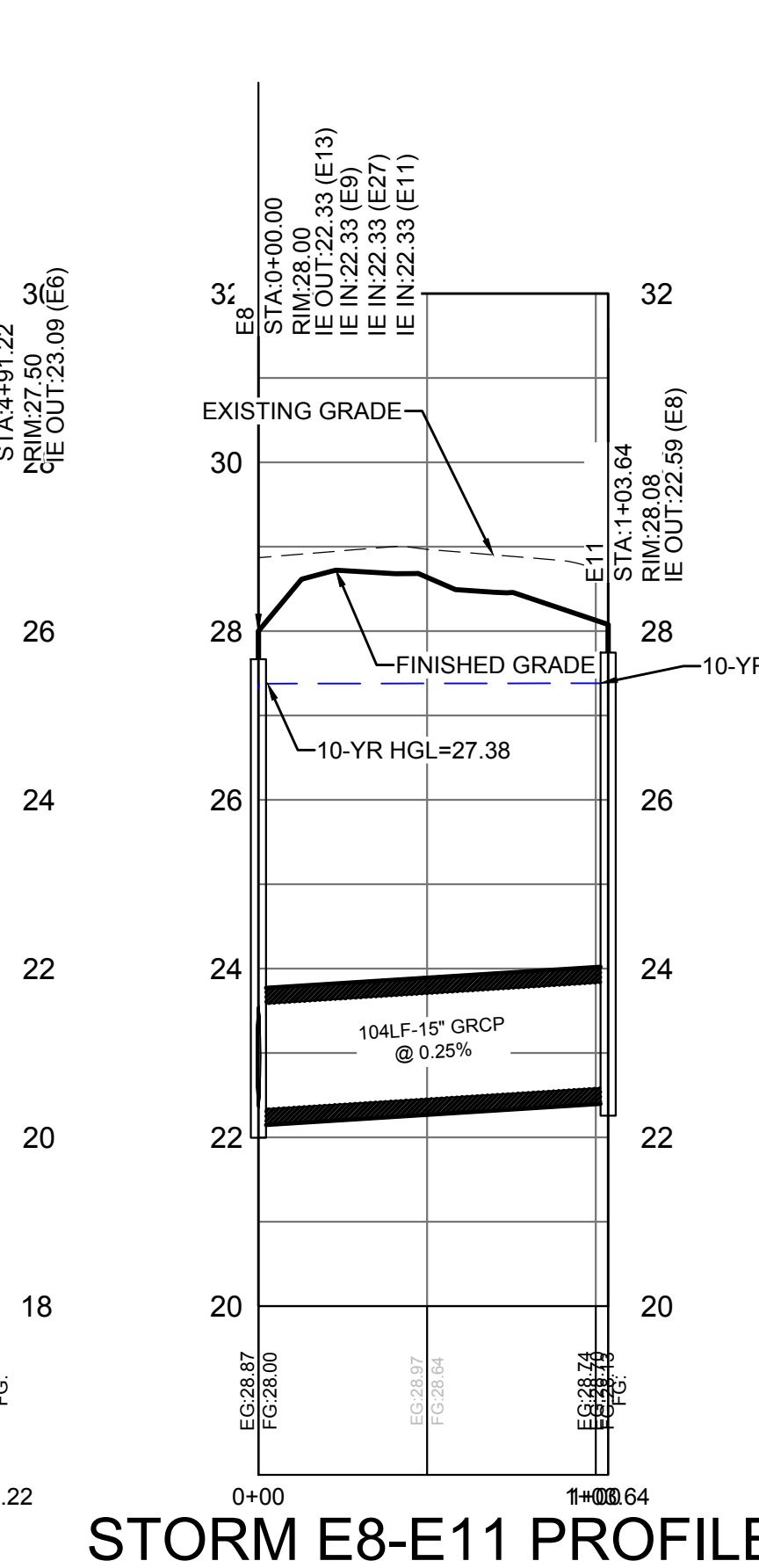
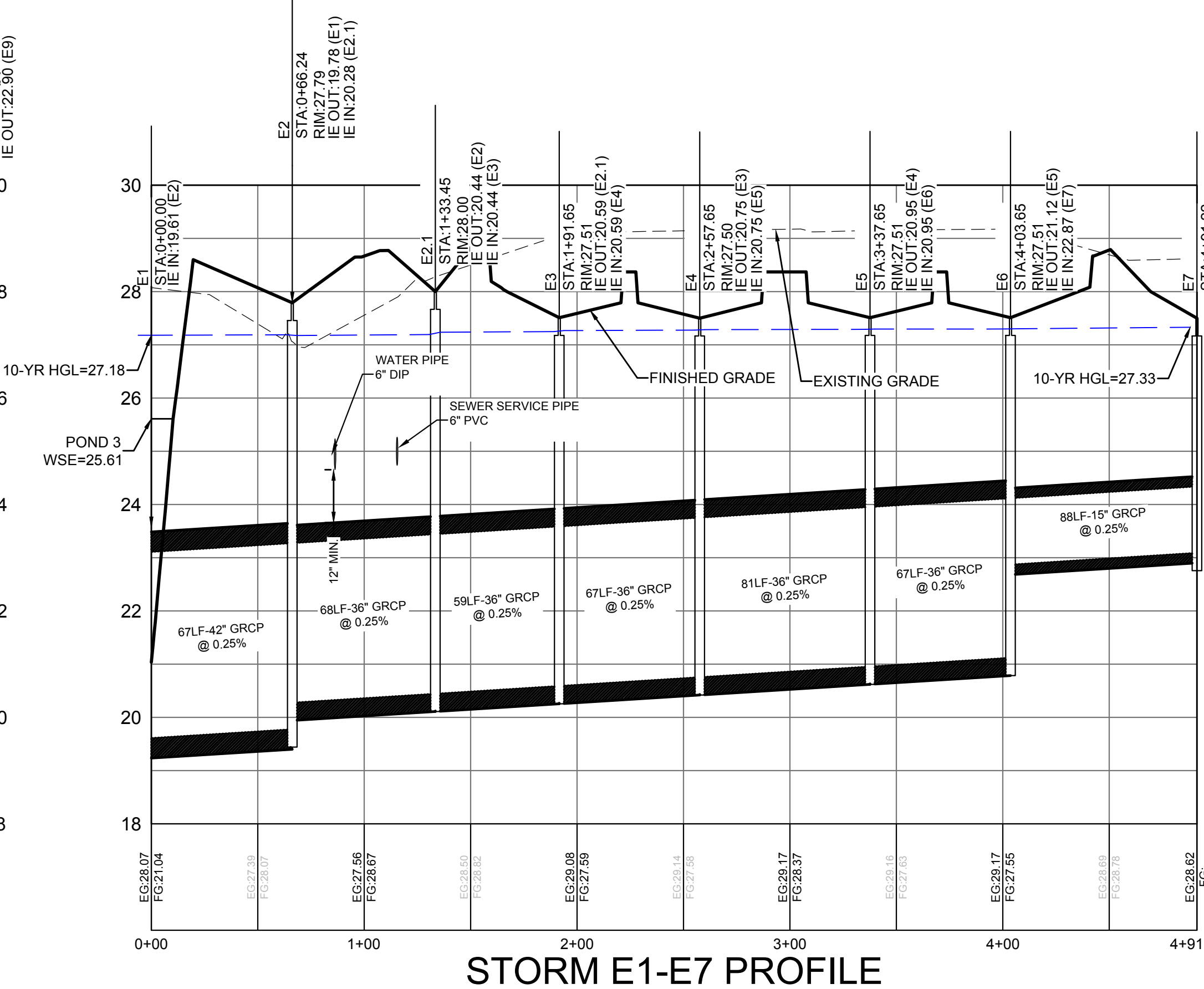
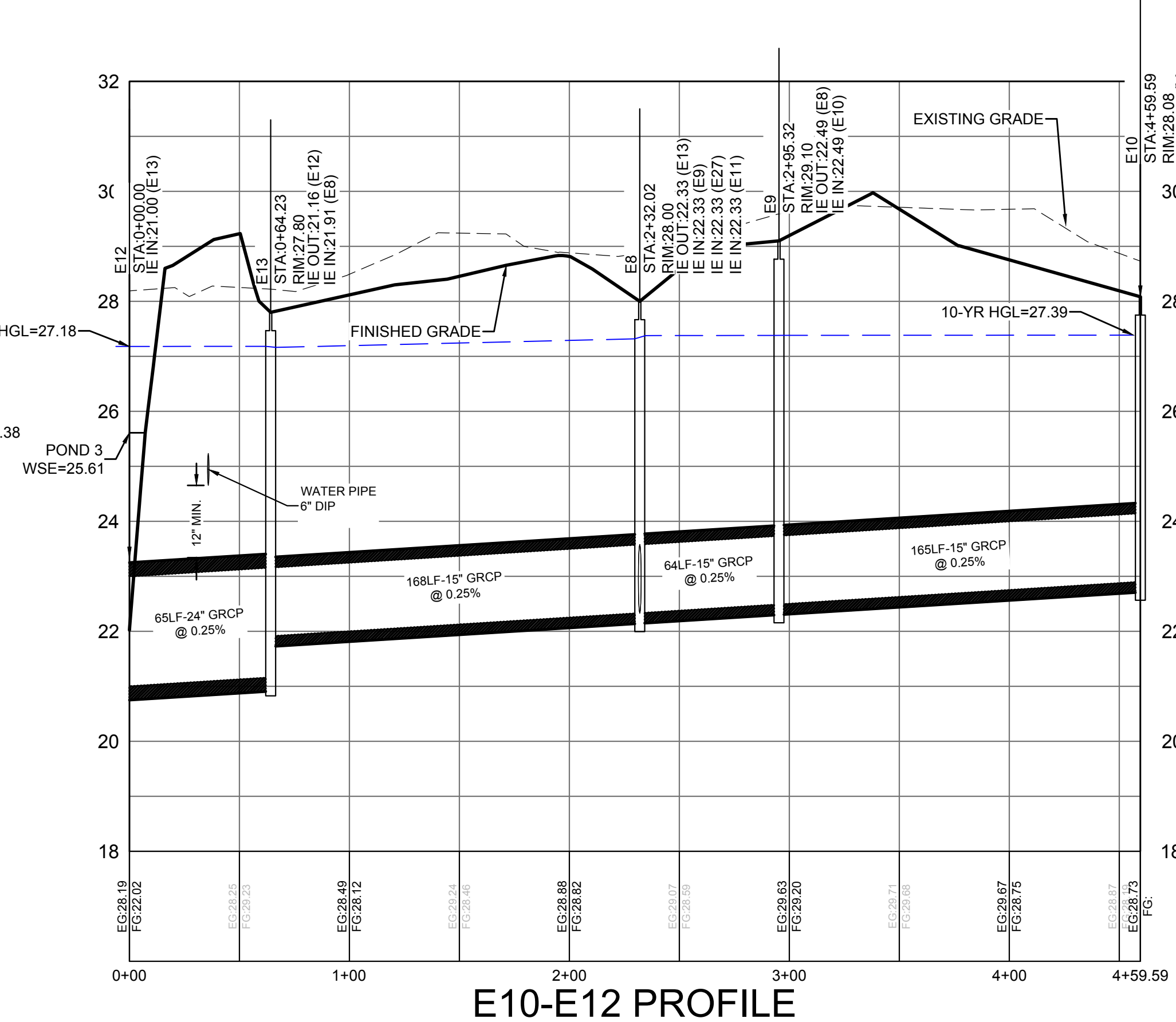
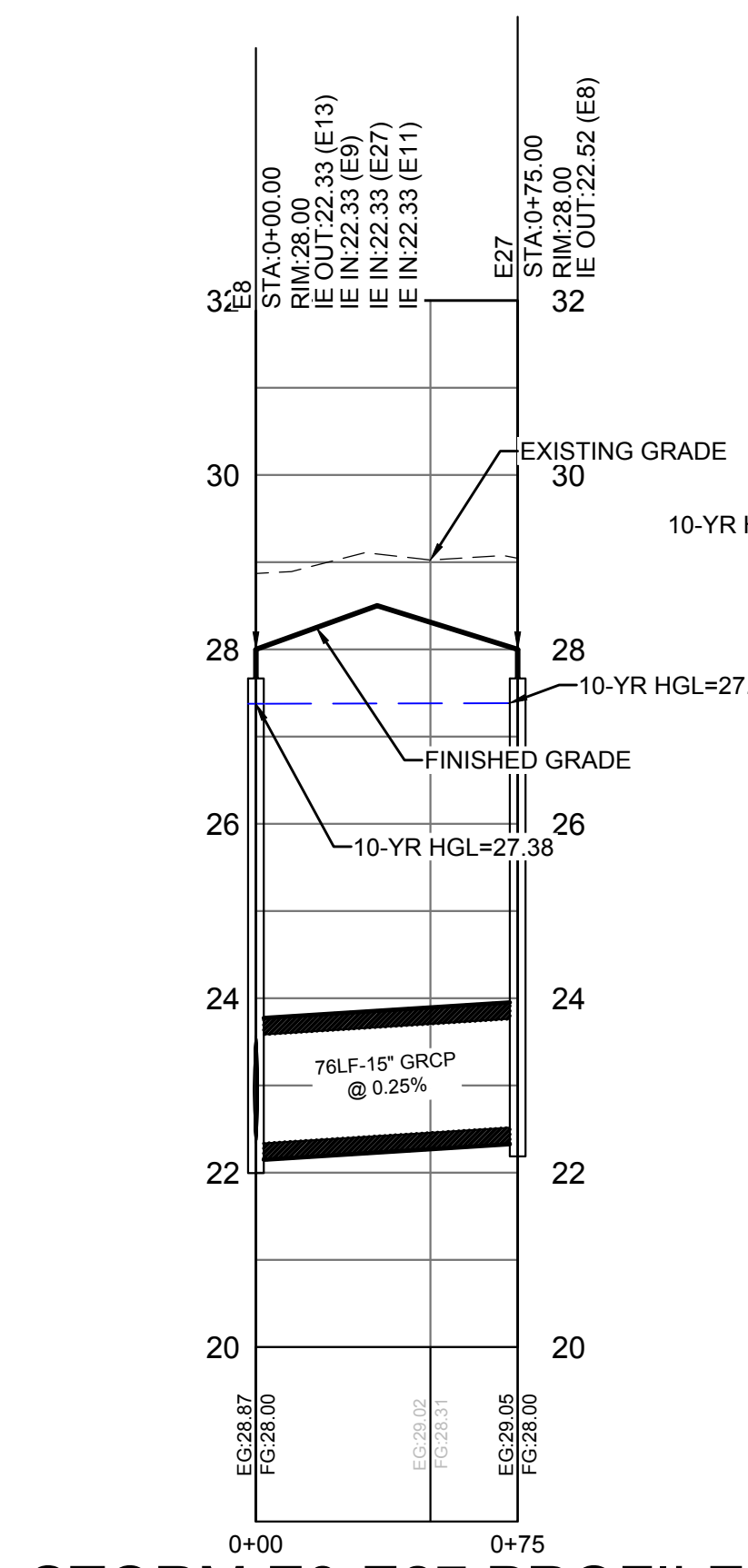
**DRAINAGE PROFILES**



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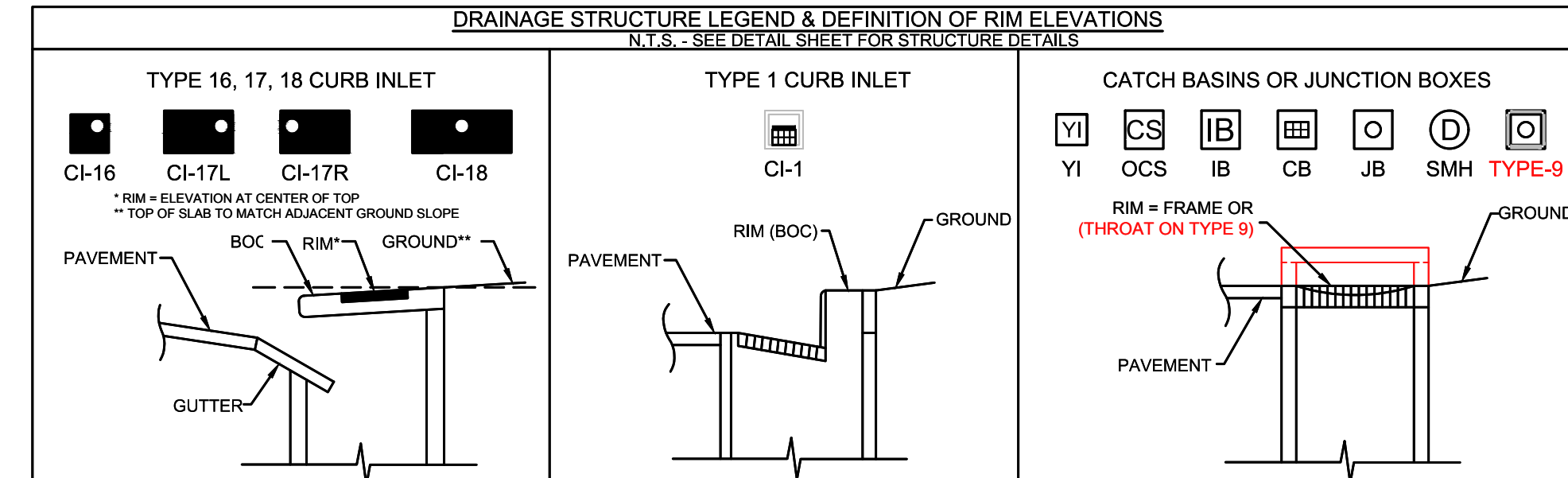
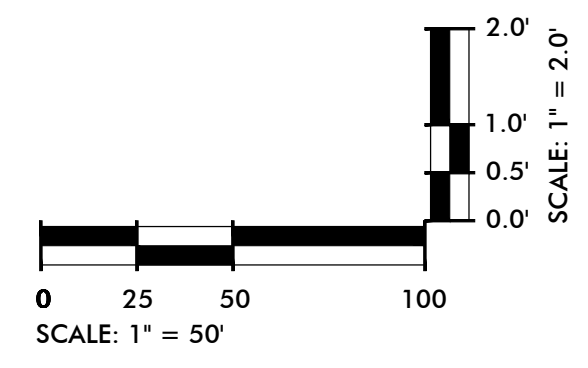
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**LINETYPE LEGEND**

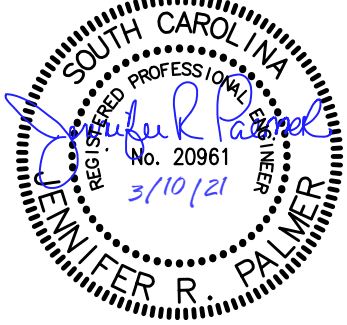
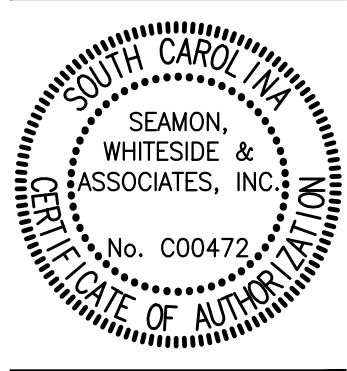
|  |   |
|--|---|
|  | FINISHED GRADE                              |
|  | EXISTING GROUND                             |
|  | HYDRAULIC GRADE LINE<br>25 YEAR STORM EVENT |

- STANDARD DRAINAGE PROFILE SHEET NOTES**
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**SW**  
SEAMON WHITESIDE

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**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
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**REVISION HISTORY**

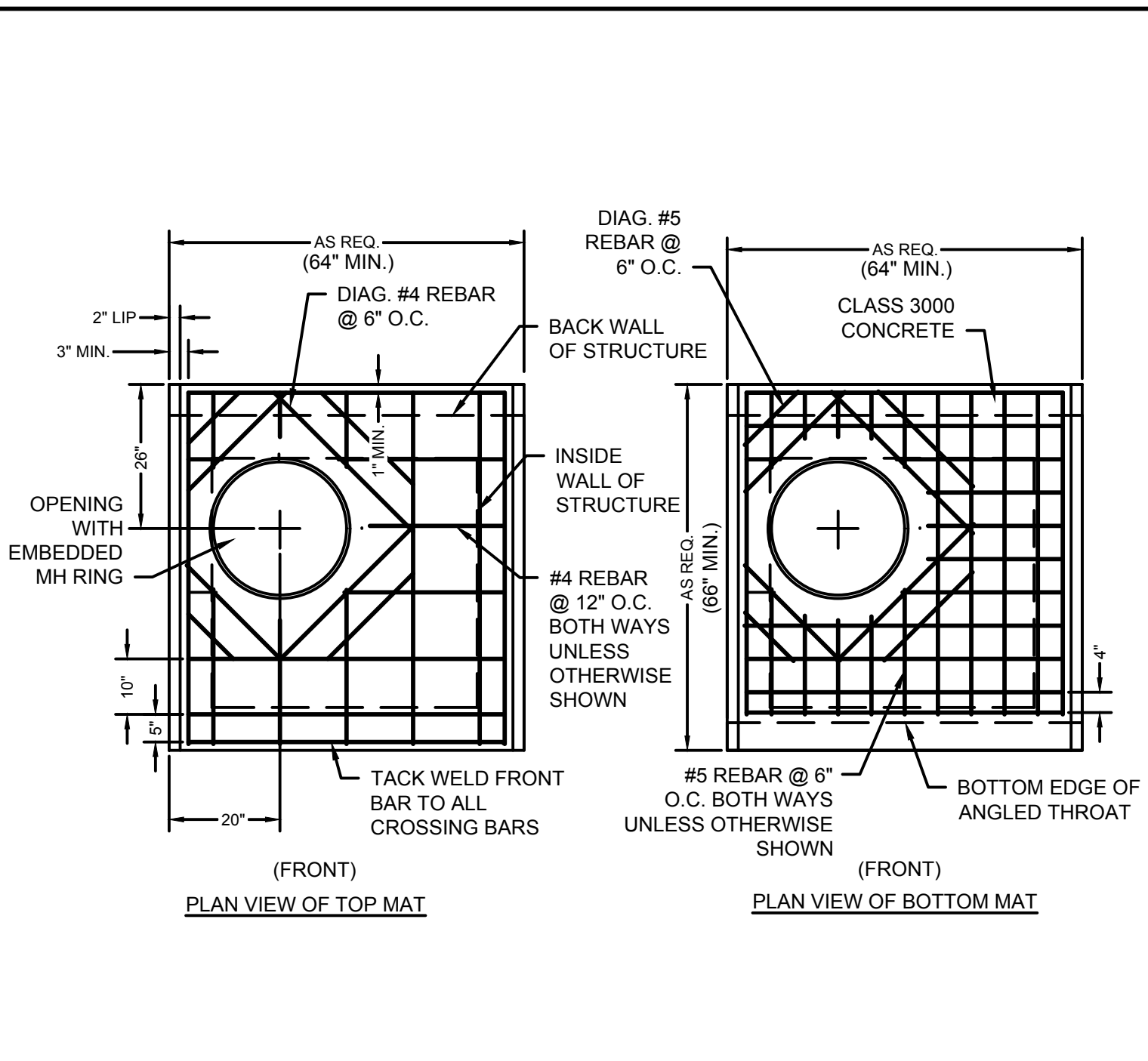
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|---|----------|
| A | 6/12/20  |
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**DRAINAGE PROFILES**

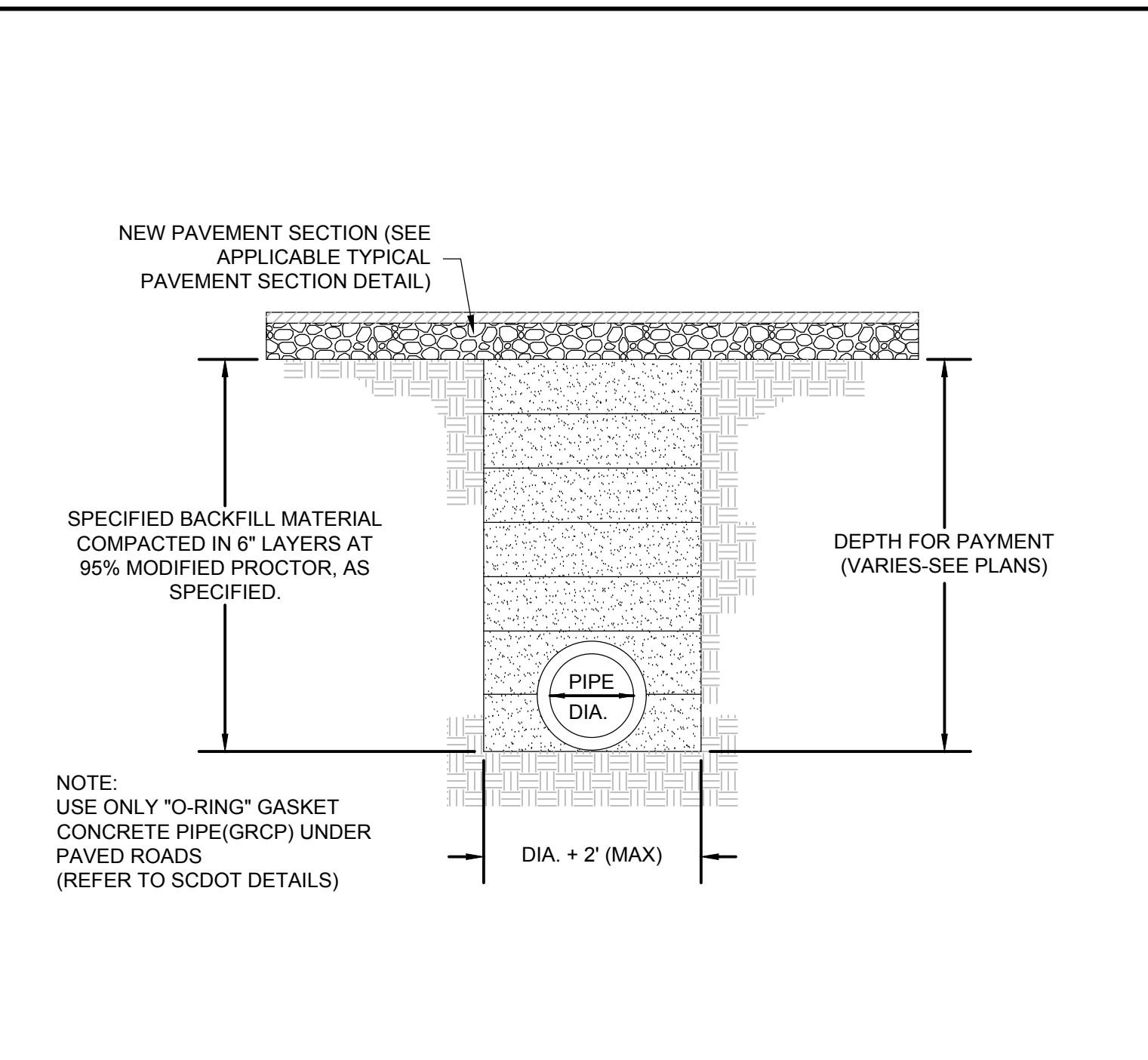
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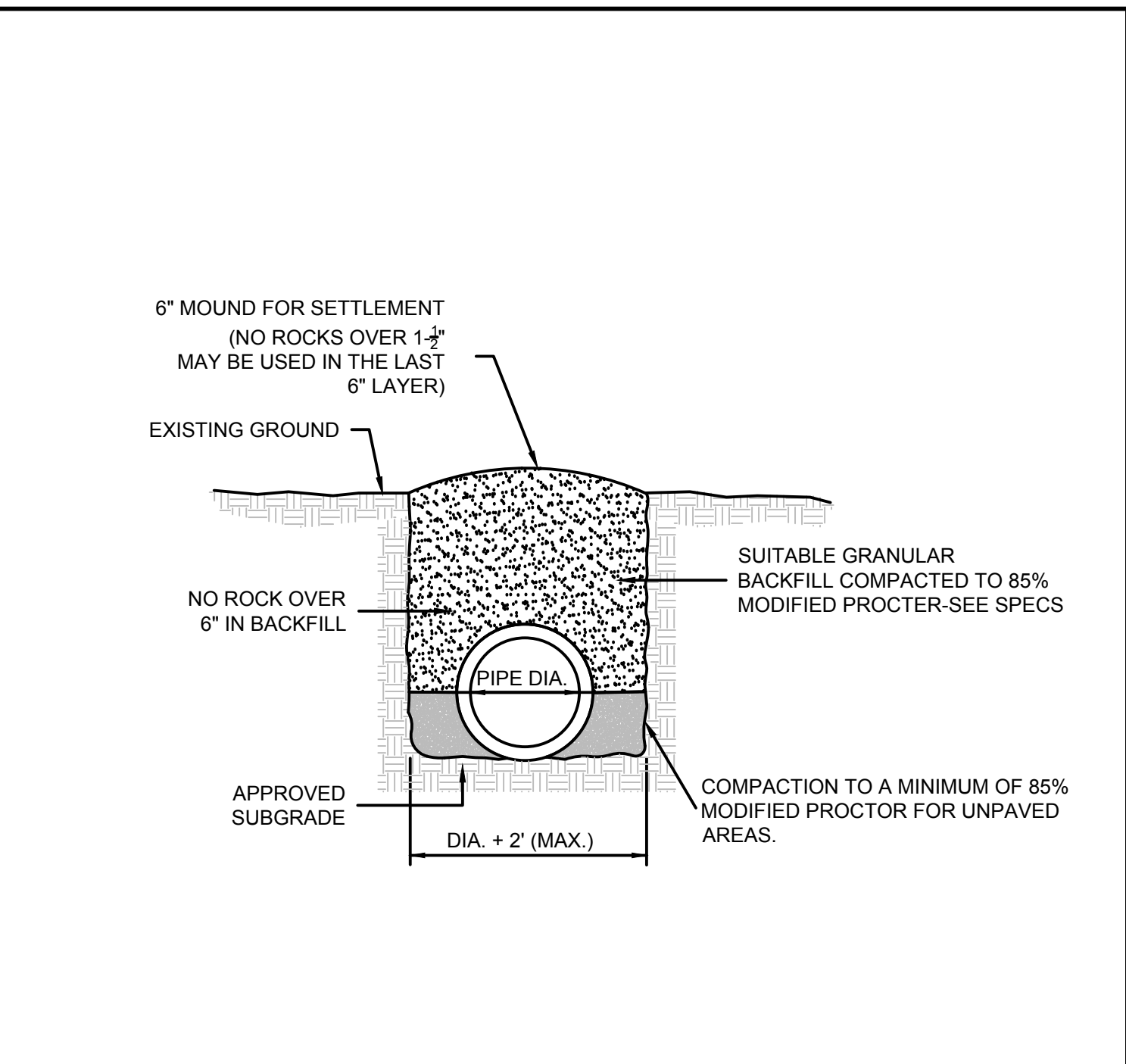
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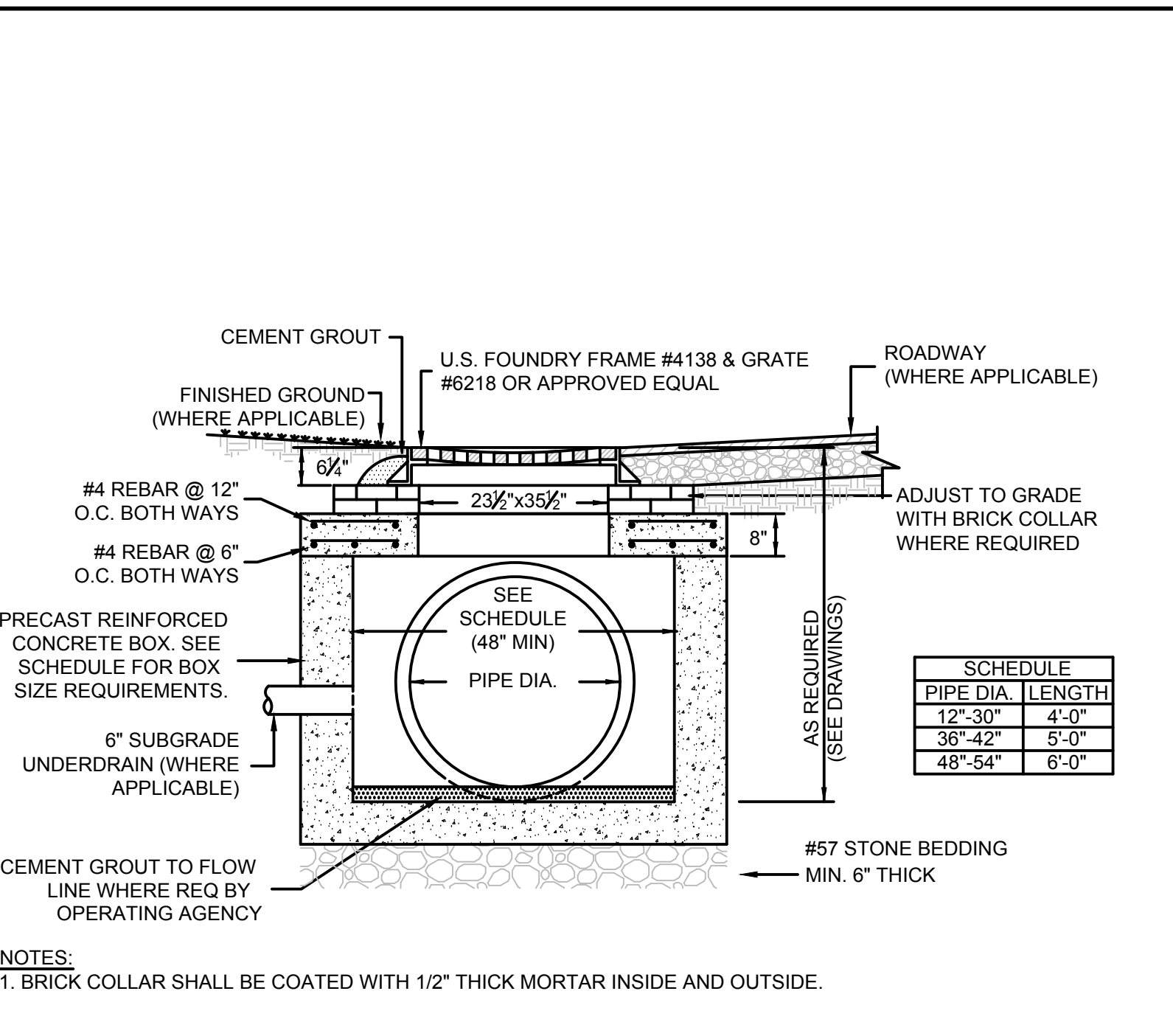
**1 CURB INLET TOP SLAB**  
(NOT TO SCALE)



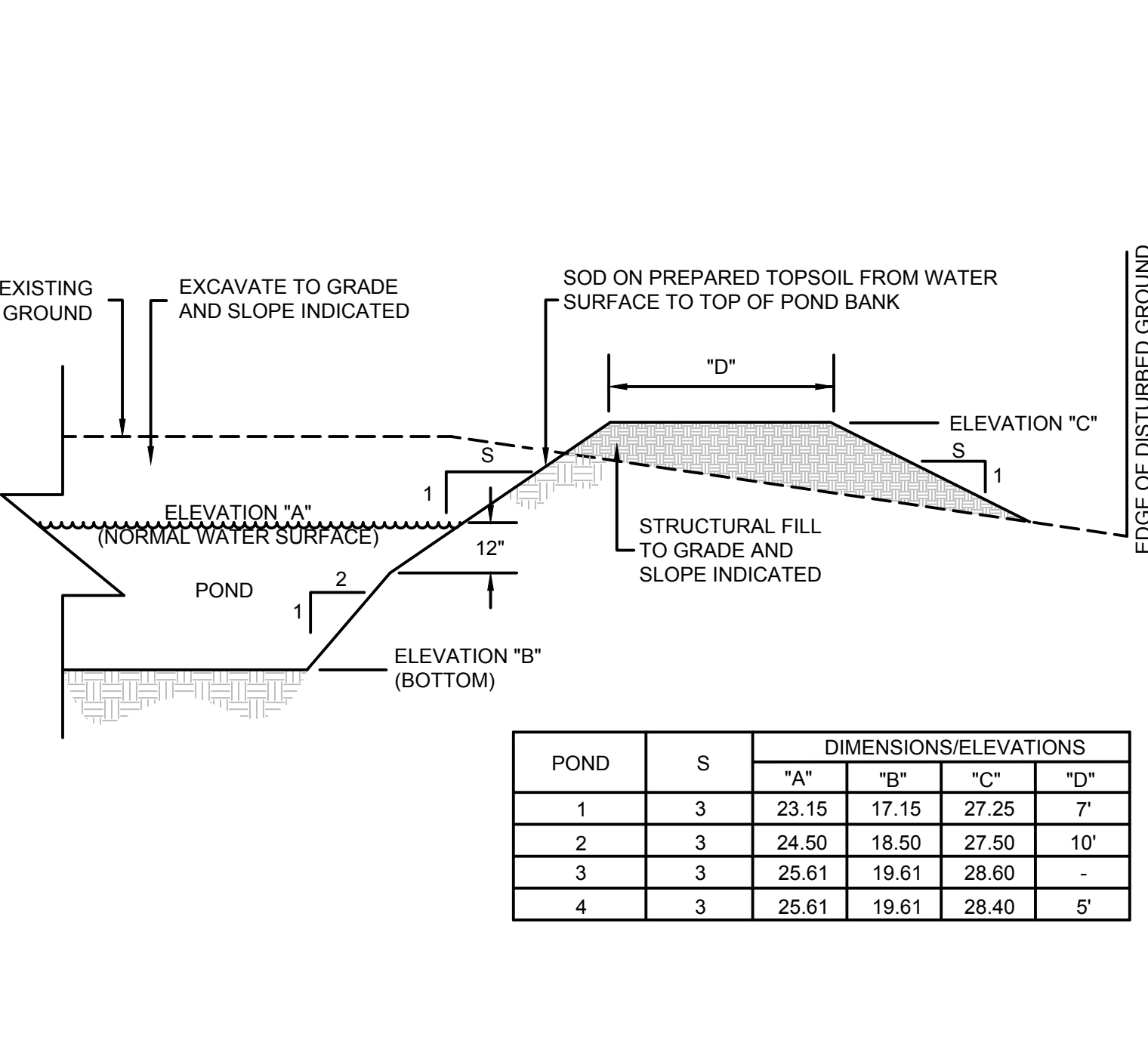
**2 STORM DRAINAGE PIPE TRENCH (UNDER PAVED AREAS)**  
(NOT TO SCALE)



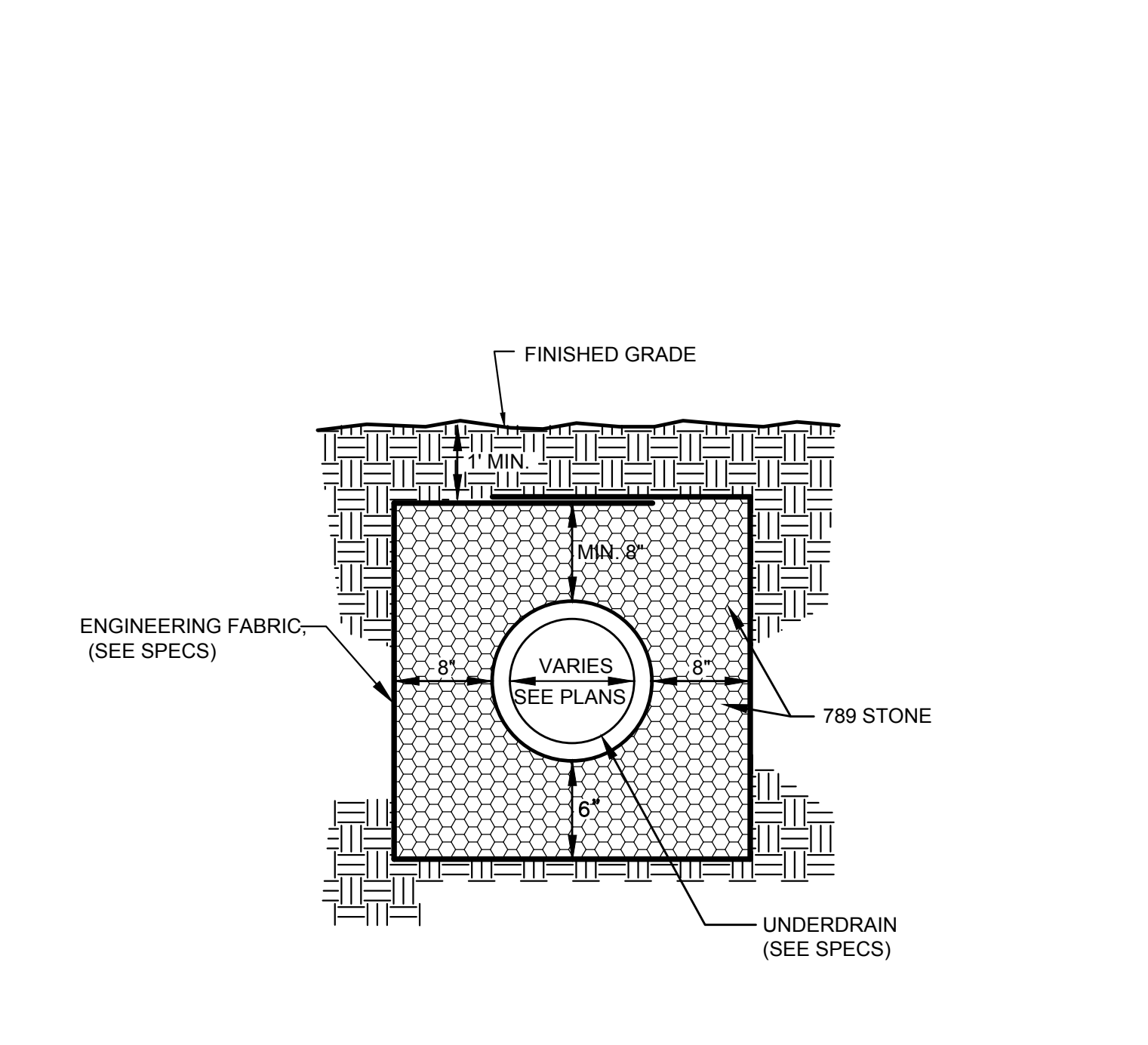
**3 STORM DRAINAGE PIPE TRENCH (NOT UNDER PAVED AREAS)**  
(NOT TO SCALE)



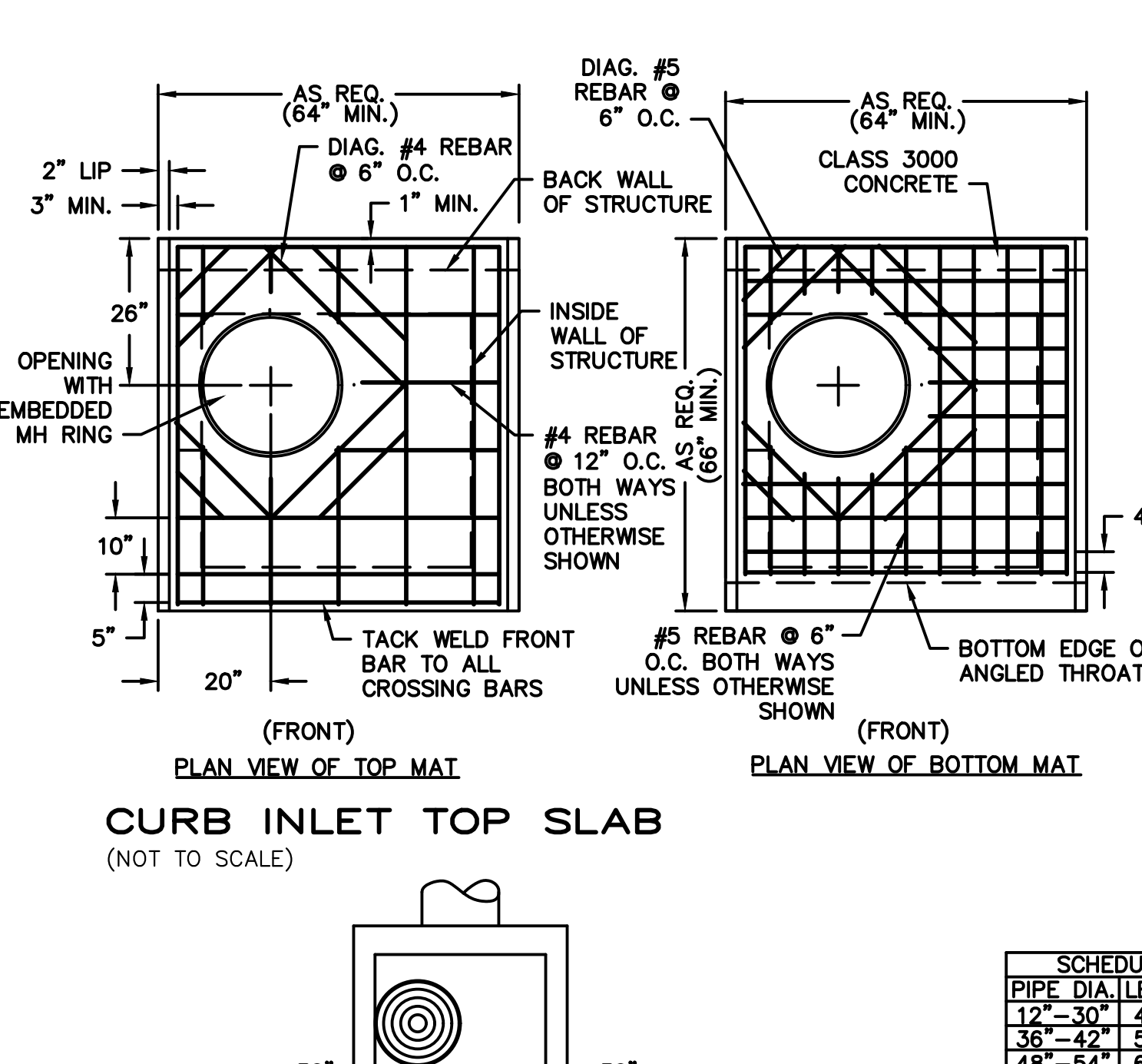
**4 CATCH BASIN**  
(NOT TO SCALE)



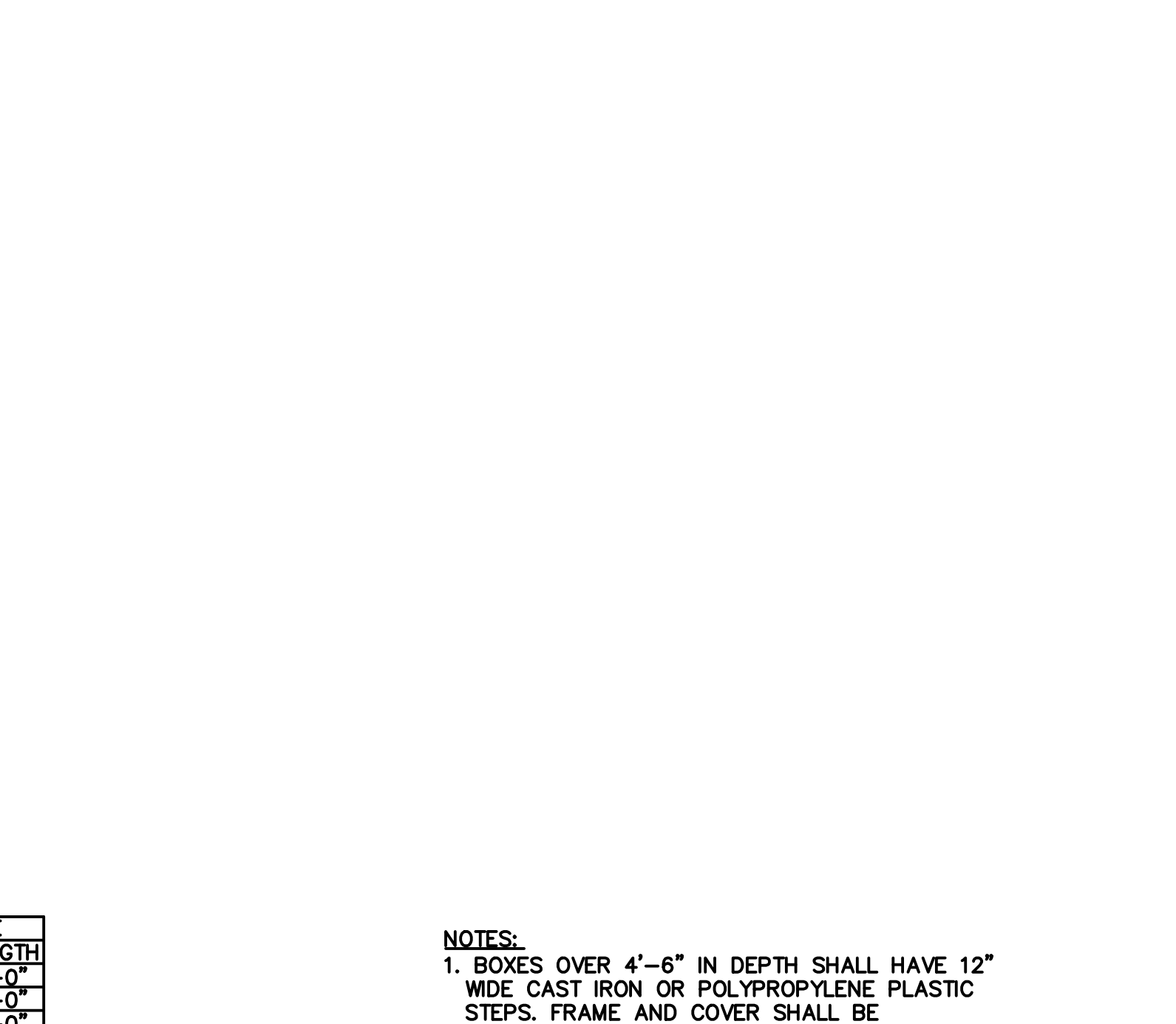
**5 POND BANK WITH DIKE**  
(NOT TO SCALE)



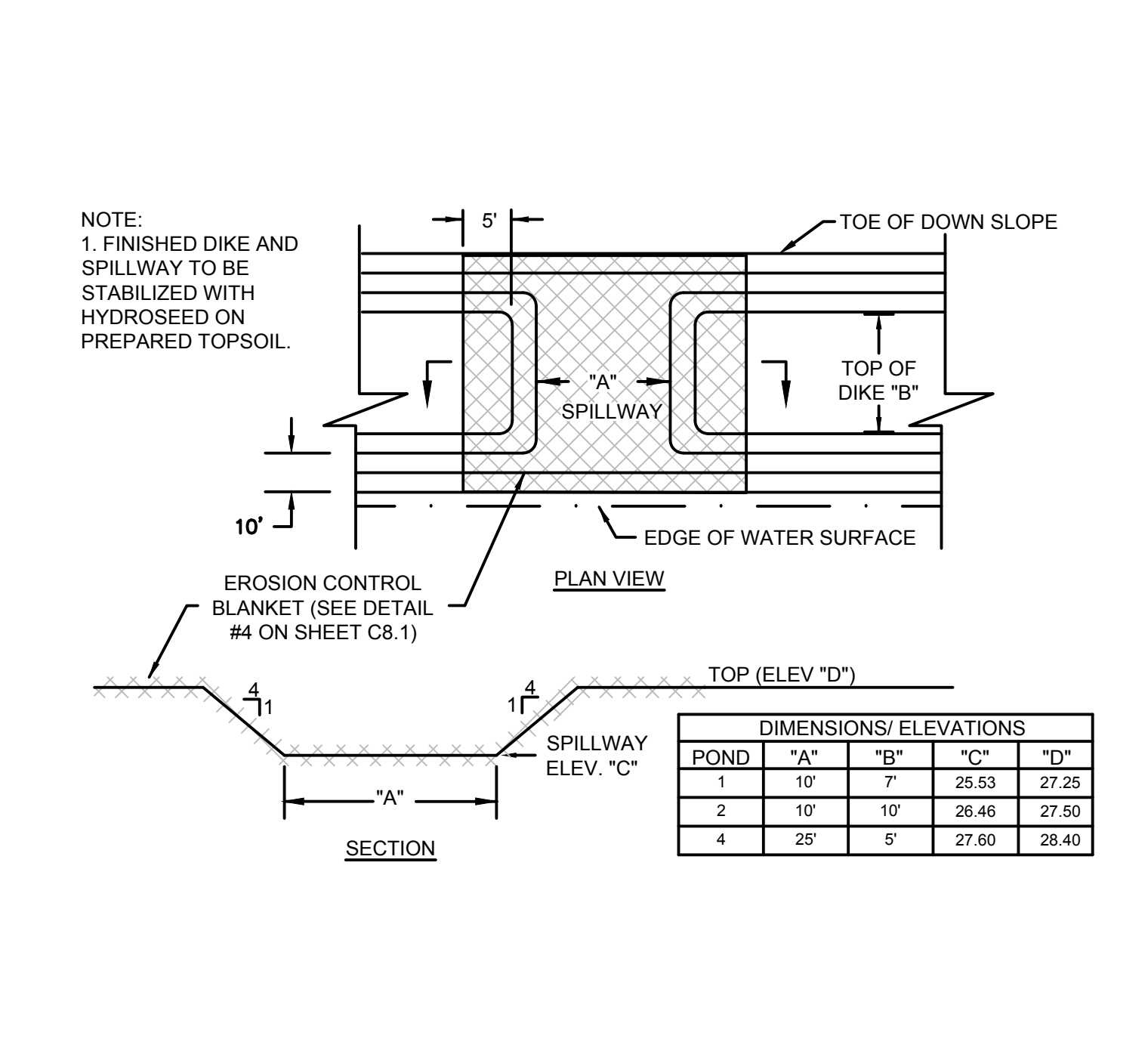
**6 MULTI-PURPOSE FIELD AND SWALE UNDERDRAIN**  
(NOT TO SCALE)



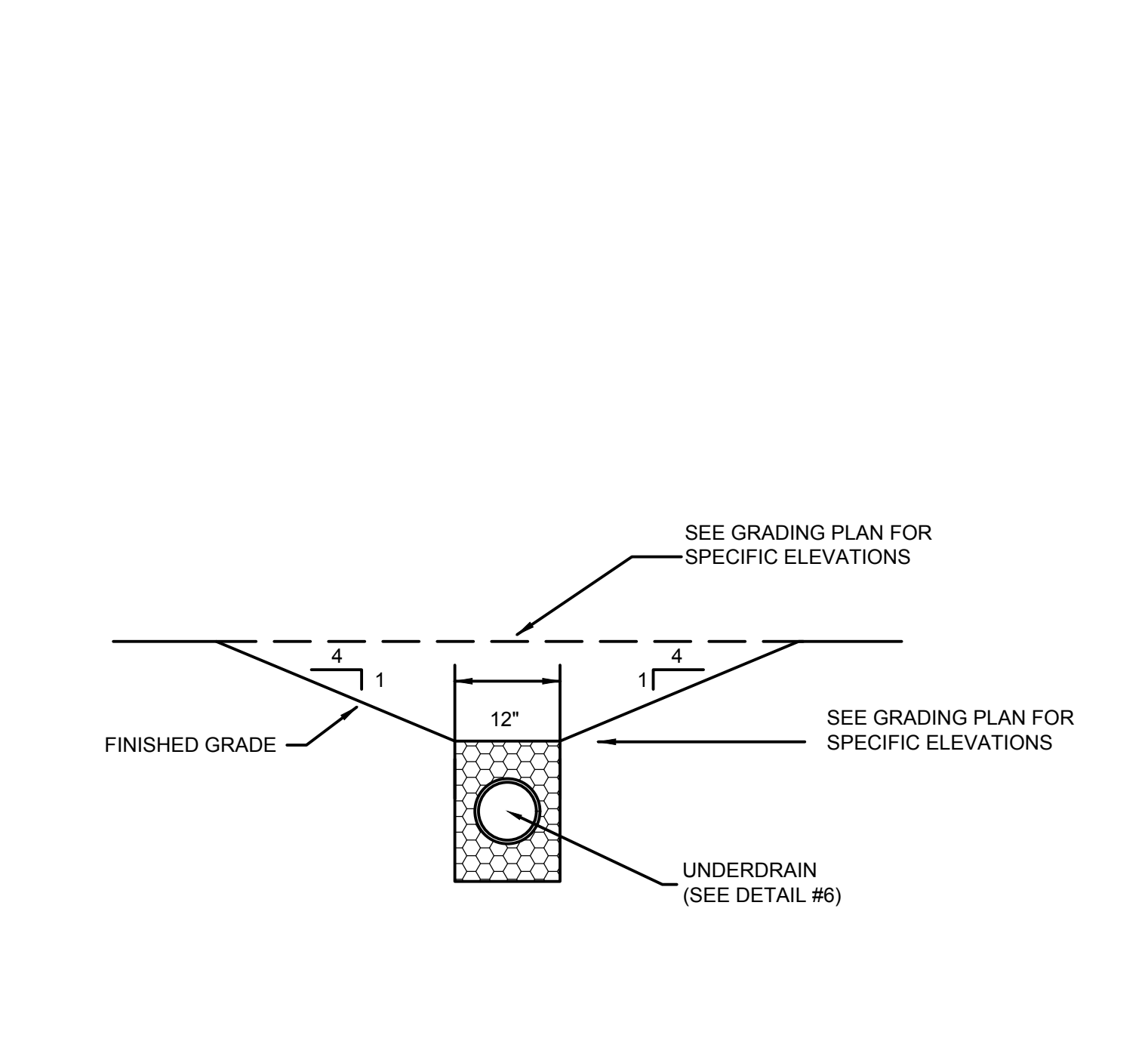
**7 SCDOT TYPE 16 CURB INLET**  
(NOT TO SCALE)



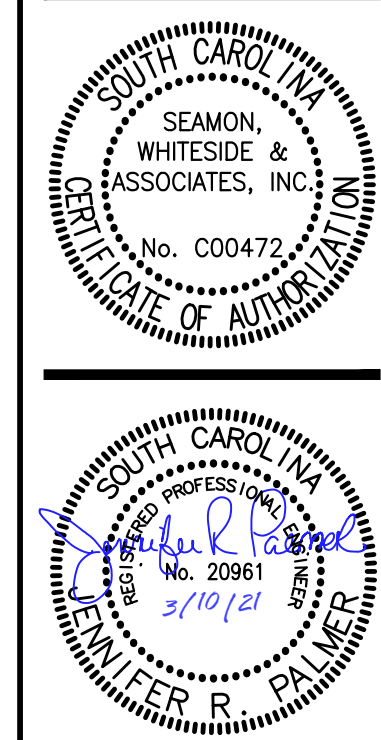
**4 CATCH BASIN**  
(NOT TO SCALE)



**8 EMERGENCY SPILLWAY**  
(NOT TO SCALE)



**9 SWALE**  
(NOT TO SCALE)



SW+ PROJECT: 7867  
DATE: 06/12/20  
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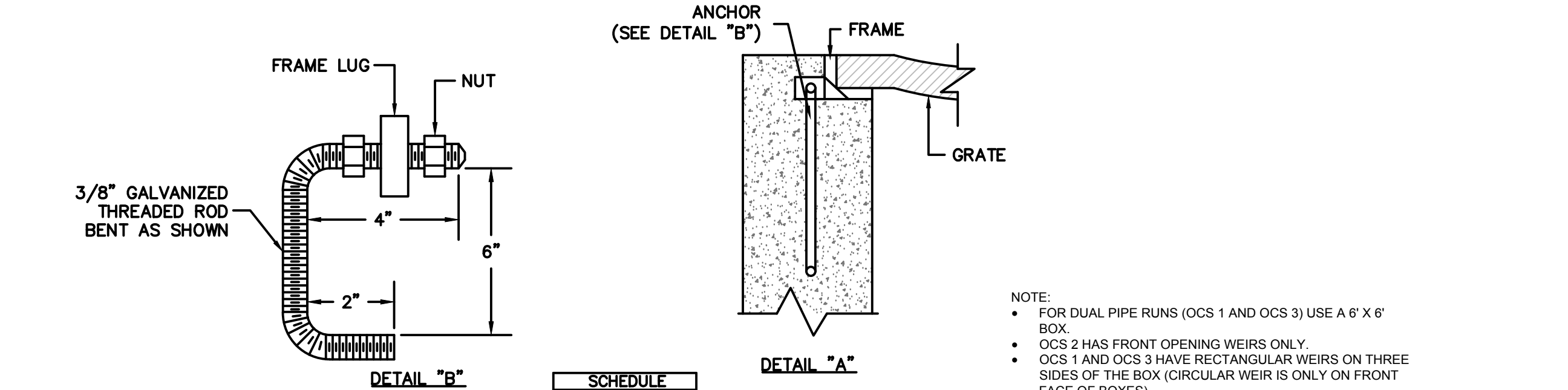
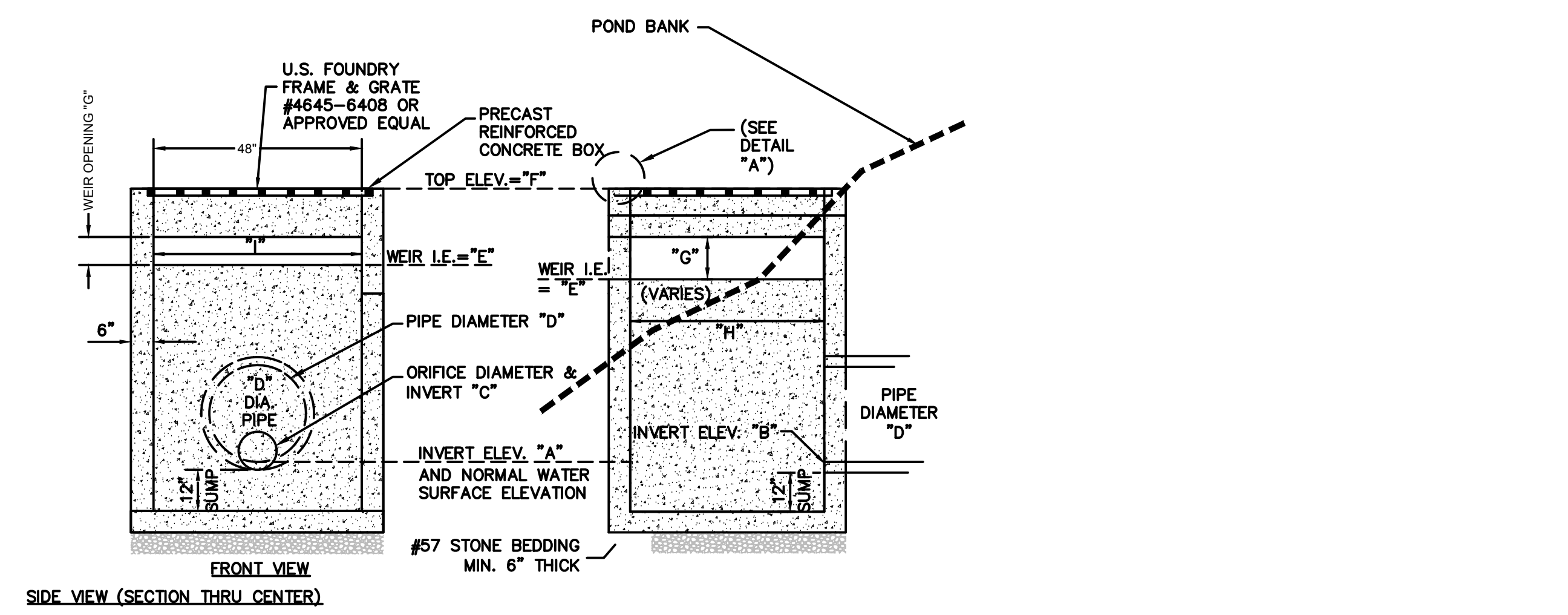
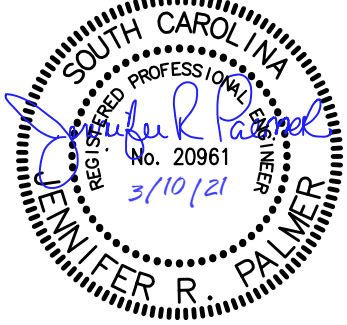
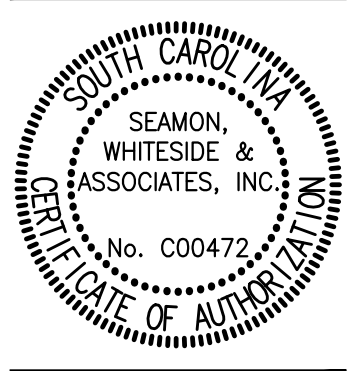
**REVISION HISTORY**

| NO. | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

GRADING & DRAINAGE DETAILS

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| PIPE DIA. | LENGTH |
|-----------|--------|
| 12"       | 4'-0"  |
| 18"       | 5'-0"  |
| 24"       | 6'-0"  |

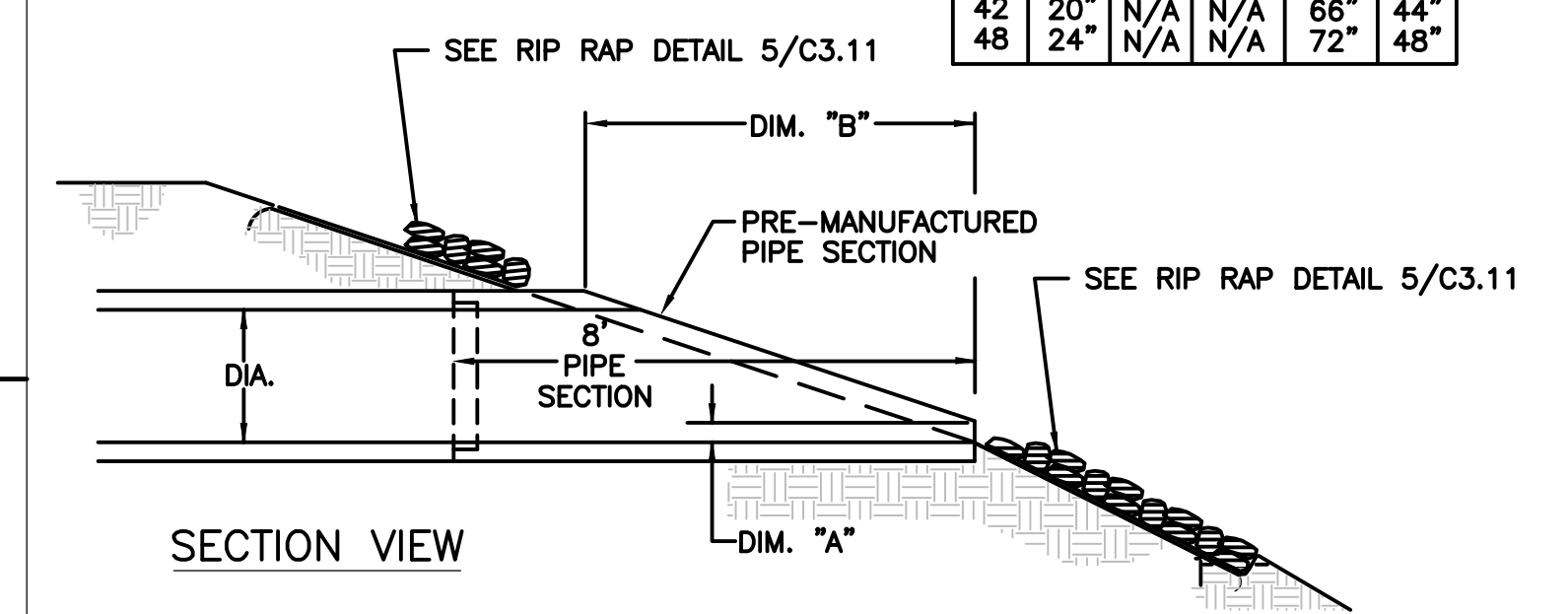
NOTE:  
 • FOR DUAL PIPE RUNS (OCS 1 AND OCS 3) USE A 6' X 6' BOX  
 • OCS 2 HAS FRONT OPENING WEIRS ONLY  
 • OCS 1 AND OCS 3 HAVE RECTANGULAR WEIRS ON THREE SIDES OF THE BOX (CIRCULAR WEIR IS ONLY ON FRONT FACE OF BOXES)

| STRUCTURE | POND   | ELEVATIONS |       | FRONT ORIFICE |       | PIPE DIAMETER | WEIR I.E. | MIN. RIM ELEV. | WEIR OPENING | WEIR OPENING  | WEIR OPENING |
|-----------|--------|------------|-------|---------------|-------|---------------|-----------|----------------|--------------|---------------|--------------|
|           |        | "A"        | "B"   | "C"           | I.E.  |               |           |                |              |               |              |
| OCS 1     | POND 1 | 23.15      | 23.15 | 6"            | 23.15 | 2-24"         | 24.25     | 26.50          | 6"           | 36" (3 SIDES) | 36"          |
| OCS 2     | POND 2 | 24.50      | 24.50 | 4"            | 24.50 | 24"           | 25.50     | 27.50          | 6"           | 0"            | 36"          |
| OCS 3     | POND 4 | 25.61      | 25.61 | 8"            | 25.61 | 2-24"         | 26.65     | 28.00          | 6"           | 36" (3 SIDES) | 36"          |

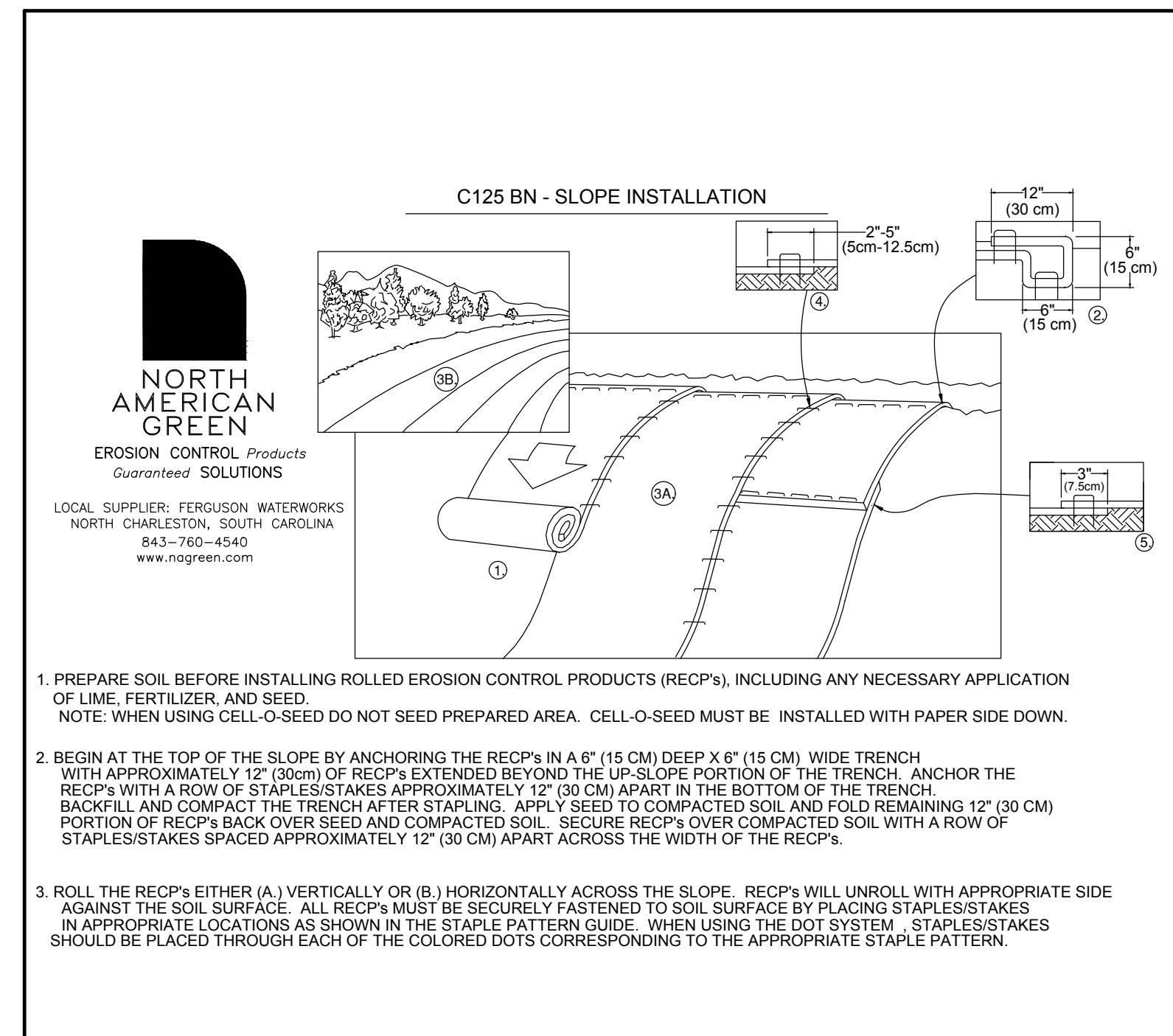
### 1 OUTLET CONTROL STRUCTURES (NOT TO SCALE)

THE CONTRACTOR SHALL SHAPE THE POND BANK TO CONFORM TO SLOPE OF THE BEVELED PIPE.

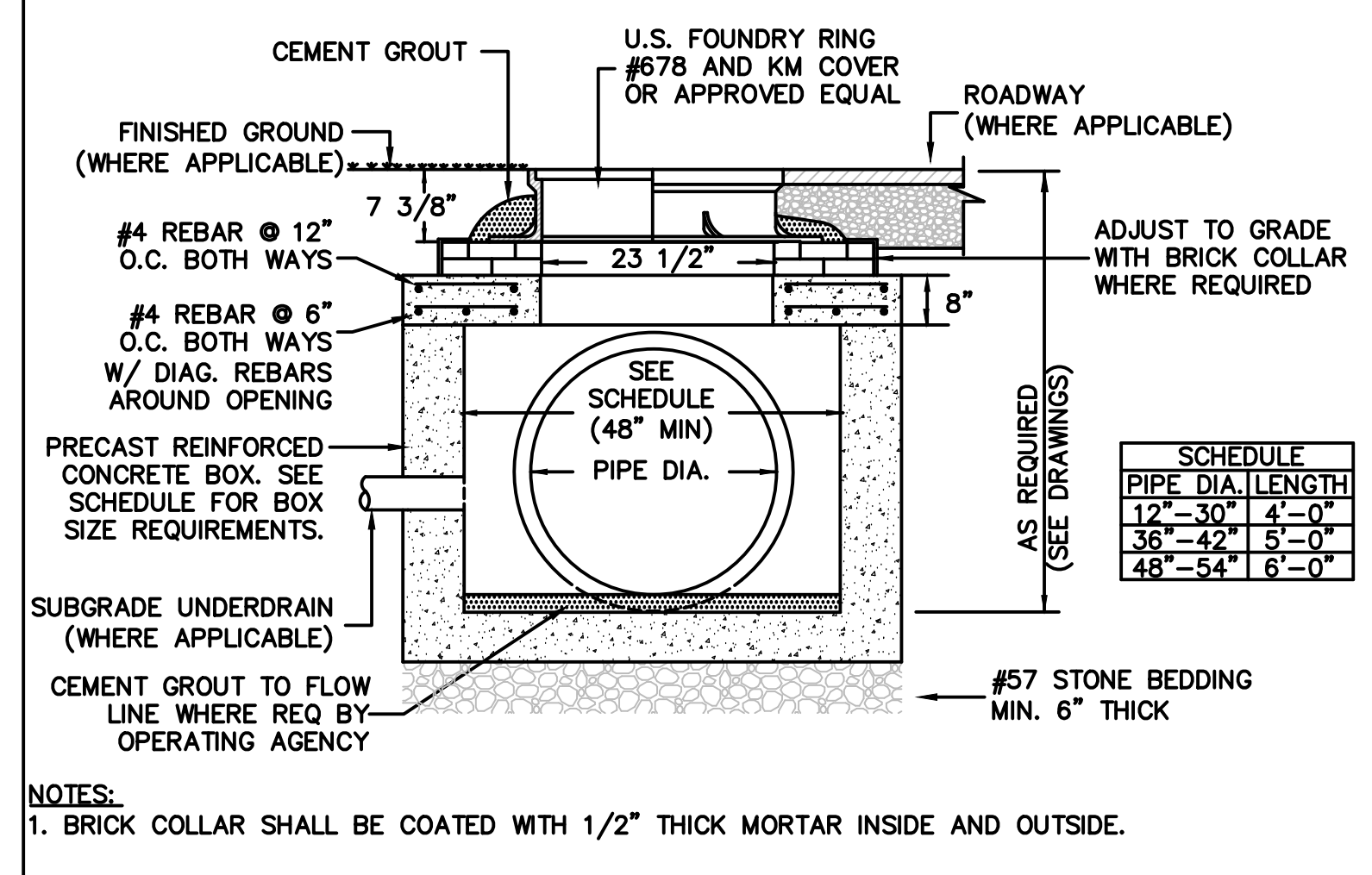
| DIA. | END SECTION DIM. |     |     |     |
|------|------------------|-----|-----|-----|
|      | A                | 5:1 | 4:1 | 3:1 |
| 18"  | 6"               | 45" | 36" | 27" |
| 24"  | 9"               | 45" | 36" | 27" |
| 30"  | 12"              | N/A | 72" | 54" |
| 36"  | 15"              | N/A | N/A | 63" |
| 42"  | 20"              | N/A | N/A | 66" |
| 48"  | 24"              | N/A | N/A | 72" |



### 2 PRECAST BEVELED PIPE END (NOT TO SCALE)



### 4 EROSION CONTROL BLANKET (NOT TO SCALE)



### 3 JUNCTION BOX (NOT TO SCALE)

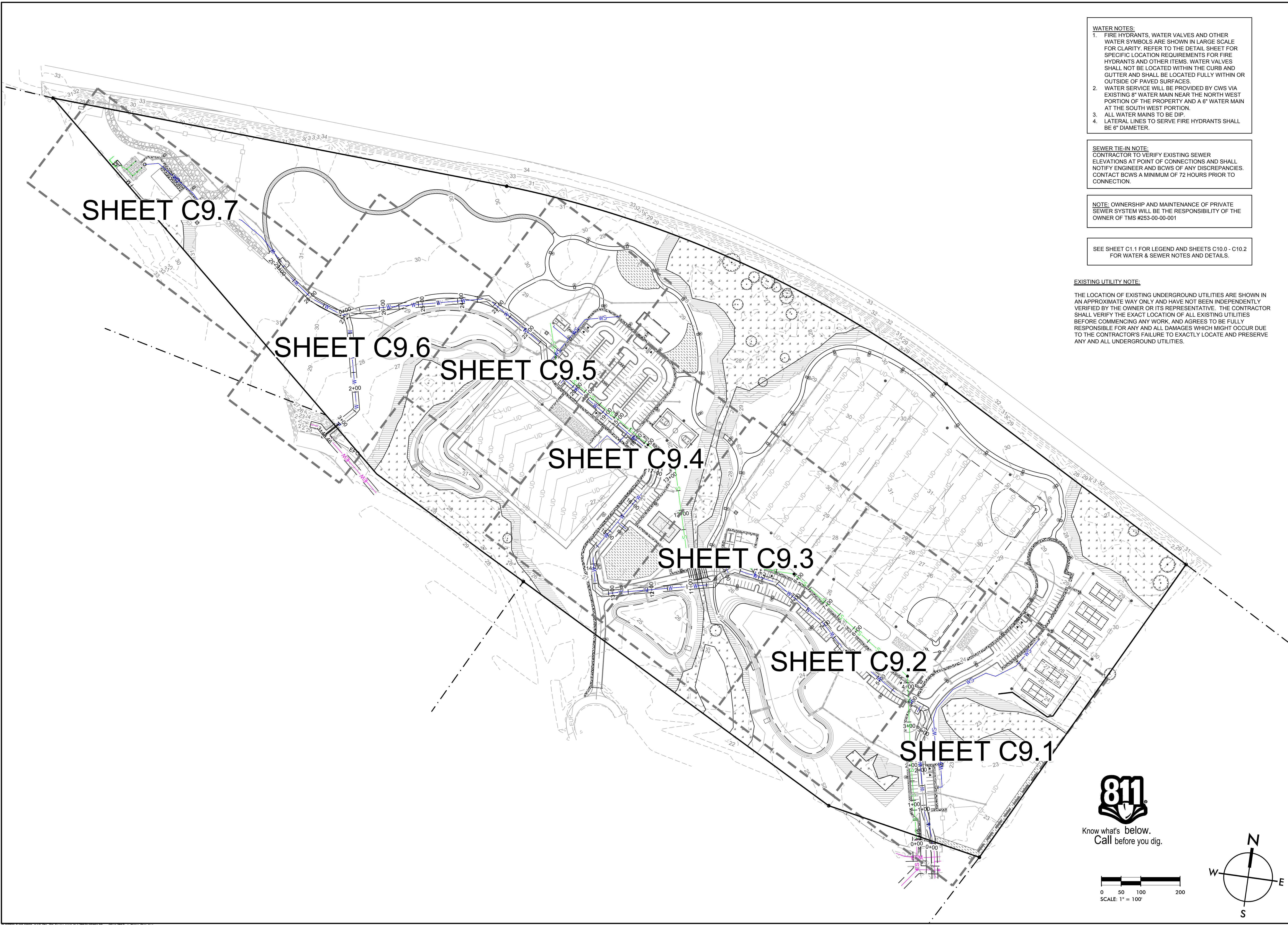
**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BET  
 CHECKED BY: JRP

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 10/29/20 |
| C                | 01/22/21 |
| D                | 03/11/21 |

GRADING & DRAINAGE DETAILS

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**WATER NOTES:**  
1. FIRE HYDRANTS, WATER VALVES AND OTHER WATER SYMBOLS ARE SHOWN IN LARGE SCALE FOR CLARITY. REFER TO THE DETAIL SHEET FOR SPECIFIC LOCATION REQUIREMENTS FOR FIRE HYDRANTS AND OTHER ITEMS. WATER VALVES SHALL NOT BE LOCATED WITHIN THE CURB AND GUTTER AND SHALL BE LOCATED FULLY WITHIN OR OUTSIDE OF PAVED SURFACES.  
2. WATER SERVICE WILL BE PROVIDED BY CWS VIA EXISTING 8" WATER MAIN NEAR THE NORTH WEST PORTION OF THE PROPERTY AND A 6" WATER MAIN AT THE SOUTH WEST PORTION.  
3. ALL WATER MAINS TO BE DIP.  
4. LATERAL LINES TO SERVE FIRE HYDRANTS SHALL BE 6" DIAMETER.

**SEWER TIE-IN NOTE:**  
CONTRACTOR TO VERIFY EXISTING SEWER CONNECTIONS AT POINT OF CONNECTIONS AND SHALL NOTIFY ENGINEER AND BCWS OF ANY DISCREPANCIES. CONTACT BCWS A MINIMUM OF 72 HOURS PRIOR TO CONNECTION.

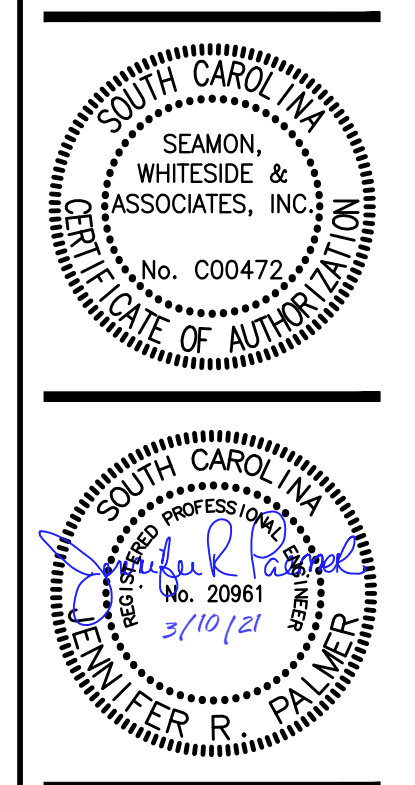
**NOTE: OWNERSHIP AND MAINTENANCE OF PRIVATE SEWER SYSTEM WILL BE THE RESPONSIBILITY OF THE OWNER OF TMS #253-00-001**

SEE SHEET C.1.1 FOR LEGEND AND SHEETS C10.0 - C10.2 FOR WATER & SEWER NOTES AND DETAILS.

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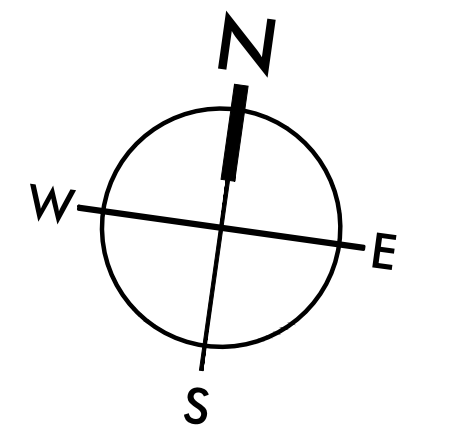
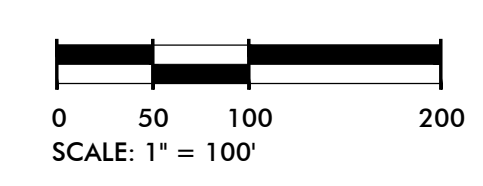
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CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

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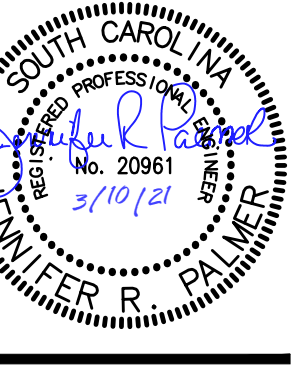
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|------------------|----------|
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Know what's below.  
Call before you dig.



OVERALL WATER & SEWER PLAN

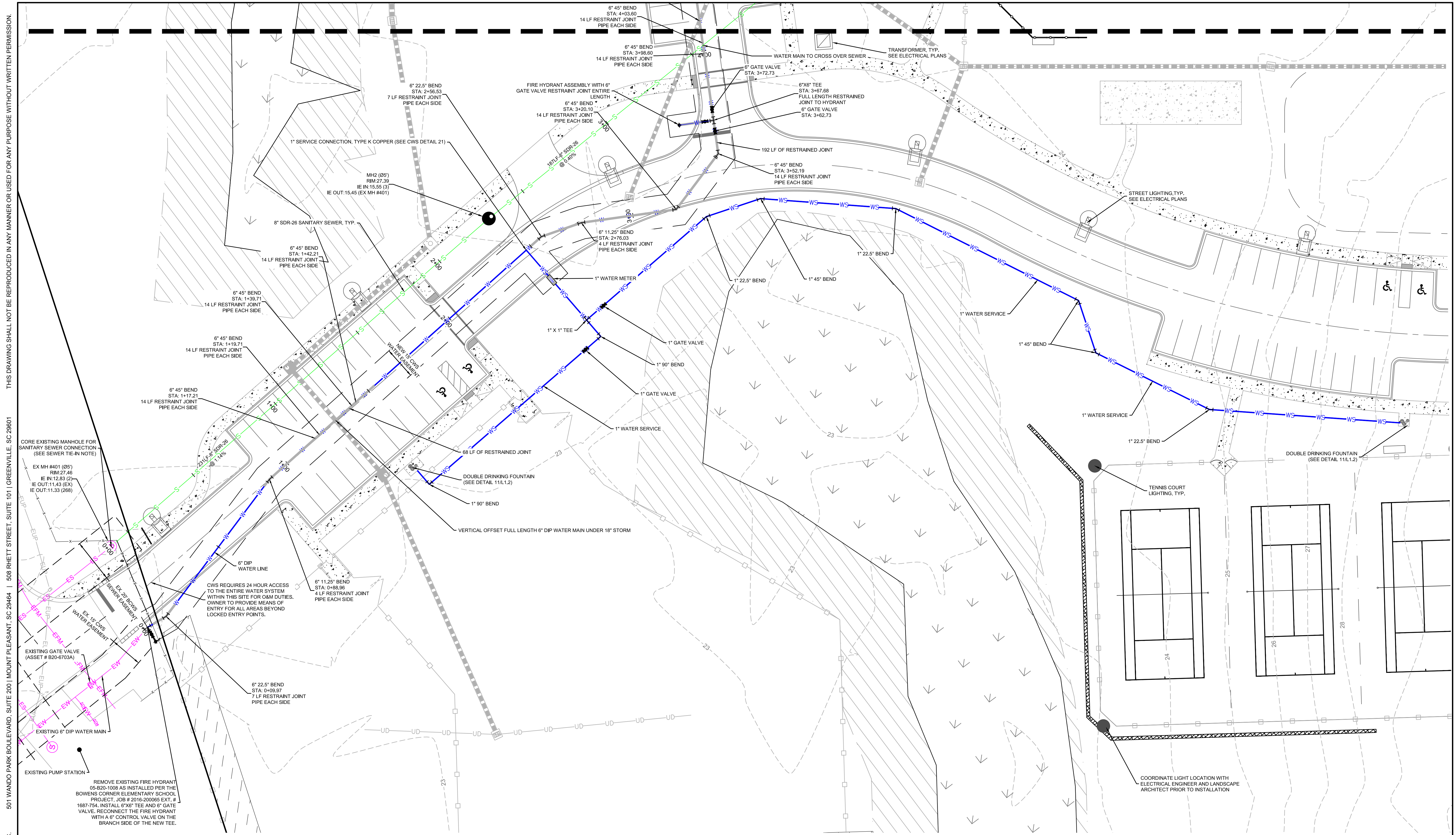


**HANAHAN RECREATION  
COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

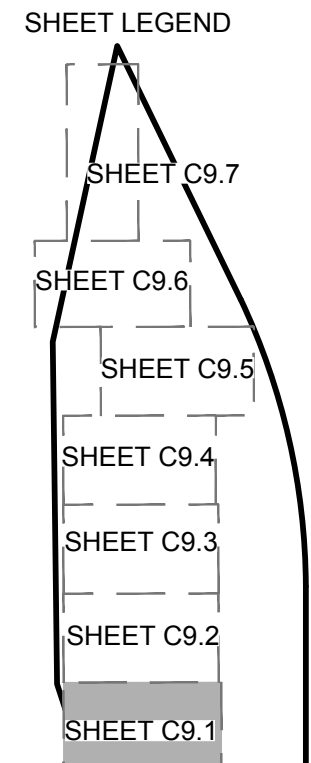
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**WATER &  
SEWER**



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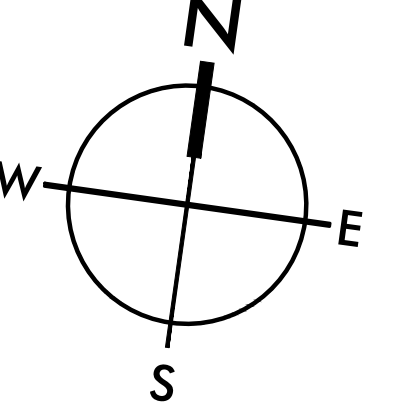
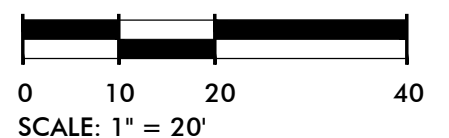
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4. 6" LATERAL LINES TO FIRE HYDRANTS  
5. CWS REQUIRES 24 HOUR ACCESS TO THE ENTIRE WATER SYSTEM WITHIN THE SITE FOR O&M DUTIES. OWNER TO PROVIDE A MEANS OF ENTRY FOR ALL AREAS BEYOND LOCKED ENTRY POINTS.

**SEWER TIE-IN NOTE:**  
1. CONTRACTOR TO VERIFY EXISTING MH ELEVATIONS AND NOTIFY ENGINEER AND BCWS OF ANY DISCREPANCIES. CONTACT BCWS A MINIMUM OF 72 HOURS PRIOR FOR CONNECTION.  
2. CONNECTION TO EXISTING SEWER SYSTEM SHALL BE MADE IN THE PRESENCE OF BCWS INSPECTOR WITH AT LEAST 72 HOURS ADVANCED NOTICE

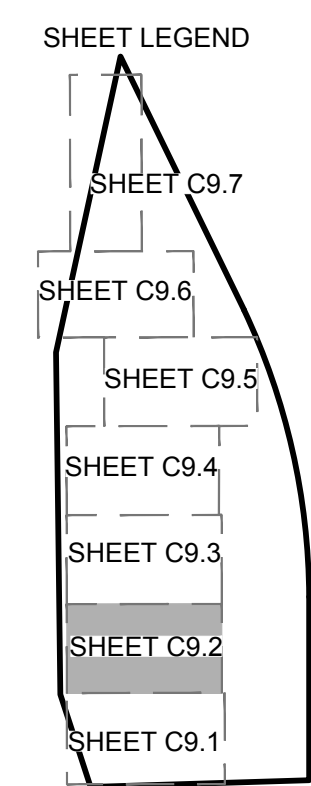
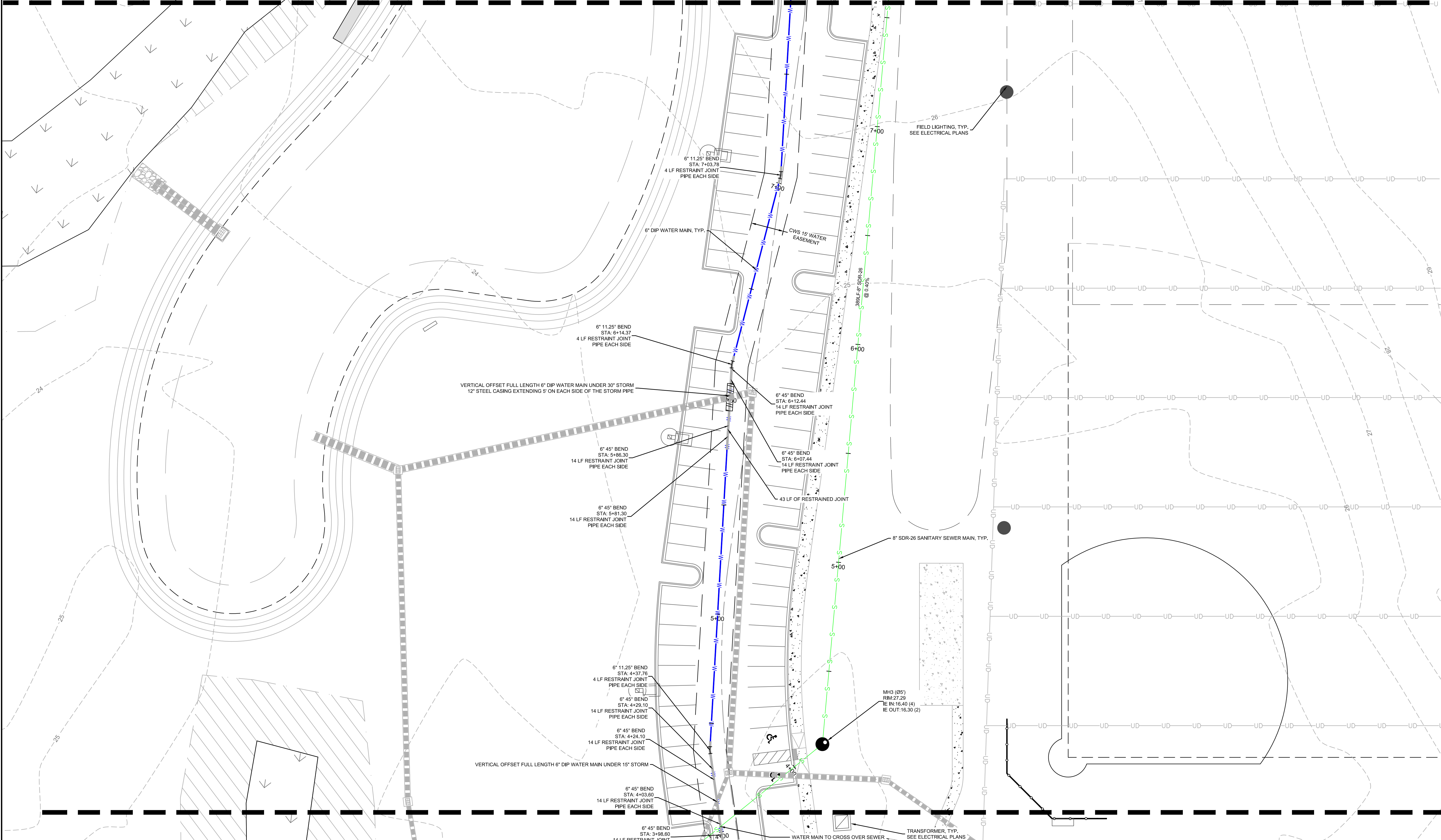
**NOTE: OWNERSHIP AND MAINTENANCE OF PRIVATE SEWER SYSTEM WILL BE THE RESPONSIBILITY OF THE OWNER OF TMS #259-00-00-189**

SEE SHEET C1.1 FOR LEGEND AND SHEETS C10.0 - C10.3 FOR WATER & SEWER NOTES AND DETAILS.

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**SEWER TIE-IN NOTE:**

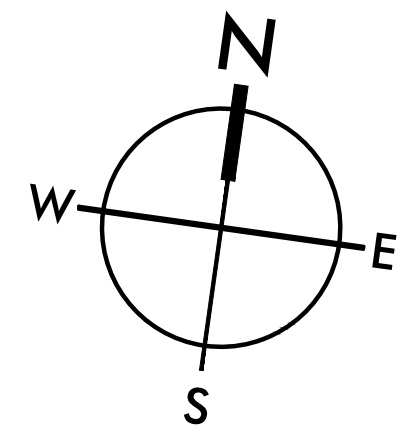
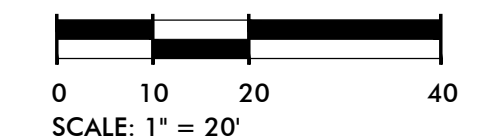
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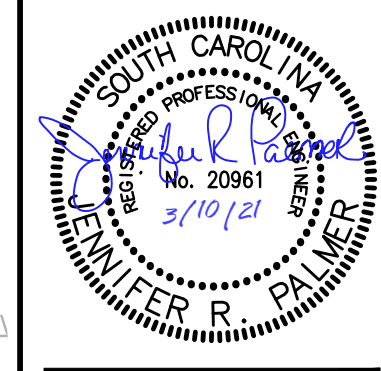
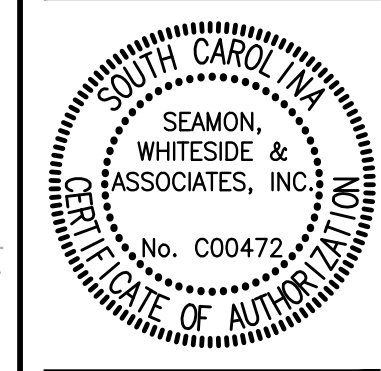
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
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 CHECKED BY: JRP

**REVISION HISTORY**

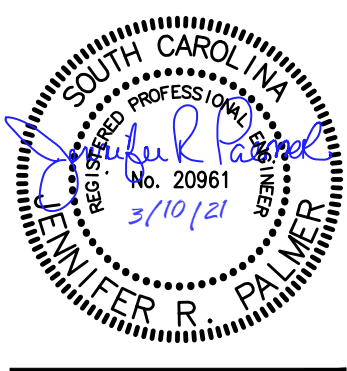
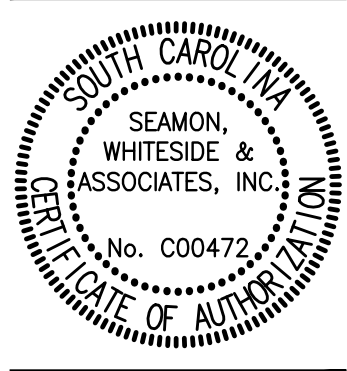
|   |          |
|---|----------|
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

**WATER & SEWER PLAN**

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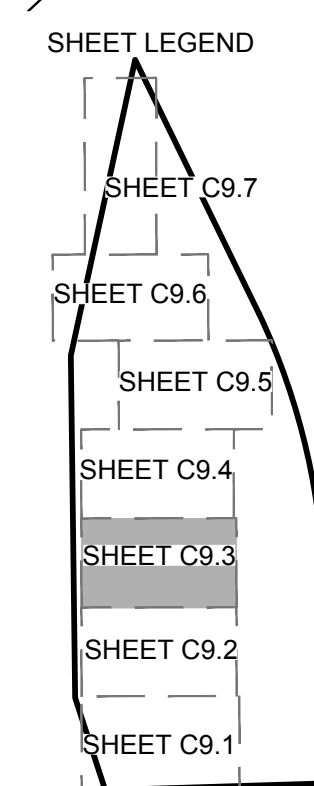
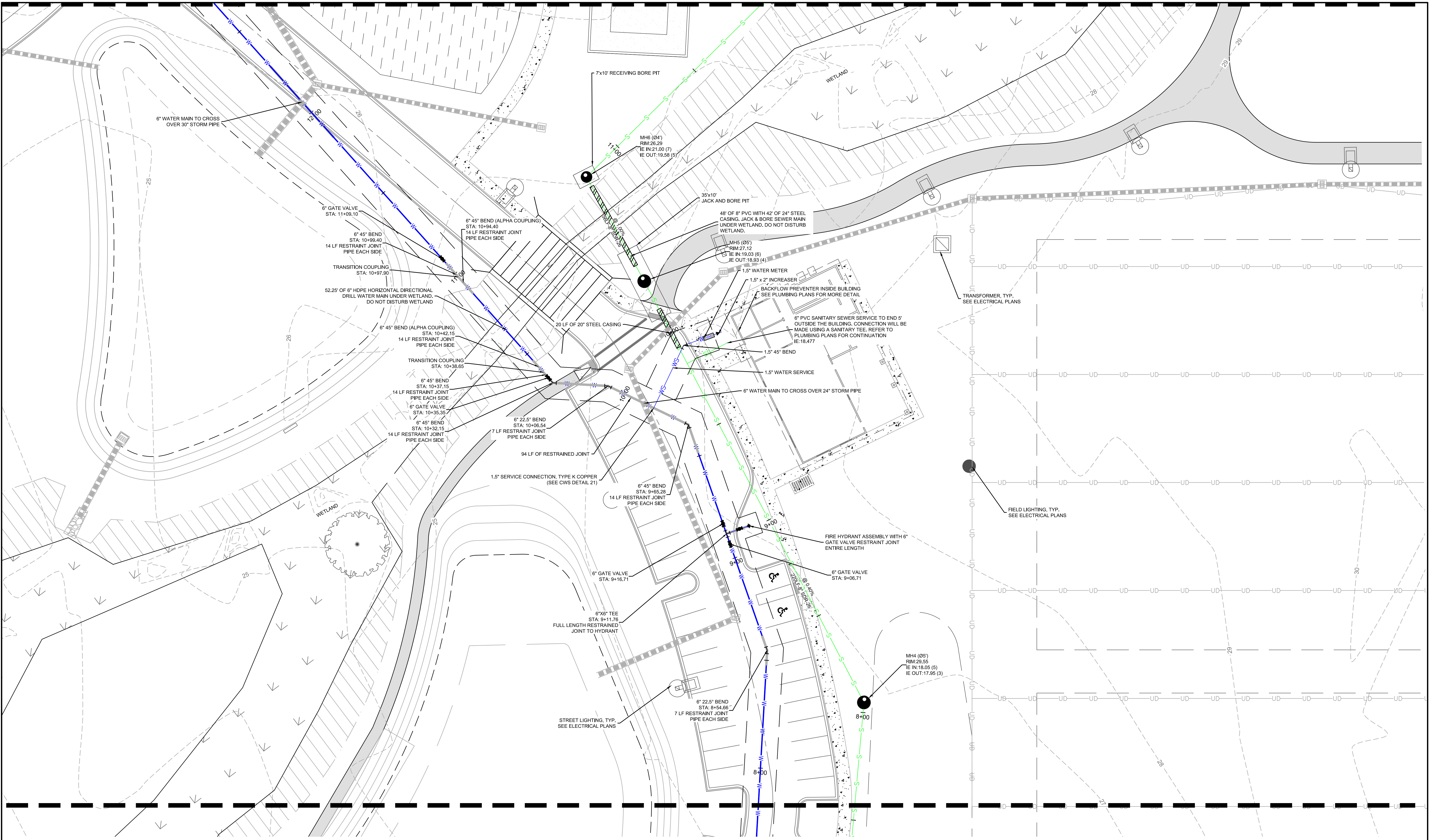


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**WATER & SEWER PLAN**



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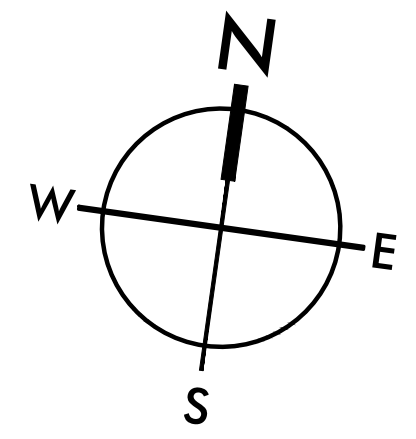
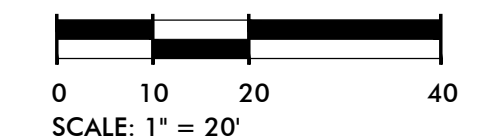
**HDD BORE NOTE:**

- CONTRACTOR TO PROVIDE HDD BORE PROFILE TO CWS FOR APPROVAL PRIOR TO INSTALLATION.

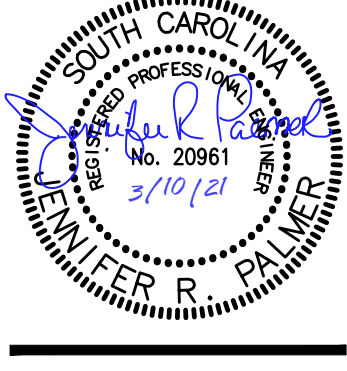
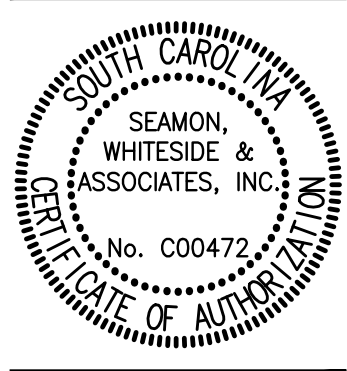
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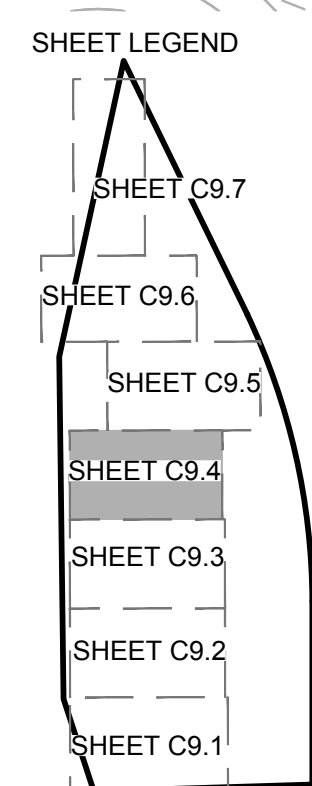
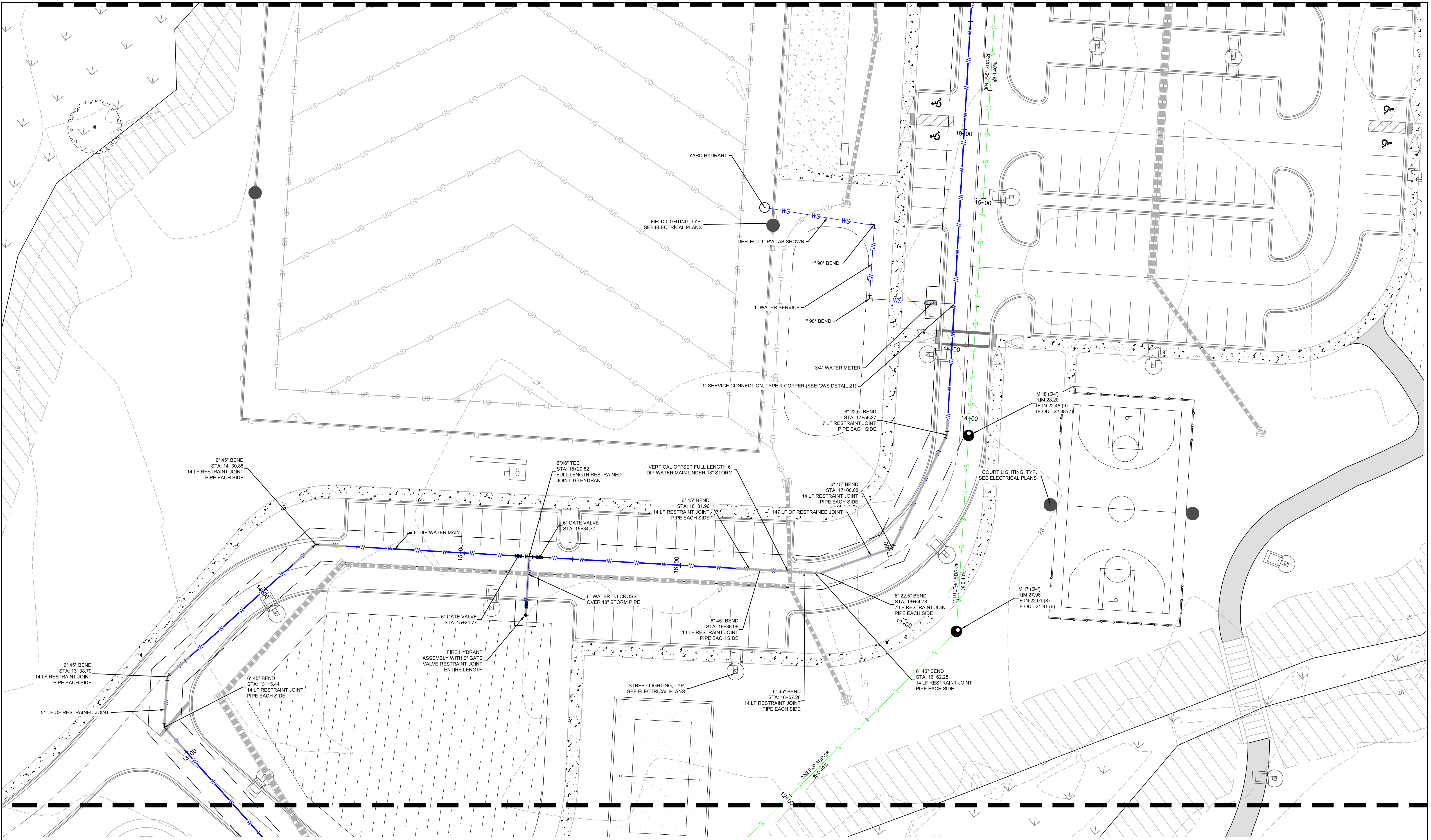
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**WATER & SEWER PLAN**



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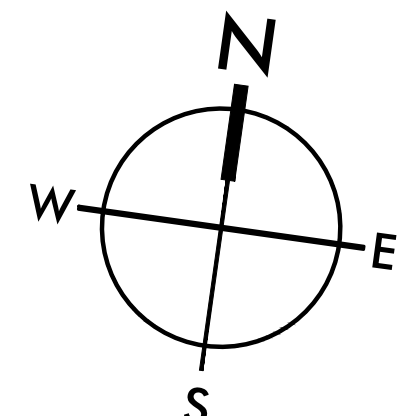
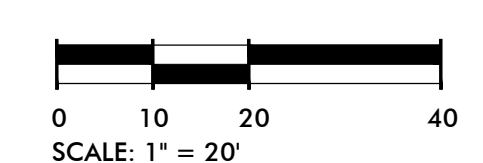
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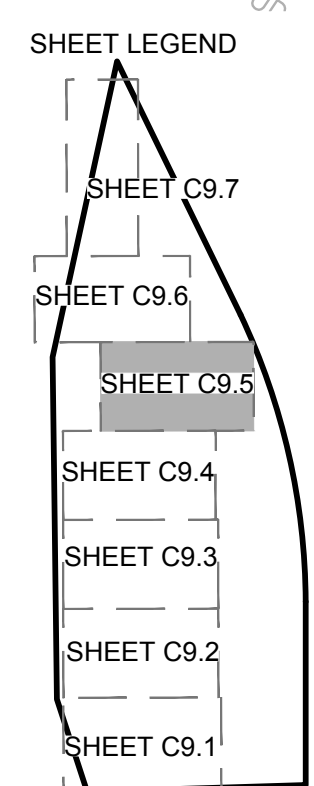
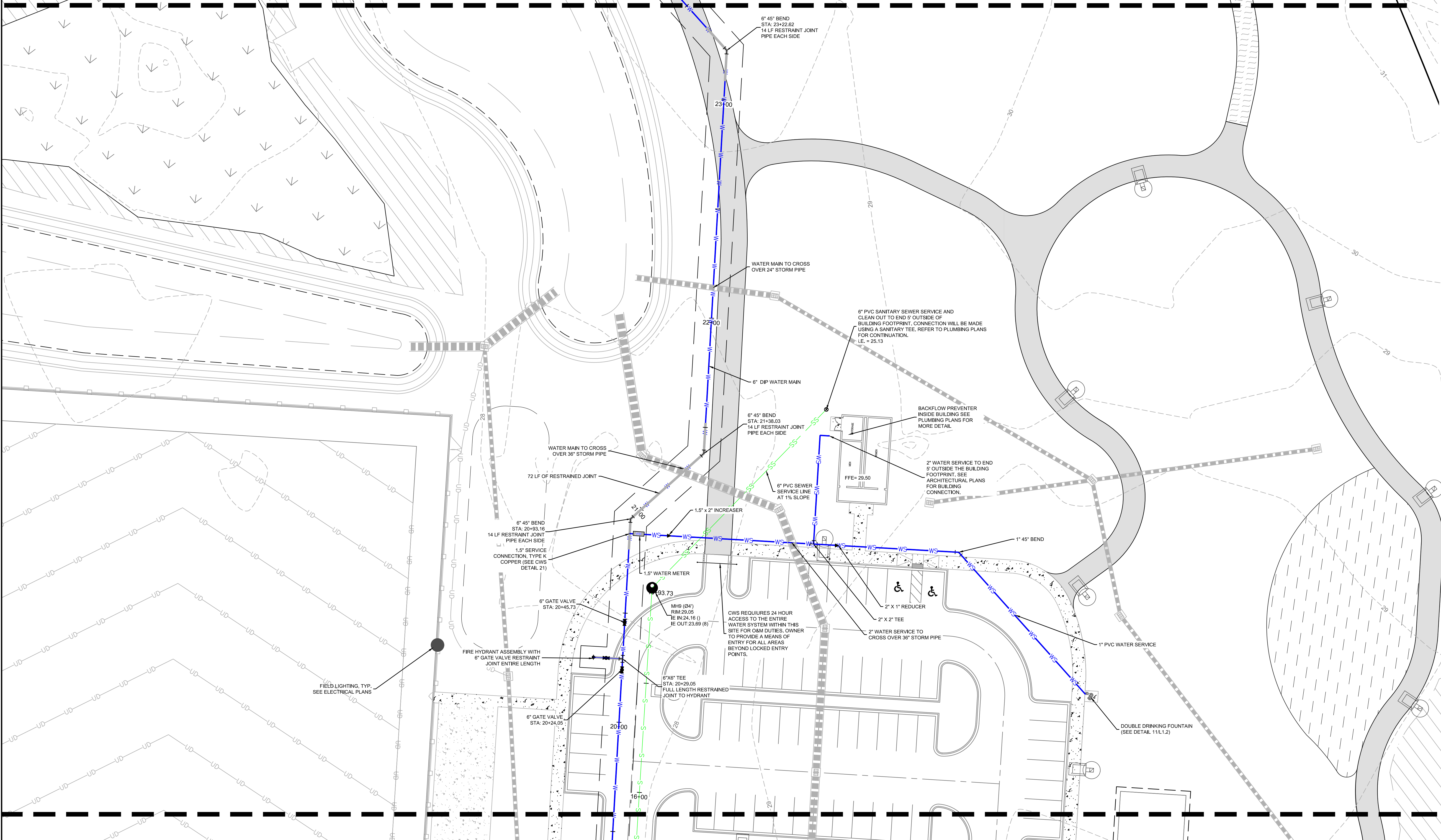
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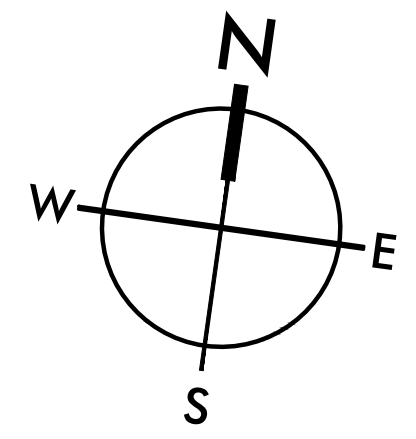
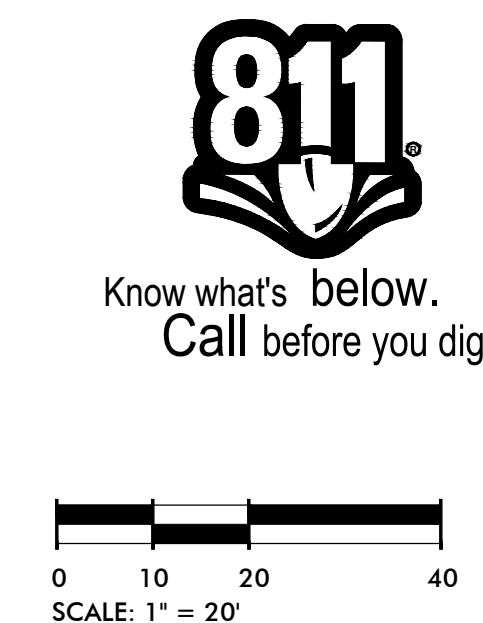
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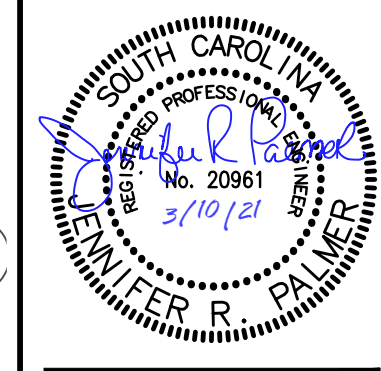
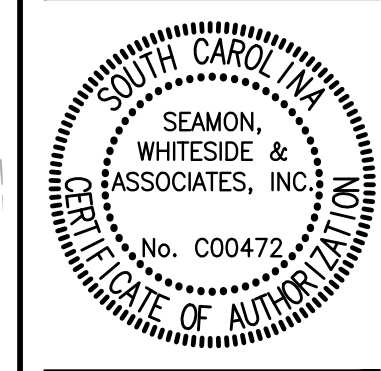
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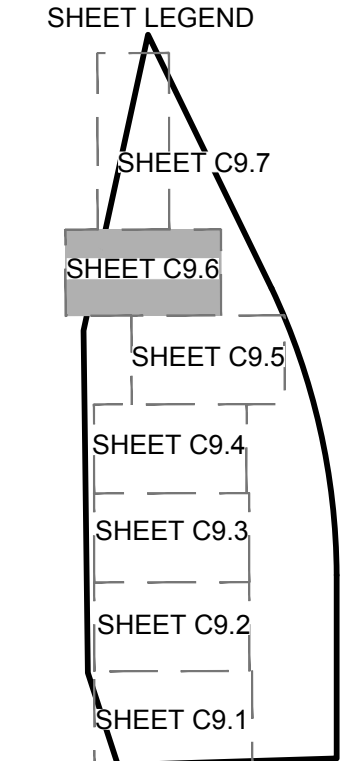
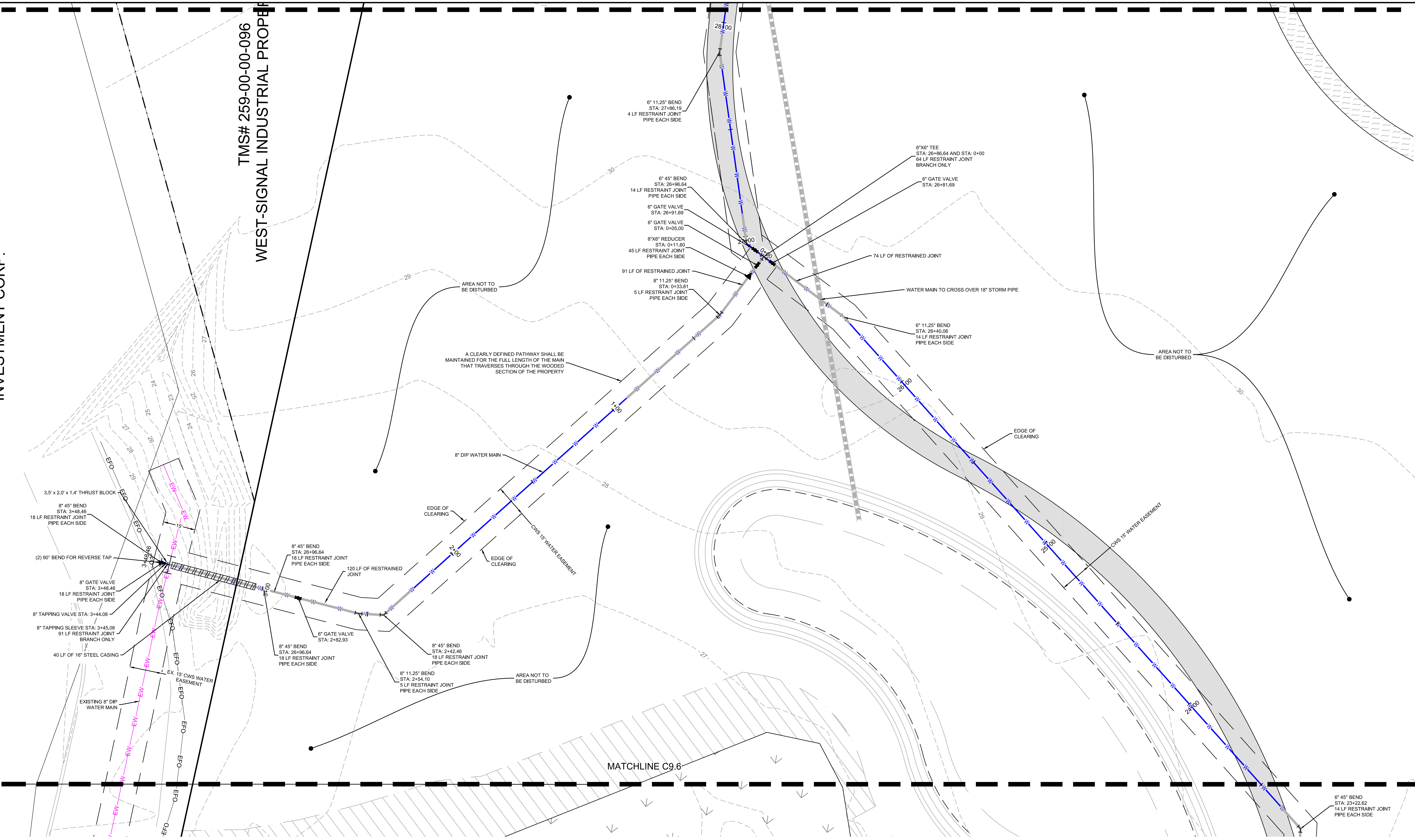
**REVISION HISTORY**

|   |          |
|---|----------|
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

**WATER & SEWER PLAN**  
 C9.5

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**TMS# 259-00-00-096**  
**WEST-SIGNAL INDUSTRIAL PROPERTY**



**WATER NOTES:**

- FIRE HYDRANTS, WATER VALVES AND OTHER WATER SYMBOLS ARE SHOWN IN LARGE SCALE FOR CLARITY. REFER TO THE DETAIL SHEET FOR SPECIFIC LOCATION REQUIREMENTS FOR FIRE HYDRANTS AND OTHER ITEMS. WATER VALVES SHALL NOT BE LOCATED WITHIN THE CURB AND GUTTER.
- WATER SERVICE WILL BE PROVIDED BY CWS VIA EXISTING 8" WATER MAIN NEAR THE NORTH WEST PORTION OF THE PROPERTY AND A 6" WATER MAIN AT THE SOUTH WEST PORTION.
- ALL WATER LINES TO BE DIP.
- 6" LATERAL LINES TO FIRE HYDRANTS

**SEWER TIE-IN NOTE:**

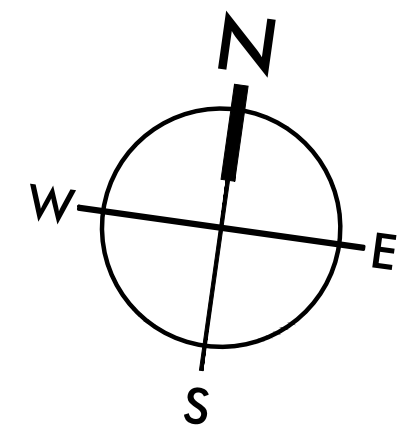
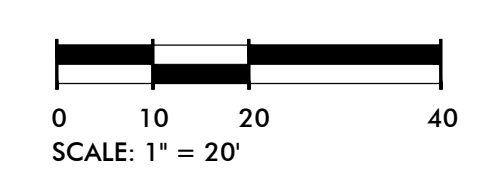
- CONTRACTOR TO VERIFY EXISTING MH ELEVATIONS AND NOTIFY ENGINEER AND BCWS OF ANY DISCREPANCIES. CONTACT BCWS A MINIMUM OF 72 HOURS PRIOR FOR CONNECTION.

**NOTE: OWNERSHIP AND MAINTENANCE OF PRIVATE SEWER SYSTEM WILL BE THE RESPONSIBILITY OF THE OWNER OF TMS #259-00-00-189**

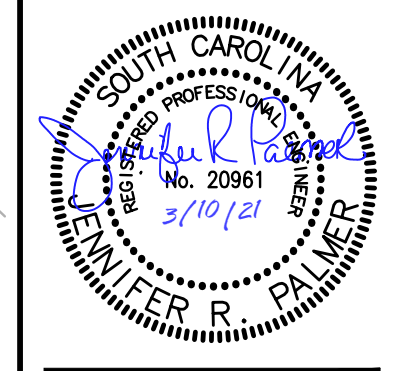
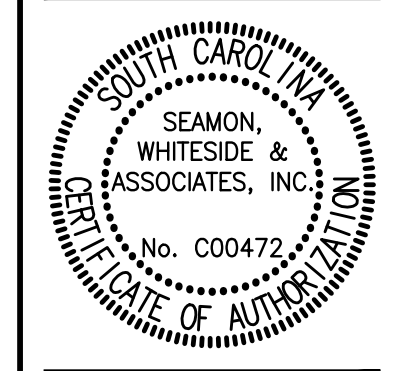
SEE SHEET C1.1 FOR LEGEND AND SHEETS C10.0 - C10.3 FOR WATER & SEWER NOTES AND DETAILS.

**EXISTING UTILITY NOTE:**

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.



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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

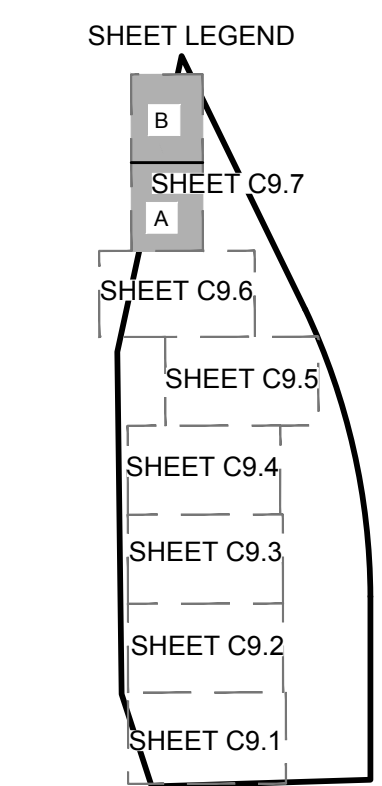
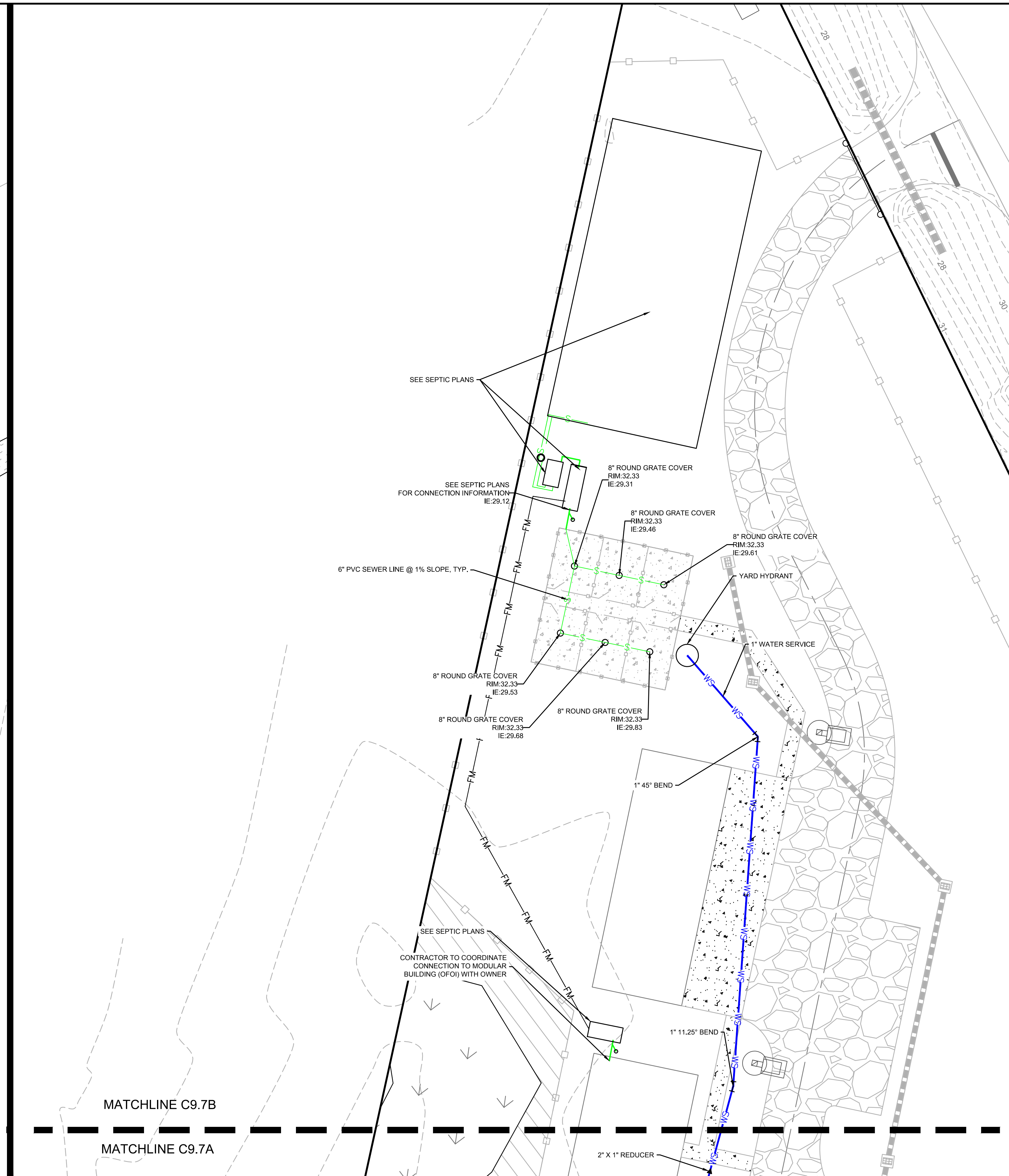
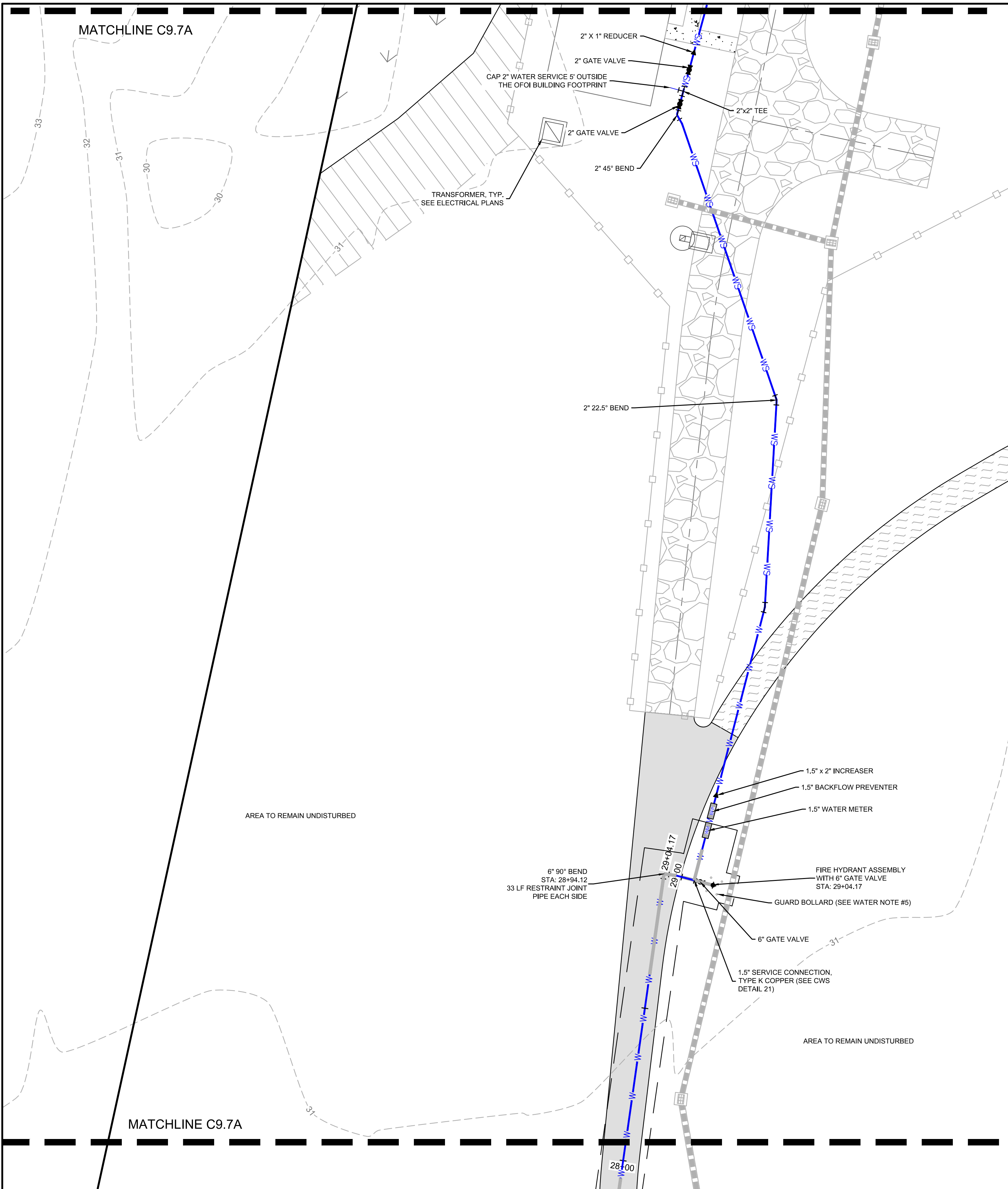
SW+ PROJECT: 7867  
 DATE: 06/12/20  
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**REVISION HISTORY**

| NO. | DATE     | DESCRIPTION |
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| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

**WATER & SEWER PLAN**

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- WATER NOTES:**
- FIRE HYDRANTS, WATER VALVES AND OTHER WATER SYMBOLS ARE SHOWN IN LARGE SCALE FOR CLARITY. REFER TO THE DETAIL SHEET FOR SPECIFIC LOCATION REQUIREMENTS FOR FIRE HYDRANTS AND OTHER ITEMS. WATER VALVES SHALL NOT BE LOCATED WITHIN THE CURB AND GUTTER.
  - WATER SERVICE WILL BE PROVIDED BY CWS VIA EXISTING 8" WATER MAIN NEAR THE NORTH WEST PORTION OF THE PROPERTY AND A 6" WATER MAIN AT THE SOUTH WEST PORTION.
  - ALL WATER LINES TO BE DIP.
  - 8" LATERAL LINES TO FIRE HYDRANTS
  - FOUR BOLLARDS SHALL BE INSTALLED AROUND ANY FIRE HYDRANT THAT WILL BE VULNERABLE TO BEING STRUCK BY A VEHICLE. BOLLARDS SHALL BE:
    - 6" DIAMETER STEEL/IRON PIPE
    - 7' LENGTH, 3' BURIED IN CONCRETE AND 4' EXPOSED
    - PAINT CAUTION YELLOW
    - DO NOT LOCATE BOLLARDS IN FRONT OF HYDRANT NOZZLES
    - BOLLARDS SHALL BE LOCATED 3' FROM CENTER OF HYDRANT

**SEWER TIE-IN NOTE:**

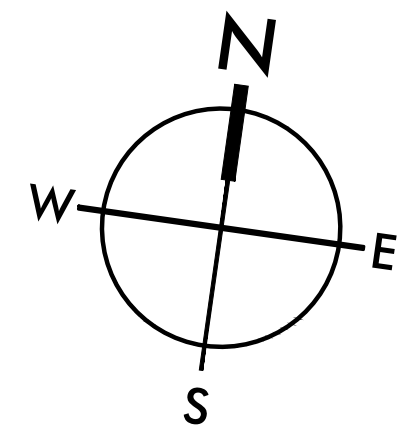
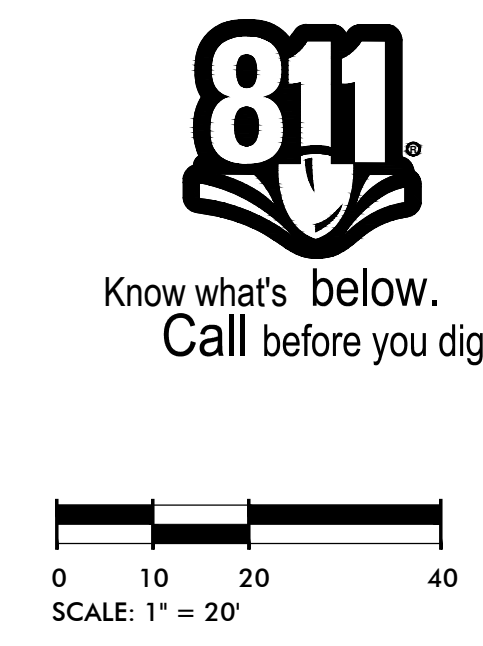
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**NOTE: OWNERSHIP AND MAINTENANCE OF PRIVATE SEWER SYSTEM WILL BE THE RESPONSIBILITY OF THE OWNER OF TMS #259-00-00-189**

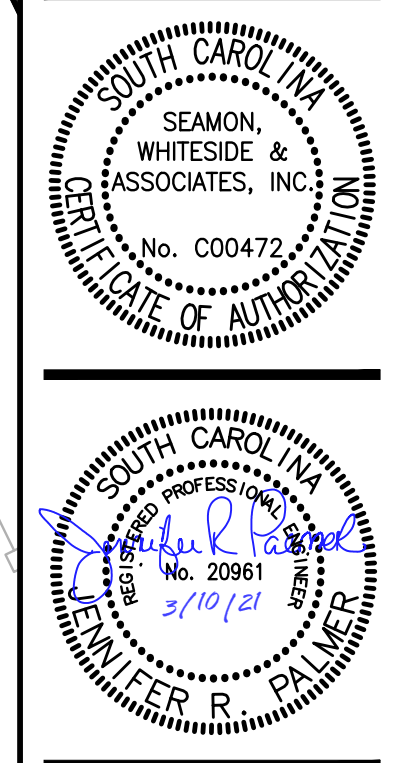
SEE SHEET C1.1 FOR LEGEND AND SHEETS C10.0 - C10.3 FOR WATER & SEWER NOTES AND DETAILS.

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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
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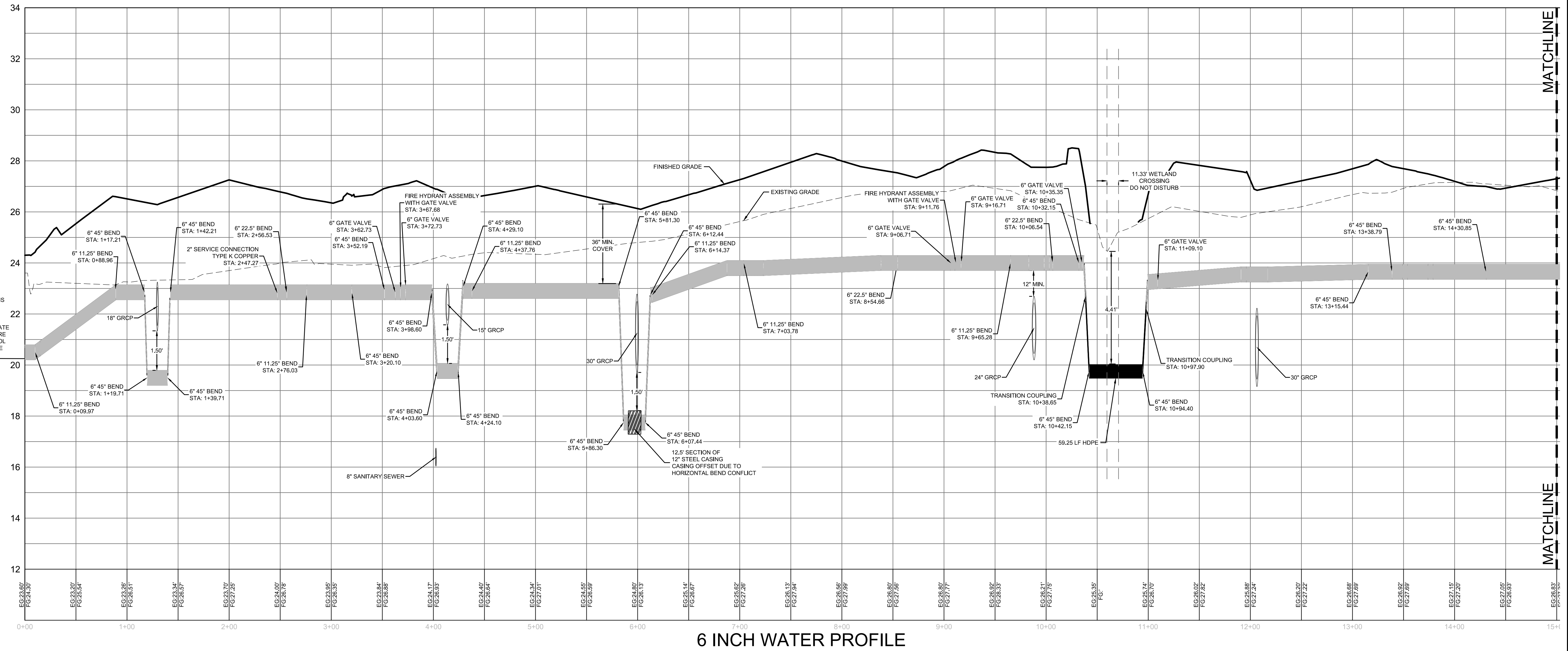
| REVISION HISTORY |          |
|------------------|----------|
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WATER & SEWER PLAN

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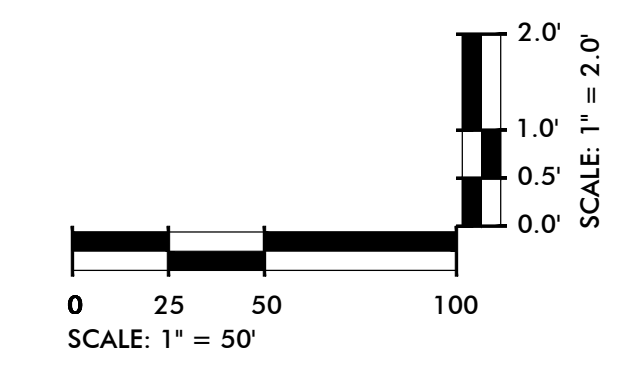
REMOVE EXISTING FIRE HYDRANT 05-820-1008 AS INSTALLED PER THE BOWENS CORNER ELEMENTARY SCHOOL PROJECT, JOB # 2016-200065 EXT. # 1687-754. INSTALL 6"X6" TEE AND 6" GATE VALVE. RECONNECT THE FIRE HYDRANT WITH A 6" CONTROL VALVE ON THE BRANCH SIDE OF THE NEW TEE.

SEE 20.25 (CONTRACTOR TO VERIFY, CONTACT ENGINEER IF ANY DISCREPANCIES)

6 INCH WATER PROFILE

**HDD BORE NOTE:**  
CONTRACTOR TO PROVIDE HDD BORE PROFILE TO CWS FOR APPROVAL PRIOR TO INSTALLATION.

**NOTE:**  
ALL 6" AND 8" WATER MAIN SHALL BE D.I.P



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CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

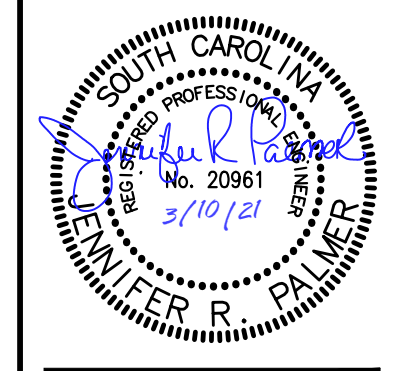
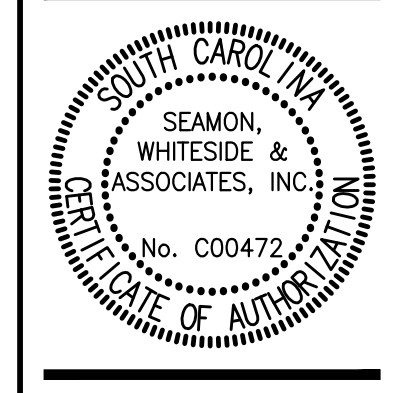
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**REVISION HISTORY**

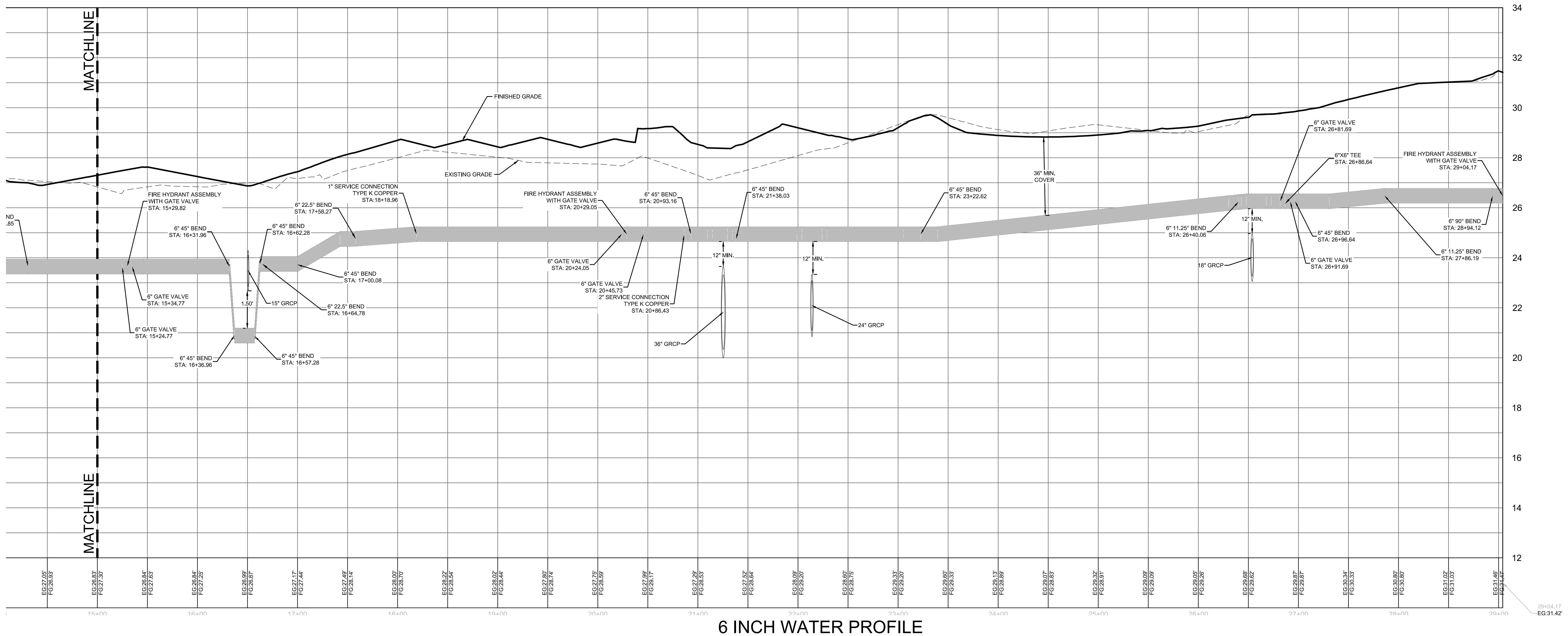
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WATER PROFILES

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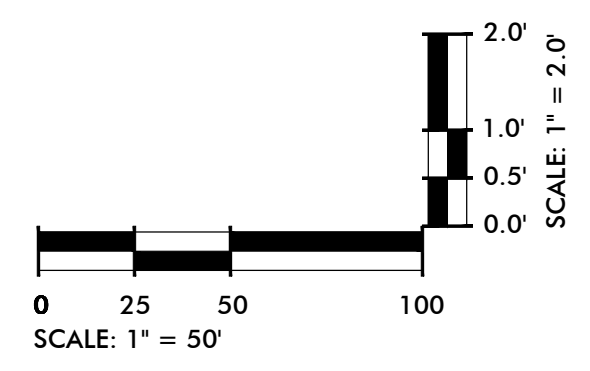


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6 INCH WATER PROFILE

NOTE:  
ALL 6" AND 8" WATER MAIN SHALL BE D.I.P

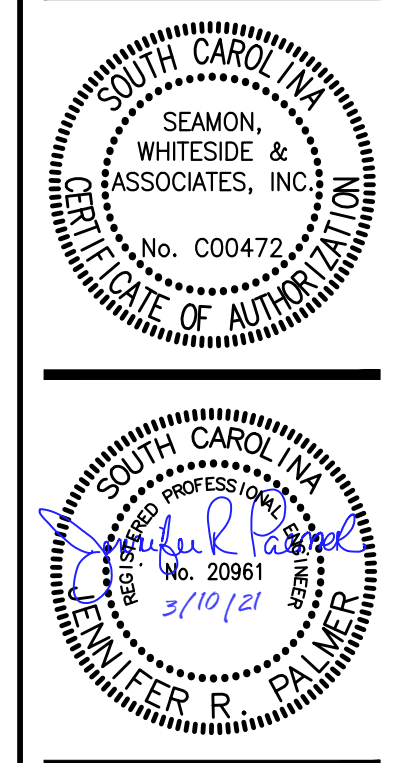


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CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

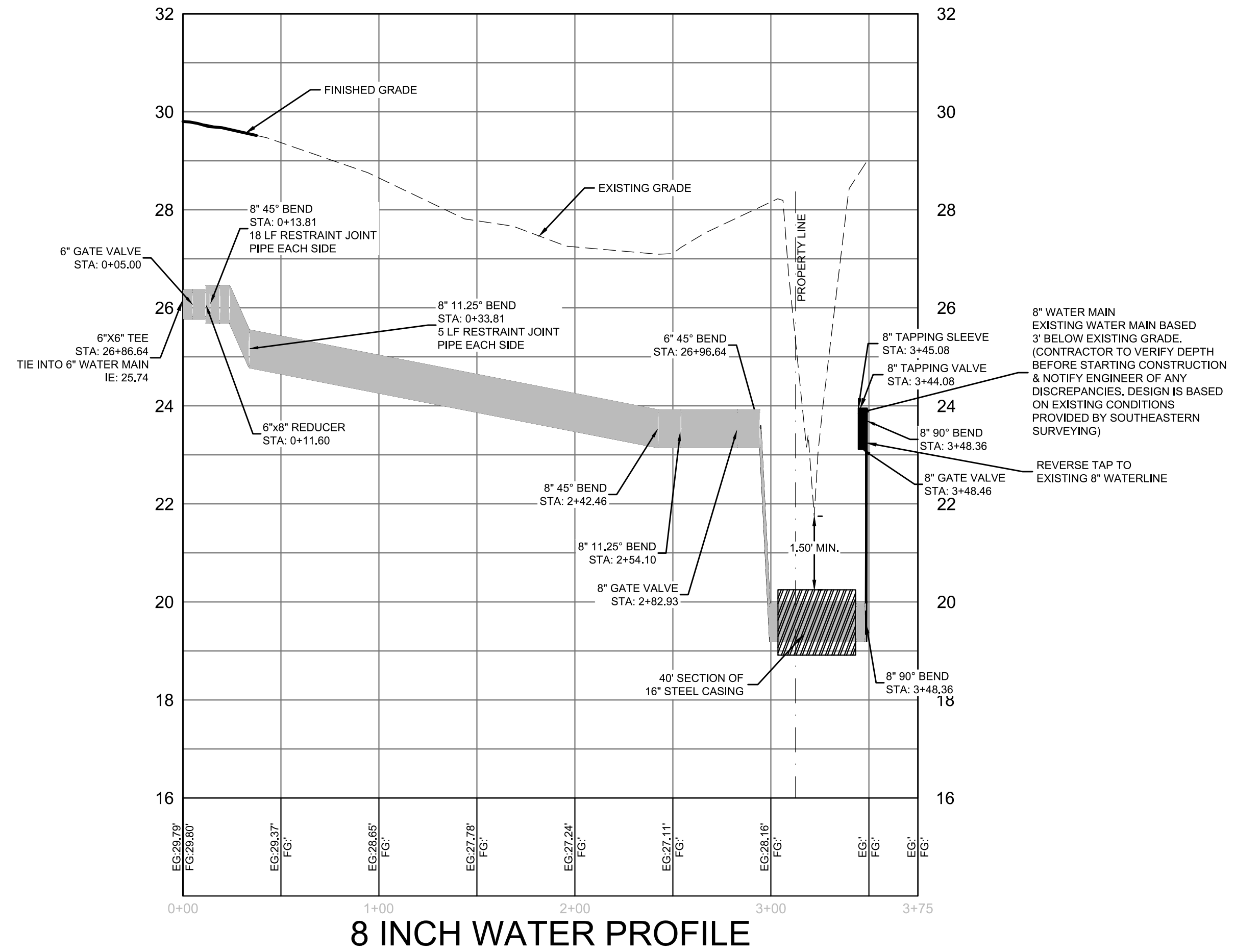
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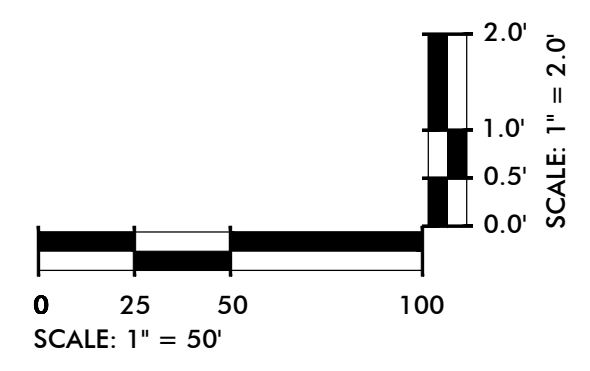
WATER PROFILES

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8 INCH WATER PROFILE

NOTE:  
 ALL 6" AND 8" WATER MAIN SHALL BE D.I.P



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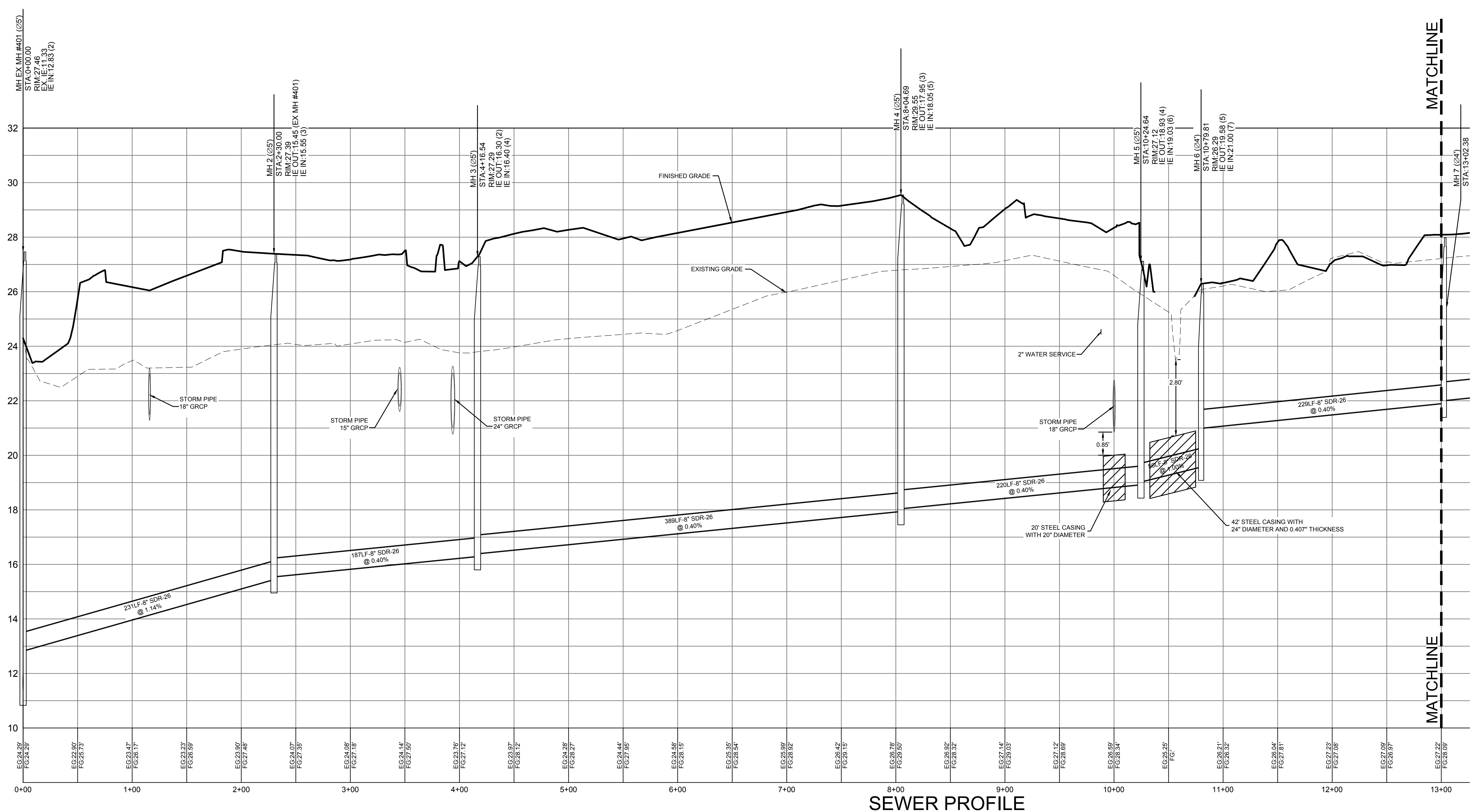
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 HANAHAN, SOUTH CAROLINA

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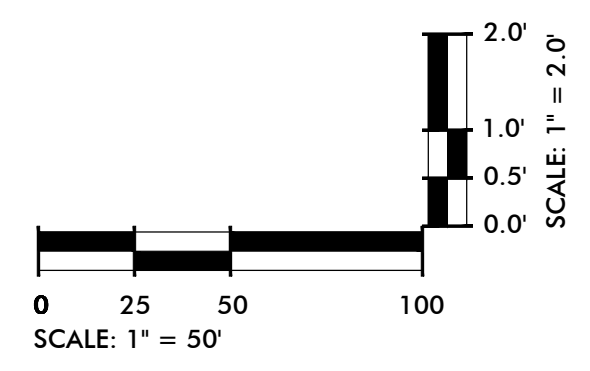
WATER PROFILES

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SEWER PROFILE

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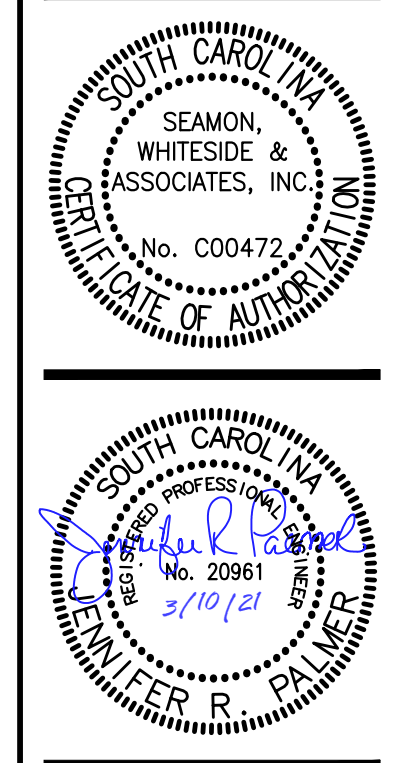
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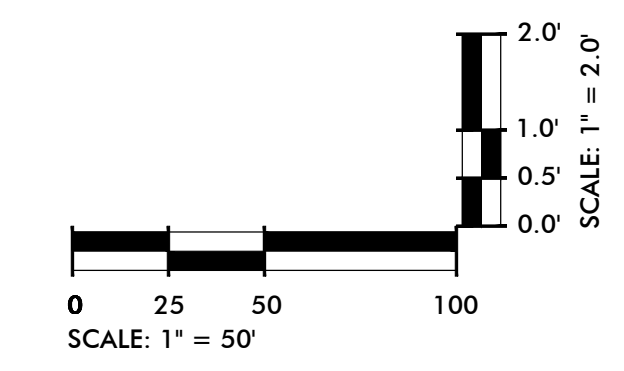
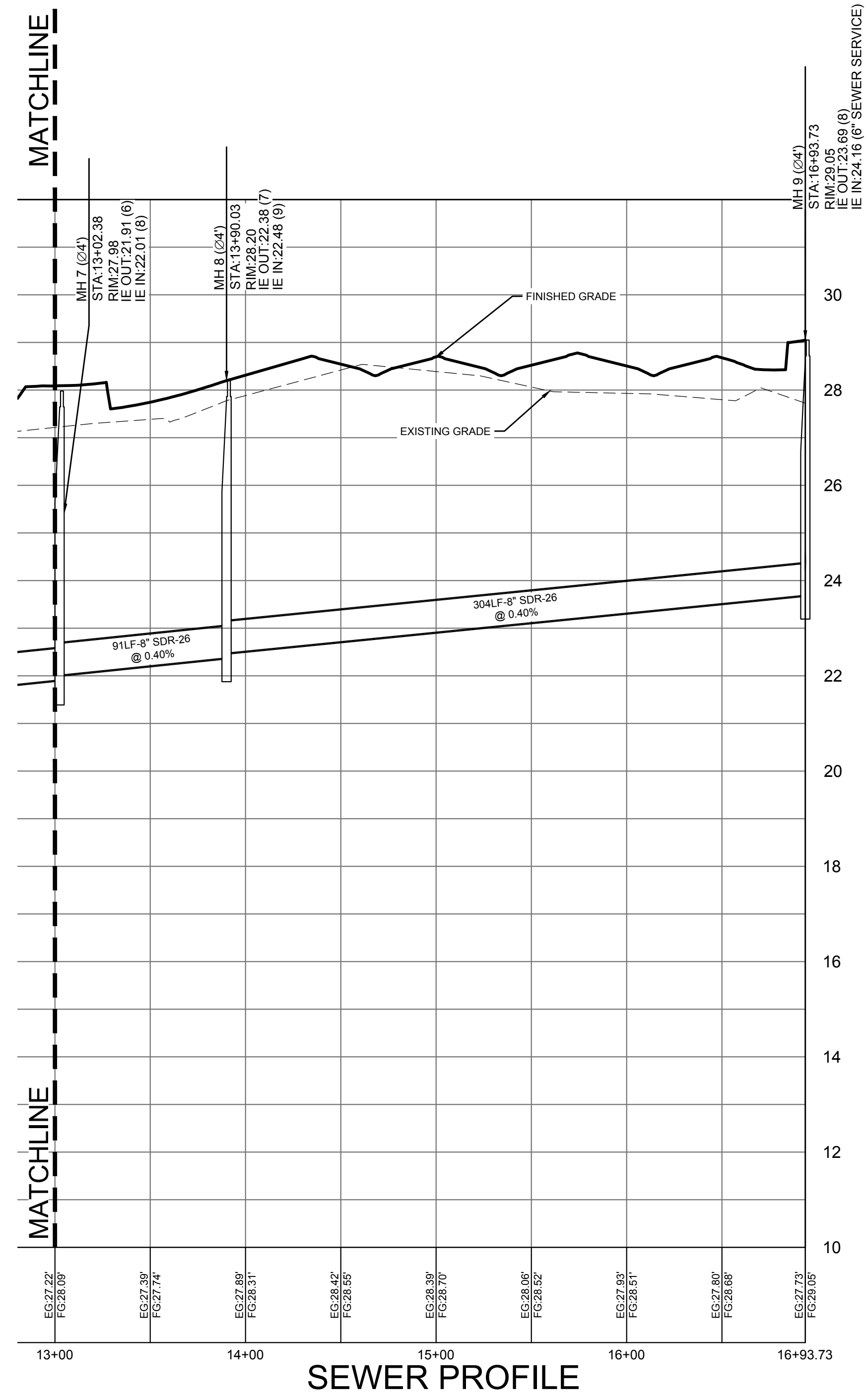
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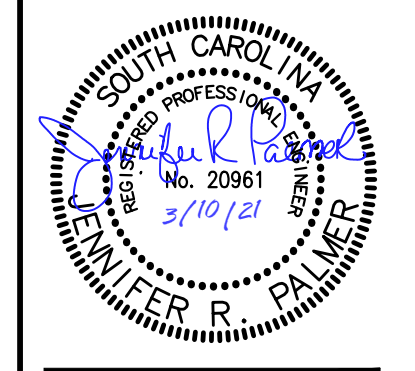


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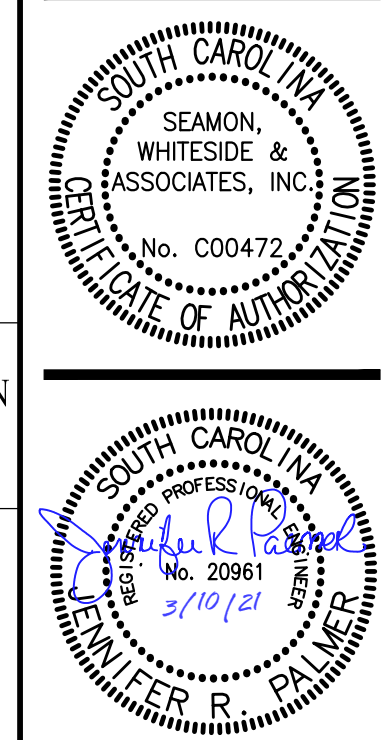


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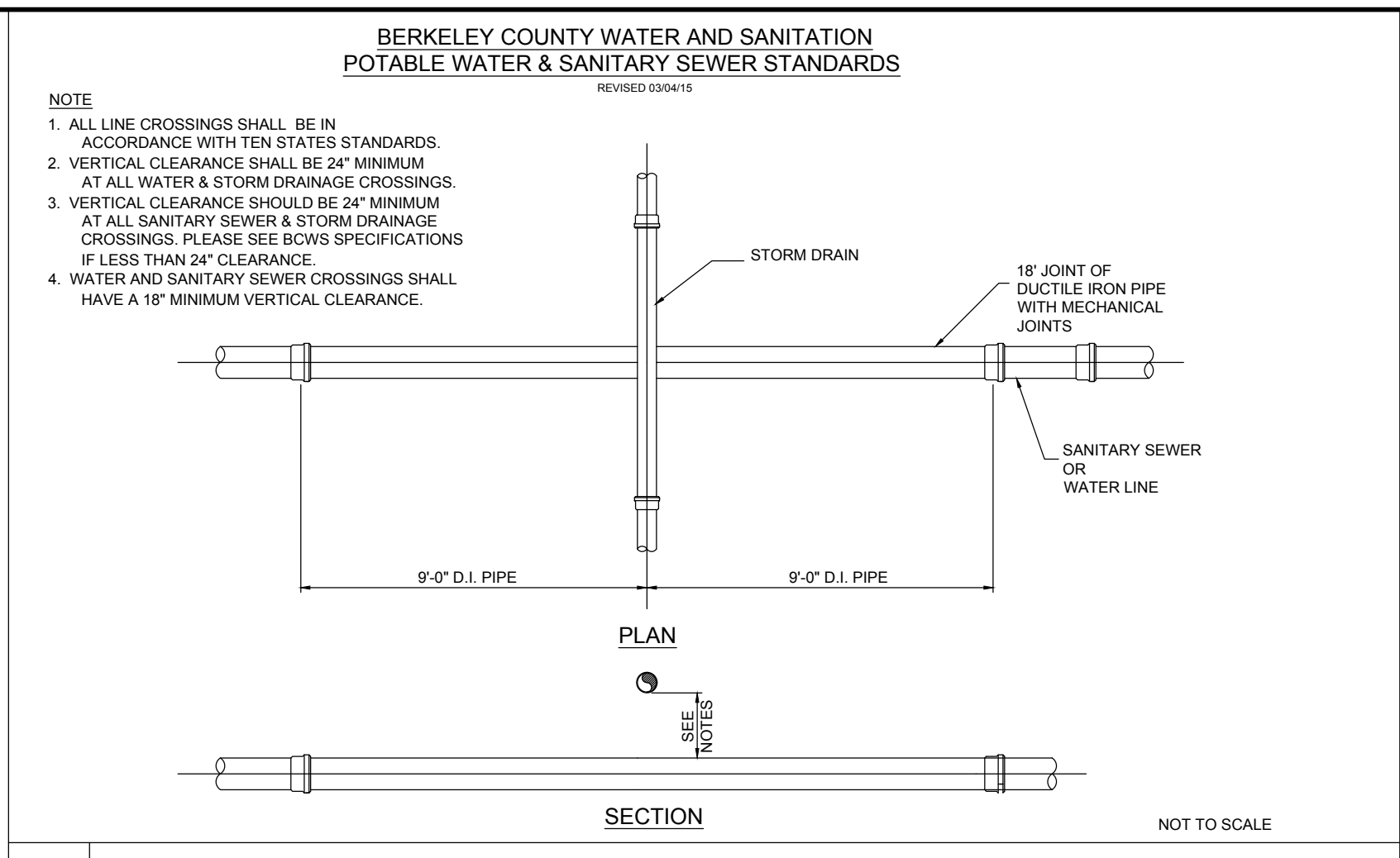


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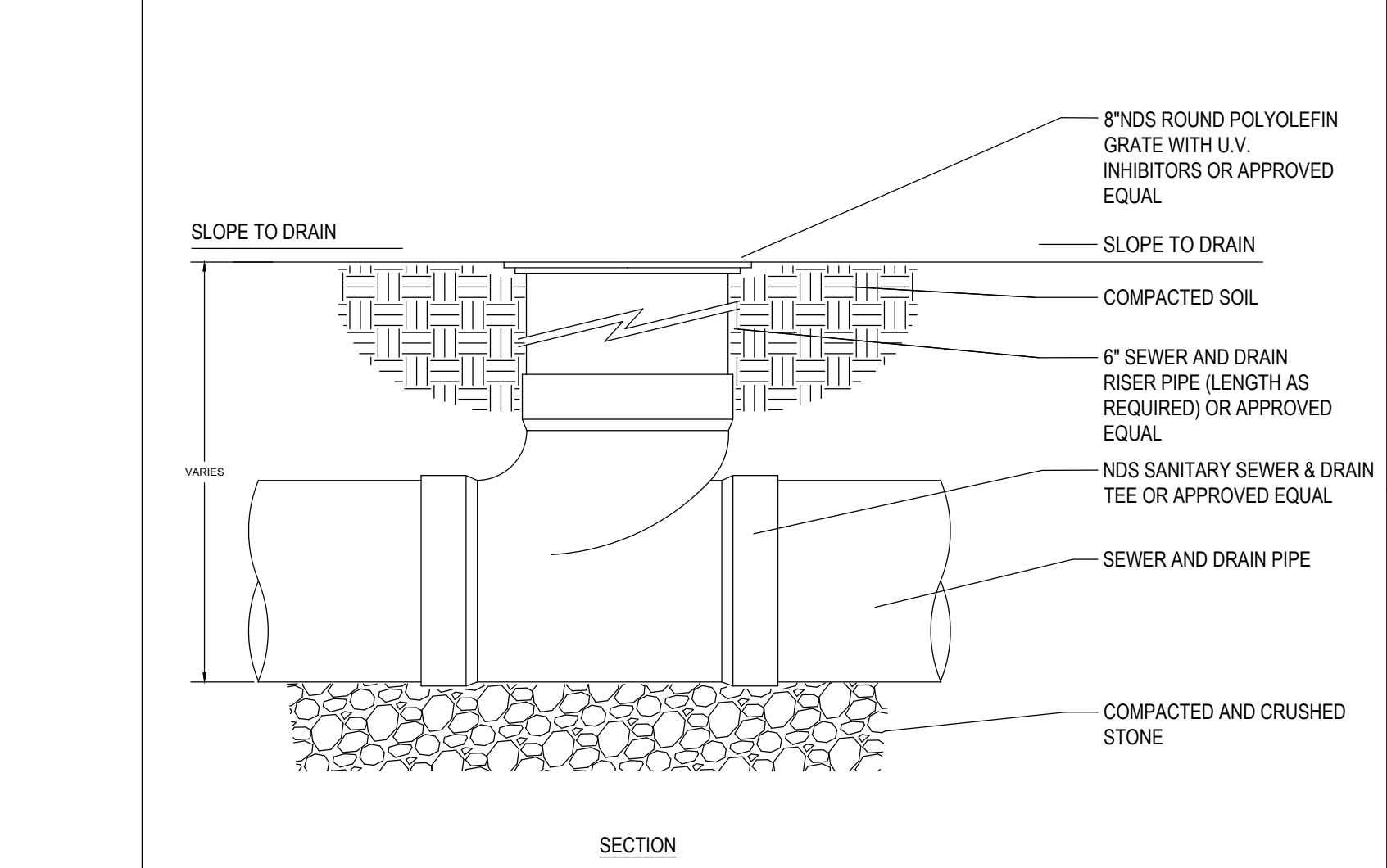
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| CHECKED BY:      | JRP      |
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SEWER DETAILS

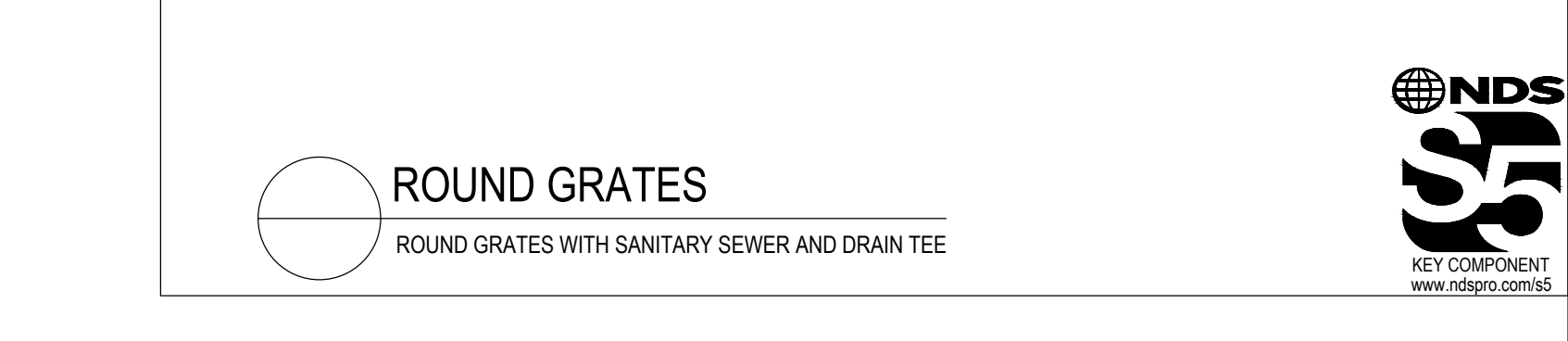


**CP4 SANITARY SEWER AND STORM DRAIN/WATER LINE CROSSING**

**NDS, INC.**  
 851 NORTH HARVARD AVE.  
 LINDSAY, CA 93247  
 TOLL FREE: 1-800-726-1994  
 PHONE: (559) 562-9888  
 FAX: (559) 562-4488  
 www.ndspro.com

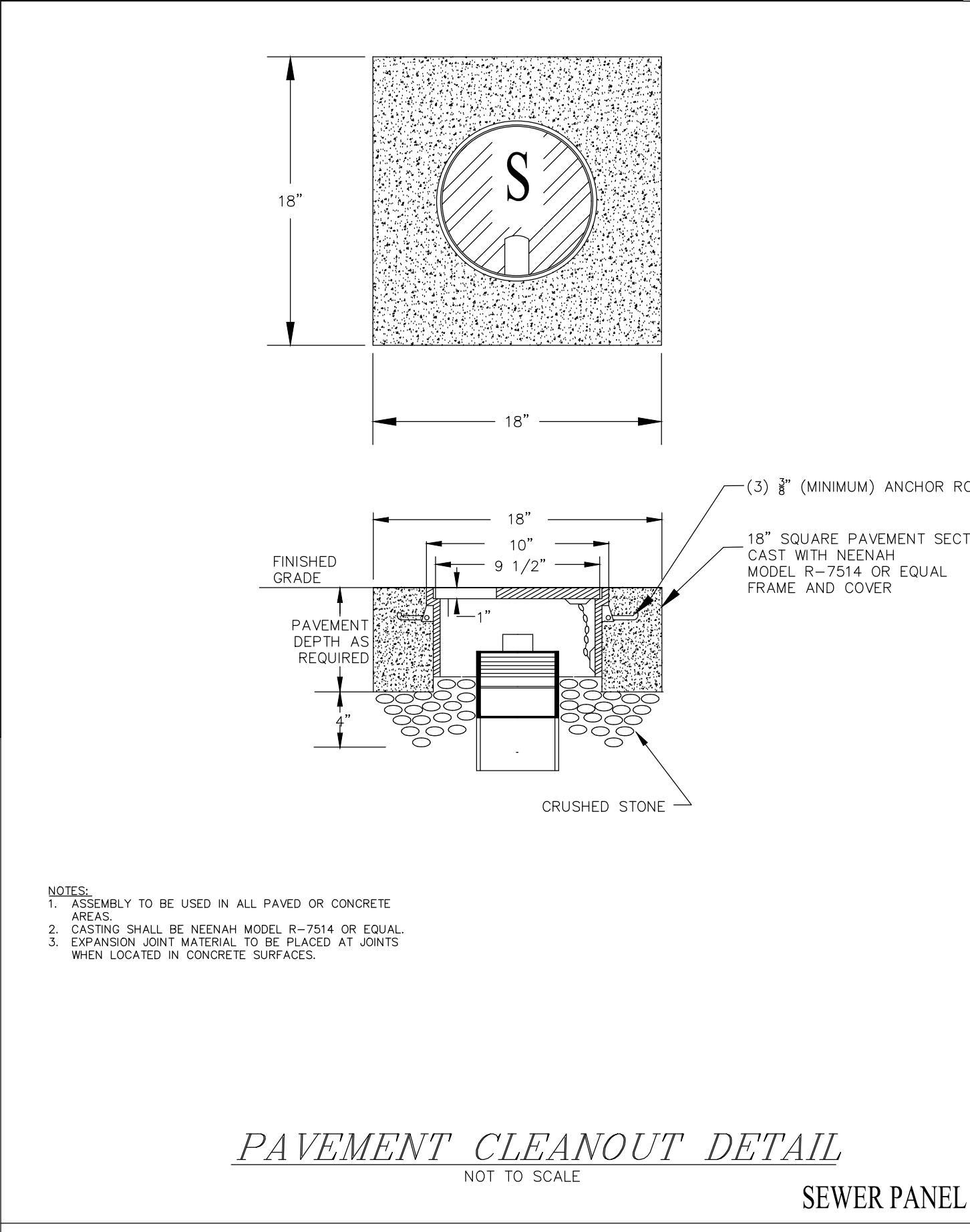


- NOTES:**
- INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
  - DO NOT SCALE DRAWING.
  - THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY.
  - ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

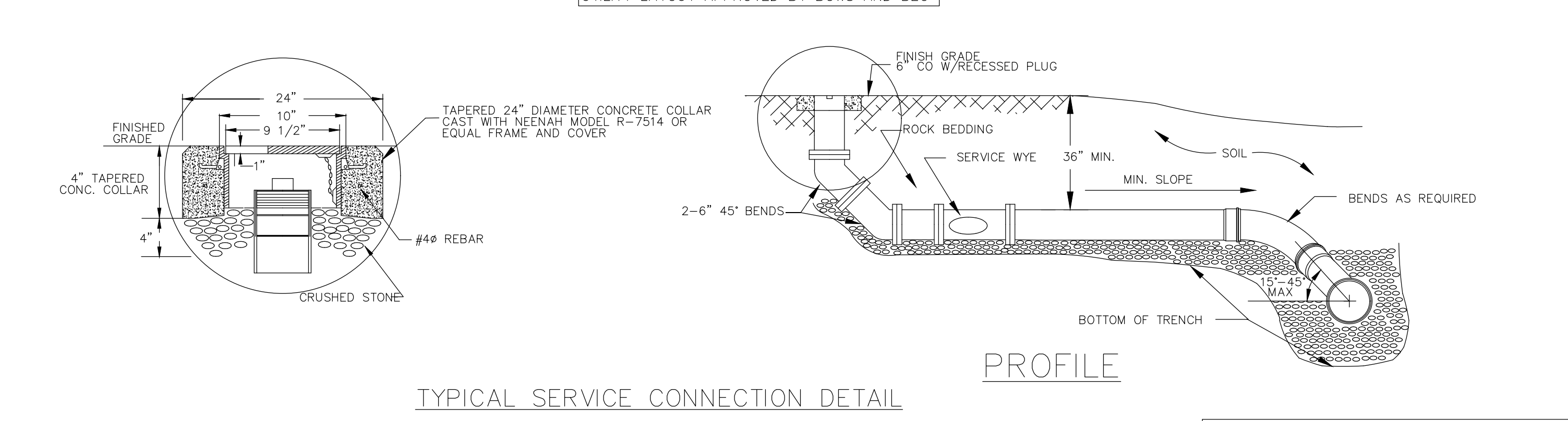
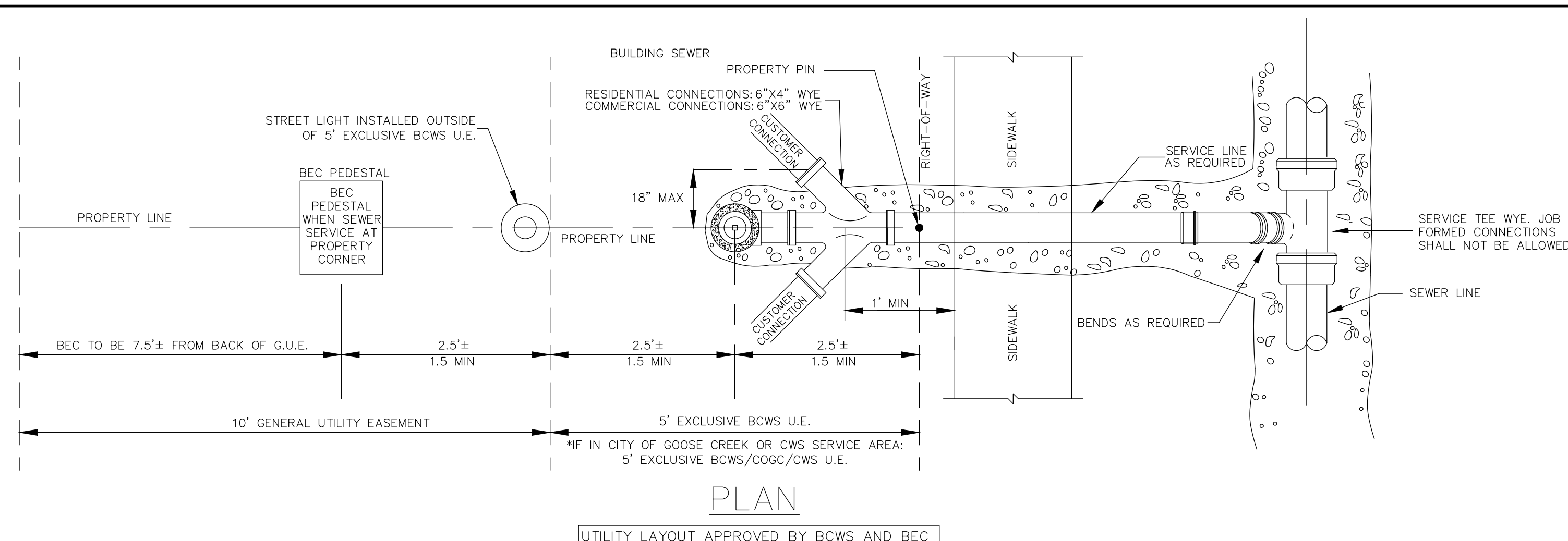


- SEWER NOTES:**
- SEWER INSTALLATION SHALL BE IN ACCORDANCE WITH "TEN STATES STANDARDS," SC DHEC AND BCWS REGULATIONS.
  - ALL SANITARY SEWER SERVICES SHALL BE LAD ON A MINIMUM SLOPE OF 0.5% AND SHALL BE 6" PVC UNLESS INDICATED OTHERWISE IN THIS SPECIFICATION.
  - CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH BCWS AT LEAST 72 HOURS PRIOR TO BEGINNING WORK.
  - CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING WORK. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES FOUND IN THE FIELD OR ON THE DRAWINGS PRIOR TO BEGINNING OR CONTINUING WORK. ANY DEVIATIONS FROM THE CONSTRUCTION PLANS SHALL NEED TO BE APPROVED IN WRITING BY BCWS.
  - CONNECTION TO EXISTING SEWER SYSTEM SHALL BE MADE IN THE PRESENCE OF BCWS INSPECTOR WITH AT LEAST 72 HOURS ADVANCED NOTICE.
  - CONTRACTOR SHALL PLACE 6" SERVICES AND STUB UP TO EXISTING GRADE. CONCRETE COLLARS SHALL BE PLACED AROUND 4" PLUGGED CLEAN OUT.
  - WATER TIGHT RINGS AND COVERS SHALL BE INSTALLED ON MANHOLES IN SIDEWALK AREAS AFFECTED BY STREET RUNOFF OR BELOW THE 50 YEAR FLOOD ELEVATION. MANHOLE COVER SHALL BE INSTALLED COMPLETELY WITHIN OR COMPLETELY OUT OF PAVED AREAS (INCLUDING SIDEWALKS).
  - MANHOLES RECEIVING FORCE MAIN DISCHARGE SHALL BE COATED WITH RAVEN 405 LINER.
  - ALL DUCTILE IRON PIPES, JOINTS AND FITTINGS SHALL BE LINED WITH PROTECTO 401 CERAMIC EPOXY COATING.
  - THICKNESS CLASS 52 DIP OR SDR-26 PVC IN STEEL OR HDPE CASING SHALL BE USED WHEN:
    - CROSSING BENEATH STORM DRAINAGE PIPE WITH LESS THAN 2' OF CLEARANCE,
    - CROSSING WATER MAIN WITHIN 18".
  - SELECTION OF PIPE MATERIALS SHALL COMPLY WITH THE FOLLOWING:
    - LESS THAN THREE (3') OF COVER: CLASS 52 DIP;
    - GREATER THAN 3 FEET BUT LESS THAN 15 FEET (>3' BUT <15') IN DEPTH: SDR-26 PVC AND IN ACCORDANCE WITH CROSSING REQUIREMENTS LISTED ABOVE;
    - GREATER THAN 15 FEET BUT LESS THAN 24 FEET (>15' BUT <24') IN DEPTH: CLASS 52 DIP OR DR-18 C900
    - GREATER THAN 24 FEET (>24') IN DEPTH: CLASS 52 DIP.
  - SEWER SERVICE CONNECTIONS LOCATED AT DEPTHS GREATER THAN 15' SHALL BE MADE WITH DUCTILE IRON FITTINGS LINED WITH PROTECTO 401 COATING OR SOLID MOLDED C900 FITTINGS.
  - CLEAN OUTS SHALL BE INSTALLED WITHIN THE RIGHT-OF-WAY OR GENERAL UTILITY EASEMENT (GUE) AND HAVE A MINIMUM OF 1 FOOT SEPARATION FROM SIDEWALKS. INSTALL CLEAN OUTS NO MORE THAN 18" OFF OF THE COMMON PROPERTY CORNER UNLESS OTHERWISE NOTED ON THE CONSTRUCTION PLANS.
  - CONTRACTOR SHALL KEEP A RED-LINED SET OF THE CONSTRUCTION DRAWINGS ON SITE AT ALL TIMES.
  - UPON COMPLETION OF CONSTRUCTION OF THE SEWER SYSTEM, THE FOLLOWING APPROVAL PROCEDURES MUST BE FOLLOWED:
    - CONTRACTOR SHALL SCHEDULE ALL REQUIRED TESTS AND INSPECTIONS WITH BCWS AT LEAST 72 HOURS IN ADVANCE.
    - CONTRACTOR SHALL CONDUCT A PRELIMINARY INSPECTION TO LOCATE ANY DEFECTS AND DETERMINE WHEN THE SEWER SYSTEM IS READY FOR TESTS AND FINAL INSPECTION. PRIOR TO INSPECTION, THE SEWER SYSTEM SHALL BE FLUSHED AND CLEANED OF DEBRIS.
    - THE ENGINEER SHALL SCHEDULE LOW PRESSURE AIR TEST AND DEFLECTION TEST WITH BCWS. DEFLECTION TEST SHALL BE CONDUCTED PRIOR TO LOW PRESSURE AIR TEST.
    - CONTRACTOR SHALL SUPPLY TO THE OWNER'S ENGINEER AN AS-BUILT SURVEY, INCLUDING THE SERVICE LATERAL INFORMATION, THE LOCATIONS OF WHICH SHALL HAVE BEEN STAKED IN THE FIELD.
    - A SET OF PRELIMINARY RECORD DRAWINGS SHALL BE PROVIDED TO BCWS INSPECTOR FOR CCTV INSPECTION VIDEO REVIEW.
    - CCTV INSPECTION VIDEOS SHALL BE SUBMITTED FOR BCWS REVIEW. ANY NECESSARY REPAIRS ARE TO BE COMPLETED PRIOR TO SCHEDULING A FINAL INSPECTION.
    - THE ENGINEER SHALL SUBMIT THE TEST RESULTS, RECORD DRAWINGS, CONTINUITY TEST CERTIFICATION LETTER AND ALL OTHER REQUIRED DOCUMENTS TO BCWS FOR REVIEW AND APPROVAL.
    - THE ENGINEER SHALL SCHEDULE A FINAL INSPECTION WITH BCWS AT LEAST 72 HOURS IN ADVANCE.
  - LIMESTONE IS NOT AN APPROVED EMBEDMENT MATERIAL. USE #57 GRANITE, AIR COOLED BLAST FURNACE SLAG OR APPROVED MATERIALS LISTED IN BCWS SPECIFICATIONS.
  - MJ SLEEVES OR APPROVED ADAPTERS SHALL BE USED TO TRANSITION BETWEEN PVC AND DIP. FERROD OR SIMILAR COUPLINGS ARE NOT ALLOWED.

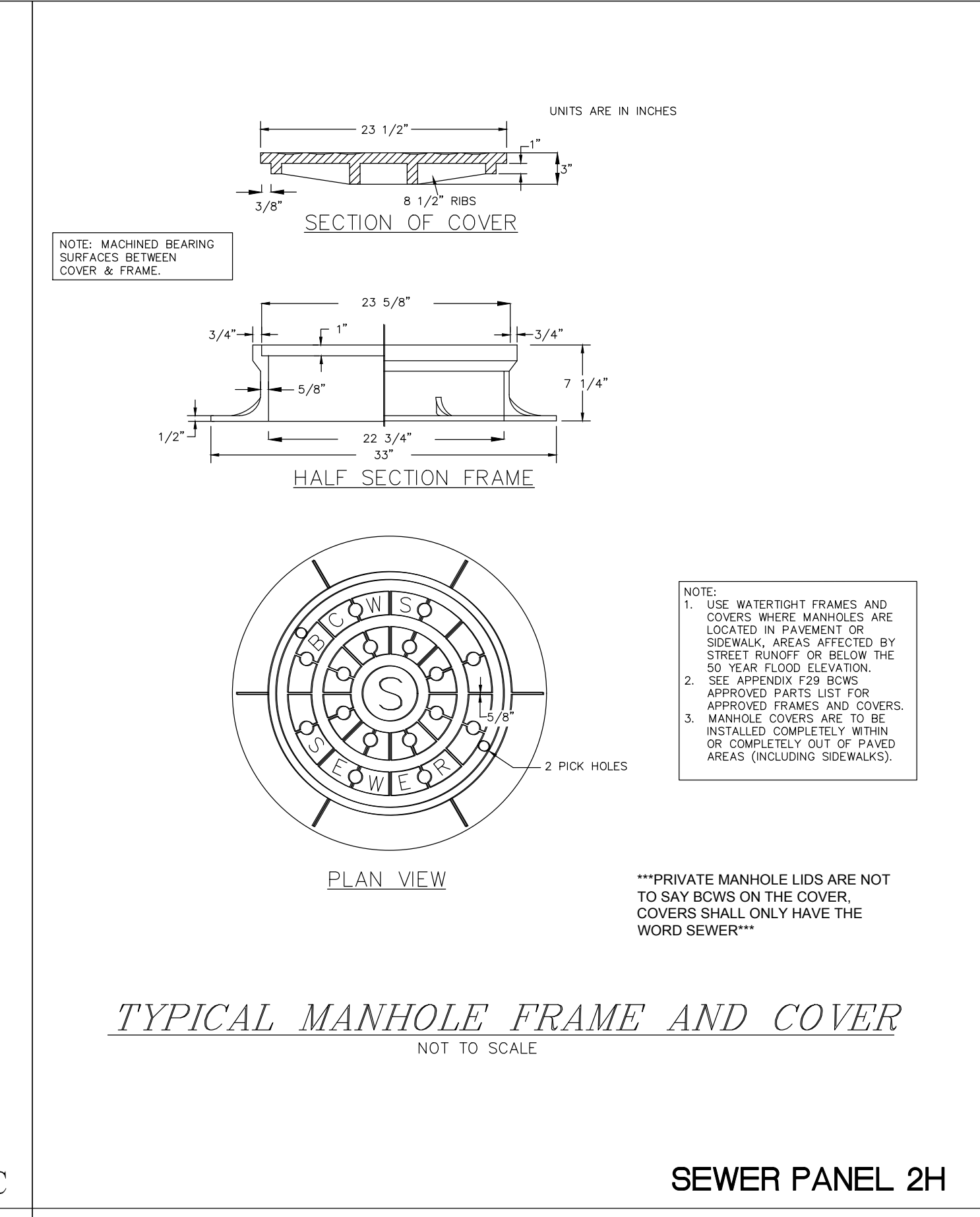
**SEWER PANEL 8**  
 BERKELEY COUNTY WATER AND SANITATION  
 POTABLE WATER & SANITARY SEWER STANDARDS  
 6/15/15



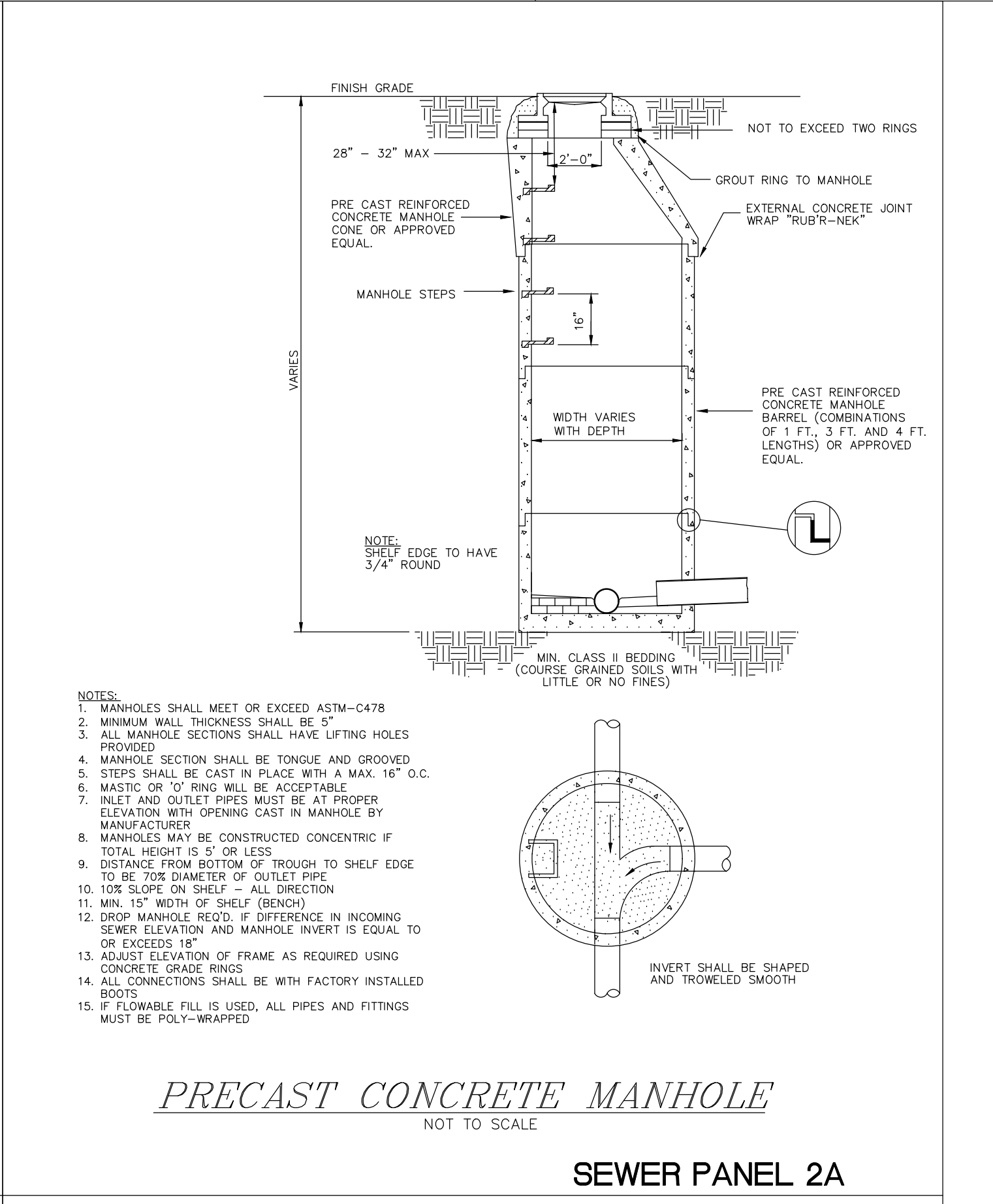
**PAVEMENT CLEANOUT DETAIL**  
 NOT TO SCALE  
 SEWER PANEL 1C  
 BERKELEY COUNTY WATER AND SANITATION  
 POTABLE WATER & SANITARY SEWER STANDARDS  
 REVISED 05/15/20



**TYPICAL SERVICE CONNECTION DETAIL**  
 NOT TO SCALE  
 SEWER PANEL 1A  
 BERKELEY COUNTY WATER AND SANITATION  
 POTABLE WATER & SANITARY SEWER STANDARDS  
 REVISED 01/30/18



**TYPICAL MANHOLE FRAME AND COVER**  
 NOT TO SCALE  
 SEWER PANEL 2H  
 BERKELEY COUNTY WATER AND SANITATION  
 POTABLE WATER & SANITARY SEWER STANDARDS  
 REVISED 06/15/15



**PRECAST CONCRETE MANHOLE**  
 NOT TO SCALE  
 SEWER PANEL 2A  
 BERKELEY COUNTY WATER AND SANITATION  
 POTABLE WATER & SANITARY SEWER STANDARDS  
 REVISED 02/08/10

COPYRIGHT © SEAMON, WHITESIDE & ASSOCIATES, INC. 501 WANDO PARK BOULEVARD, SUITE 200 | MOUNT PLEASANT, SC 29464 | 508 RHETT STREET, SUITE 101 | GREENVILLE, SC 29601 THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
|------|---------|---------|-----|-----|------------|----------|---------|
| 4"   | 2       | 5       | 10  | 24  | 38         | 61       | 44      |
| 6"   | 4       | 7       | 14  | 33  | 64         | 85       | 47      |
| 8"   | 5       | 9       | 18  | 44  | 91         | 111      | 45      |
| 10"  | 6       | 11      | 22  | 52  | 113        | 132      | 46      |
| 12"  | 6       | 12      | 25  | 60  | 133        | 155      | 84      |
| 16"  | 8       | 16      | 32  | 76  | 177        | 198      | 84      |
| 20"  | 9       | 18      | 38  | 91  | 218        | 238      | 83      |
| 24"  | 11      | 21      | 43  | 104 | 255        | 277      | 116     |

NOTES:  
 1. THE FOLLOWING CONDITIONS WERE USED TO CALCULATE THE RESTRAINED LENGTHS SHOWN IN THE TABLE:  
 • LAYING CONDITION IS TYPE 3  
 • SOIL DESIGNATED AS SAND-SILT  
 • DEPTH IS 3 FT.  
 • DESIGN PRESSURE (TEST) IS 150 P.S.I.  
 • SAFETY FACTOR IS 1.5  
 • PIPE IS POLYETHYLENE ENCASED  
 FOR THE TEE BRANCH AND REDUCER, LENGTHS ARE BASED ON BRANCHING AND REDUCING FROM THE NEXT LARGER SIZE IN THE TABLE. TEE BRANCH LENGTHS ARE BASED ON FIRST JOINT OF 10 FT. DEVIATIONS FROM THESE CONDITIONS MUST BE BASED ON THE ABOVE PARAMETERS.  
 2. REFER TO CWS MINIMUM STANDARDS FOR APPROVED RESTRAINING METHODS.  
 3. THE FOLLOWING RESTRAINING GLANDS AND GASKETS ARE APPROVED PRODUCTS:  
 • DUCTILE IRON PIPE  
 • AMERICAN CAST IRON PIPE - FAST GRIP, FLEX-RING, FIELD FLEX-RING, OR LOCK-RING  
 • US PIPE - TR FLEX OR FIELD LOK 350 GASKETS  
 • GRIFFIN PIPE - SNAP-LOCK RESTRAINED JOINT, OR TALON RJ GASKET  
 • EBBA - MEGALOG RESTRAINED JOINT  
 • FORD - SERIES 1400 RESTRAINED JOINT  
 • SOMA - ONE-LOCK SERIES SLD RESTRAINED JOINT  
 • MOBIANE - SURE STOP 350 RESTRAINED JOINT  
 • EBBA - FLEX-RING  
 • EBBA MEGALOG SERIES 2000PV  
 • FORD SERIES 1500 WILL BE USED ON EXISTING PVC PIPE

**RESTRAINED JOINT FITTING (HORIZONTAL PIPE ONLY)**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
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 2. REFER TO CWS MINIMUM STANDARDS FOR APPROVED RESTRAINING METHODS.  
 3. THE FOLLOWING RESTRAINING GLANDS AND CLAMP ASSEMBLIES ARE APPROVED PRODUCTS:  
 • EBBA 1500 TO FOR DUCTILE IRON AND PVC PIPE UP TO 12"  
 • EBBA 1100 HD FOR DUCTILE IRON PIPE 10" AND GREATER  
 • FORD UFR SERIES 1490

**TYPICAL BELL JOINT CLAMP (FOR RESTRAINING EXISTING PIPE ONLY)**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

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 • LAYING CONDITION IS TYPE 3  
 • SOIL DESIGNATED AS SAND-SILT  
 • DEPTH IS 3 FT.  
 • DESIGN PRESSURE (TEST) IS 150 P.S.I.  
 • SAFETY FACTOR IS 1.5  
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 • EBBA 1500 TO FOR DUCTILE IRON AND PVC PIPE UP TO 12"  
 • EBBA 1100 HD FOR DUCTILE IRON PIPE 10" AND GREATER  
 • FORD UFR SERIES 1490

**MAIN UNDER PAVED DRIVEWAY**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

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**TYPICAL HYDRANT INSTALLATION**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
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 • FORD UFR SERIES 1490

**WATER MAIN BEDDING**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

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**METER AND BACKFLOW SCHEMATIC FOR FIRE, DOMESTIC, AND IRRIGATION SERVICES**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
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| 20"  | 9       | 18      | 38  | 91  | 218        | 238      | 83      |
| 24"  | 11      | 21      | 43  | 104 | 255        | 277      | 116     |

NOTES:  
 1. APPROVED WATER CARRYING PIPE SHALL BE USED BETWEEN CWS'S METER AND THE INLET SIDE OF THE BACKFLOW PREVENTER. NO BLACK STEEL OR GALVANIZED PIPE SHALL BE USED BEFORE THE FIRE SPRINKLER OR DOMESTIC BACKFLOW PREVENTER'S INLET SIDES.  
 2. FOR FIRE SERVICE, NO METER WILL BE ON THE LINE.

**TYPICAL VALVE BOX**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

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NOTES:  
 1. CENTER VALVE BOX OVER OPERATING NUT TO ENSURE FREE VALVE OPERATION.  
 2. USE 6" RISER PIPE ON 4" AND 6" VALVES.  
 3. USE 8" RISER PIPE ON 8" VALVES AND LARGER.  
 4. DO NOT ALLOW VALVE BOX OR RISER TO REST ON ANY PORTION OF VALVE.  
 5. RISER LENGTH AS REQUIRED WITH VALVE BOX ADJUSTED FULLY DOWN. VALVE BOX SHALL BE ADJUSTED UP TO MATCH FINISH PAVEMENT ELEVATION OR 1" ABOVE FINISH GRADE.  
 6. REFER TO CWS MINIMUM STANDARDS FOR APPROVED INSTALLATION REQUIREMENTS.  
 7. THE FOLLOWING VALVE BOXES ARE APPROVED PRODUCTS:  
 • TYLER UNION #4850 SERIES  
 • BINGHAM & TAYLOR #4905 SERIES (U.S. ONLY)  
 • AFC BOX WITH EXTERNAL STEM AND LOCKING LID  
 • EAST JORDAN BROWNSON #8500 SERIES  
 8. IF VALVE BOX IS USED WITH GATE VALVE AS AN ALTERNATIVE TO A FIRE SERVICE POST INDICATOR VALVE, THE UPPER BOX INTERIOR AND LID SHALL BE PAINTED RED AND "FIRE" SHALL BE CAST IN THE LID.

**WATER MAIN BEDDING**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

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NOTES:  
 1. WATER INSTALLATION SHALL BE IN ACCORDANCE WITH "TEN STATES STANDARDS", S.C.D.H.E.C. REGULATIONS, AND CHARLESTON WATER SYSTEM'S "MINIMUM STANDARDS FOR THE DESIGN & CONSTRUCTION OF WATER AND SANITARY SEWER SYSTEMS" AS FOUND AT www.charlestonwater.com. BACKFLOW PREVENTION REQUIREMENTS CAN ALSO BE FOUND AT www.charlestonwater.com.  
 2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ALL TAPS. TAPS REQUIRING A SLEEVE SHALL BE NO CLOSER TO A JOINT THAN 4 FEET.  
 3. THRUST BLOCKING SHALL BE USED ONLY ON WET TAPS. CONTRACTOR SHALL NOTIFY CWS INSPECTOR A MINIMUM OF 72 HOURS (THREE FULL WORKING DAYS) PRIOR TO MAKING ANY WET TAP.  
 4. ROUGH GRADING SHALL BE DONE PRIOR TO INSTALLATION OF WATER MAINS.  
 5. CONTRACTOR SHALL MAINTAIN BETWEEN 36" - 48" COVER OVER TOP OF FLANGE.  
 6. ALL COMPONENTS OF THE PIPING SYSTEM SHALL BE NEW DUCTILE IRON AND ENCLOSED WITH LINEAR LOW-DENSITY 8 MILS BLUE POLYETHYLENE ENCASEMENT.  
 7. ALL VALVES AND HYDRANTS SHALL OPEN CLOCKWISE, EXCEPT ON THE FORMER NAVAL BASE, WHERE THE VALVES SHALL OPEN COUNTERCLOCKWISE.  
 8. MEGALOG, FORD SERIES 1400, OR SOMA ONE-LOCK RETAINER GLANDS SHALL BE USED FOR ALL FITTINGS, VALVES, AND HYDRANTS.  
 9. RESTRAINED LENGTHS SHALL BE IN MULTIPLES OF A FULL LENGTH OF PIPE.  
 10. USE 45° OR FLATTER BENDS WHEN GOING UNDER RCP AND DO NOT INSTALL VALVES, HYDRANTS, OR SERVICES ON DEEP PIPE SECTIONS.  
 11. WHERE POSSIBLE, HORIZONTAL WATERLINES SHALL BE DEFLECTED IN LIEU OF USING BENDS. DEFLECTIONS SHALL NOT EXCEED 75%  
 12. WHERE WATER AND SANITARY SEWER LINES CROSS WITHIN 18", THE LINE LAD LAST SHALL HAVE A FULL LENGTH OF PIPE INSTALLED WITH ITS MIDPOINT VERTICALLY IN LINE WITH THE OTHER LINE. THE CROSSING SHALL BE AT NOT LESS THAN A 45° ANGLE.  
 13. ALL MATERIAL SHALL CONFORM TO CWS SPECIFICATIONS AS TO MANUFACTURER, TYPE, AND DESIGN.  
 14. DEVELOPER'S ENGINEER SHALL INSPECT PROJECT WEEKLY TO PROVIDE WRITTEN WEEKLY UPDATES TO CWS INSPECTOR AND TO CERTIFY THE CORRECTNESS OF THE WATER PORTION OF CONTRACTOR'S RECORD DRAWINGS.  
 15. CONTRACTOR INSTALLING THE WATER SYSTEM SHALL BE ON CWS'S "APPROVED CONTRACTORS LIST".  
 16. COORDINATE INSPECTION OF THE BACKFLOW DEVICES WITH CWS CROSS CONNECTION DEPARTMENT BY CALLING (843) 727-6981. WATER SERVICE SHALL NOT BE TURNED ON UNTIL ALL BACKFLOW DEVICES HAVE PASSED INSPECTION.  
 17. DEVELOPER SHALL TAKE NECESSARY MEASURES TO PROTECT CWS WATER SYSTEM DURING THE TIME BETWEEN THE COMMISSIONING INSPECTION AND THE 2-YEAR MAINTENANCE BOND INSPECTION.  
 18. CHARLESTON WATER SYSTEM RESERVES THE RIGHT NOT TO INSTALL WATER METERS IF METER BOXES ARE NOT LOCATED AND ON GRADE IN COMPLIANCE WITH ITS MINIMUM STANDARDS.  
 19. ALL METER VAULTS AND ASSOCIATED PIPING 3" AND LARGER SHALL BE INSTALLED BY CWS UNLESS APPROVED IN WRITING BY THE CWS WATER DISTRIBUTION ENGINEER.

**TYPICAL HYDRANT INSTALLATION**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
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| 6"   | 4       | 7       | 14  | 33  | 64         | 85       | 47      |
| 8"   | 5       | 9       | 18  | 44  | 91         | 111      | 45      |
| 10"  | 6       | 11      | 22  | 52  | 113        | 132      | 46      |
| 12"  | 6       | 12      | 25  | 60  | 133        | 155      | 84      |
| 16"  | 8       | 16      | 32  | 76  | 177        | 198      | 84      |
| 20"  | 9       | 18      | 38  | 91  | 218        | 238      | 83      |
| 24"  | 11      | 21      | 43  | 104 | 255        | 277      | 116     |

NOTES:  
 1. CENTER VALVE BOX OVER OPERATING NUT TO ENSURE FREE VALVE OPERATION.  
 2. USE 6" RISER PIPE ON 4" AND 6" VALVES.  
 3. USE 8" RISER PIPE ON 8" VALVES AND LARGER.  
 4. DO NOT ALLOW VALVE BOX OR RISER TO REST ON ANY PORTION OF VALVE.  
 5. RISER LENGTH AS REQUIRED WITH VALVE BOX ADJUSTED FULLY DOWN. VALVE BOX SHALL BE ADJUSTED UP TO MATCH FINISH PAVEMENT ELEVATION OR 1" ABOVE FINISH GRADE.  
 6. REFER TO CWS MINIMUM STANDARDS FOR APPROVED INSTALLATION REQUIREMENTS.  
 7. THE FOLLOWING VALVE BOXES ARE APPROVED PRODUCTS:  
 • TYLER UNION #4850 SERIES  
 • BINGHAM & TAYLOR #4905 SERIES (U.S. ONLY)  
 • AFC BOX WITH EXTERNAL STEM AND LOCKING LID  
 • EAST JORDAN BROWNSON #8500 SERIES  
 8. IF VALVE BOX IS USED WITH GATE VALVE AS AN ALTERNATIVE TO A FIRE SERVICE POST INDICATOR VALVE, THE UPPER BOX INTERIOR AND LID SHALL BE PAINTED RED AND "FIRE" SHALL BE CAST IN THE LID.

**TYPICAL VALVE BOX**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)

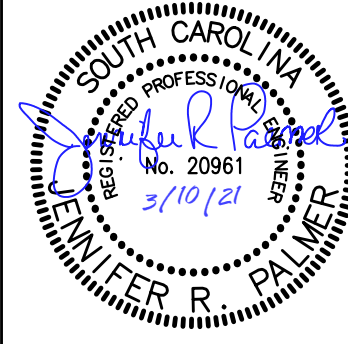
| SIZE | 11.1/4" | 22.1/2" | 45" | 90" | TEE BRANCH | DEAD END | REDUCER |
|------|---------|---------|-----|-----|------------|----------|---------|
| 4"   | 2       | 5       | 10  | 24  | 38         | 61       | 44      |
| 6"   | 4       | 7       | 14  | 33  | 64         | 85       | 47      |
| 8"   | 5       | 9       | 18  | 44  | 91         | 111      | 45      |
| 10"  | 6       | 11      | 22  | 52  | 113        | 132      | 46      |
| 12"  | 6       | 12      | 25  | 60  | 133        | 155      | 84      |
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**TYPICAL VALVE BOX**  
NOT TO SCALE

**RESTRAIN JOINT TABLE**

RESTRAIN ALL JOINTS WITHIN THESE LENGTHS (IN L.F. EACH SIDE OF THE FITTING)



REVISION HISTORY

| NO. | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 10/29/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

**NOTES:**

- MARKER SHALL HAVE A 2" DIA BRASS INSERT CAST IN TOP. PLACE MARKER 1'-0" FROM VALVE WITH A DIRECTION ARROW & DISTANCE FROM MARKER TO VALVE STAMPED ON BRASS INSERT.
- MARKER SHALL BE PAINTED WATER BLUE.
- THE LETTERS "WV" SHALL BE ON THE ROAD SIDE OF THE MARKER.
- LOCATE AT ALL BURIED VALVES ON MAINS GREATER THAN 12".

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: NOV 1, 2015  
DETAIL NO: 29

**NOTE:**

NO PRECAST CONCRETE COLLAR IS NEEDED IF VALVE BOX IS LOCATED IN PAVED OR CONCRETE AREA.

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: NOV 1, 2015  
DETAIL NO: 11

| TAP SIZE | W   | H   | D   |
|----------|-----|-----|-----|
| 4" & 6"  | 2.0 | 1.4 | 1.0 |
| 8"       | 3.5 | 2.0 | 1.4 |
| 10"      | 4.0 | 2.5 | 1.8 |
| 12"      | 5.0 | 3.0 | 2.5 |

MINIMUM CONCRETE STRENGTH = 3000 PSI.

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: JAN 1, 2016  
DETAIL NO: 8

| SIZE | 11 1/4" | 22 1/2" | 40" | 60" | TEE | DEAD | REDUCER |
|------|---------|---------|-----|-----|-----|------|---------|
| 4"   | 2       | 5       | 10  | 24  | 38  | 61   | 44      |
| 6"   | 4       | 7       | 14  | 33  | 64  | 85   | 47      |
| 8"   | 5       | 9       | 18  | 44  | 91  | 111  | 45      |
| 10"  | 6       | 11      | 22  | 52  | 113 | 132  | 46      |
| 12"  | 6       | 12      | 25  | 60  | 133 | 155  | 84      |
| 16"  | 8       | 16      | 32  | 76  | 177 | 198  | 84      |
| 20"  | 9       | 18      | 38  | 91  | 218 | 238  | 83      |
| 24"  | 11      | 21      | 43  | 104 | 255 | 277  | 116     |

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: JAN 1, 2016  
DETAIL NO: 6

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: NOV 1, 2015  
DETAIL NO: 27

CLASS II BACKFILL GRANULAR MATERIALS TAMPED IN 6" LIFTS WHEN INDICATED ON DRAWINGS OR NOTED BY ENGINEER COMPACTED TO 90% MAXIMUM DRY DENSITY FOR ASTM D1557.

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: NOV 1, 2015  
DETAIL NO: 2

**NOTES:**

- FOR NEW STREETS, INSTALL WATER VALVES (WV) AT THE TANGENTS OF THE RIGHT-OF-WAY (ROW) INTERSECTION CURVES.
- FOR EXISTING STREETS, INSTALL VALVES AT THE ENDS OF PAVED TRANSITION CURVES.
- THE MAIN LINE VALVE SHALL NORMALLY BE SET BEYOND ANY FIRE HYDRANT (FH) AT THE INTERSECTION.
- VALVES SHOULD BE INSTALLED OUTSIDE OF PAVED ROADWAYS UNLESS OTHERWISE SPECIFIED.

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: NOV 1, 2015  
DETAIL NO: 13

| LOCATION | SIZE | MAKE       | DATE SET  | NO. TURNS |
|----------|------|------------|-----------|-----------|
| A        | 8"   | AM DARLING | 11/1/2014 | 27        |
| B        | 6"   | AM DARLING | 11/1/2014 | 20.5      |
| C        | 12"  | AM DARLING | 11/1/2014 | 38.5      |
| D        | 8"   | AM DARLING | 11/1/2014 | 27        |
| E        | 12"  | AM DARLING | 11/1/2014 | 38.5      |

DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: JAN 1, 2016  
DETAIL NO: 28

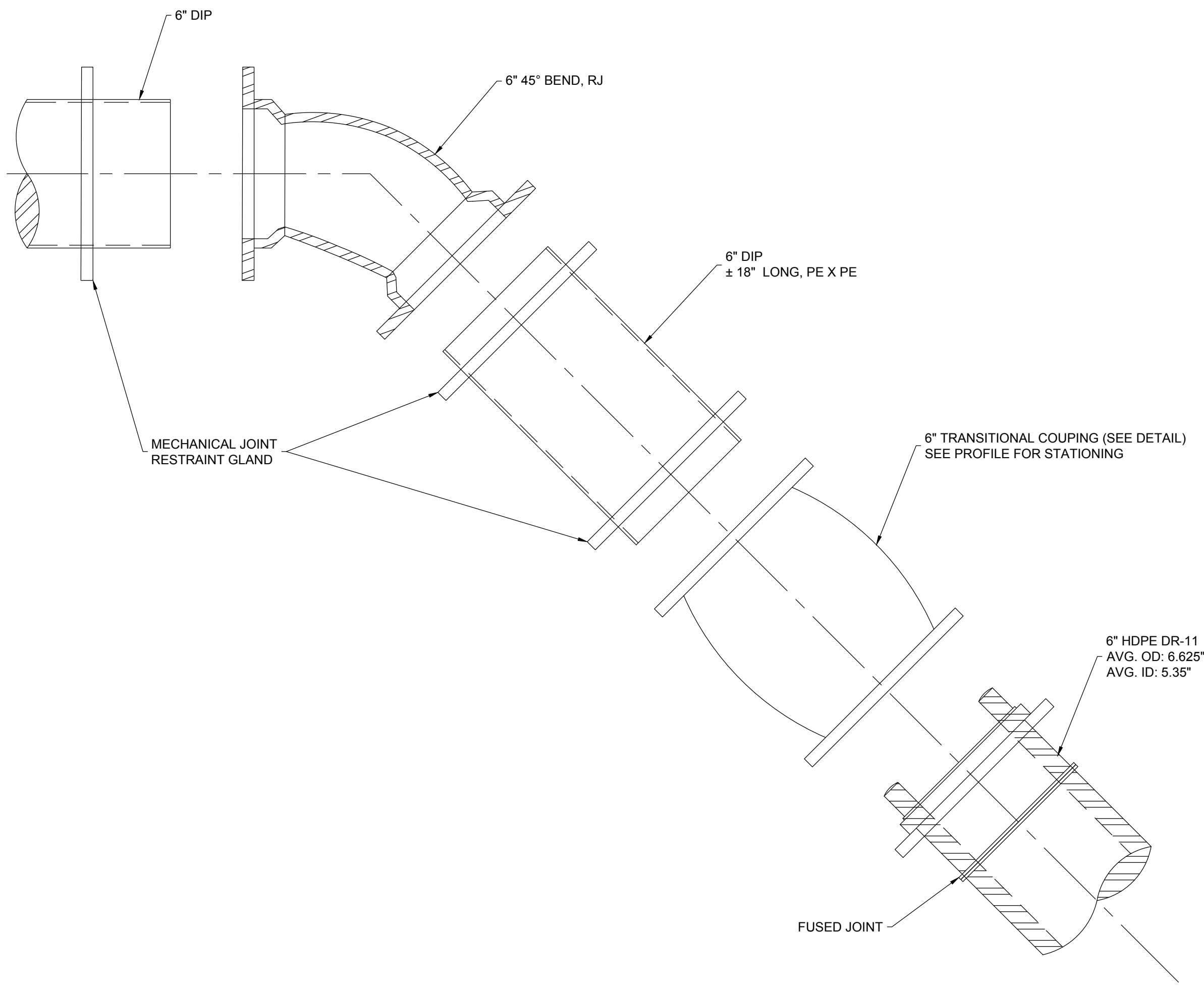
DOCUMENT NO: EC-4.3.2-CD-W  
REVISION DATE: JAN 1, 2016  
DETAIL NO: 19

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**1 WATER CONNECTION DETAIL - DIP TO HDPE PIPE**  
(NOT TO SCALE)

| SIZE | PIPE OD RANGE | BODY OD<br>Ø A | LENGTH<br>B | HEIGHT<br>C | MAX PRESSURE (PSI) | MAX DEFLECTION (DEGREES) | APPX. WEIGHT (LBS) |
|------|---------------|----------------|-------------|-------------|--------------------|--------------------------|--------------------|
| 4    | 4.50-4.90     | 8.15           | 11.80       | 9.76        | 350                | 4                        | 40                 |
| 6    | 6.60-7.00     | 10.35          | 11.98       | 11.98       | 350                | 4                        | 50                 |
| 8    | 8.60-9.10     | 13.47          | 13.23       | 15.10       | 350                | 4                        | 75                 |
| 10   | 10.75-11.20   | 15.56          | 13.25       | 17.18       | 350                | 4                        | 95                 |
| 12   | 12.75-13.30   | 17.58          | 13.30       | 19.21       | 350                | 4                        | 100                |

**SECTION A-A**

**DETAIL B SCALE 1:3**

**NOTES:**

- ALL MATERIALS ASTM A536 GRADE 65-45-12 DUCTILE IRON UNLESS OTHERWISE SPECIFIED.
- GASKET MATERIAL: NSF 61 SBR PER ASTM D2000, NSF 61 NBR AVAILABLE UPON REQUEST.
- FASTENER MATERIAL: TYPE 304 STAINLESS STEEL, 316 IS AVAILABLE UPON REQUEST.
- BOLT GUIDE COATING BLACK XYLAN 1212. BLACK E-COAT UPON REQUEST.
- MINIMUM PIPE INSERTION IS 4 INCHES.

**COMPONENTS:** HANDLE, BODY, NSF 61 FUSION BONDED EPOXY, RAMP RUNNERS, REINFORCED NYLON 66, GRIPPERS, (XYLAN 1424), DRAW HOOK, 304L SS, WASHER, 304 SS, BOLT GUIDE (XYLAN 1212), T-BOLT 5/8-11 304 SS, END RING, (BLACK POLYESTER), GASKET, NSF 61.

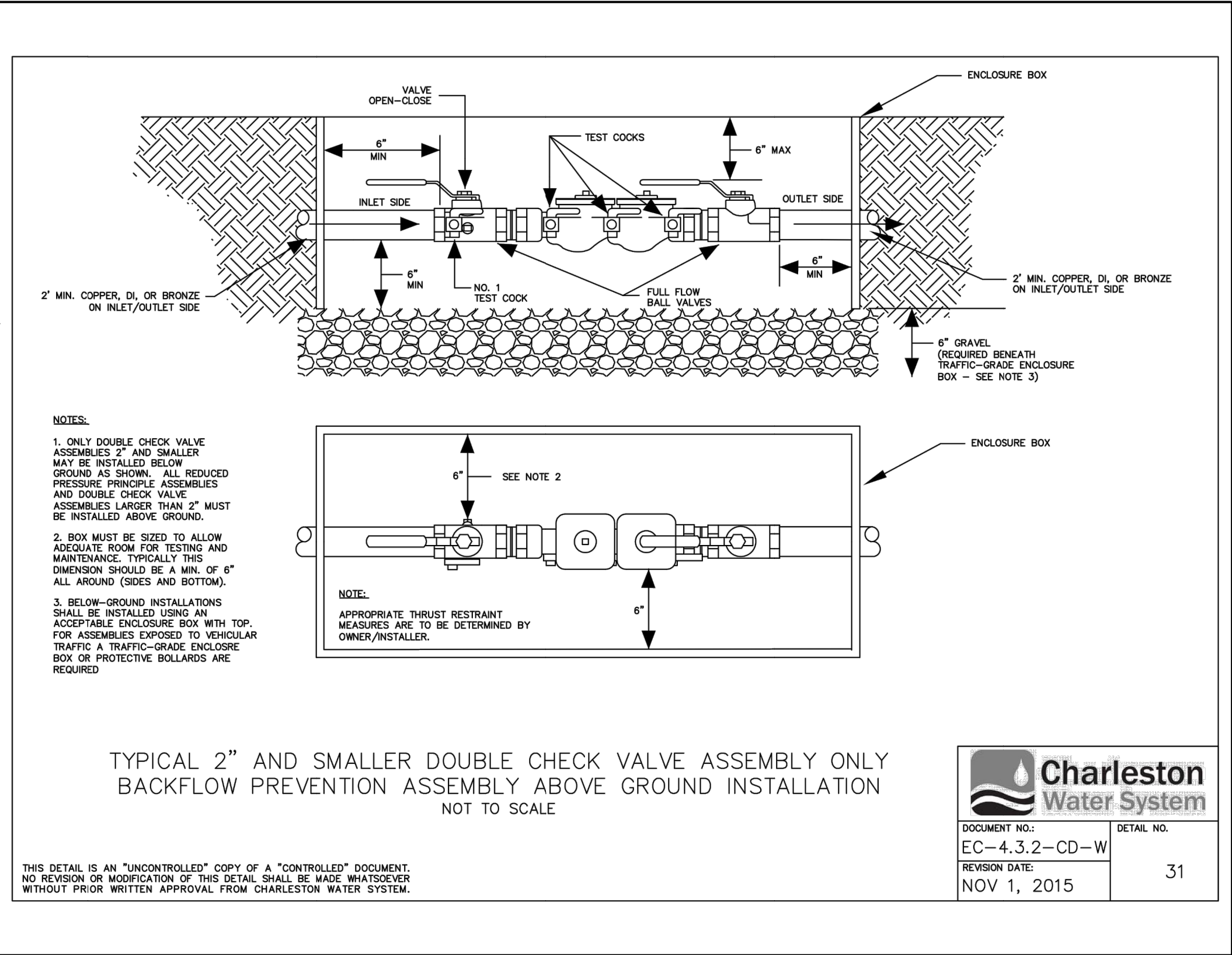
**ROMAC INDUSTRIES INC.**  
TITLE: ALPHA COUPLING, 4-12 INCH, STANDARD  
DWG NO: CAD-045677  
SCALE: 1:8  
SHEET: 1 OF 1

**PROPRIETARY NOTICE:** UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. DRAWING NOT PERFECTLY TO SCALE.

**SIGNATURES:** Tyler Matthews (7/8/2019), Caitlin Boone (7/8/2019)

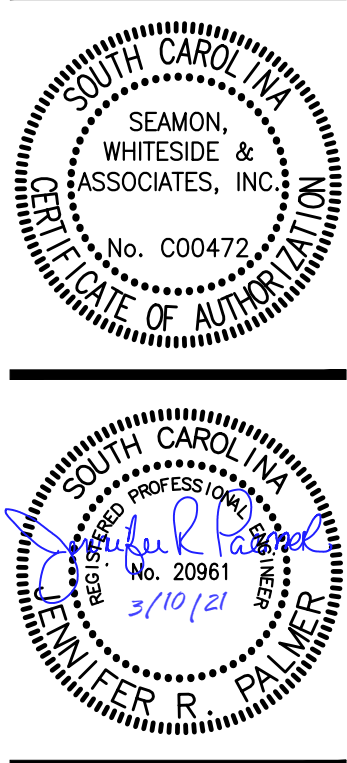
**LEGACY DRAWING #** SHOWN FILE NAME: ALPHA\_COUPLING\_4-12\_INCH\_STANDARD

**\* OR APPROVED EQUAL**



**SW**  
SEAMON WHITESIDE

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SUMMERVILLE, SC 843.972.0710  
SPARTANBURG, SC 864.298.0534  
CHARLOTTE, NC 980.312.5450  
WWW.SEAMONWHITESIDE.COM



**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BET  
CHECKED BY: JRP

**REVISION HISTORY**

|   |          |
|---|----------|
| B | 10/29/20 |
| C | 01/22/21 |
| D | 03/11/21 |

**WATER DETAILS**

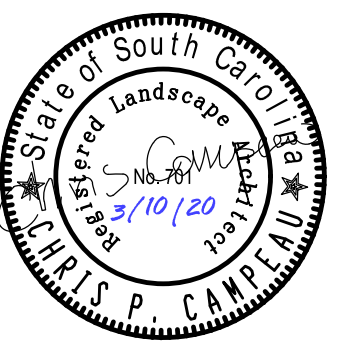
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 SPARTANBURG, SC 864.272.1272  
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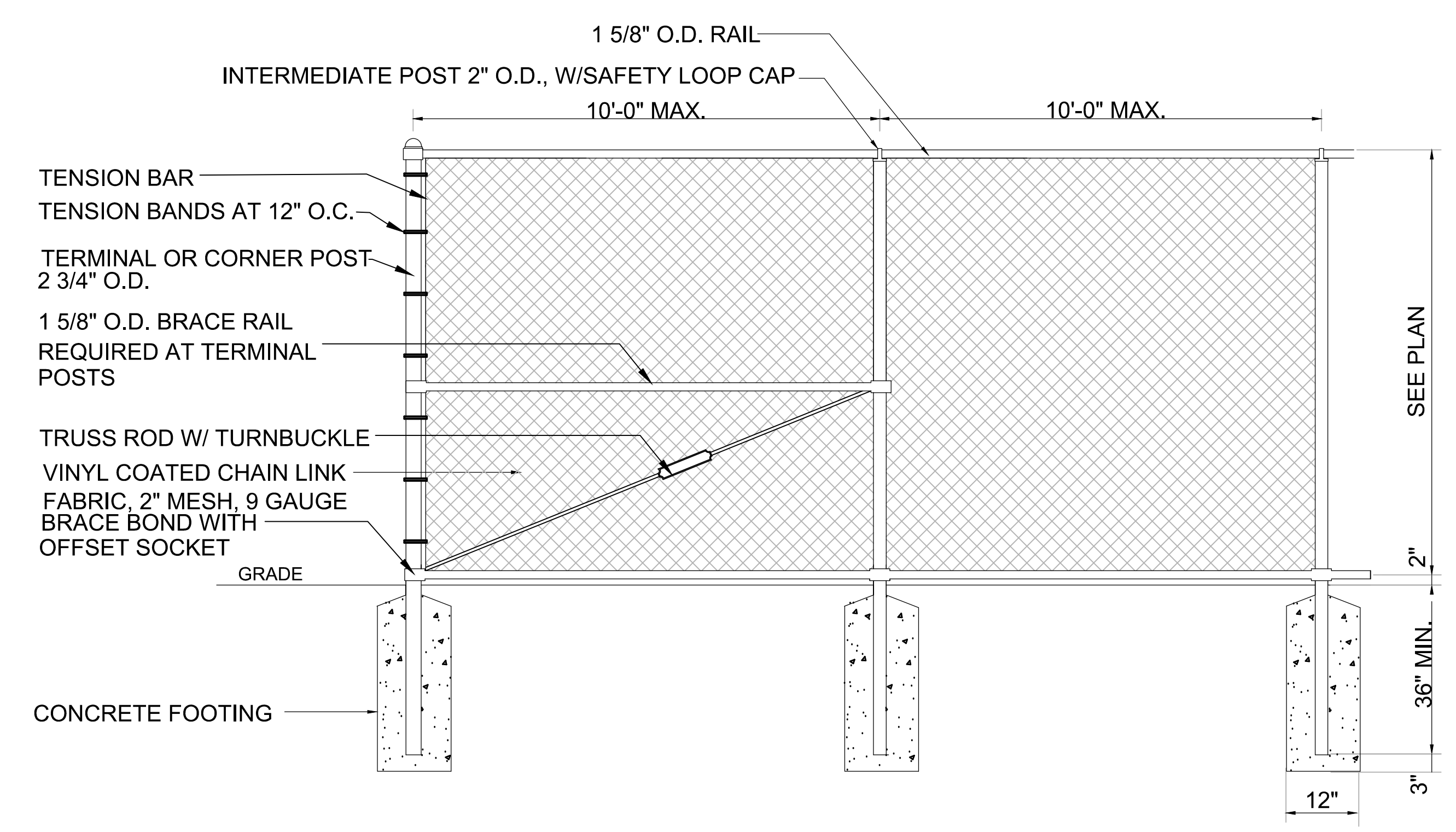


**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 06/12/20  
 DRAWN BY: BAE  
 CHECKED BY: CPC

| REVISION HISTORY |          |
|------------------|----------|
| A                | 6/12/20  |
| B                | 11/20/20 |
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| D                | 03/11/21 |

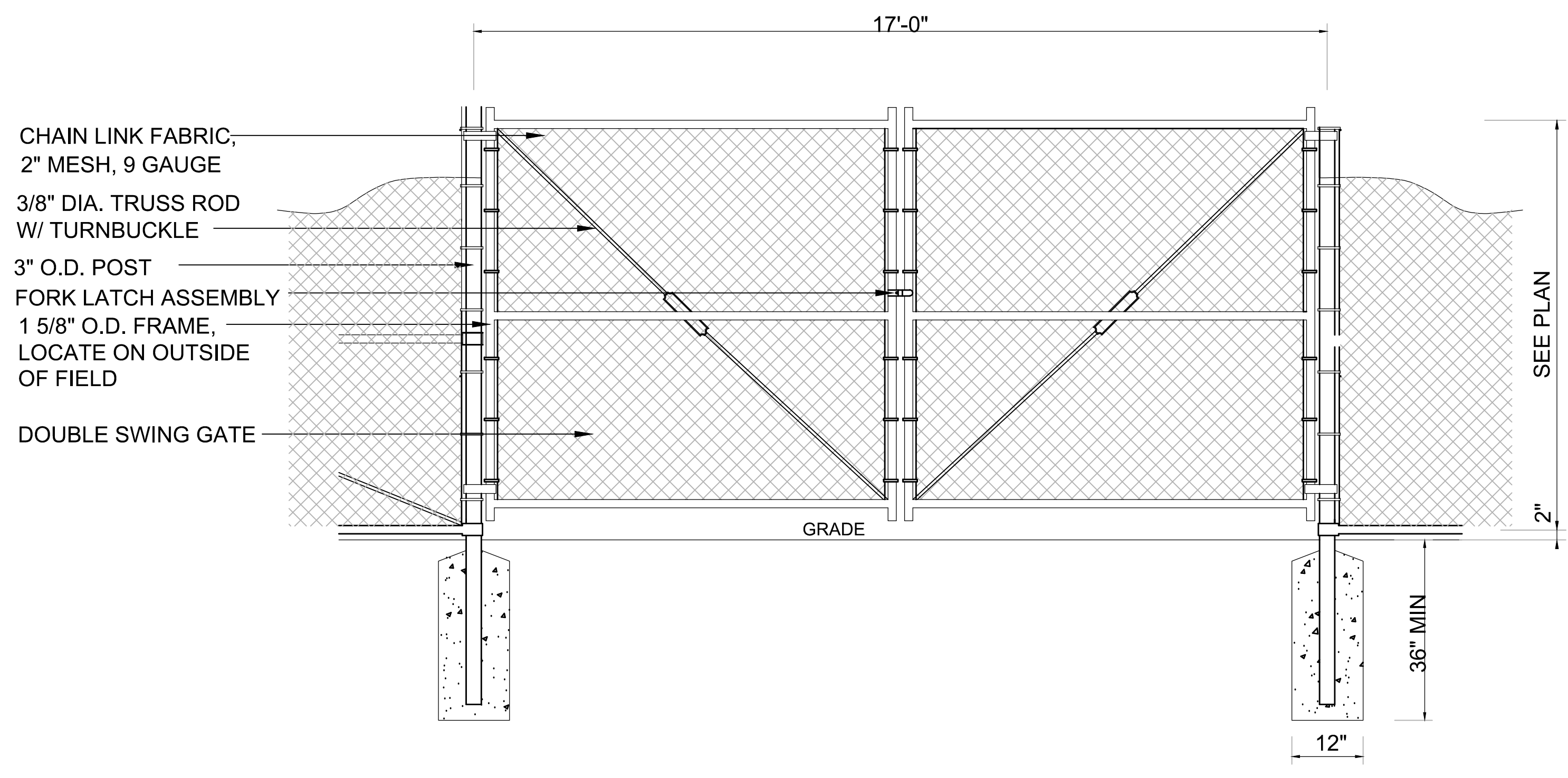
HARDSCAPE DETAILS



NOTES:  
 1. ALL FENCING AND COMPONENTS TO BE VINYL COATED; COLOR: BLACK

NTS

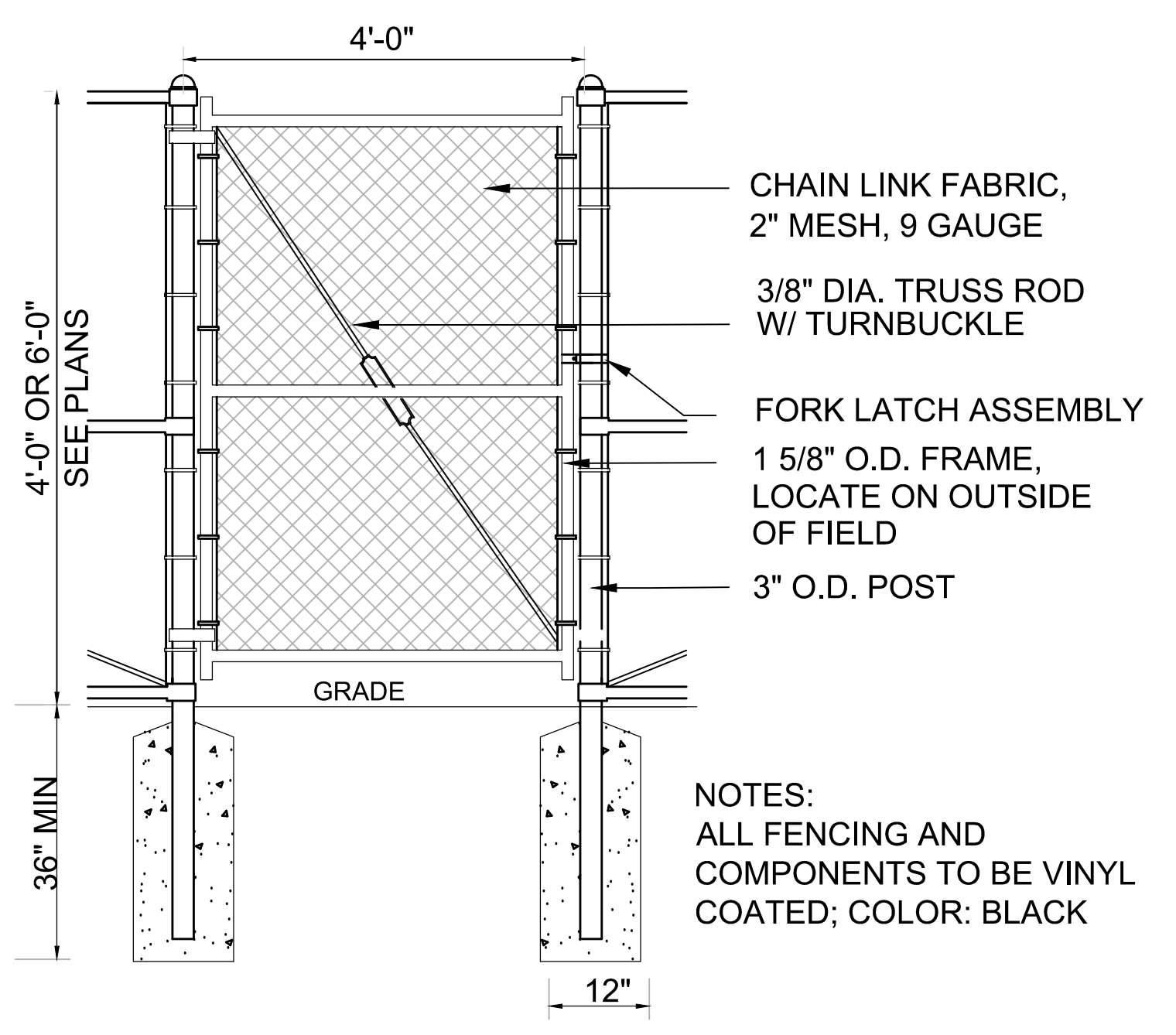
1 CHAIN LINK FENCE



NOTES:  
 1. ALL FENCING AND COMPONENTS TO BE VINYL COATED; COLOR: BLACK

NTS

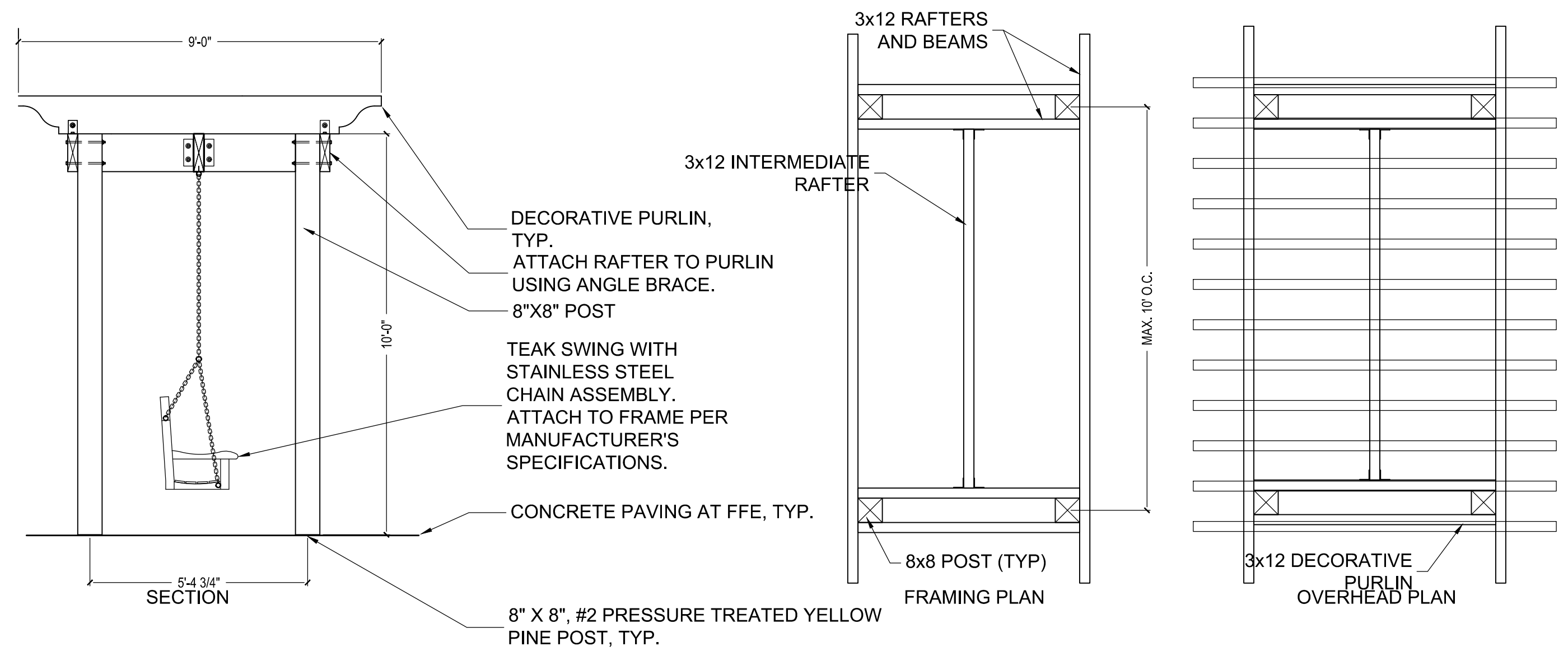
2 CHAIN LINK FENCE - 17' WIDE DOUBLE GATE



NOTES:  
 ALL FENCING AND COMPONENTS TO BE VINYL COATED; COLOR: BLACK

3 CHAIN LINK FENCE - 4' PEDESTRIAN GATE

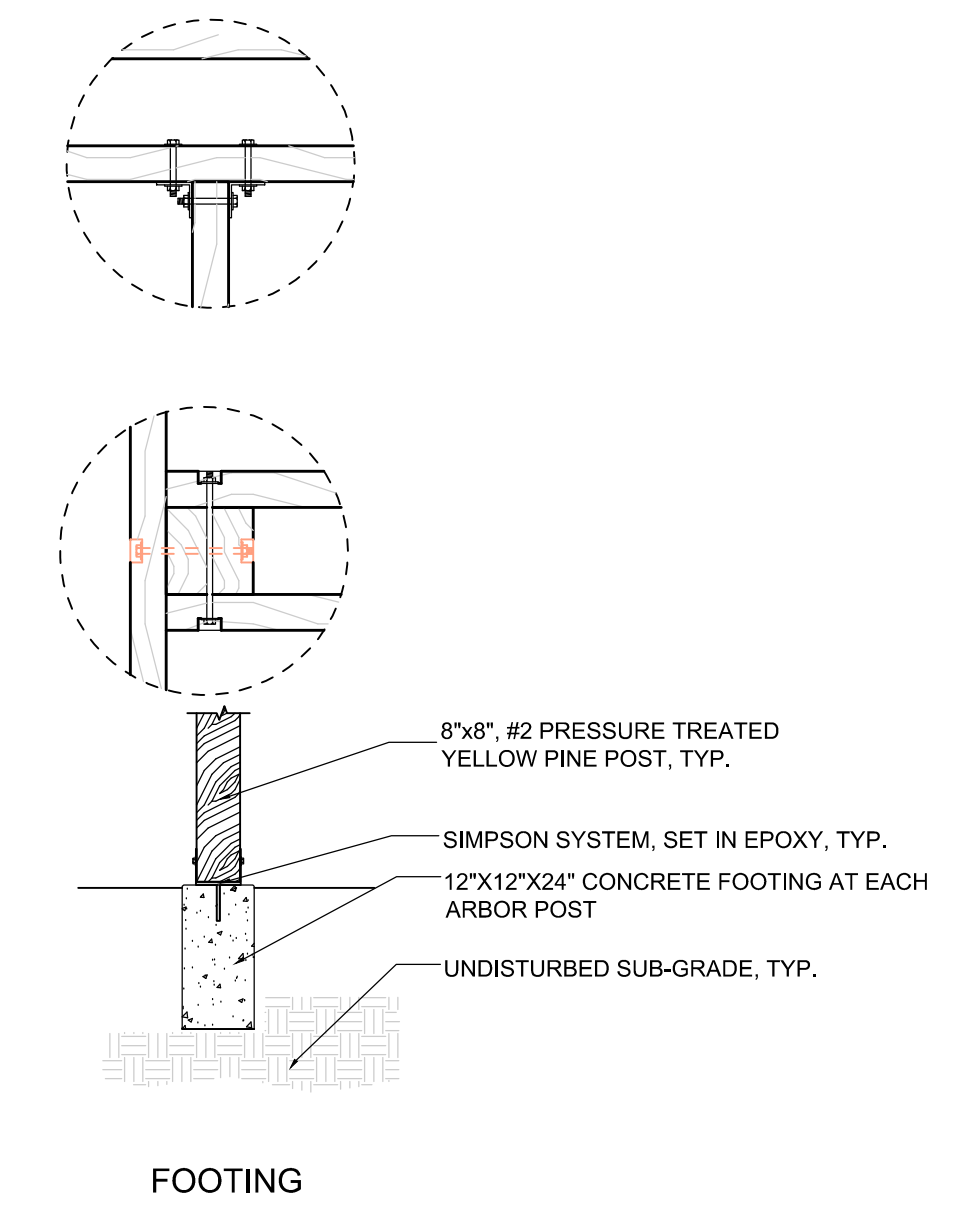
NOTES:  
 1. ALL WOOD TO BE NO. 2 OR BETTER TREATED SOUTHERN YELLOW PINE. POSTS TO BE PRESSURE TREATED FOR GROUND CONTACT USE, OTHER UNITS FOR ABOVE GROUND USE.  
 2. ALL HARDWARE AND FASTENERS TO BE STAINLESS STEEL. NAILS TO BE GALVANIZED SPIRAL DECKING NAILS.  
 3. ALL WOOD TO HAVE NATURAL FINISH.  
 4. LOCATION OF ARBORS TO BE DETERMINED.



NTS

4 SWING ARBOR

NOTE:  
 1. REFER TO LEGEND FOR MATERIAL COLOR & FINISH.  
 2. ALL HARDWARE & FASTENERS TO BE STAINLESS STEEL.  
 3. NAILS TO BE GALVANIZED SPIRAL DECKING NAILS.  
 4. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY CLIENT & LANDSCAPE ARCHITECT.

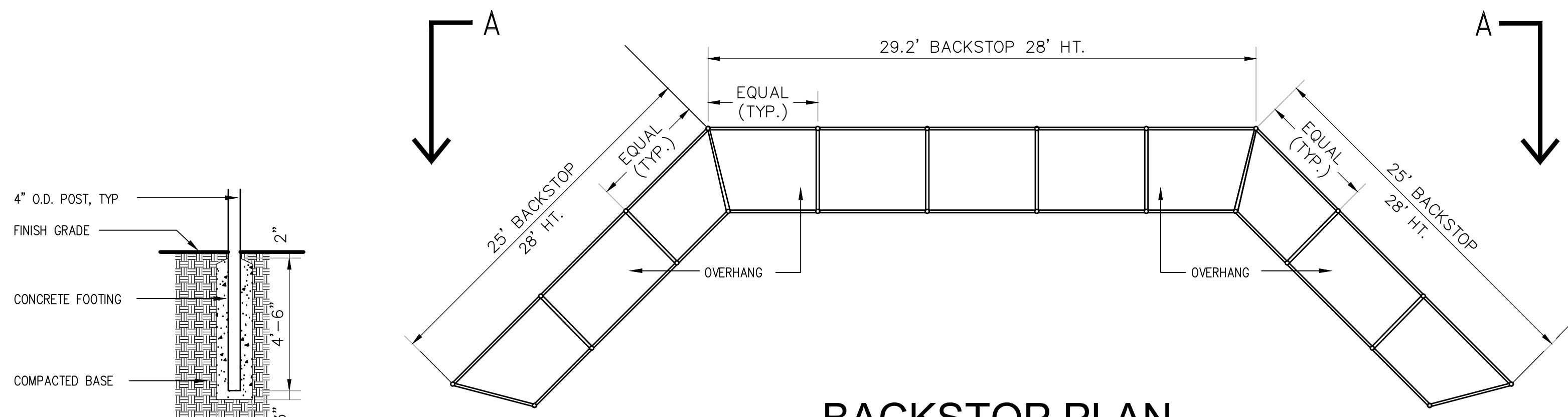


FOOTING

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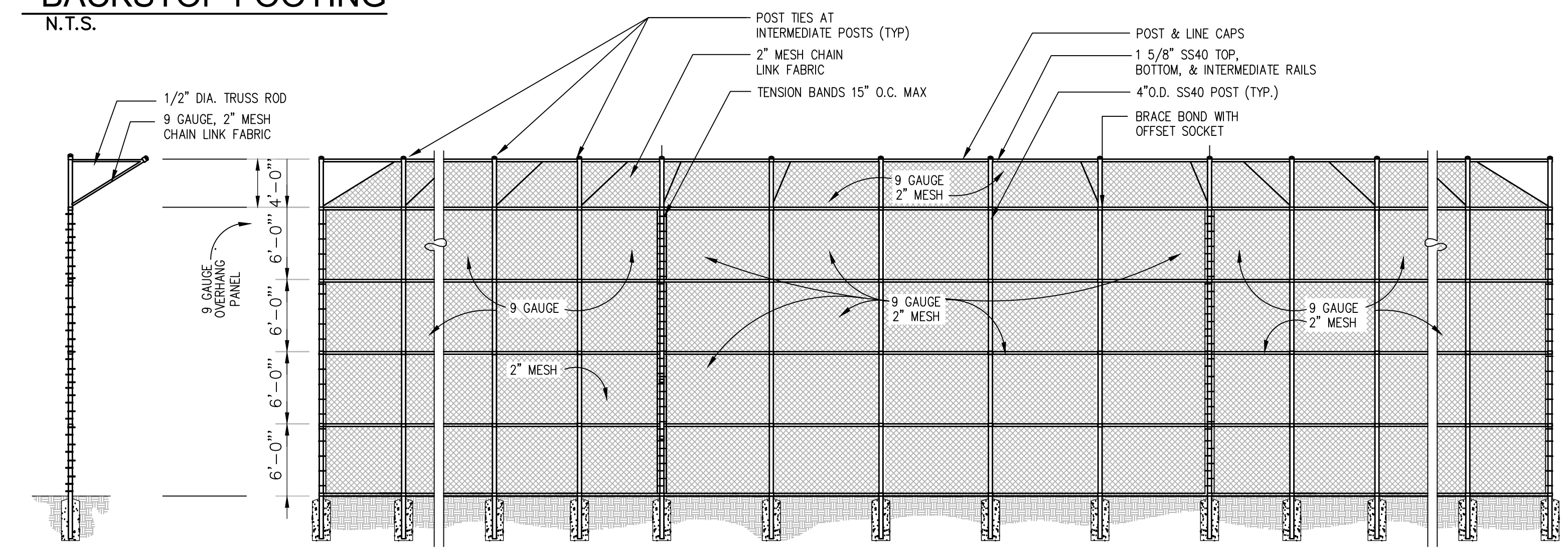
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**BACKSTOP PLAN**  
NOT TO SCALE

**NOTES:**  
1. POSTS & RAILS SHALL BE INSTALLED ON OUTSIDE OF BACKSTOP.  
2. ALL BACKSTOP POSTS SHALL BE 4" O.D.

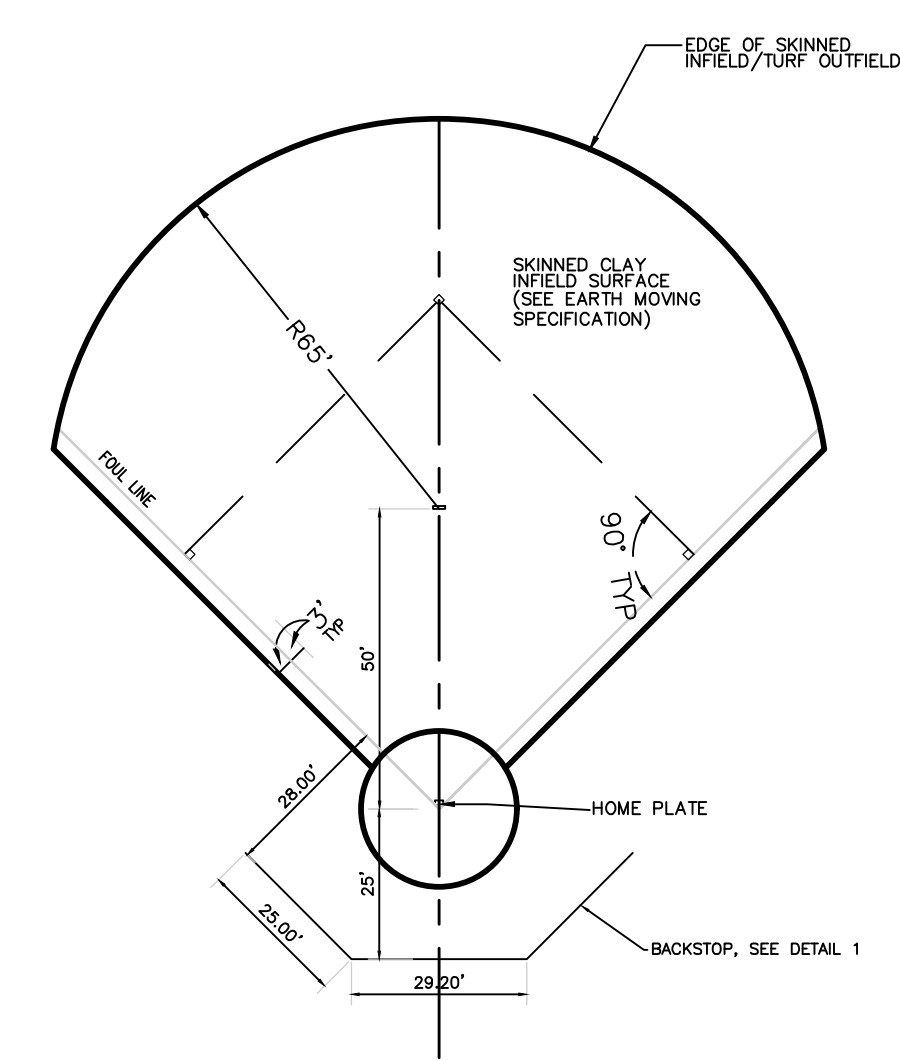
**BACKSTOP FOOTING**  
N.T.S.



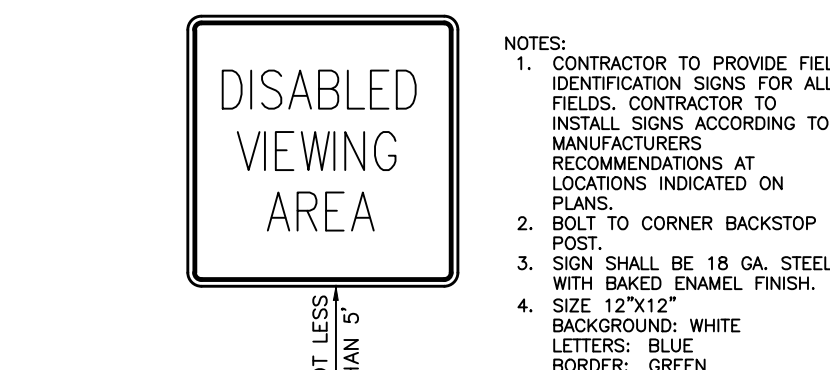
**SECTION** NOT TO SCALE

**ELEVATION AA** NOT TO SCALE

NTS



**INFIELD LAYOUT**  
SCALE: 1" = 20'



**"DISABLED VIEWING AREA" SIGNAGE**  
NOT TO SCALE

NTS

**1 BASEBALL BACKSTOP**

**2 BASEBALL INFIELD DETAILS**

**MASTERS SERIES LAKWOOD**

| MODEL           | 1     | 2     | 3     | 4     | 5     | 6     |
|-----------------|-------|-------|-------|-------|-------|-------|
| Flow Rate (GPM) | 1.2   | 1.5   | 2.0   | 2.5   | 3.0   | 3.5   |
| Flow Rate (MGD) | 0.008 | 0.010 | 0.014 | 0.017 | 0.021 | 0.024 |
| Flow Rate (MGD) | 0.008 | 0.010 | 0.014 | 0.017 | 0.021 | 0.024 |
| Flow Rate (MGD) | 0.008 | 0.010 | 0.014 | 0.017 | 0.021 | 0.024 |
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| Flow Rate (MGD) | 0.008 | 0.010 | 0.014 | 0.017 | 0.021 | 0.024 |

**MASTERS SERIES VERTICAL DESIGN**

**MASTERS SERIES MOORING**

**MASTERS SERIES CONTROL PANEL**

**CONTROL PANEL COMPONENTS**

- Outdoor rated, lockable enclosure constructed of galvanized steel powder coated gray.
- Standard enclosure size: 18" x 18" x 18" for 1 HP and 24" x 24" x 18" for 2.5-3 HP.
- Overcurrent protection.
- Ground fault protection.
- Motor overcurrent and overload.
- Capacitors (single phase only).
- Digital timer with battery backup.
- LED lighting circuit included in all standard panels.
- Custom Control Panels for multiple units and options available.

**MANUFACTURER:** AQUAMASTER  
16024 COUNTY RD X  
KIEL, WI 53042

**MODEL/STYLE:** MASTERS SERIES - LAKWOOD - VERTICAL DESIGN

**NOTES:** (1) HORSEPOWER  
240 VOLT 1-PHASE POWER

**INSTALLATION:** INSTALL PER MANUFACTURER'S INSTRUCTIONS

**QUANTITY:** 5 (AS SHOWN ON PLAN)

**CONTACT:** (800) 693-3144

**NOTE:** CONTRACTOR MAY SUBMIT AN ALTERNATE PRODUCT FOR REVIEW AND APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.

**3 POND FOUNTAIN**

NTS

**SW** SEAMONWHITESIDE

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Landscape Architecture  
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STATE OF SOUTH CAROLINA  
LANDSCAPE ARCHITECT

State of South Carolina  
Landscape Architecture  
No. 2710120  
CHRIS P. CAMPBELL

**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BAE  
CHECKED BY: CPC

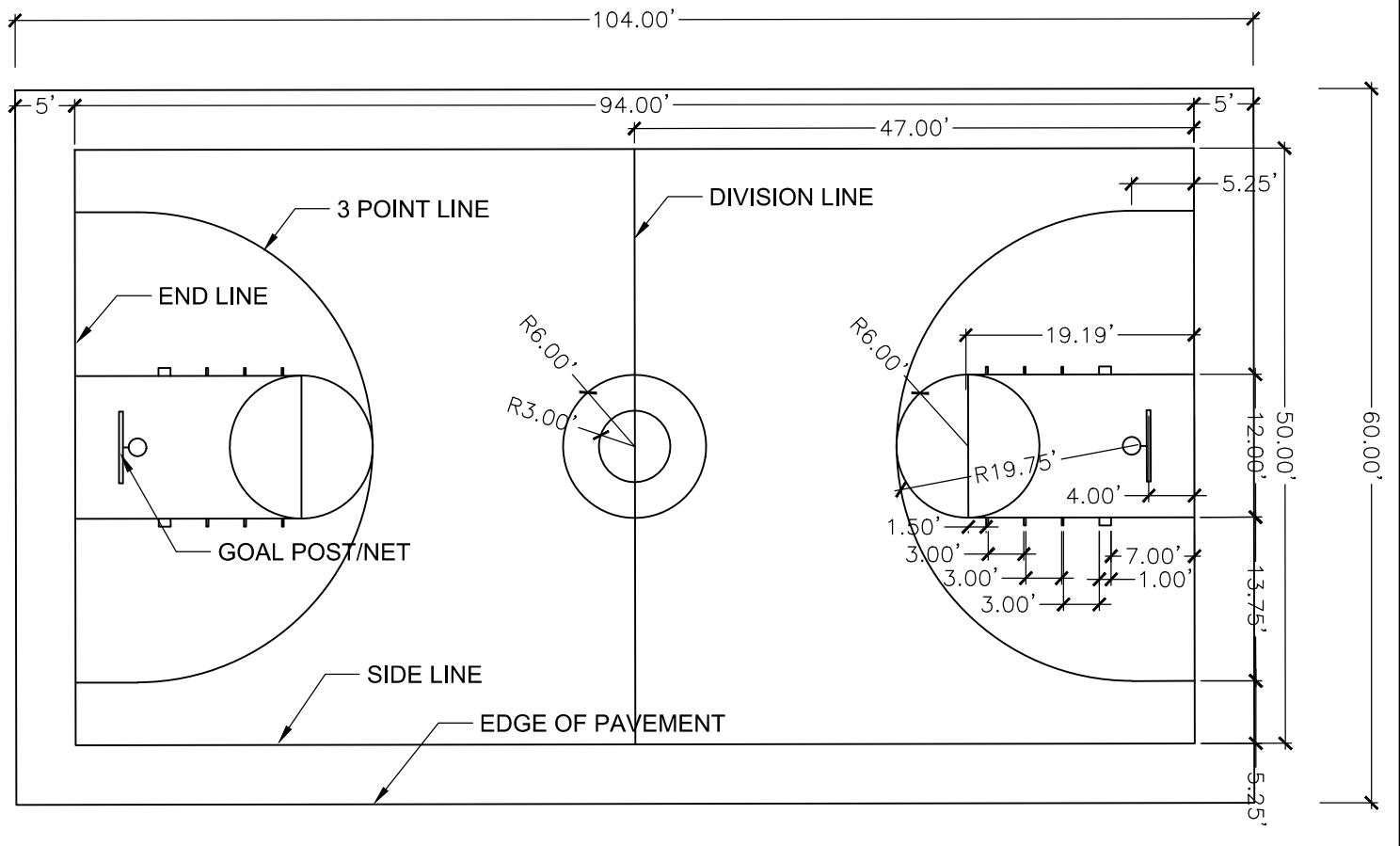
**REVISION HISTORY**

| REV | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 11/20/20 |             |
| C   | 01/22/21 |             |
| D   | 03/11/21 |             |

**HARDSCAPE DETAILS**

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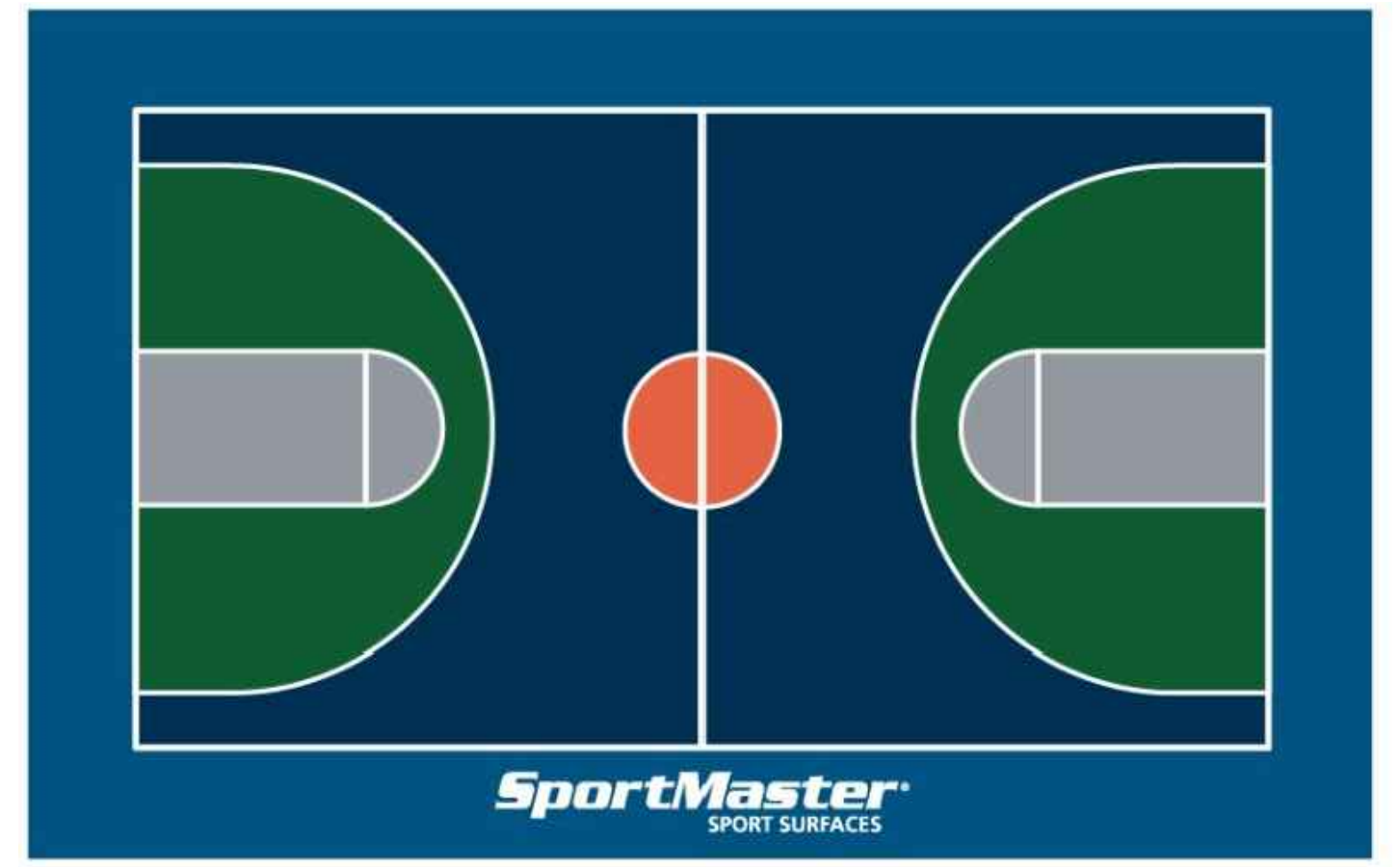
NOTES:  
1. ALL DIMENSIONS ARE TO THE OUTSIDE EDGE OF THE LINES.  
2. MANUFACTURER OF COURT SURFACING: SPORT MASTER SPORT SURFACES, P.O. BOX 2277, SANDUSKY, OH 44870, PHONE: 1-800-395-7325, WEBSITE: www.sportmaster.net  
3. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.



MANUFACTURER: SPORTS MASTER SPORT SURFACES, P.O. BOX 2277, SANDUSKY, OH 44870, PH. 1-800-395-7325  
WEBSITE: www.sportmaster.net  
STYLE: SPORT MASTER COLOR COATING SYSTEMS OVER 4" THICK CONCRETE PAD WITH 6X6 W2.9XW2.9 WWF (SEE CIVIL DETAILS AND SPECIFICATIONS.)

COLORS:  
COURT: BLUE  
BORDER: LIGHT BLUE  
3 POINT AREA: LIGHT GREEN  
KEY/TOP OF KEY: GRAY  
CENTER COURT AREA: ORANGE

NOTE: INSTALL PER MANUFACTURER'S SPECIFICATIONS.



1 BASKETBALL COURT DIMENSIONS NTS

2 COURT SURFACING NTS

3 BASKETBALL GOAL NTS

MANUFACTURER: SPORTS IMPORTS  
400 PARKWAY LANE, HILLIARD, OH 43026  
PH. 1-800-556-3188  
WEBSITE: www.sportsimports.com

STYLE: BEACH 2 VOLLEYBALL POLES AND NET  
QUANTITY: 2

NOTE: INSTALL PER MANUFACTURER'S SPECIFICATIONS. SEE HARDSCAPE PLAN FOR LOCATIONS.

FOOTING DIMENSIONS: 18"x18"x24" DEEP

USAV SAND SPECIFICATIONS

USAV ProCourt Sand Chart

SECTION AT CURB

ANCHOR ROPE TO CONCRETE DEADMAN LOCATED 20" BELOW SURFACE (TYP.)

LIMIT OF SAND

VOLLEYBALL NET & POST

VOLLEYBALL EDGE

1/2" YELLOW NYLON ROPE BOUNDARY LINE

QUANTITY: 4

4 VOLLEYBALL NET NTS

5 VOLLEYBALL COURT EDGE SCALE: 1" - 0" = 3/4"

6 VOLLEYBALL COURT SCALE: 1" - 0" = 1/16"

7 PICNIC TABLE NTS

INSTALL WITH GROUND SOCKETS PER MANUFACTURER'S SPECIFICATIONS

SINGLE POST PORTABLE PITCHFORK GOAL EQUIVALENT TO "SPORTSPLAY" #561-445 WITH GROUND SOCKETS, 18'-6" IN WIDTH.

MANUFACTURER: LANDSCAPE FORMS  
431 LAWNSDALE AVE.  
KALAMAZOO, MI 49408

MODEL/STYLE: POE TRASH RECEPTACLE WITH SIDE OPENING

SIZE: 29"x44"x34 GAL.

COLOR: MERCURY

INSTALLATION: SURFACE INSTALLATION PER MANUFACTURER'S INSTRUCTIONS

QUANTITY: 4 (LOCATIONS TO BE DETERMINED)

CONTACT: LORI BROWN  
(704) 248-7914

(LOCATIONS TO BE DETERMINED)

MANUFACTURER: VICTOR STANLEY  
P.O. DRAWER 330  
DUNKIRK, MD 20754  
(800) 368-2573

MODEL/STYLE: RB-28 / STANDARD

SIZE: 4' LENGTH

COLOR: BLACK

INSTALLATION: SURFACE MOUNT INSTALLATION PER MANUFACTURER'S INSTRUCTIONS.

QUANTITY: 4

CONTACT: JEFF HASLEY  
jeff.hasley@hasleyassociates.com  
(704) 362-5880

(LOCATIONS TO BE DETERMINED)

MANUFACTURER: MOST DEPENDABLE FOUNTAINS, INC.  
5705 COMMANDER DR. P.O. BOX 587  
ARLINGTON, TN 38002-0587  
TOLL FREE: 1-800-552-6331  
PHONE: (901) 867-0039  
FAX: (901) 867-0159  
www.mostdependable.com

MODEL 10155SM

10155SM SHOWN WITH OPTIONAL 1/2" SS SURFACE CARRIER

QUANTITY: 3; FOR LOCATION, SEE CIVIL SITE PLAN SHEETS C4.1-4.3

8 FOOTBALL GOAL POST NTS

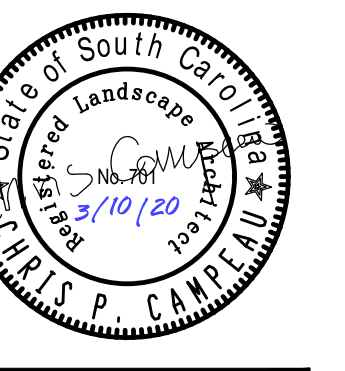
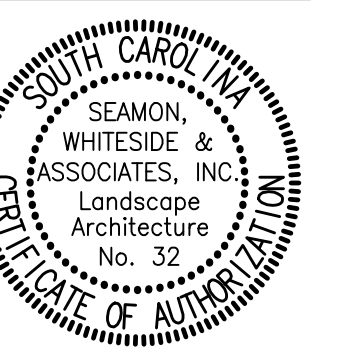
9 TRASH RECEPTACLE NTS

10 PARK BENCH NTS

11 DRINKING FOUNTAIN NTS



MOUNT PLEASANT, SC 843.884.1667  
GREENVILLE, SC 864.298.0534  
SUMMERVILLE, SC 843.972.0710  
SPARTANBURG, SC 864.272.1272  
CHARLOTTE, NC 980.312.5450  
WWW.SEAMONWHITESIDE.COM



HANAHAN RECREATION COMPLEX  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BAE  
CHECKED BY: CPC

REVISION HISTORY

| NO. | DATE     | DESCRIPTION |
|-----|----------|-------------|
| A   | 6/12/20  |             |
| B   | 11/20/20 |             |
|     | 03/11/21 |             |

HARDSCAPE DETAILS

THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.

501 WANDO PARK BOULEVARD, SUITE 200 | MOUNT PLEASANT, SC 29464 | 508 RHETT STREET, SUITE 101 | GREENVILLE, SC 29601

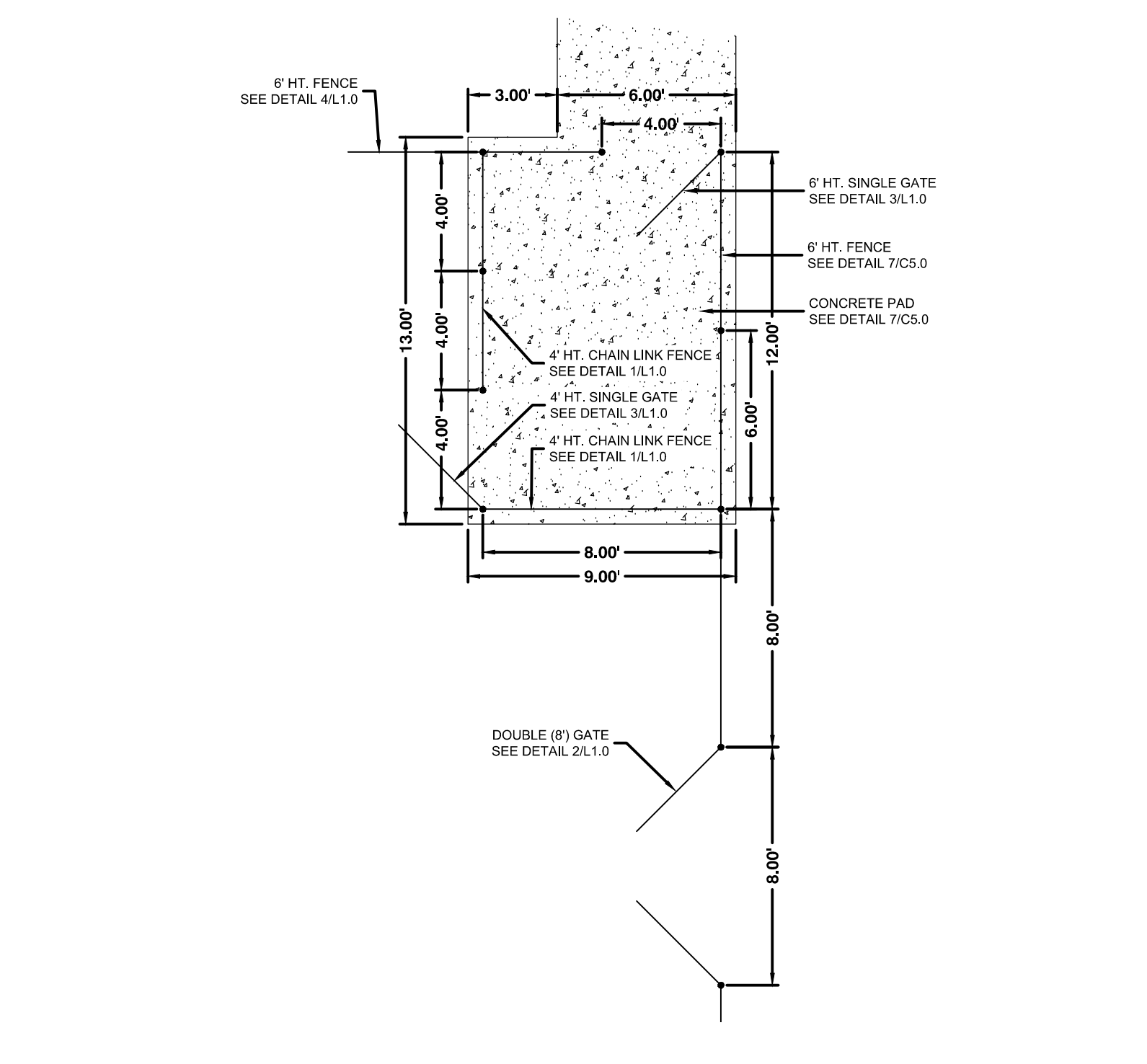
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**TIMBER FRAMING NOTES:**

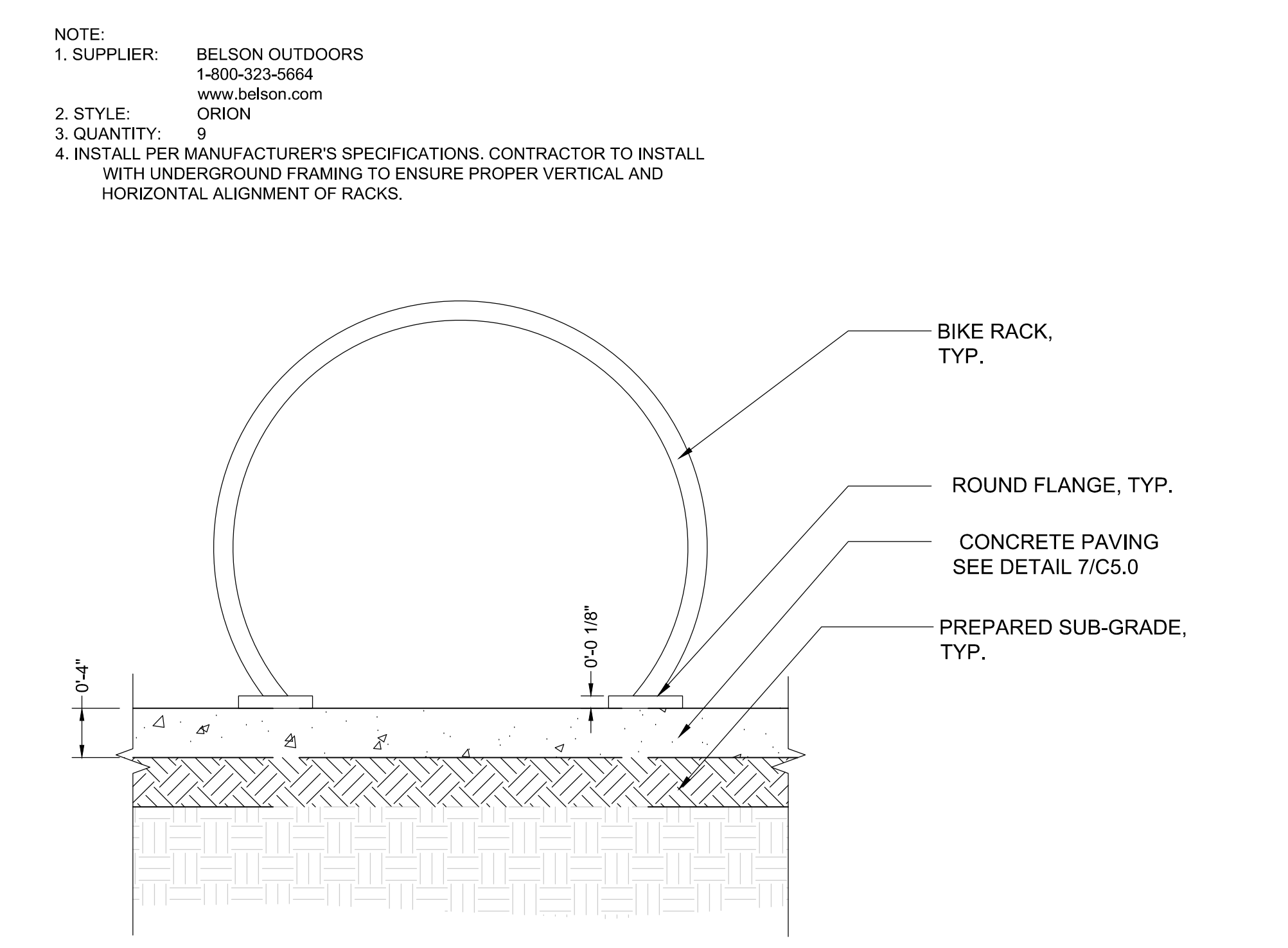
- TIMBER SHALL BE NO. 1 SO. YELLOW PINE, AND SHALL BE PRESSURE TREATED IN ACCORDANCE WITH THE AMERICAN WOOD PRESERVERS ASSOCIATION AND SHALL BEAR A STAMP INDICATING QUALITY AND TREATMENT.
- ALL TIMBER MATERIALS SHALL BE NEW UNLESS SPECIFICALLY PROVIDED OTHERWISE IN THE CONTRACT DOCUMENTS. CUT JOINTS ACCURATELY TO MAKE A NEAT, SNUG FIT. TOLERANCE SHALL BE  $\frac{1}{8}$ ".
- REMOVE ANY STAINING FROM SOIL, OIL OR GREASE.
- TIMBERS WITH A MODERATE BOW ARE PERMITTED WHERE THEIR INTENDED USE WILL STRAIGHTEN THEM. DO NOT USE SEVERELY BOWED TIMBERS OR TIMBERS BOWED IN MORE THAN ONE DIRECTION.
- TIMBER CONSTRUCTION SHALL CONFORM TO NATIONAL DESIGN STANDARD FOR WOOD CONSTRUCTION, CURRENT EDITION.
- ALL CUTS, HOLES, AND DAMAGE TO THE SURFACE OF TREATED WOOD SHALL BE FIELD TREATED WITH COPPER NAPHTHALATE (OR EQUAL.)

**HARDWARE NOTES:**

- ALL GALVANIZED BOLTS, NUTS AND WASHERS SHALL BE HOT DIPPED GALVANIZED PER ASTM-153 WITH 20 OUNCES OF ZINC PER SQUARE FOOT.
- ALL BOLTS SHALL BE EQUIPPED WITH WASHERS, LOCK WASHERS AND NUTS.
- ALL WOOD SCREWS SHALL BE 316 STAINLESS STEEL.
- ALL NAILS (IF USED) SHALL BE STAINLESS STEEL RING SHANK.
- SET SCREW HEAD FLUSH WITH MEMBER TO BE CONNECTED AND DO NOT ALLOW TIP OR THREADS TO PROTRUDE.
- ROUND OVER (EASE EDGE) ALL HANDRAIL COMPONENTS.



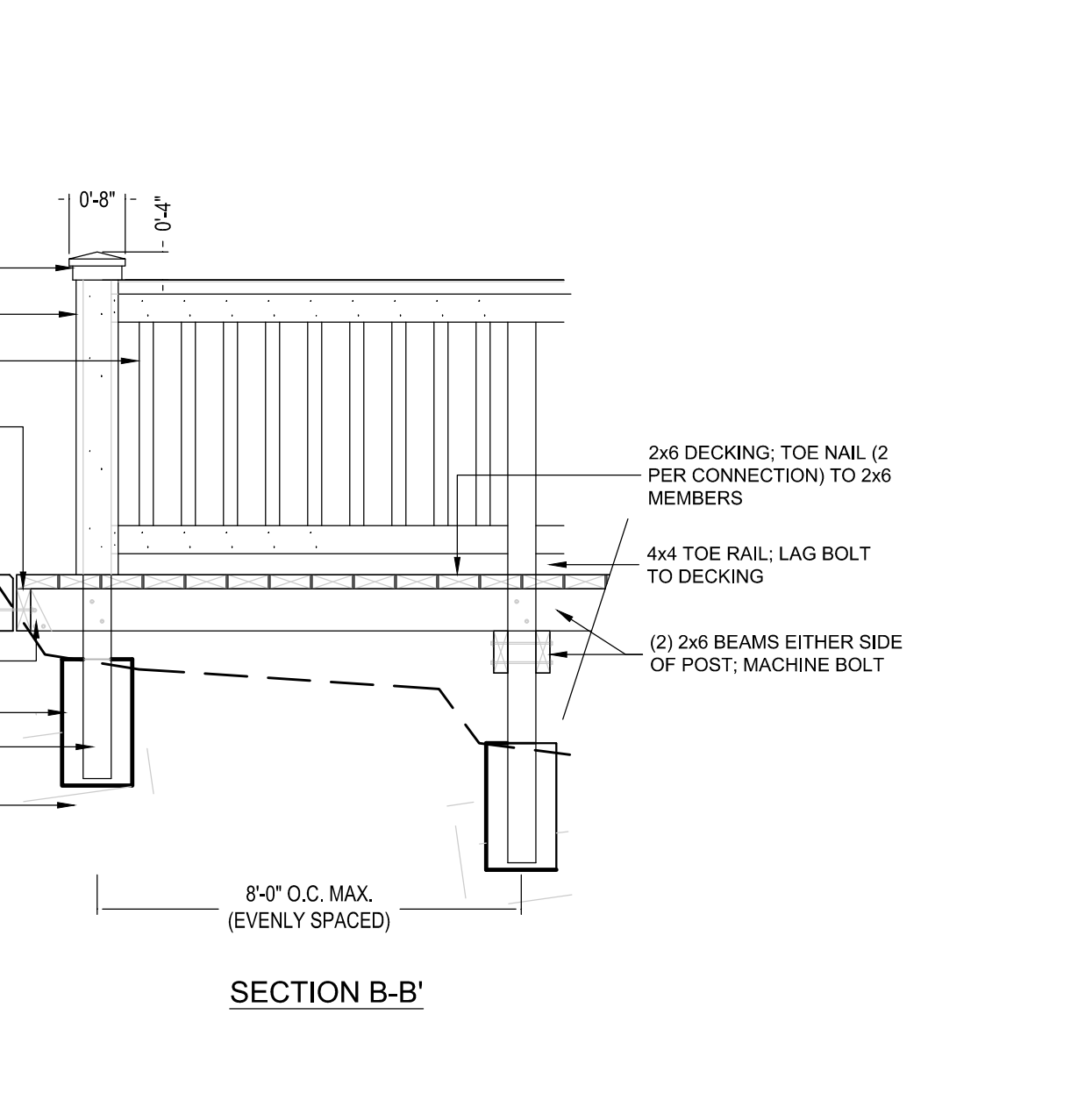
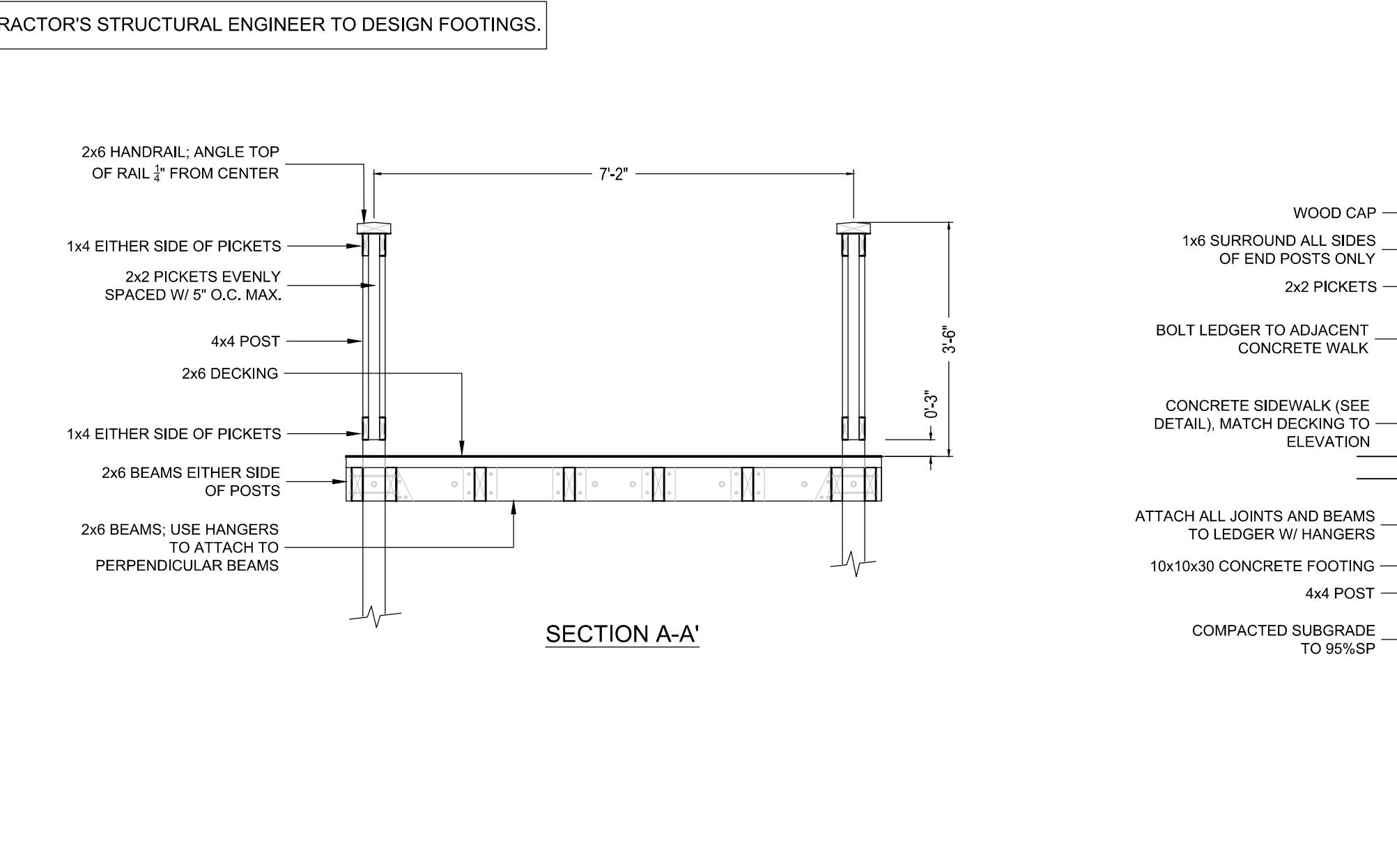
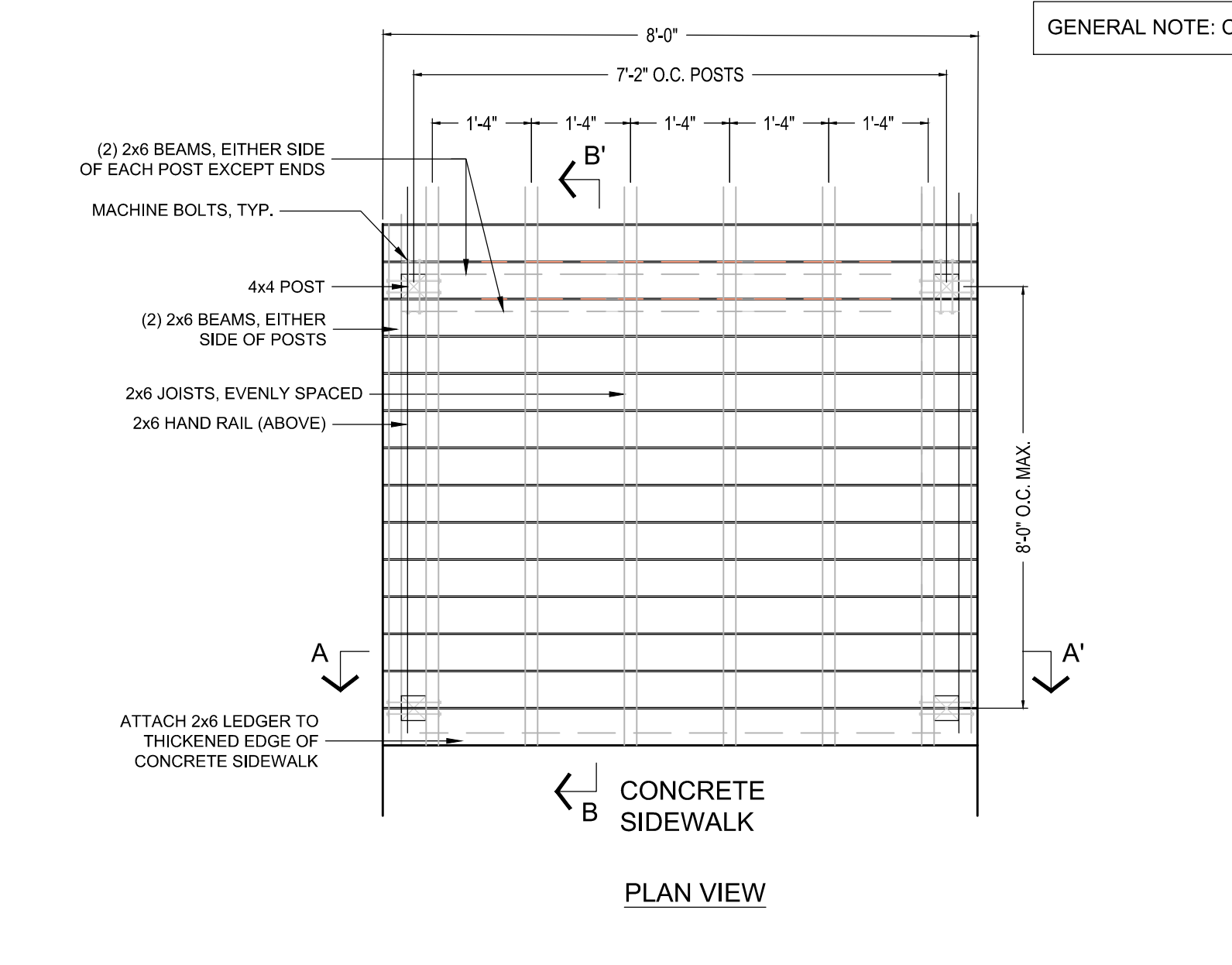
**1 DOG PARK ENTRY** NTS



**2 BIKE RACK** NTS



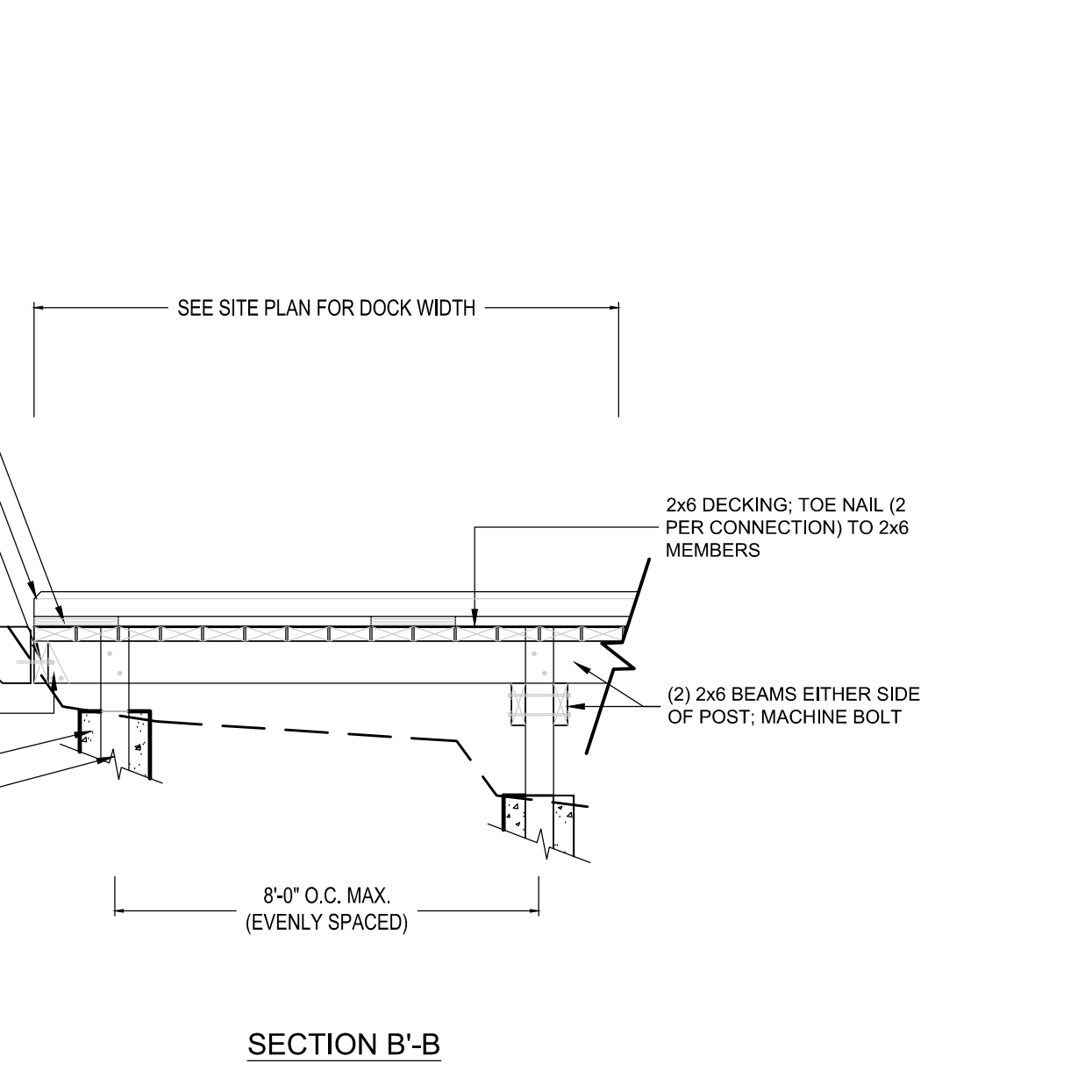
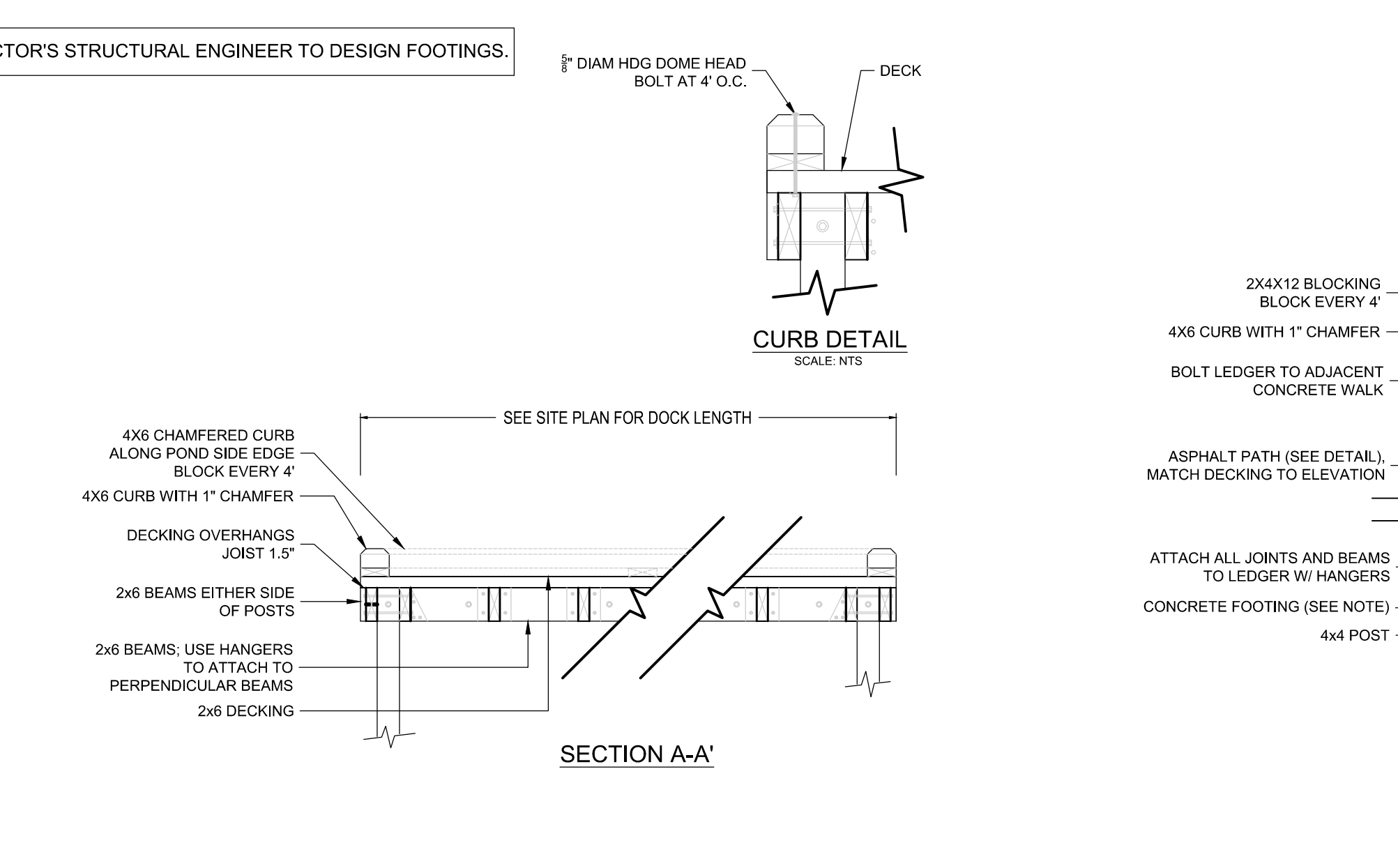
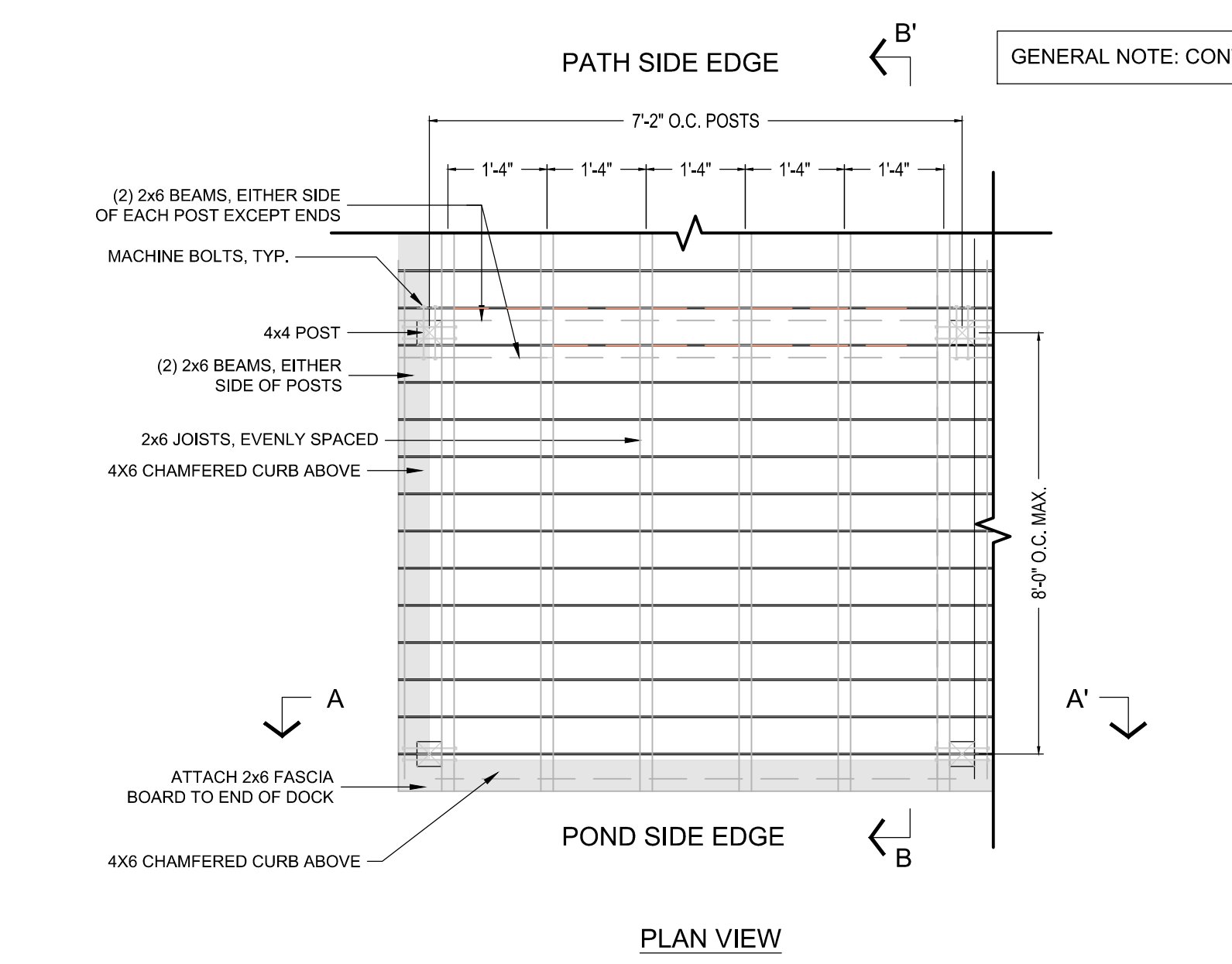
**3 METAL TRAIL MARKER** NTS



**4 BOARDWALK - PLAN**

**BOARDWALK - SECTION**

**BOARDWALK - ELEVATION**



**6 FISHING DOCK PLAN**

**FISHING DOCK - SECTION**

**FISHING DOCK ELEVATION - ELEVATION**

**PRODUCT: PET STATION DOG WASTE DISPOSAL**  
**MODEL NUMBER: DOG1003-L**  
**DESCRIPTION: STURDY ALUMINUM, 400-BAG CAPACITY DISPENSER SET INCLUDES**  
\* TWO 200-BAG ROLLS  
\* HINGED, LOCKING FRONT ACCESS PANEL  
\* CLEARLY POSTED INSTRUCTIONS  
10 GAL. STEEL TRASH RECEPTACLE WITH LID  
4'-8" TELESCOPING SQUARE POST WITH HARDWARE  
50 LDPE TRASH BAGS  
EYE-CATCHING 12" X 18" ALUMINUM PET WASTE SIGN TO ENCOURAGE RESPONSIBLE BEHAVIOR  
QUANTITY: 2 (LOCATION TO BE DETERMINED)  
WWW.BARCOPRODUCTS.COM  
PHONE #: 1-800-338-2697

**5 PET WASTE STATION** NTS

**SEAMON WHITESIDE**

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CHARLOTTE, NC 980.312.5450  
WWW.SEAMONWHITESIDE.COM

SEAMON, WHITESIDE & ASSOCIATES, INC.  
Landscape Architecture  
No. 32  
STATE OF SOUTH CAROLINA  
Landscape Architect  
2/10/2010

**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

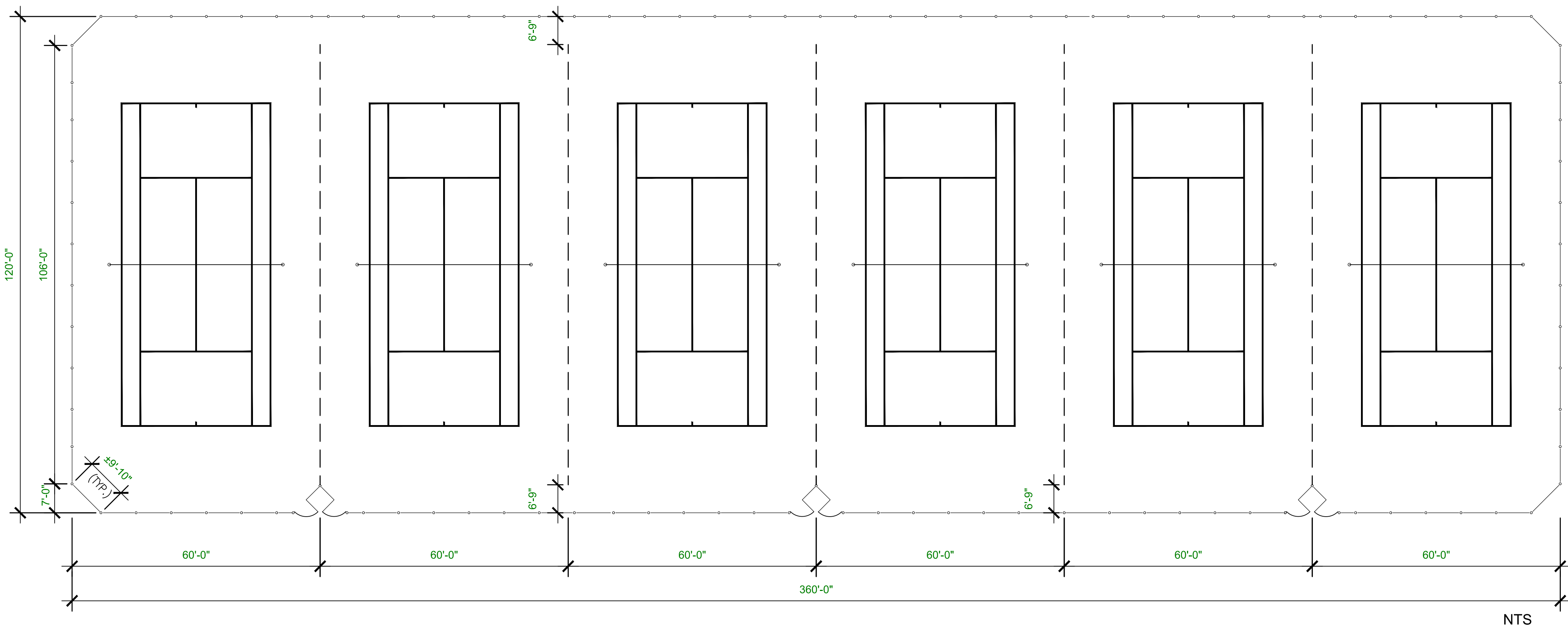
SW+ PROJECT: 7867  
DATE: 06/12/20  
DRAWN BY: BAE  
CHECKED BY: CPC

**REVISION HISTORY**

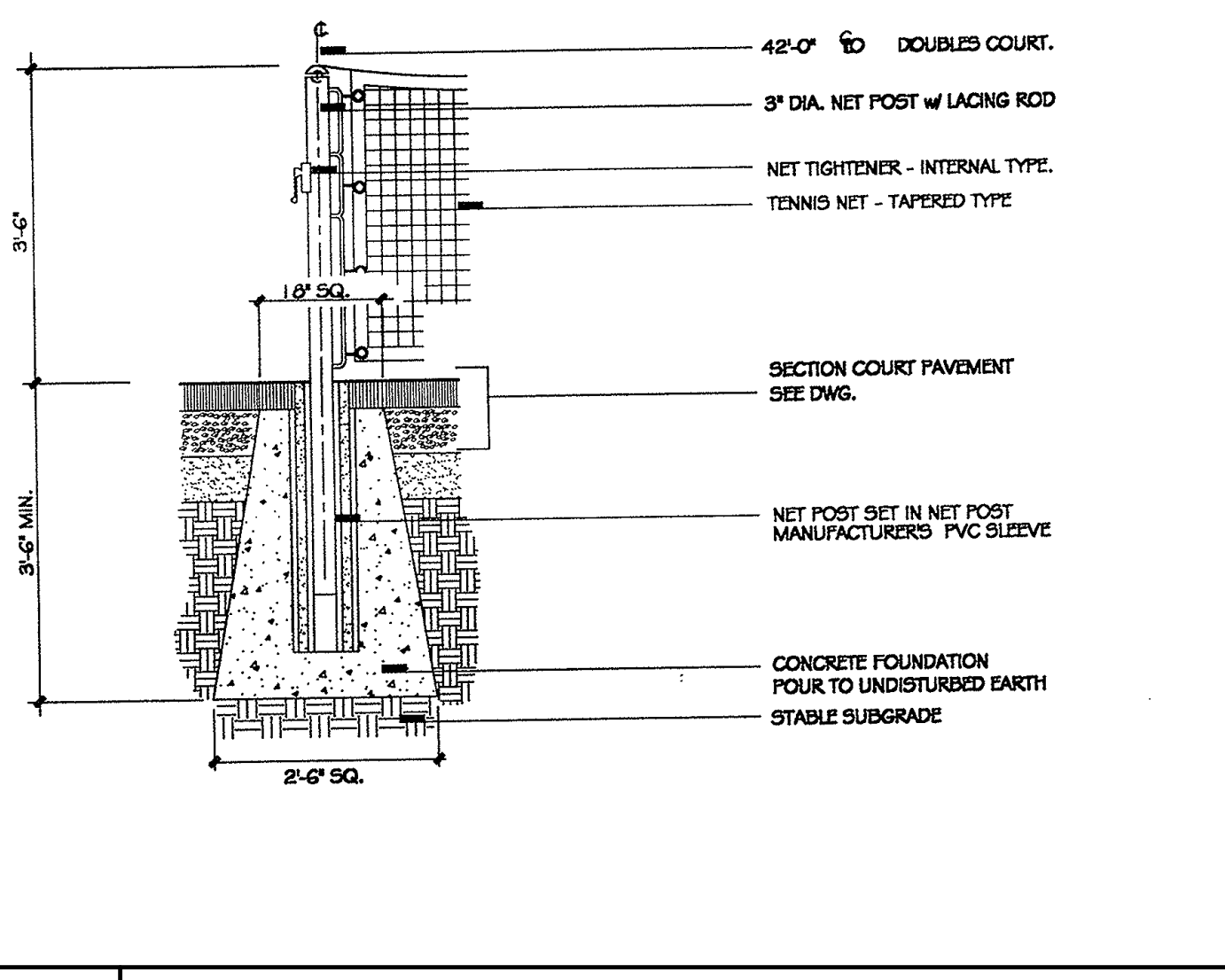
|   |          |
|---|----------|
| A | 6/12/20  |
| B | 11/20/20 |
| C | 01/22/21 |
| D | 03/11/21 |

**HARDSCALE DETAILS**





**1 TENNIS LAYOUT PLAN** NTS

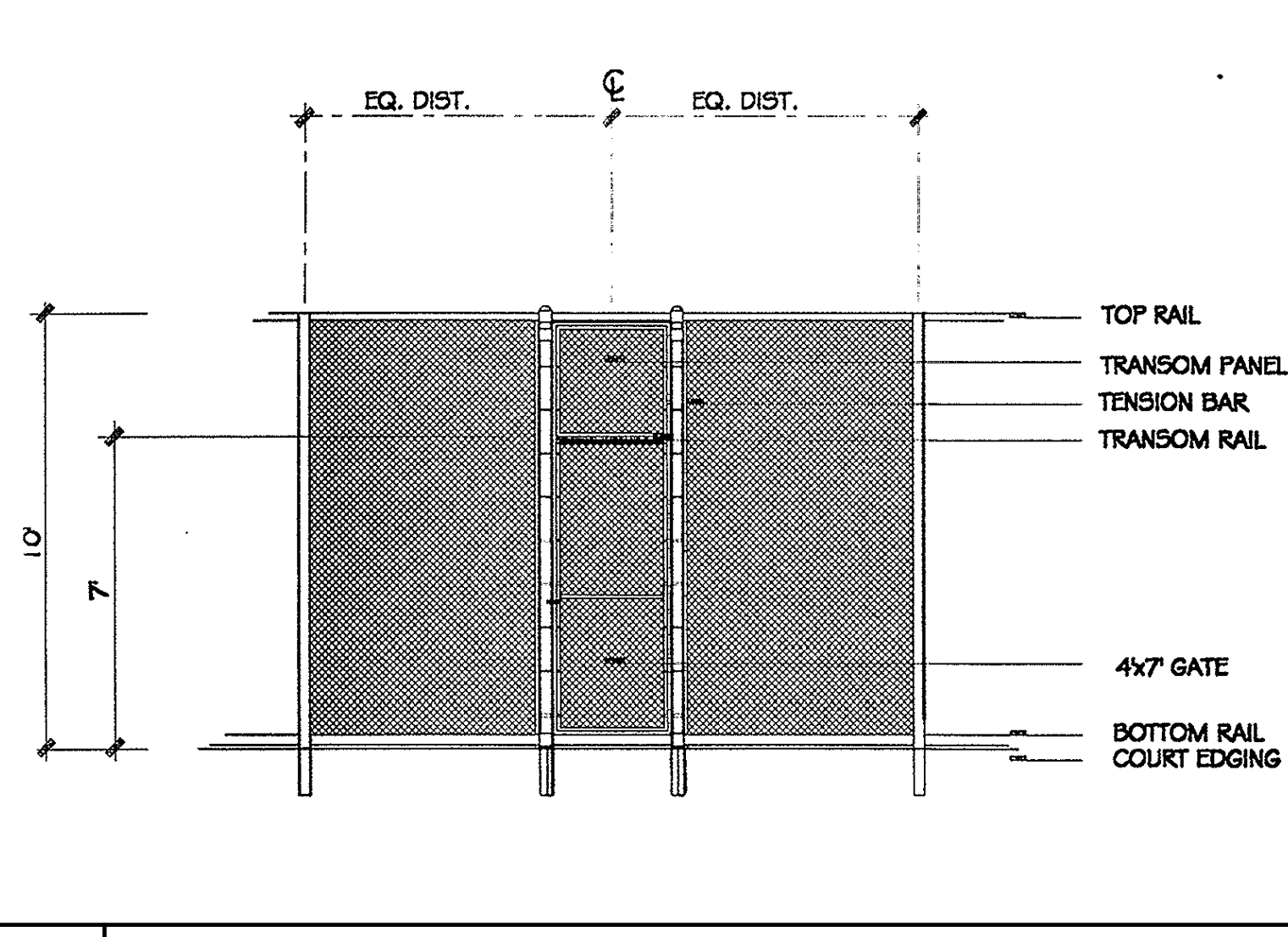


| MATERIAL SCHEDULE             | 10' HT. POST FOUNDATION MINIMUM DIAMETER        |
|-------------------------------|---|
| CORNER, GATE & TERMINAL POSTS | 3'Ø   |
| LINE POSTS                    | 2-1/2'Ø   |
| TOP AND BOTTOM RAILS          | 1-3/4'Ø   |
| GATE FRAMES                   | 2'Ø   |
| FENCE FABRIC                  | 1 3/8" SQUARE #9 GAUGE CORE BONDED VINYL COATED |

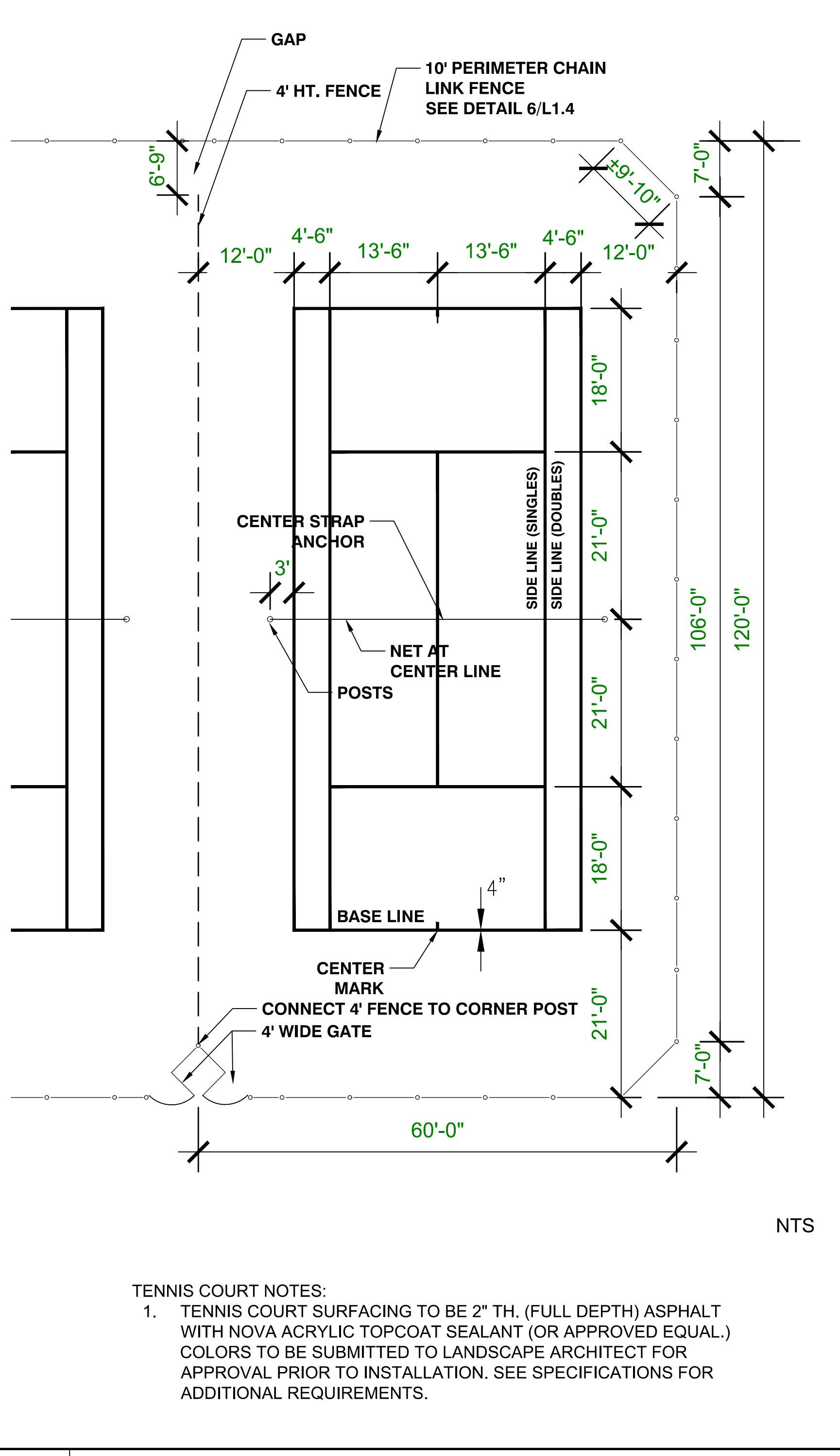
**NOTES:**

1. ALL FENCE FRAME MATERIALS SHALL BE SCH40 VINYL COATED.
2. FENCE COLOR SHALL BE BLACK.
3. FENCE FABRIC TO BE 1/2" ABOVE ASPHALT PAVEMENT
4. FENCE FABRIC TO BE UNIFORM 1/2 DIAMOND ABOVE CENTERLINE OF TOP RAIL (LOWER RAIL IN DOUBLE RAIL AREAS).
5. ALL CORNER, GATE AND TERMINAL POSTS TO BE CUT TO EXTEND UNIFORMLY 2" ABOVE THE TOP RAIL.
6. ALL TIE WIRE SHALL BE 9 GAUGE CORE x 8-1/2" VINYL CLAD ALUMINUM WIRE.
7. SPACING OF THE WIRES SHALL BE 15 INCHES ON THE RAILS, 12 INCHES ON THE POSTS. ENDS SHALL BE WOUND IN A TELEGRAPH TWIST 2-1/2 TURNS.
8. FENCE POST FOUNDATIONS TO BE 40" DEEP WITH 36" PIPE INSERTION.
9. PROVIDE ALL FENCE POSTS IN PVC SLEEVES TO ALLOW FOR FENCE REMOVAL.
10. INSTALL FENCE FABRIC ON COURT SIDE OF POSTS
11. PROVIDE WINDSCREENS TO BE 6" CLOSED MESH SCREEN VIPOL MATRIX 10 OZ. MATERIAL, TUFFY BRAND OR APPROVED ALTERNATE.

**2 TENNIS COURT NET POST FOUNDATION DETAIL** NTS



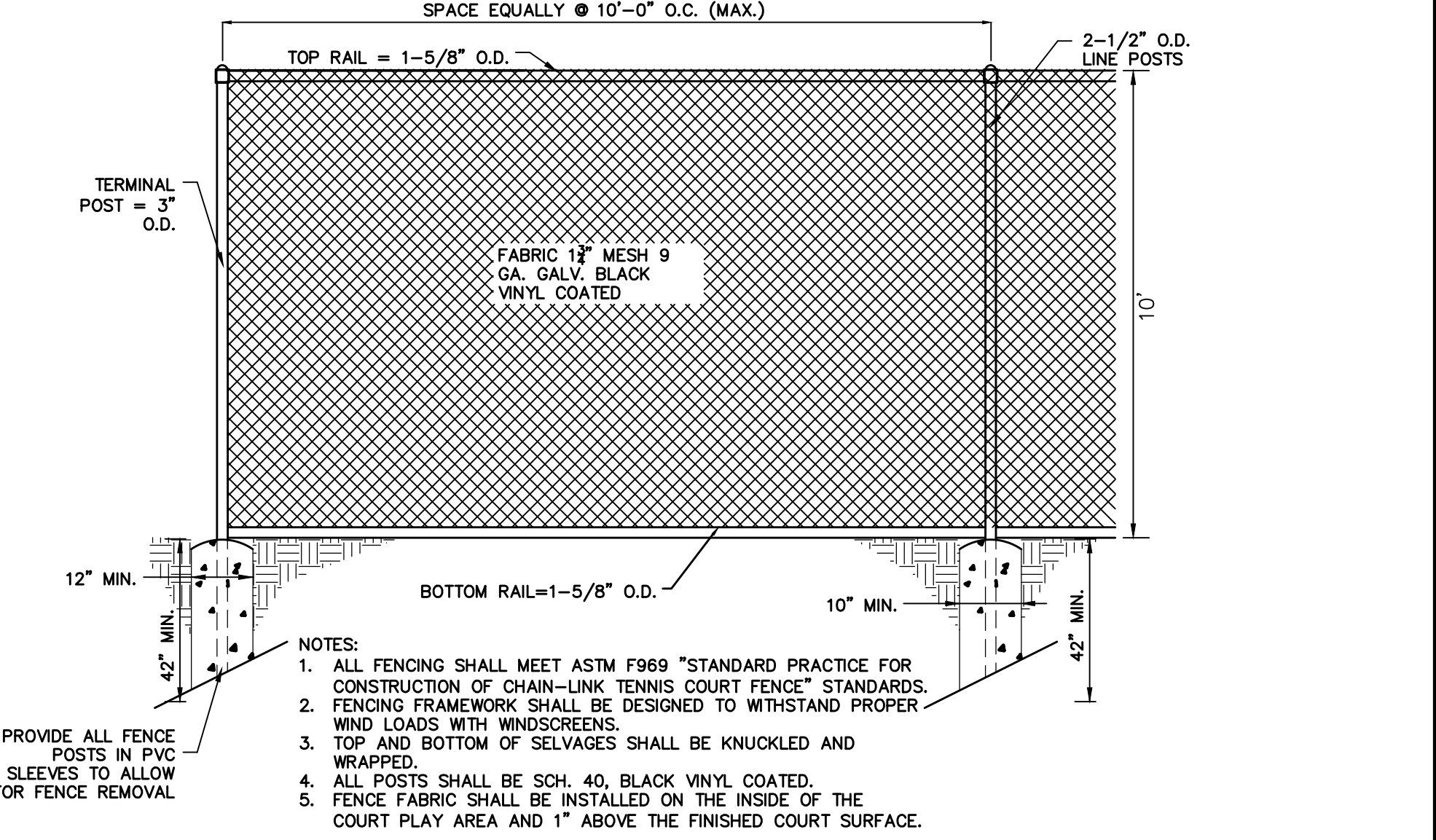
**4 TENNIS/BASKETBALL COURT PEDESTRIAN GATE** NTS



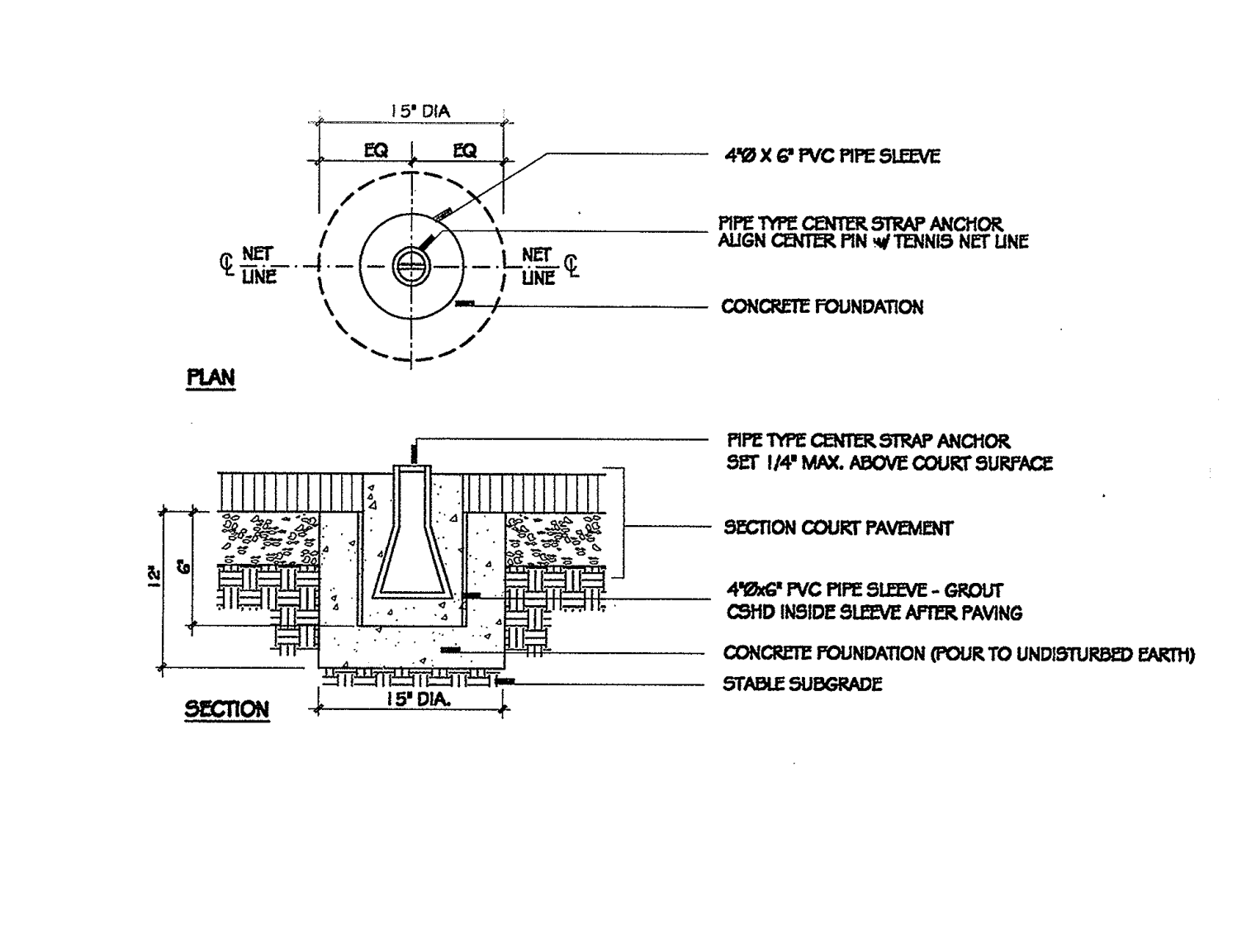
**5 TENNIS COURT LAYOUT PLAN** NTS

**TENNIS COURT NOTES:**

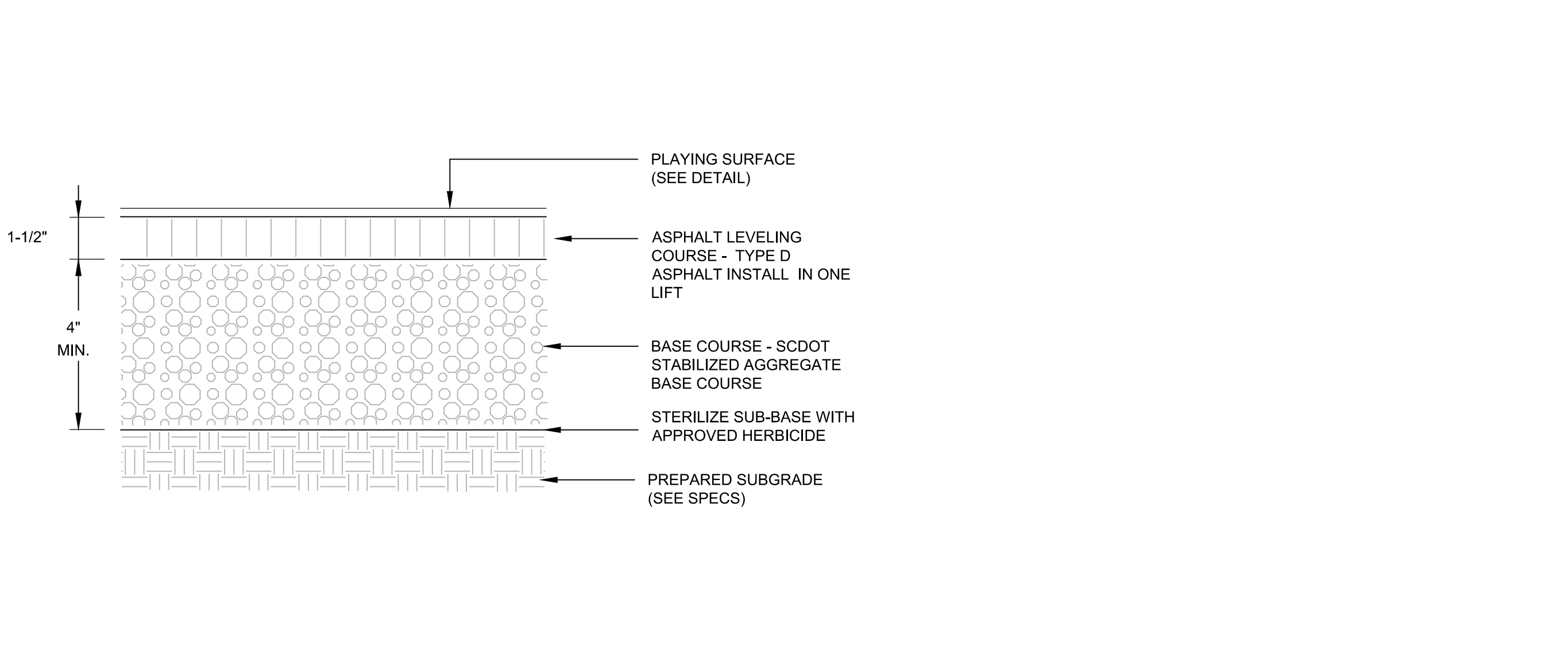
1. TENNIS COURT SURFACING TO BE 2" TH. (FULL DEPTH) ASPHALT WITH NOVA ACRYLIC TOPCOAT SEALANT (OR APPROVED EQUAL.) COLORS TO BE SUBMITTED TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



**6 TENNIS AND BASKETBALL COURT FENCE (10' HIGH)** NTS



**7 CENTER STRAP ANCHOR FOUNDATION DETAIL** NTS



**8 HARD TENNIS COURT PAVEMENT SECTION** NTS

**SW**  
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Professional Engineer Seal for Seamon Whiteside & Associates, Inc. (Landscape Architecture) No. 32.

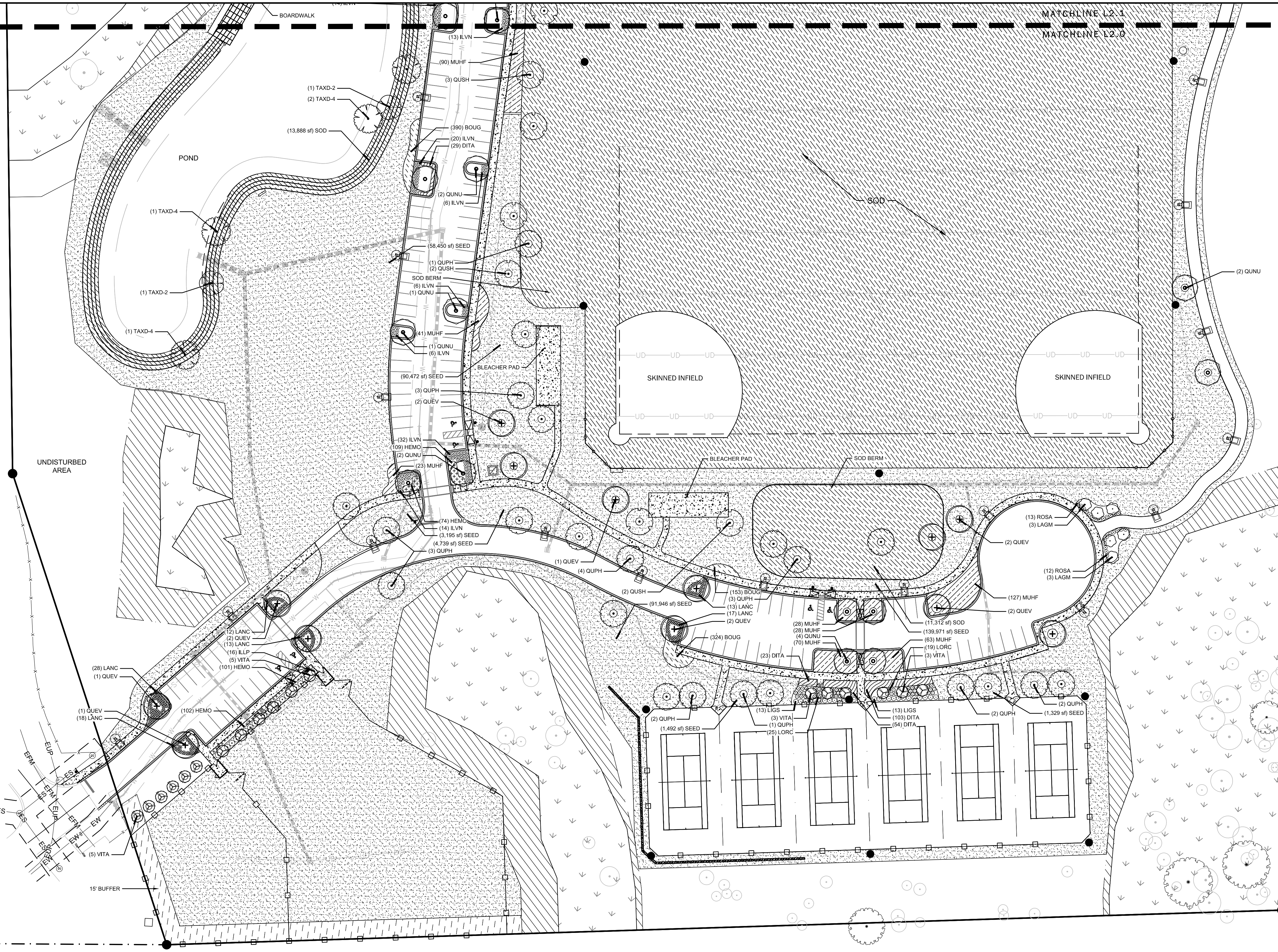
Professional Engineer Seal for Seamon Whiteside & Associates, Inc. (Landscape Architecture) No. 32.

**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

| SW+ PROJECT:     | 7867     |
|------------------|----------|
| DATE:            | 06/12/20 |
| DRAWN BY:        | BAE      |
| CHECKED BY:      | CPC      |
| REVISION HISTORY |          |
| A                | 6/12/20  |
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| D                | 03/11/21 |

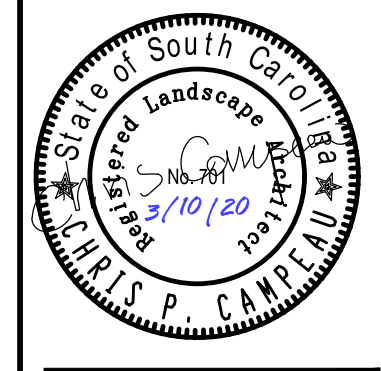
**HARDSCAPE DETAILS**

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| PLANT LEGEND            |        |   |
|-------------------------|--------|---|
| <b>TREES</b>            |        |   |
|                         | CODE   | BOTANICAL / COMMON NAME   |
|                         | QUEV   | Quercus virginiana / Southern Live Oak                            |
|                         | QUNU   | Quercus nuttallii / Nuttall Oak                                   |
|                         | QUPH   | Quercus phellos / Willow Oak                                      |
|                         | QUSH   | Quercus shumardii / Shumard Red Oak                               |
|                         | TAXD-2 | Taxodium distichum / Bald Cypress                                 |
|                         | TAXD-4 | Taxodium distichum / Bald Cypress                                 |
| <b>UNDERSTORY TREES</b> |        |   |
|                         | LAGM   | Lagerstroemia x 'Muskegee' / Muskogee Crape Myrtle                |
|                         | VITA   | Vitex agnus-castus / Chaste Tree                                  |
| <b>SHRUBS</b>           |        |   |
|                         | ILLP   | Illicium parviflorum / Anise Tree                                 |
|                         | ILVN   | Ilex vomitoria 'Nana' / Dwarf Yaupon                              |
|                         | LANC   | Lantana x 'Mori' / Confetti Spreading Lantana                     |
|                         | LIGS   | Ligustrum sinense 'Sunshine' / Sunshine Ligustrum                 |
|                         | LORC   | Loropetalum chinense 'PPI' TM / Purple Daydream Dwarf Loropetalum |
|                         | ROSA   | Rosa x 'Radtko' / Double Knockout Rose                            |
| <b>SHRUB AREAS</b>      |        |   |
|                         | CODE   | BOTANICAL / COMMON NAME   |
|                         | BOUG   | Bouteloua gracilis / Blue Grama Grass                             |
|                         | MUHF   | Muhlenbergia filipes / Muhly                                      |
| <b>GROUND COVERS</b>    |        |   |
|                         | CODE   | BOTANICAL / COMMON NAME   |
|                         | DITA   | Dianella tasmanica 'Variegata' / Variegated Flax Lily             |
|                         | HEMO   | Hemerocallis x 'Orange' / Orange Day Lily                         |
| <b>SOD/SEED</b>         |        |   |
|                         | CODE   | BOTANICAL / COMMON NAME   |
|                         | SEED   | Cynodon dactylon / Bermuda Grass                                  |
|                         | SOD    | Cynodon dactylon / Bermuda Grass                                  |

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**HANAHAN RECREATION  
 COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

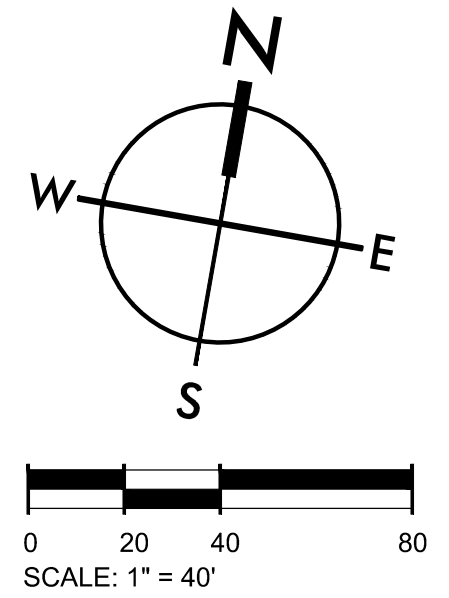
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LANDSCAPE PLAN

**GENERAL NOTES:**

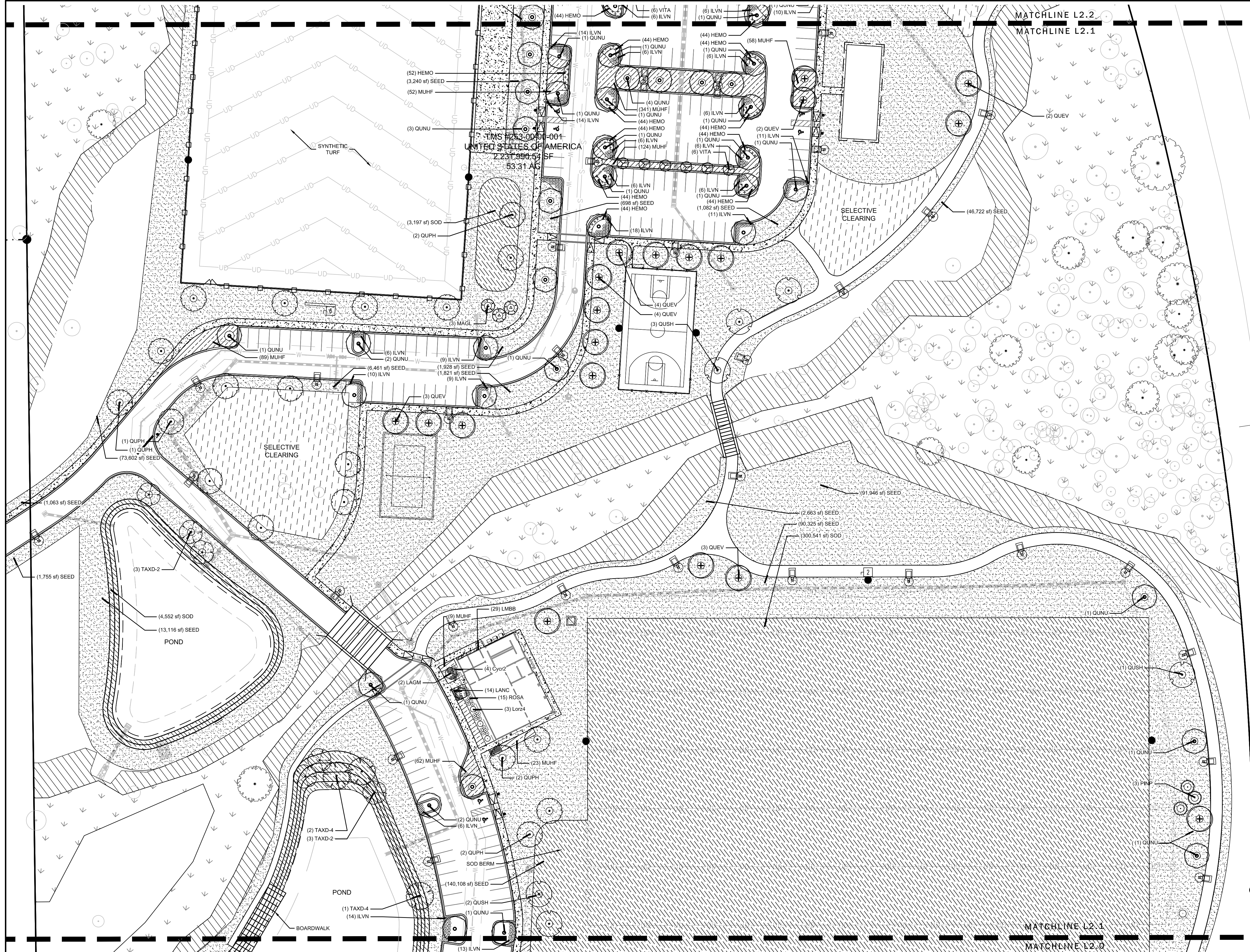
- SEE SWPPP PLANS [SHEETS C3.0-C3.11] FOR SILT FENCE LOCATIONS, TREE PROTECTION ZONES AND BARRICADES, AND ADDITIONAL NOTES AND DETAILS.
- FOR REQUIRED TREE MITIGATION AND DEVELOPMENT INCHES PER THE TOWN OF HANAHAN ZONING ORDINANCE, PLEASE REFER TO SHEET L2.4 FOR PLANT SCHEDULE QUANTITY AND SIZES.
- THE OVERALL PLANT QUANTITY FOR THE ENTIRE SITE CAN BE FOUND ON THE MASTER PLAN SCHEDULE, SHEET L-2.4
- CONTRACTOR TO CONTACT CIVIL ENGINEER OR LANDSCAPE ARCHITECT REGARDING ANY SITEMODIFICATIONS FROM THESE PLANS PRIOR TO CHANGES IN THE FIELD.  
CONTACT: 843-884-1667
- CWS REQUIRES 24 HOUR ACCESS TO THE ENTIRE WATER SYSTEM WITHIN THIS SITE FOR O&M DUTIES. OWNER TO PROVIDE MEANS OF ENTRY FOR ALL AREAS BEYOND LOCKED ENTRY POINTS.



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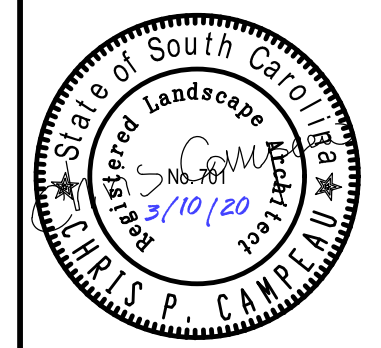
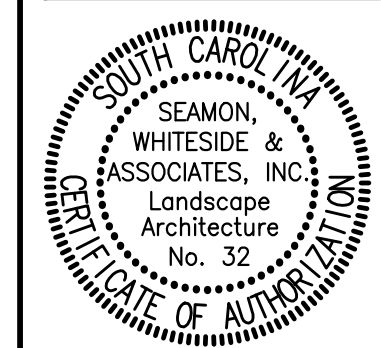


### PLANT LEGEND

| TREES            | CODE   | BOTANICAL / COMMON NAME  |
|------------------|--------|--|
|                  | PINP   | Pinus palustris / Longleaf Pine  |
|                  | QUEV   | Quercus virginiana / Southern Live Oak   |
|                  | QUNU   | Quercus nuttallii / Nuttall Oak  |
|                  | QUPH   | Quercus phellos / Willow Oak   |
|                  | QUSH   | Quercus shumardii / Shumard Red Oak  |
|                  | TAXD-2 | Taxodium distichum / Bald Cypress  |
|                  | TAXD-4 | Taxodium distichum / Bald Cypress  |
| UNDERSTORY TREES | CODE   | BOTANICAL / COMMON NAME  |
|                  | LAGM   | Lagerstroemia x Muskogee / Muskogee Crape Myrtle                                 |
|                  | MAGL   | Magnolia grandiflora 'Claudia Wannamaker' / Claudia Wannamaker Southern Magnolia |
|                  | VITA   | Vitex agnus-castus / Chaste Tree   |
| SHRUBS           | CODE   | BOTANICAL / COMMON NAME  |
|                  | ILVN   | Ilex vomitoria 'Nana' / Dwarf Yaupon   |
|                  | LANC   | Lantana x 'Moni' / Confeiti Spreading Lantana                                    |
|                  | Lorz4  | Loropetalum chinense rubrum 'Zhuzhou' / Zhuzhou Fuchsia Loropetalum              |
|                  | ROSA   | Rosa x 'Radiko' / Double Knockout Rose   |
| CYCADS/PALMS     | CODE   | BOTANICAL / COMMON NAME  |
|                  | Cycr2  | Cycas revoluta / Sago Palm   |
| SHRUB AREAS      | CODE   | BOTANICAL / COMMON NAME  |
|                  | MUHF   | Muhlenbergia filipes / Muhly   |
| GROUND COVERS    | CODE   | BOTANICAL / COMMON NAME  |
|                  | HEMO   | Heemerocallis x 'Orange' / Orange Day Lily                                       |
|                  | LMBB   | Liriope muscari 'Big Blue' / Big Blue Lilyturf                                   |
| SOD/SEED         | CODE   | BOTANICAL / COMMON NAME  |
|                  | SEED   | Cynodon dactylon / Bermuda Grass   |
|                  | SOD    | Cynodon dactylon / Bermuda Grass   |

**SW**  
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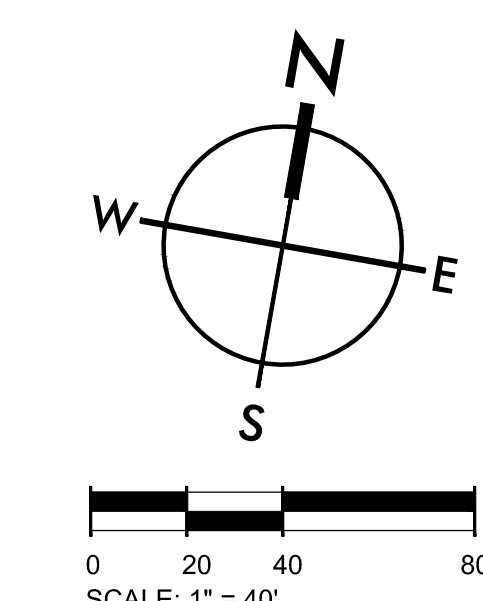
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HANAHAN, SOUTH CAROLINA

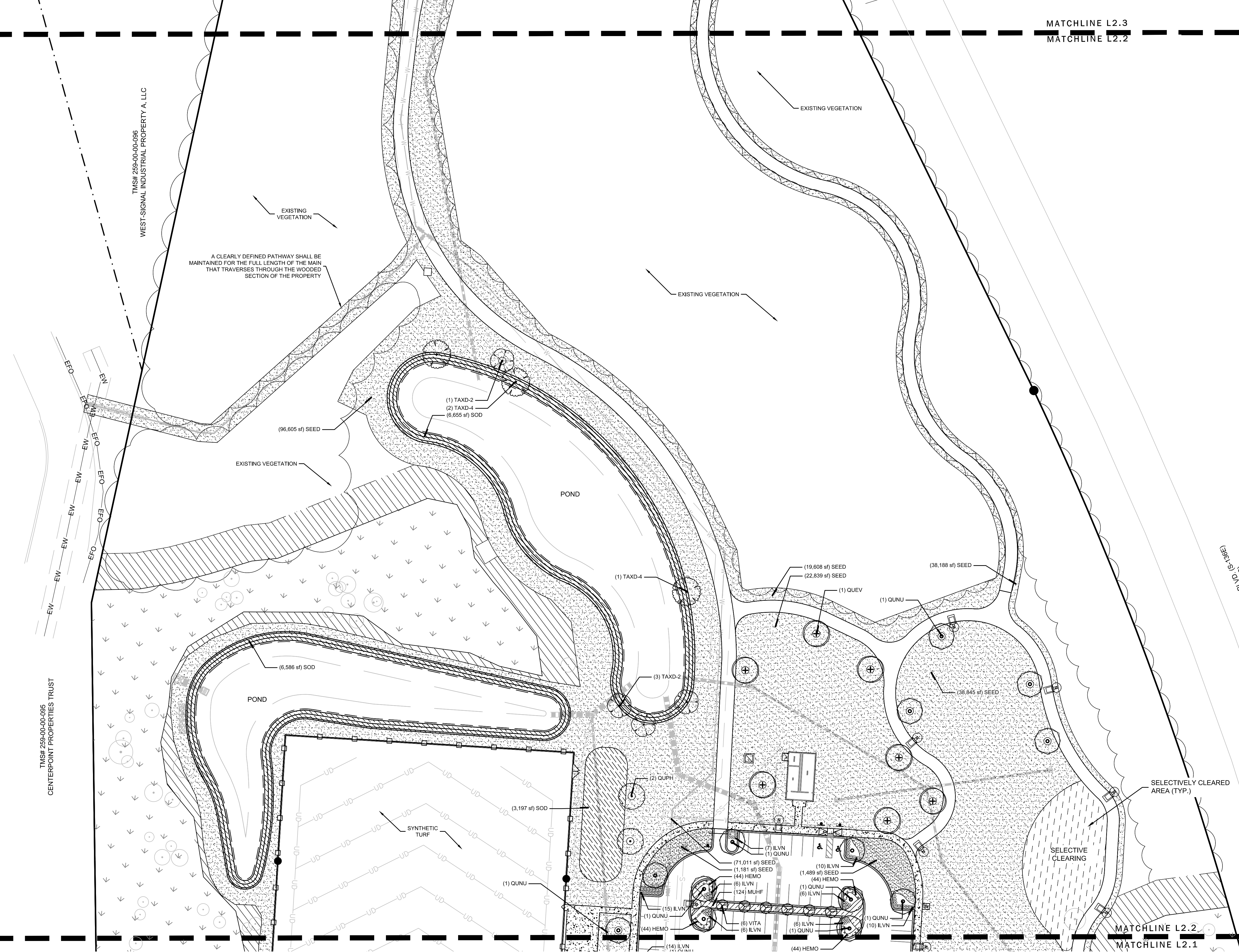
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LANDSCAPE PLAN

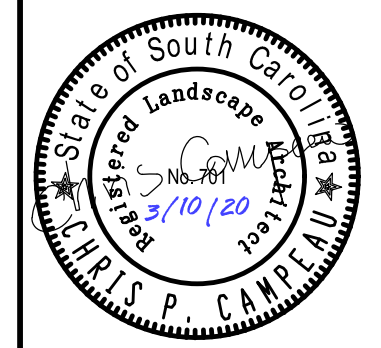
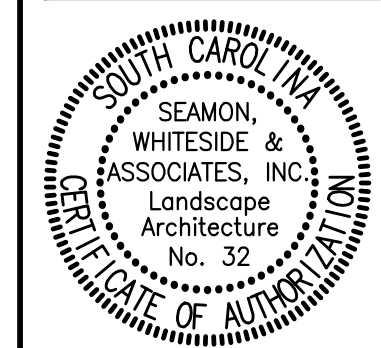
- #### GENERAL NOTES:
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CONTACT: 843-884-1667
  - CWS REQUIRES 24 HOUR ACCESS TO THE ENTIRE WATER SYSTEM WITHIN THIS SITE FOR O&M DUTIES. OWNER TO PROVIDE MEANS OF ENTRY FOR ALL AREAS BEYOND LOCKED ENTRY POINTS.





### PLANT LEGEND

| TREES            | CODE   | BOTANICAL / COMMON NAME                 |
|------------------|--------|---|
|                  | QJUEV  | Quercus virginiana / Southern Live Oak  |
|                  | QUNU   | Quercus nuttallii / Nuttall Oak         |
|                  | QUPH   | Quercus phellos / Willow Oak            |
|                  | TAXD-2 | Taxodium distichum / Bald Cypress       |
|                  | TAXD-4 | Taxodium distichum / Bald Cypress       |
| UNDERSTORY TREES | CODE   | BOTANICAL / COMMON NAME                 |
|                  | VITA   | Vitex agnus-castus / Chaste Tree        |
| SHRUBS           | CODE   | BOTANICAL / COMMON NAME                 |
|                  | ILVN   | Ilex vomitoria 'Nana' / Dwarf Yaupon    |
| SHRUB AREAS      | CODE   | BOTANICAL / COMMON NAME                 |
|                  | MUHF   | Muhlenbergia filipes / Muhly            |
| GROUND COVERS    | CODE   | BOTANICAL / COMMON NAME                 |
|                  | HEMO   | Hemerocallis 'Orange' / Orange Day Lily |
| SOD/SEED         | CODE   | BOTANICAL / COMMON NAME                 |
|                  | SEED   | Cynodon dactylon / Bermuda Grass        |
|                  | SOD    | Cynodon dactylon / Bermuda Grass        |



**HANAHAN RECREATION  
COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

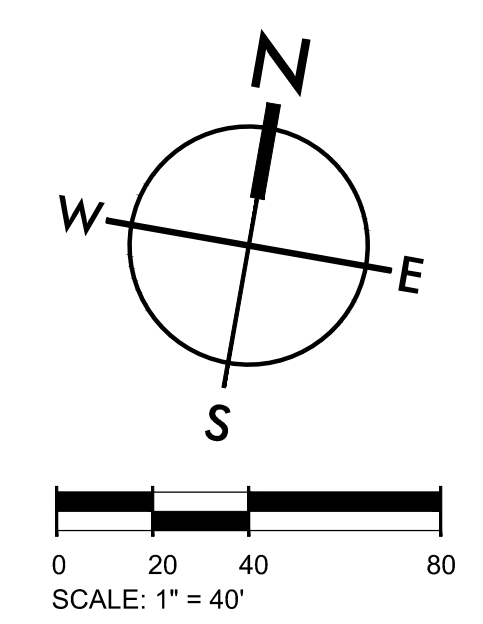
SW+ PROJECT: 7867  
 DATE: 06/12/20  
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**REVISION HISTORY**

|   |          |
|---|----------|
| A | 6/12/20  |
| B | 11/20/20 |
| C | 01/22/21 |
| D | 03/11/21 |

LANDSCAPE  
PLAN

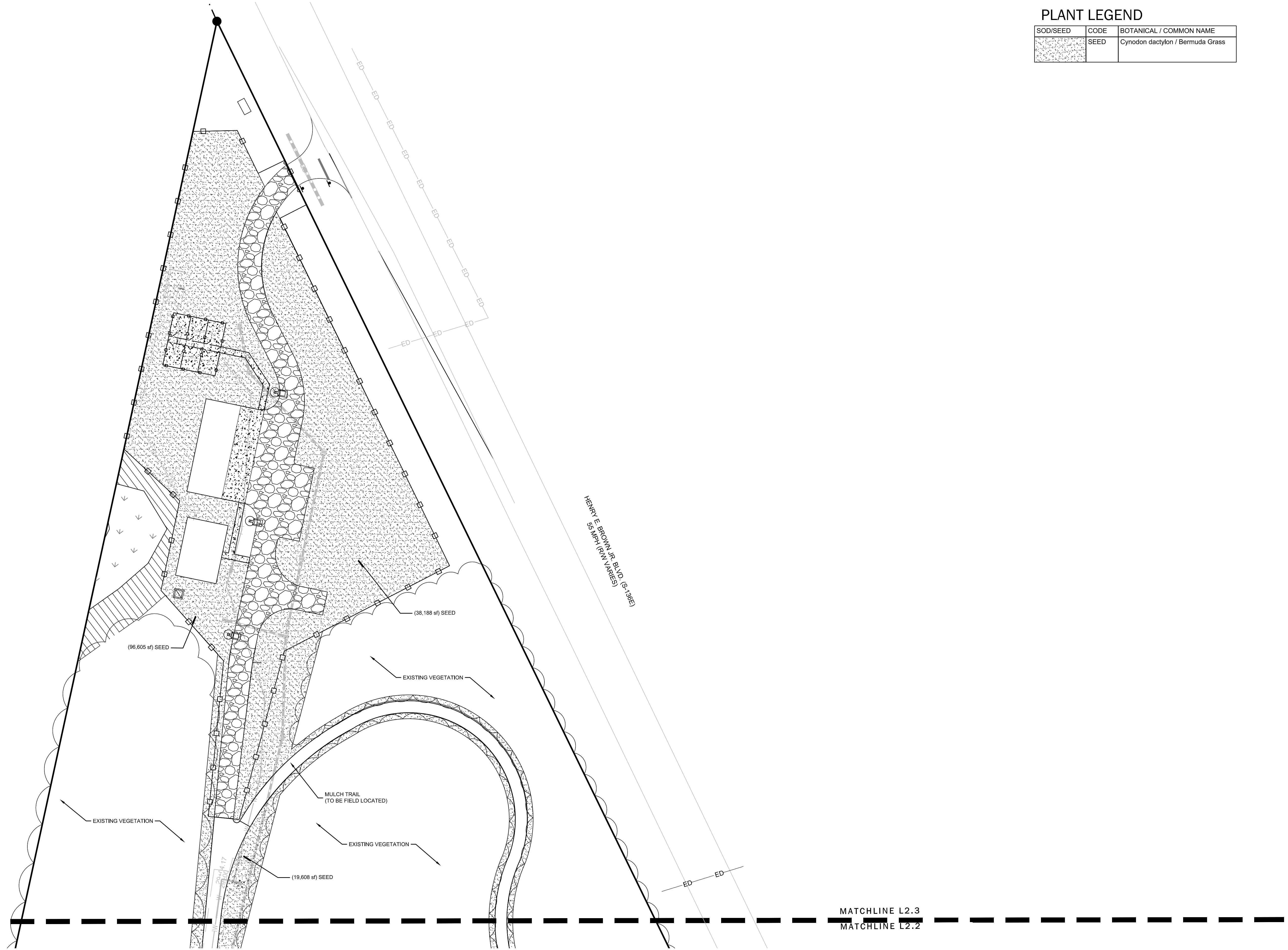
- GENERAL NOTES:**
- SEE SWPPP PLANS [SHEETS C3.0-C3.11] FOR SILT FENCE LOCATIONS, TREE PROTECTION ZONES AND BARRICADES, AND ADDITIONAL NOTES AND DETAILS.
  - FOR REQUIRED TREE MITIGATION AND DEVELOPMENT INCHES PER THE TOWN OF HANAHAN ZONING ORDINANCE, PLEASE REFER TO SHEET L2.4 FOR PLANT SCHEDULE QUANTITY AND SIZES.
  - THE OVERALL PLANT QUANTITY FOR THE ENTIRE SITE CAN BE FOUND ON THE MASTER PLAN SCHEDULE, SHEET L-2.4
  - CONTRACTOR TO CONTACT CIVIL ENGINEER OR LANDSCAPE ARCHITECT REGARDING ANY SITEWORK MODIFICATIONS FROM THESE PLANS PRIOR TO CHANGES IN THE FIELD.  
CONTACT: 843-884-1667
  - CWS REQUIRES 24 HOUR ACCESS TO THE ENTIRE WATER SYSTEM WITHIN THIS SITE FOR O&M DUTIES. OWNER TO PROVIDE MEANS OF ENTRY FOR ALL AREAS BEYOND LOCKED ENTRY POINTS.



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 INVESTMENT CORP.

TMS# 259-00-00-096  
 WEST-SIGNAL INDUSTRIAL PROPERTY A, LLC



| SOD/SEED | CODE | BOTANICAL / COMMON NAME          |
|----------|------|----------------------------------|
|          | SEED | Cynodon dactylon / Bermuda Grass |

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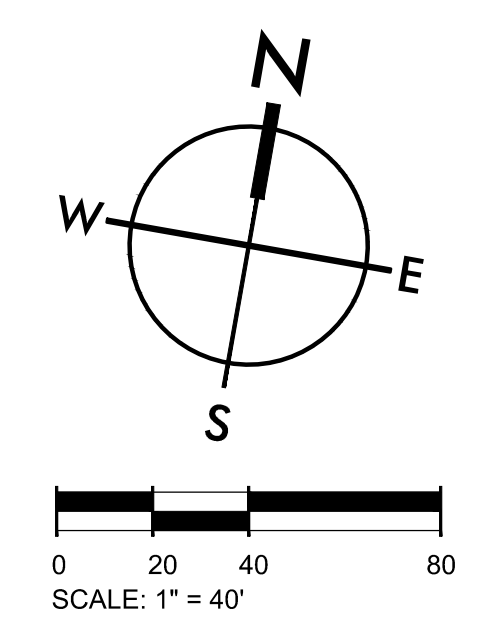
**HANAHAN RECREATION  
 COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

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LANDSCAPE PLAN

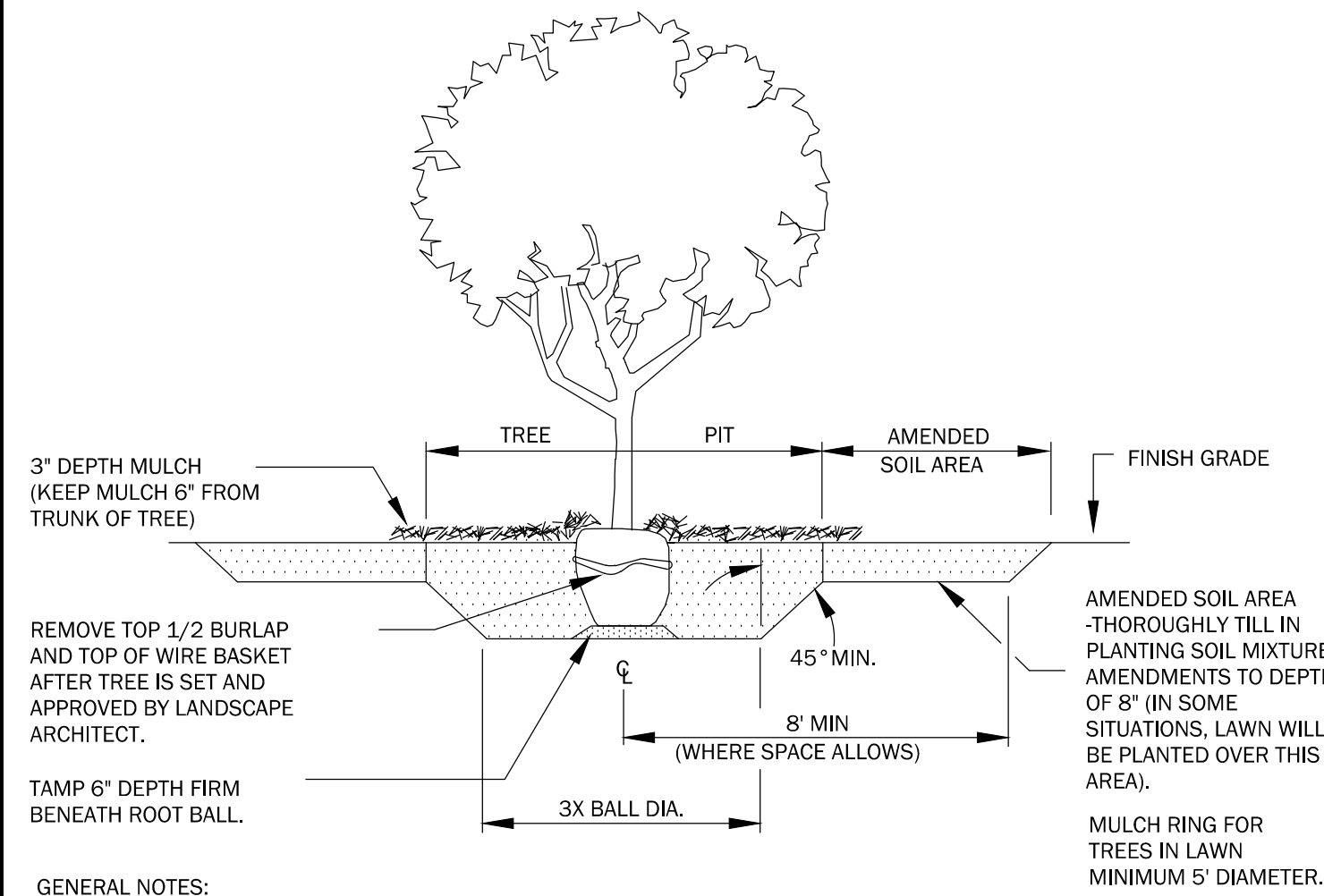
- GENERAL NOTES:**
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 Call before you dig.

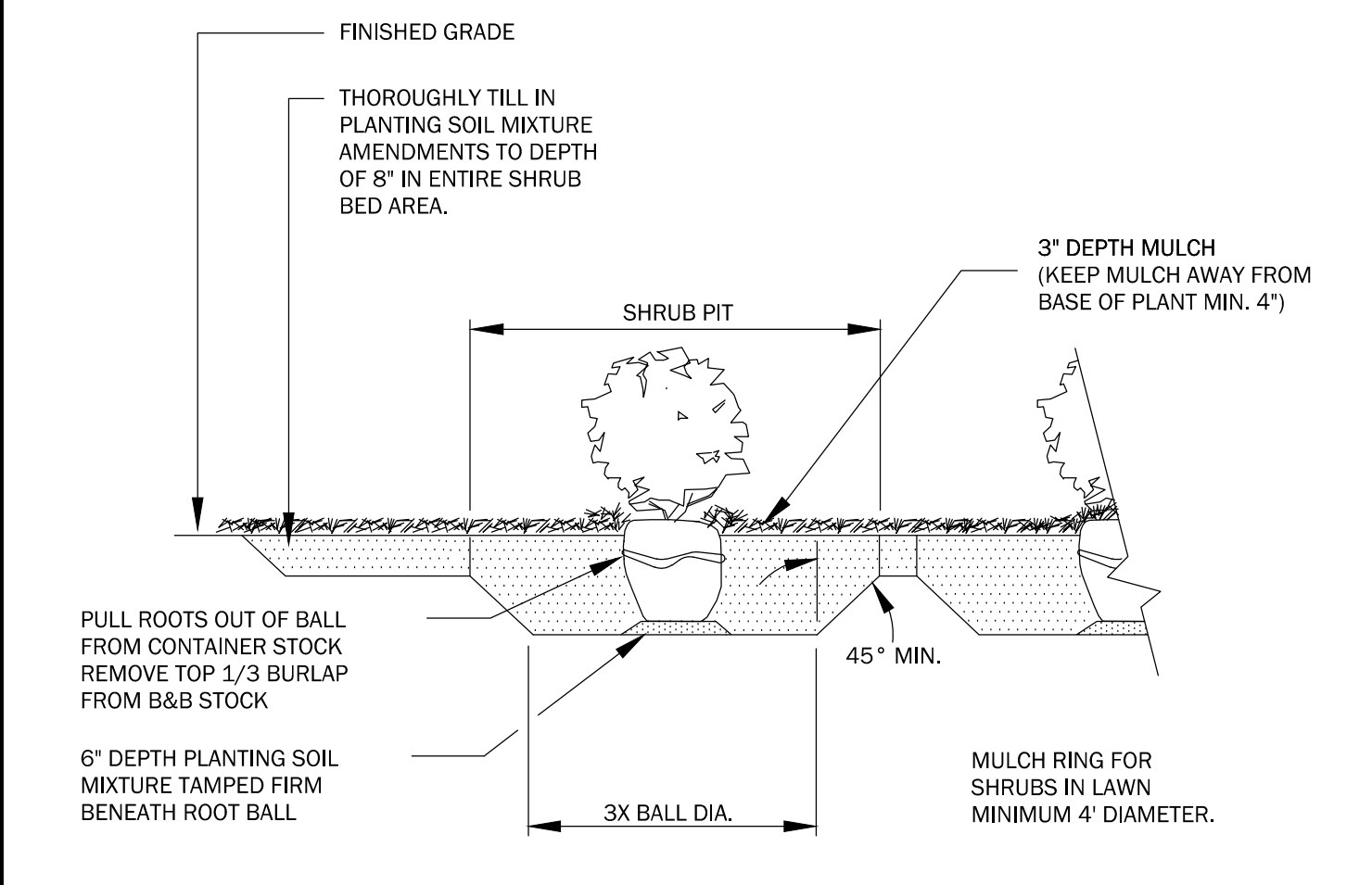
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NOTE: CONTACT LANDSCAPE ARCHITECT (LA) IF TREE STAKING IS NECESSARY & LA WILL PROVIDE DETAIL.



- GENERAL NOTES:**
- PLANT SO THAT TOP OF ROOT BALL IS 2" ABOVE FINISH GRADE.
  - SCARIFY SIDES AND BOTTOM OF PIT.
  - BACKFILL TREE PIT AND WATER UNTIL NO MORE WATER IS ABSORBED.
  - HAND TAMP OR PROBE WITH SHOVEL HANDLES TO REMOVE VOIDS.
  - DO NOT WRAP TREE TRUNKS.

### 1 | TYPICAL TREE PLANTING

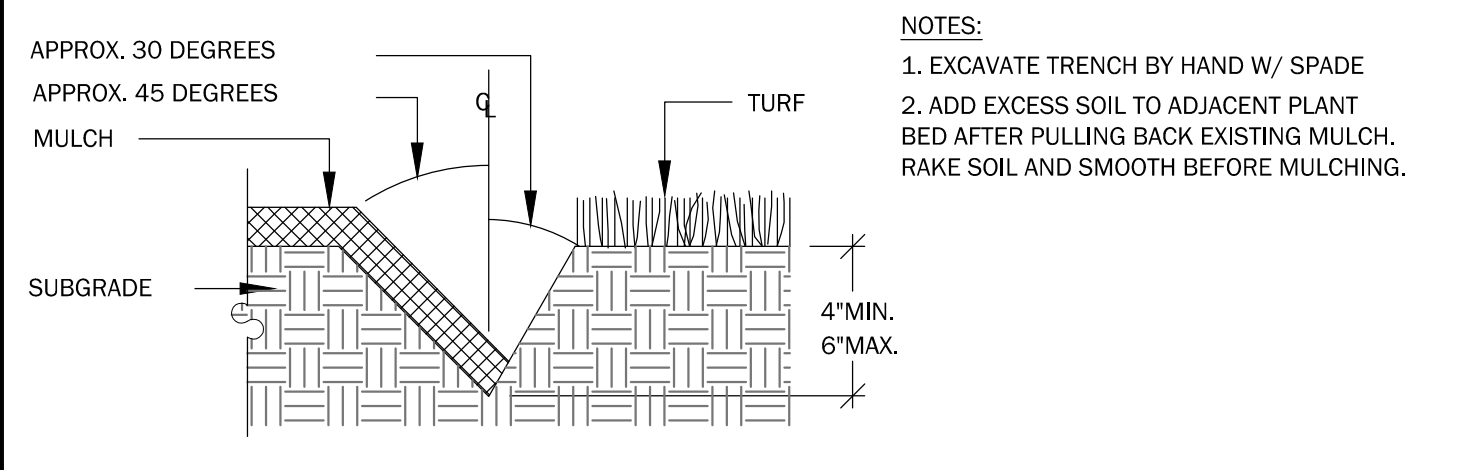


- GENERAL NOTES:**
- PLANT SO THAT TOP OF ROOT BALL IS 1" ABOVE FINISH GRADE.
  - SCARIFY SIDES AND BOTTOM OF PIT.
  - BACKFILL SHRUB PIT WITH SPECIFIED PLANTING SOIL MIXTURE IN 6" LAYERS, HAND-TAMPED, TO REMOVE VOIDS.
  - WHEN 2/3 BACKFILLED, FILL WITH WATER.
  - AFTER PLACING AND HAND-TAMPING FINAL LAYERS, WATER AGAIN UNTIL NO MORE WATER IS ABSORBED.

### 3 | TYPICAL SHRUB PLANTING

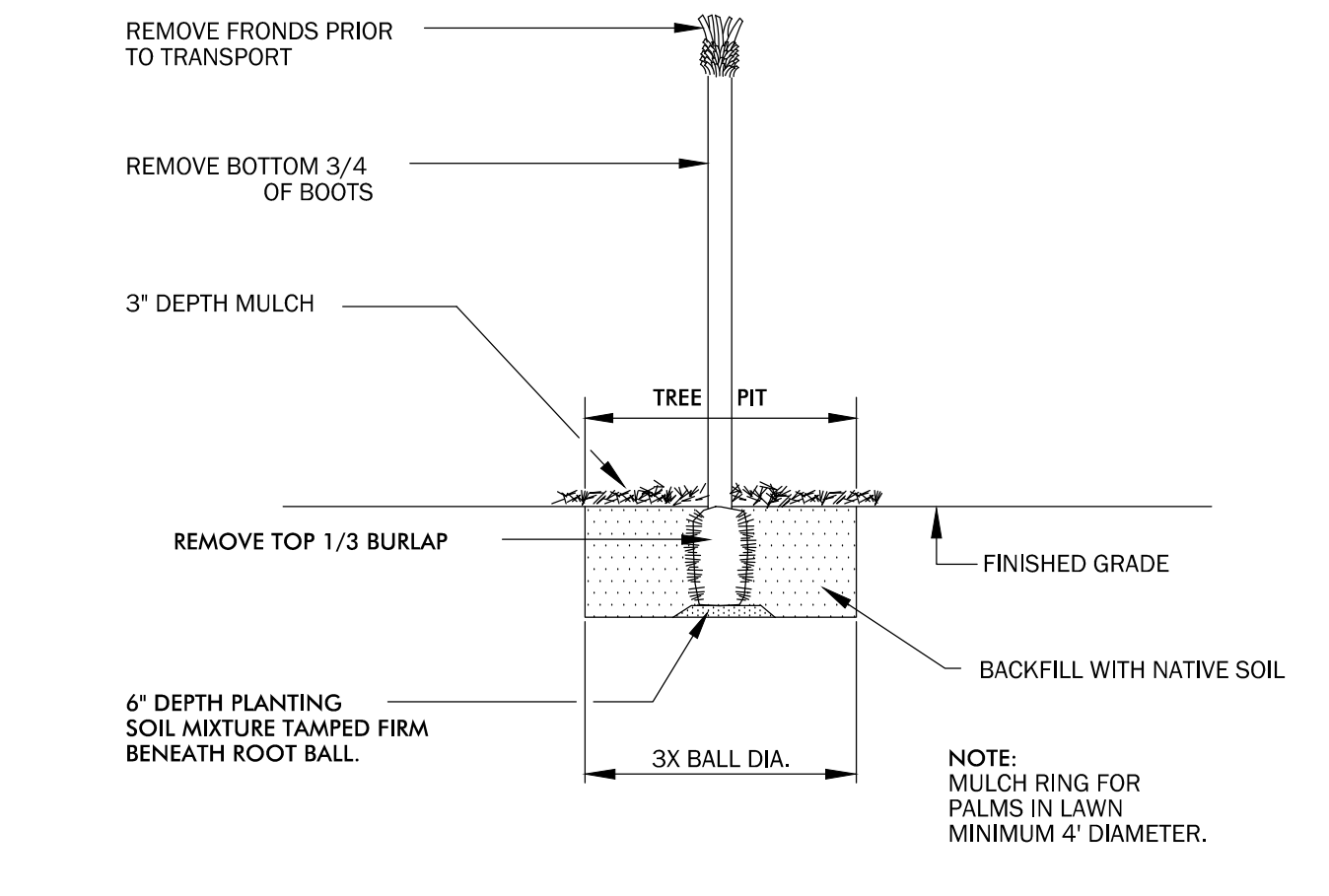
- GENERAL NOTES:**
- FOR EACH UNAMENDED SOIL TYPE, FURNISH SOIL ANALYSIS AND A WRITTEN REPORT BY A QUALIFIED SOIL-TESTING LABORATORY STATING PERCENTAGES OF ORGANIC MATTER; GRADATION OF SAND, SILT, AND CLAY CONTENT; CATION EXCHANGE CAPACITY; SODIUM ABSORPTION RATIO; DELETERIOUS MATERIAL; BUFFER PH LEVELS; AND MINERAL AND PLANT-NUTRIENT CONTENT OF THE SOIL.
  - A MINIMUM OF THREE REPRESENTATIVE SAMPLES SHALL BE TAKEN FROM VARIED LOCATIONS FOR EACH SOIL TO BE USED OR AMENDED FOR PLANTING PURPOSES.
  - SUBMIT TO LANDSCAPE ARCHITECT THE LAB RECOMMENDATIONS FOR SOIL TREATMENTS AND SOIL AMENDMENTS TO BE INCORPORATED. INDICATE LAB RECOMMENDATIONS IN WEIGHT PER 1000 SQ. FT. OR VOLUME PER CU. YD. FOR NITROGEN, PHOSPHORUS, AND POTASH NUTRIENTS AND ORGANIC AND INORGANIC SOIL AMENDMENTS TO BE ADDED TO PRODUCE PLANTING SOIL SUITABLE FOR HEALTHY, VIABLE PLANTS.
  - ALL SOILS USED FOR PLANTING SHALL BE PREPARED AS NECESSARY USING ORGANIC AND INORGANIC SOIL AMENDMENTS AND FERTILIZERS IN THE QUANTITIES RECOMMENDED IN THE SOIL ANALYSIS REPORT TO PRODUCE SATISFACTORY PLANTING SOIL FOR HEALTHY, VIABLE PLANTS. PLANTING SOILS SHALL HAVE A PH LEVEL BETWEEN 6.0 AND 7.0.
  - IN ALL PLANTING AREAS, SPREAD PLANTING SOIL TO A DEPTH OF 8 INCHES BUT NOT LESS THAN REQUIRED TO MEET FINISH GRADES AFTER NATURAL SETTLEMENT.

### SOIL NOTES



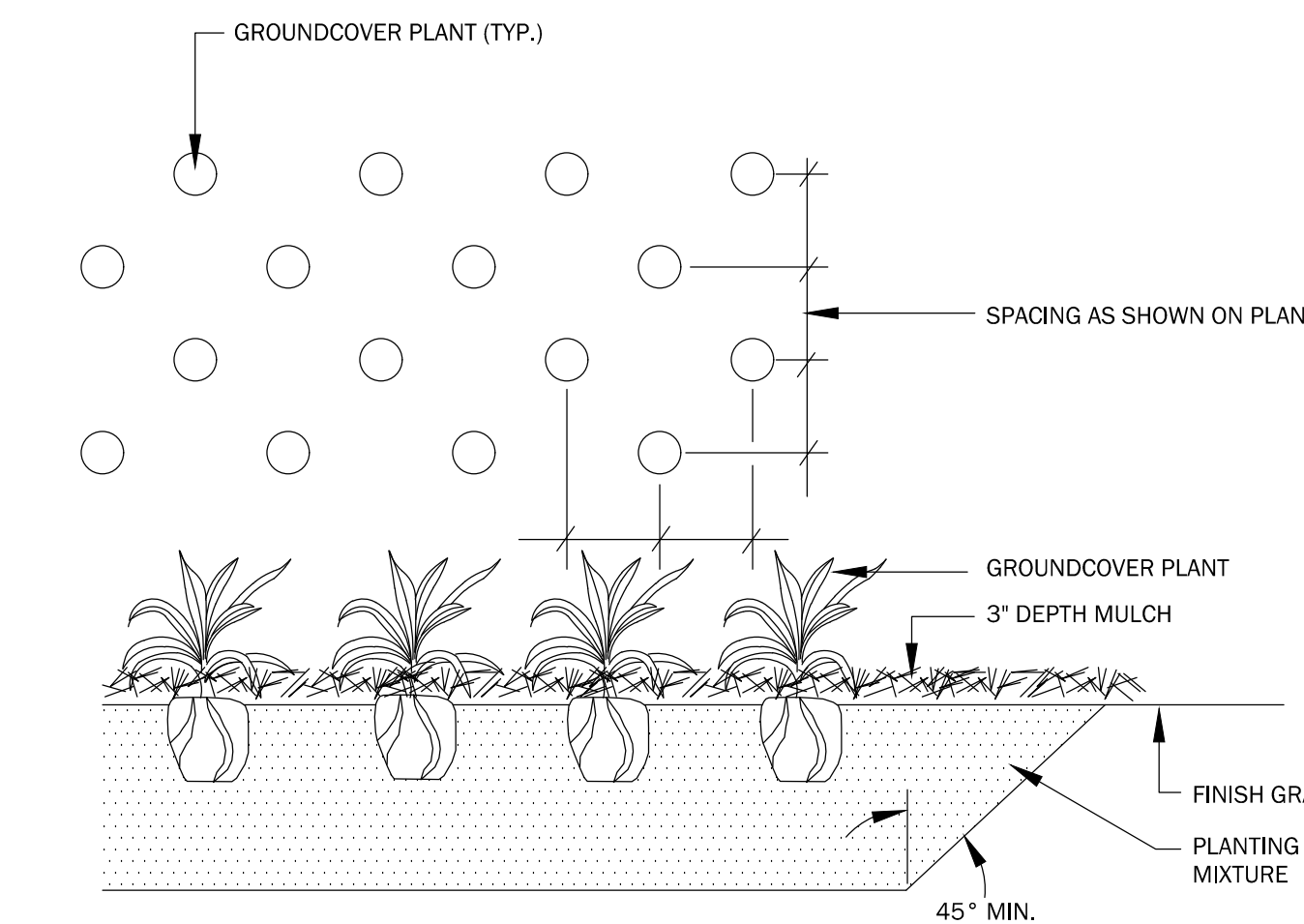
### 5 | LAWN EDGE DETAIL

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- GENERAL NOTES:**
- PALM SHOULD BE PLANTED AT SAME DEPTH AS IT WAS HARVESTED.
  - SCARIFY SIDES AND BOTTOM OF PIT.
  - BACKFILL TREE PIT WITH NATIVE SOIL IN 8" LAYERS, HAND TAMPED, TO REMOVE VOIDS.
  - WHEN 2/3 BACKFILLED, FILL WITH WATER.
  - AFTER PLACING AND HAND-TAMPING FINAL LAYERS, WATER AGAIN UNTIL NO MORE IS ABSORBED.
  - MAKE SURE THERE IS NO STANDING WATER IN BOTTOM OF HOLE.

### 2 | TYPICAL PALM TREE PLANTING



- GENERAL NOTES:**
- THOROUGHLY TILL IN PLANTING SOIL MIXTURE AMENDMENTS TO DEPTH OF 8" IN ENTIRE GROUNDCOVER BED AREA.
  - WORK SOIL TO LOOSE, UNIFORMLY FINE TEXTURE.
  - HAND-TAMP BACKFILL TO REMOVE VOIDS AND AIR POCKETS.
  - WATER IMMEDIATELY AFTER PLANTING UNTIL NO MORE WATER IS ABSORBED.

### 4 | GRASS/GROUNDCOVER PLANTING

- THE TECHNICAL SPECIFICATIONS ARE MADE A PART OF THESE PLANS AND SHALL BE CONSULTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING WORK AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS AND ON THESE PLANS.
- CONTRACTOR SHALL NOTIFY THIS OFFICE OF ANY DISCREPANCIES PRIOR TO BEGINNING OR CONTINUING WORK.
- THERE WILL BE NO SUBSTITUTIONS, DELETIONS OR ADDITIONS WITHOUT APPROVAL OF THIS OFFICE.
- SIZE OF PLANT MATERIALS SHALL CONFORM WITH THE CURRENT EDITION OF 'AMERICAN STANDARD FOR NURSERY STOCK' FOR NUMBER ONE GRADE NURSERY STOCK AS ADOPTED BY THE AMERICAN ASSOCIATION OF NURSERYMEN AND AMERICAN NATIONAL STANDARDS INSTITUTE.
- THE QUANTITIES ON THE SCHEDULE ARE ONLY A GUIDE. ALL QUANTITIES SHALL BE VERIFIED BY THE CONTRACTOR ON THE PLANTING PLAN.

### PLANT SCHEDULE NOTES

| TREE MITIGATION SUMMARY  |                        |                     |               |
|--|------------------------|---------------------|---------------|
| PROTECTED TREES REMOVED  | LANDMARK TREES REMOVED | TOTAL TREES REMOVED | TREES PLANTED |
| 644"   | 0"                     | 644"                | 532"          |
| NOTE: ALTHOUGH MITIGATION IS NOT REQUIRED, TREE MITIGATION HAS BEEN MET OR EXCEEDED BY RETAINING TREES ON SITE AND THROUGH REPLACEMENT TREES |                        |                     |               |

### TREE MITIGATION SUMMARY

### IRRIGATION NOTES

| PLANT SCHEDULE   |        |            |  |          |         |         |          |             |
|------------------|--------|------------|--|----------|---------|---------|----------|-------------|
| TREES            | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | PINP   | 3          | Pinus palustris / Longleaf Pine  | 3" CAL   | 14'-16' | 12'-14' | AS SHOWN | FWF, SP     |
|                  | QUEV   | 39         | Quercus virginiana / Southern Live Oak   | 3" CAL   | 14'-16' | 10'-12' | AS SHOWN | FWF, SP     |
|                  | QUNU   | 61         | Quercus nuttallii / Nuttall Oak  | 3" CAL   | 14'-16' | 10'-12' | AS SHOWN | FWF, SP     |
|                  | QUPH   | 43         | Quercus phellos / Willow Oak   | 3" CAL   | 14'-16' | 10'-12' | AS SHOWN | FWF, SP     |
|                  | QUSH   | 12         | Quercus shumardii / Shumard Red Oak  | 3" CAL   | 14'-16' | 12'-14' | AS SHOWN | FWF, SP     |
|                  | TAXD-2 | 12         | Taxodium distichum / Bald Cypress  | 2" CAL   | 12'-14' | 10'-12' | AS SHOWN | FWF, SP     |
|                  | TAXD-4 | 10         | Taxodium distichum / Bald Cypress  | 4" CAL   | 16'-18' | 12'-14' | AS SHOWN | FWF, SP     |
| UNDERSTORY TREES | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | LAGM   | 8          | Lagerstroemia x 'Muskegee' / Muskegee Crape Myrtle                               | 1.5" CAL | 10'-12' | 8'-10'  | AS SHOWN | MS, FWF     |
|                  | MAGL   | 3          | Magnolia grandiflora 'Claudia Wannamaker' / Claudia Wannamaker Southern Magnolia | 1.5" CAL | 8'-10'  | 8       | AS SHOWN | FWF, SP     |
|                  | VITA   | 30         | Vitex agnus-castus / Chaste Tree   | 1.5" CAL | 6'-8'   | 8       | AS SHOWN | MS, FWF, SP |
| SHRUBS           | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | ILLP   | 16         | Ilidium parviflorum / Anise Tree   | 3 GAL    | 12'-18" | 12'-18" | AS SHOWN | FWF, SP     |
|                  | ILVN   | 346        | Ilex vomitoria 'Nana' / Dwarf Yaupon   | 3 GAL    | 18"-24" | 18"-24" | AS SHOWN | FWF, SP     |
|                  | LANC   | 114        | Lantana x 'Moni' / Confetti Spreading Lantana                                    | 1 GAL    | 12"-18" | 12"-18" | AS SHOWN | FWF, SP     |
|                  | LIGS   | 26         | Ligustrum sinense 'Sunshine' / Sunshine Ligustrum                                | 3 GAL    | 18"-24" | 18"-24" | AS SHOWN | FWF         |
|                  | LORC   | 44         | Loropetalum chinense 'PPI' TM / Purple Daydream Dwarf Loropetalum                | 3 GAL    | 18"-24" | 18"-24" | AS SHOWN | FWF, SP     |
|                  | LorZ4  | 3          | Loropetalum chinense rubrum 'Zhuzhou' / Zhuzhou Fuchsia Loropetalum              | 15 GAL   | 36"-48" | 36"-48" | AS SHOWN | FWF, SP     |
|                  | ROSA   | 40         | Rosa x 'Radtke' / Double Knockout Rose   | 3 GAL    | 18"-24" | 18"-24" | AS SHOWN | FWF, SP     |
| CYCADS/PALMS     | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | Cyr2   | 4          | Cycas revoluta / Sago Palm   | 7 GAL    | 24"-36" | 24"-36" | AS SHOWN | FWF, SP     |
| SHRUB AREAS      | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | BOUG   | 867        | Bouteloua gracilis / Blue Grama Grass  | 1 GAL    | 8"-12"  | 8"-12"  | 12" O.C. |             |
|                  | MUHF   | 1,323      | Muhlenbergia filipes / Muhly   | 1 gal    | 18"-24" | 18"-24" | 36" O.C. |             |
| GROUND COVERS    | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | DITA   | 209        | Dianella tasmanica 'Variegata' / Variegated Flax Lily                            | 1 GAL    | 8"-12"  | 8"-12"  | 24"      | FWF, SP     |
|                  | HEMO   | 1,010      | Hemerocallis x 'Orange' / Orange Day Lily  | 1 GAL    | 8"-12"  | 8"-12"  | 24"      | FWF, SP     |
|                  | LMBB   | 29         | Liriope muscaris 'Big Blue' / Big Blue Lilyturf                                  | 4" POT   | 8"-12"  | 8"-12"  | 24"      | FWF, SP     |
| SOD/SEED         | CODE   | QTY        | BOTANICAL / COMMON NAME  | SIZE     | HEIGHT  | SPREAD  | SPACING  | REMARKS     |
|                  | SEED   | 537,329 sf | Cynodon dactylon / Bermuda Grass   | SEED     | N/A     | N/A     | N/A      | SP          |
|                  | SOD    | 351,486 sf | Cynodon dactylon / Bermuda Grass   | SOD      | N/A     | N/A     | N/A      | SP          |

### PLANT SCHEDULE

- GENERAL PLANTING NOTES**
- REQUIREMENTS FOR THE MEASUREMENTS, BRANCHING, GRADING, QUALITY, BALLING AND BURLAPPING OF PLANTS IN THE PLANT LIST SHOULD FOLLOW OR EXCEED THE STANDARDS CURRENTLY RECOMMENDED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. IN THE AMERICAN STANDARD FOR NURSERY STOCKS (ANS). UNLESS OTHERWISE SPECIFIED, ANY SIZE SPECIFIED SHALL BE CONSIDERED MINIMUM. MINIMUMS FOR HEIGHT, SPREAD, OR CALIPER SHALL TAKE PRECEDENCE OVER A SPECIFIED CONTAINER SIZE.
  - ALL PLANTS SHALL HAVE A WELL FORMED HEAD WITH MINIMUM CALIPER, HEIGHT AND SPREAD OF THE SIDE BRANCHES AS SHOWN ON THE PLANT LIST. TRUNKS SHALL BE UNDAUNAGED AND SHAPE SHALL BE TYPICAL OF THE SPECIES.
  - MEASUREMENT OF CONIFER HEIGHT SHALL INCLUDE NOT MORE THAN FIFTY (50) PER CENT OF THIS YEAR'S VERTICAL GROWTH (TOP CANDLE).
  - THE LANDSCAPE CONTRACTOR IS HEREBY NOTIFIED OF THE EXISTENCE OF UNDERGROUND UTILITIES WITHIN THE LIMITS OF THE PROJECT AREA. THE CONTRACTOR SHOULD VERIFY THE EXACT LOCATION OF ALL UTILITY LINES PRIOR TO COMMENCEMENT OF DIGGING OPERATIONS. CONTRACTOR RESPONSIBLE FOR LOCATING, PROTECTING, AND REPAIRING ALL DAMAGE TO BUILDINGS, UTILITIES, PAVEMENT, AND CURB & GUTTER. ANY REPAIRS SHALL BE DONE PROMPTLY AT CONTRACTOR'S EXPENSE.
  - THE CONTRACTOR WILL BE RESPONSIBLE FOR STAKING AND LAYOUT OF PLANTINGS ON THIS PROJECT. THE LANDSCAPE ARCHITECT OR OWNER SHALL BE ADVISED WHEN STAKES ARE READY FOR INSPECTION ON VARIOUS PLANTING AREAS. ALL LAYOUT WORK SHALL BE INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT AND OWNER PRIOR TO OPENING ANY PLANTING PITS.
  - IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO VERIFY THAT EACH EXCAVATED TREE OR SHRUB PIT WILL PERCOLATE (DRAIN) PRIOR TO ADDING TOPSOIL AND INSTALLING TREES OR SHRUBS. THE CONTRACTOR SHALL FILL THE BOTTOM OF HOLES WITH SIX (6) INCHES OF WATER. THIS WATER SHOULD PERCOLATE WITHIN A TWENTY-FOUR (24) HOUR PERIOD. IF WATER DOESN'T PERC, CONTRACTOR SHALL NOTIFY THE OWNER'S REP PRIOR TO INSTALLING PLANTS.
  - SHOULD THE LANDSCAPE CONTRACTOR ENCOUNTER UNSATISFACTORY SURFACE OR SUBSURFACE DRAINAGE CONDITIONS, SOIL DEPTH, LATENT SOILS, HARD PANS, STEAM OR OTHER UTILITY LINES OR OTHER CONDITIONS THAT WILL JEOPARDIZE THE HEALTH AND VIGOR OF THE PLANTS, HE MUST ADVISE THE LANDSCAPE ARCHITECT IN WRITING OF THE CONDITIONS PRIOR TO INSTALLING THE PLANTS. OTHERWISE, THE LANDSCAPE CONTRACTOR WARRANTS THAT THE PLANTING AREAS ARE SUITABLE FOR PROPER GROWTH AND DEVELOPMENT OF THE PLANTS TO BE INSTALLED.
  - THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING UP THE SITE AT THE COMPLETION OF THE PROJECT AND SHALL MAINTAIN THE SITE IN A REASONABLY NEAT AND CLEAN STATE THROUGHOUT THE INSTALLATION PROCESS. STREETS AND PAVED AREAS SHALL BE CLEANED REGULARLY TO REMOVE CONSTRUCTION MATERIALS AND OTHER DEBRIS RESULTING FROM WORK OF THE PROJECT.
  - REPLACEMENTS OF DEAD OR UNSATISFACTORY MATERIAL SHALL BE MADE AS SPECIFIED IN THE PLANT LIST. THE OWNER OR LANDSCAPE ARCHITECT SHALL INSPECT REPLACED PLANTS WHEN ALL REPLACEMENTS HAVE BEEN MADE. REPLACEMENTS ARE TO BE ALIVE AND IN A HEALTHY CONDITION WHEN THE REPLACEMENTS ARE COMPLETE. REPLACEMENTS ARE NOT SUBJECT TO AN ADDITIONAL GUARANTEE, BUT THE LANDSCAPE CONTRACTOR SHALL CONSULT WITH THE LANDSCAPE ARCHITECT ON REASON FOR PLANT DECLINE/DEATH AND HOW TO AVOID FUTURE INSTANCES.
  - SHOULD THE CONTRACTOR NOT MAKE REPLACEMENTS IN A SATISFACTORY AND TIMELY FASHION IN ACCORD WITH THE PLANTING NOTES, THE OWNER, AFTER PROPER NOTIFICATION TO THE CONTRACTOR MAY UTILIZE THE FUNDS OF THE RETAINAGE TO HAVE THE REPLACEMENTS MADE IN ACCORDANCE WITH THE SPECIFICATIONS BY ANOTHER CONTRACTOR.
  - NO EXCAVATION OR PLANTING PIT SHALL BE LEFT UNATTENDED OVERNIGHT.
  - PLANT MATERIAL QUANTITIES PROVIDED IN THE PLANT LIST ARE FOR REFERENCE ONLY AND THE CONTRACTOR IS RESPONSIBLE FOR THE ACTUAL PLANT MATERIAL COUNTS. DISCREPANCIES BETWEEN QUANTITIES SHOWN ON THE PLANTING PLAN AND THOSE IN THE PLANT LIST SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT FOR CLARIFICATION. IF CLARIFICATION OF DISCREPANCIES FROM THE LANDSCAPE ARCHITECT IS NOT POSSIBLE, THEN QUANTITIES SHOWN ON THE PLANTING PLAN SHALL TAKE PRECEDENCE.
  - REMOVE BURLAP/STRAPPING AND WIRE BASKET FROM TOP 1/3 OF ROOT BALL ON TREES.
  - REMOVE PAPER, PLASTIC OR METAL AROUND ROOT BALLS OF SHRUBS.
  - DO NOT WRAP TREES.
  - WATER ALL PLANT MATERIAL IMMEDIATELY AFTER PLANTING.
  - TREE GUYING MATERIAL SHALL BE 'ARBOR-TIE' OR EQUIVALENT.
  - ALL PLANT BEDS TO BE MULCHED WITH 3" OF PINESTRAW MULCH UNLESS OTHERWISE SPECIFIED.
  - ALL AREAS OF PLANTING, INCLUDING AREAS OF GRASS SEEDING AND SOD, SHALL BE GRADED TO PROVIDE POSITIVE DRAINAGE AND SHALL BE PROVIDED APPROPRIATE SOIL FOR THE PROPOSED PLANTINGS.
  - ALL EXISTING VEGETATION WITHIN AREAS TO BE PLANTED, SODDED AND/OR SEEDING SHALL BE REMOVED PRIOR TO PLANTING, SODDING, AND SEEDING. ALL AREAS INDICATED TO BE GRASS SEED SHALL BE SEED PER GRASSING SPECIFICATIONS FOR PERMANENT STABILIZATION.

### GENERAL NOTES

- |     |                               |     |                        |
|-----|-------------------------------|-----|------------------------|
| FWF | FULL WELL FORMED              | MS  | MULTI-STEMMED TRUNK    |
| SP  | SPECIMEN MATERIAL             | CAL | TRUNK CALIPER          |
| TF  | TREE FORM HABIT               | GAL | GALLON CONTAINER       |
| EGG | EGG CAN CONTAINER             | CON | CONTAINERIZED MATERIAL |
| B&B | BALLED AND BURLAPPED MATERIAL | BR  | BARE ROOT MATERIAL     |
|     |                               | ESP | ESPALIER               |

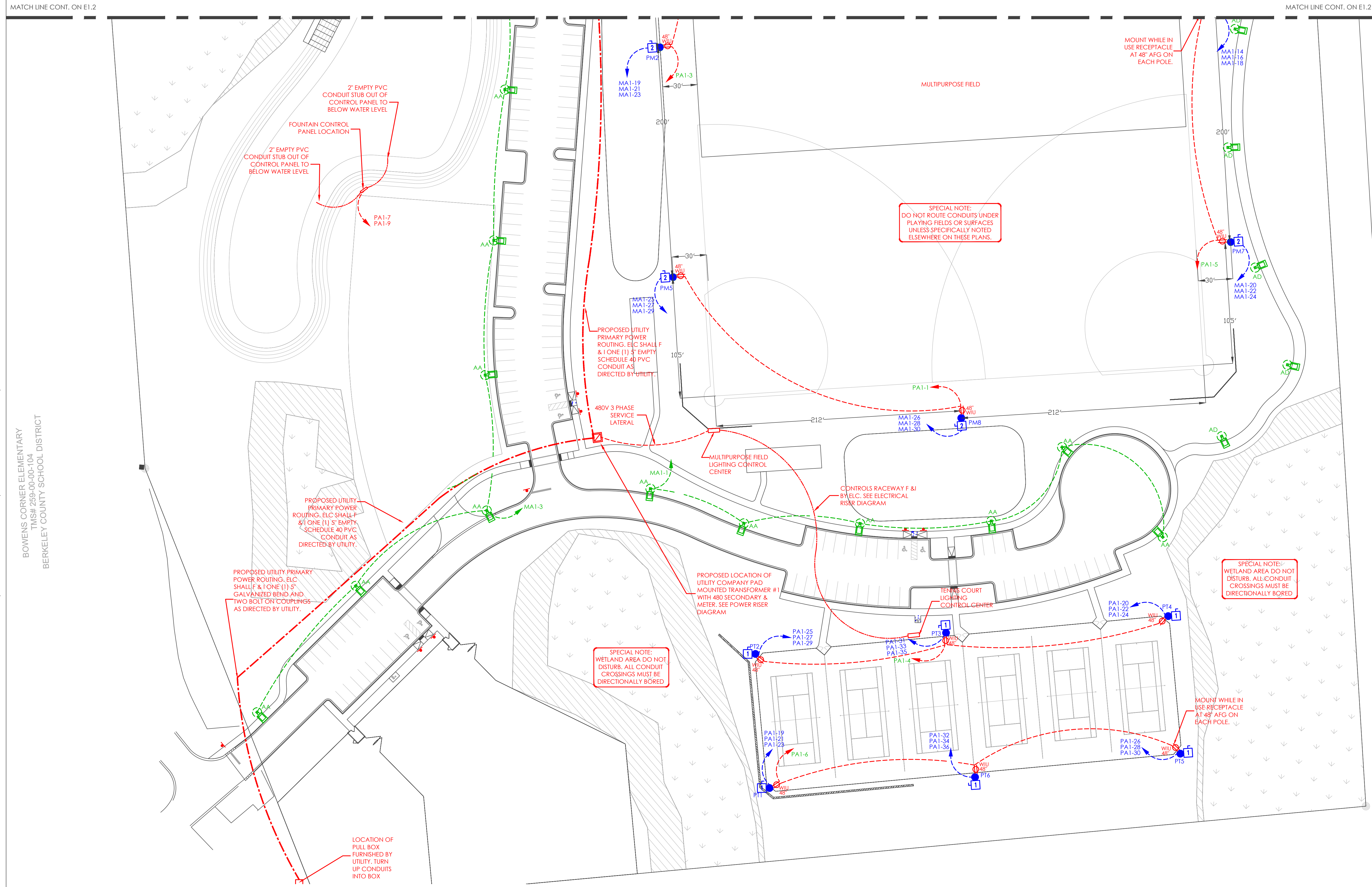
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

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PLANT SCHEDULE, DETAILS AND NOTES

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 BOWENS CORNER ELEMENTARY  
 TMS# 259-00-00-104  
 BERKELEY COUNTY SCHOOL DISTRICT  
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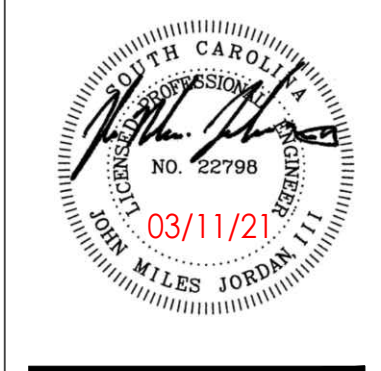
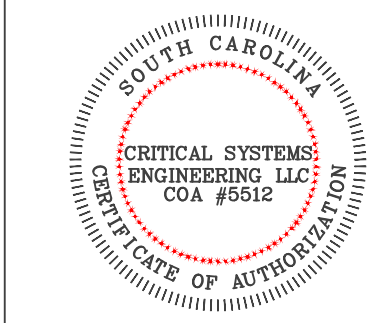


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 SPARTANBURG, SC 864.272.1272  
 CHARLOTTE, NC 980.312.5450  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7897  
 DATE: 03/11/21  
 DRAWN BY: JMJ  
 CHECKED BY: JMJ

| REVISION HISTORY |          |
|------------------|----------|
| 0 BID SET        | 03/11/21 |
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|                  |          |
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SITE ELECTRICAL PLAN

E-1.1

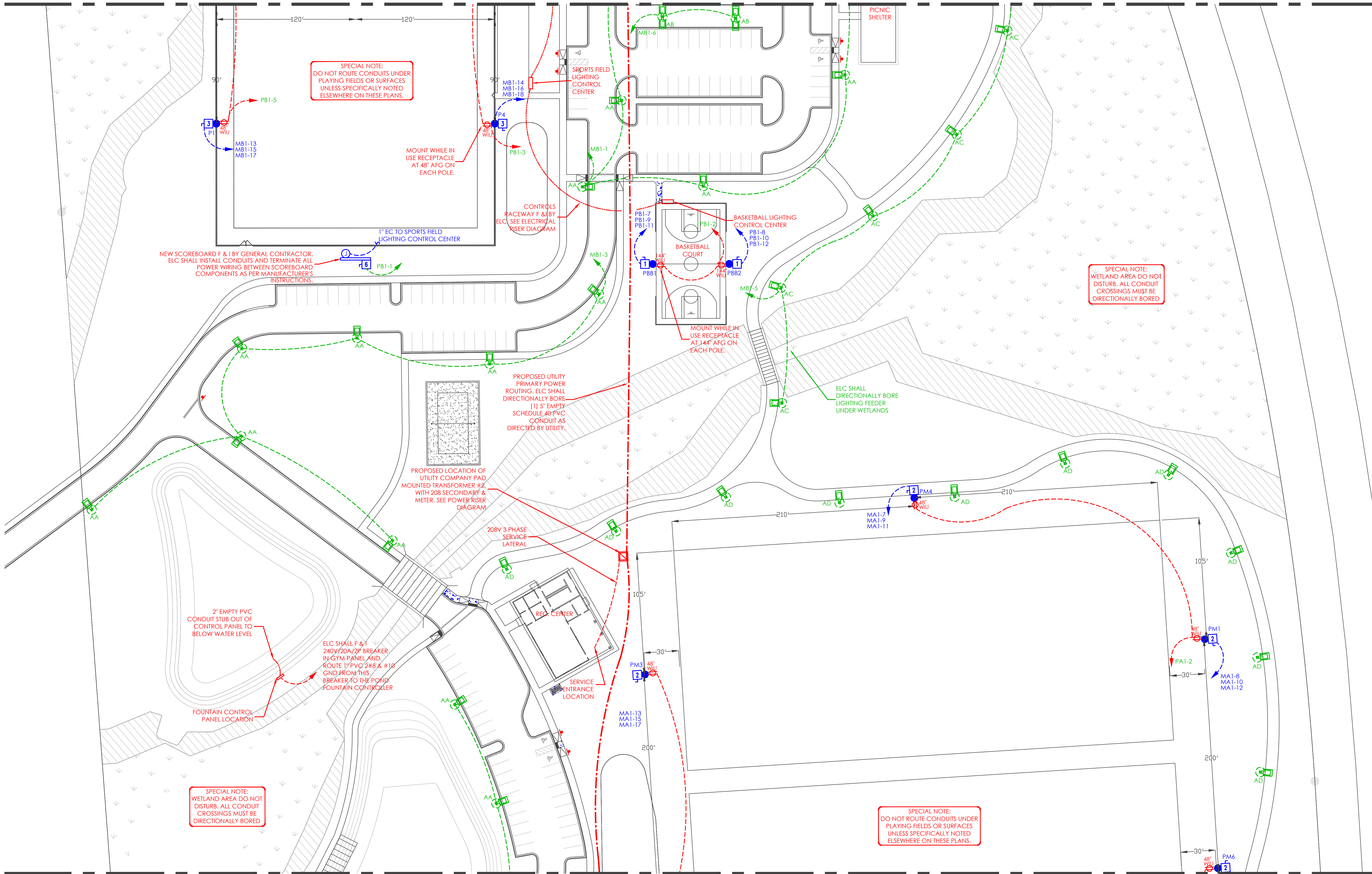


**ELECTRICAL SITE PLAN**  
1" = 40'-0"

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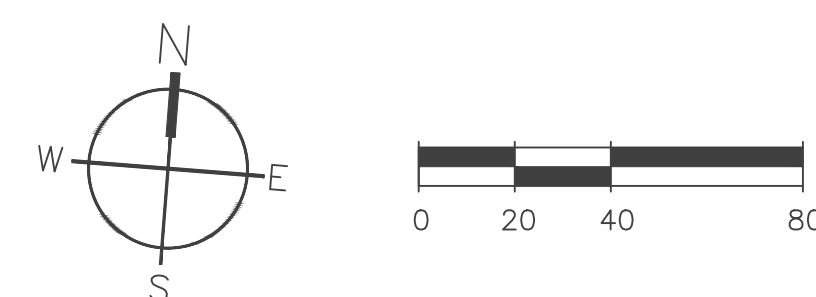
MATCH LINE CONT. ON E1.3

MATCH LINE CONT. ON E1.3



MATCH LINE CONT. ON E1.1

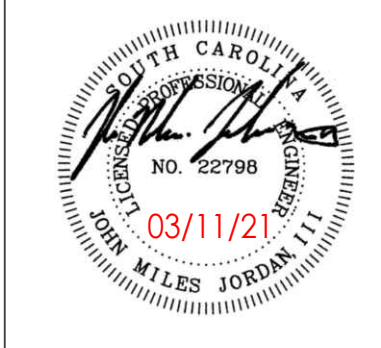
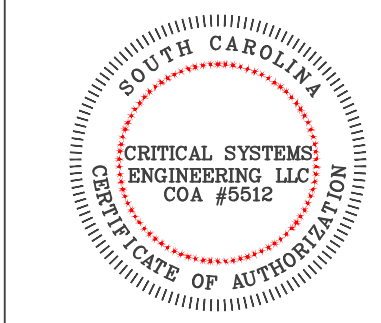
MATCH LINE CONT. ON E1.1



ELECTRICAL SITE PLAN  
1" = 40'-0"



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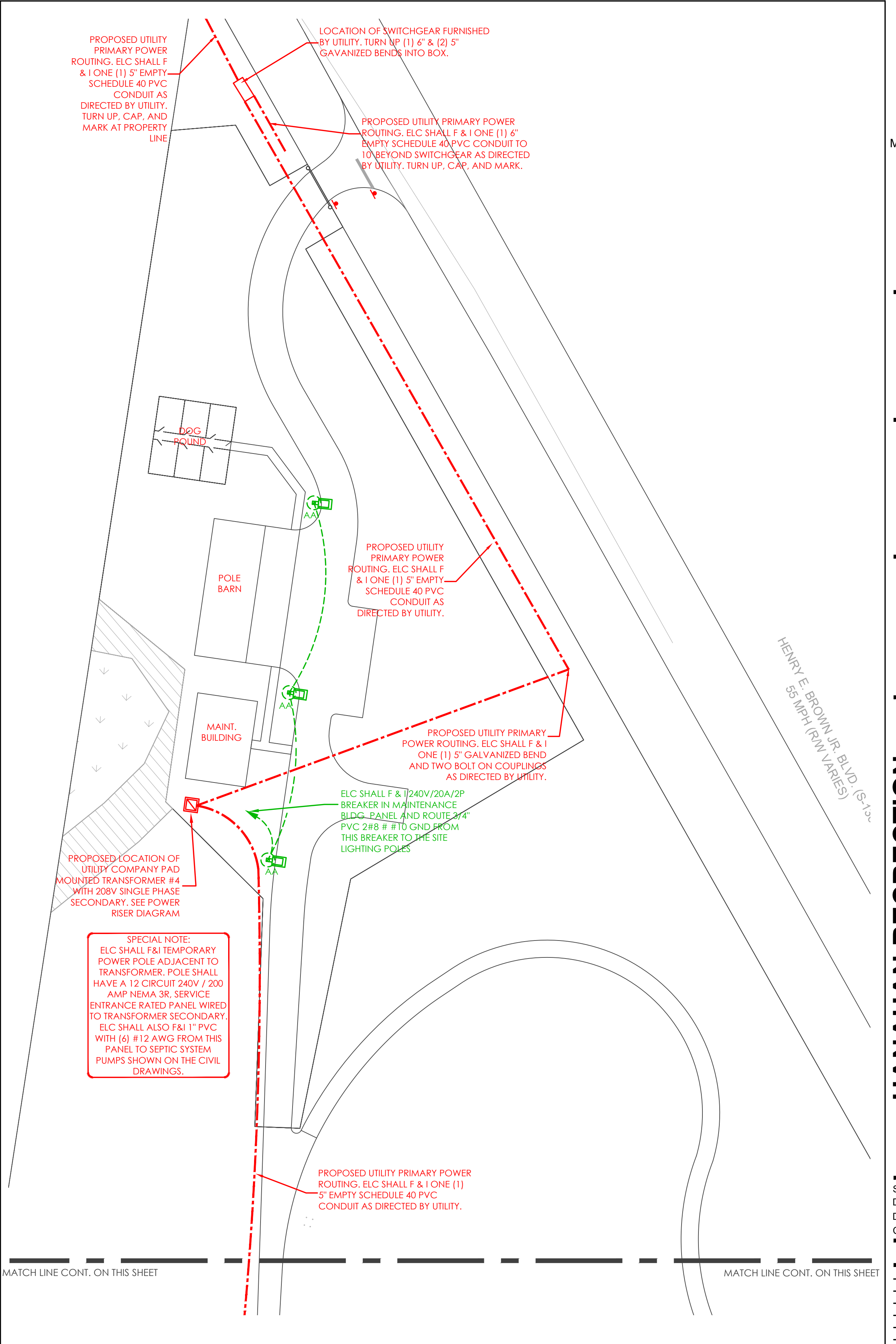
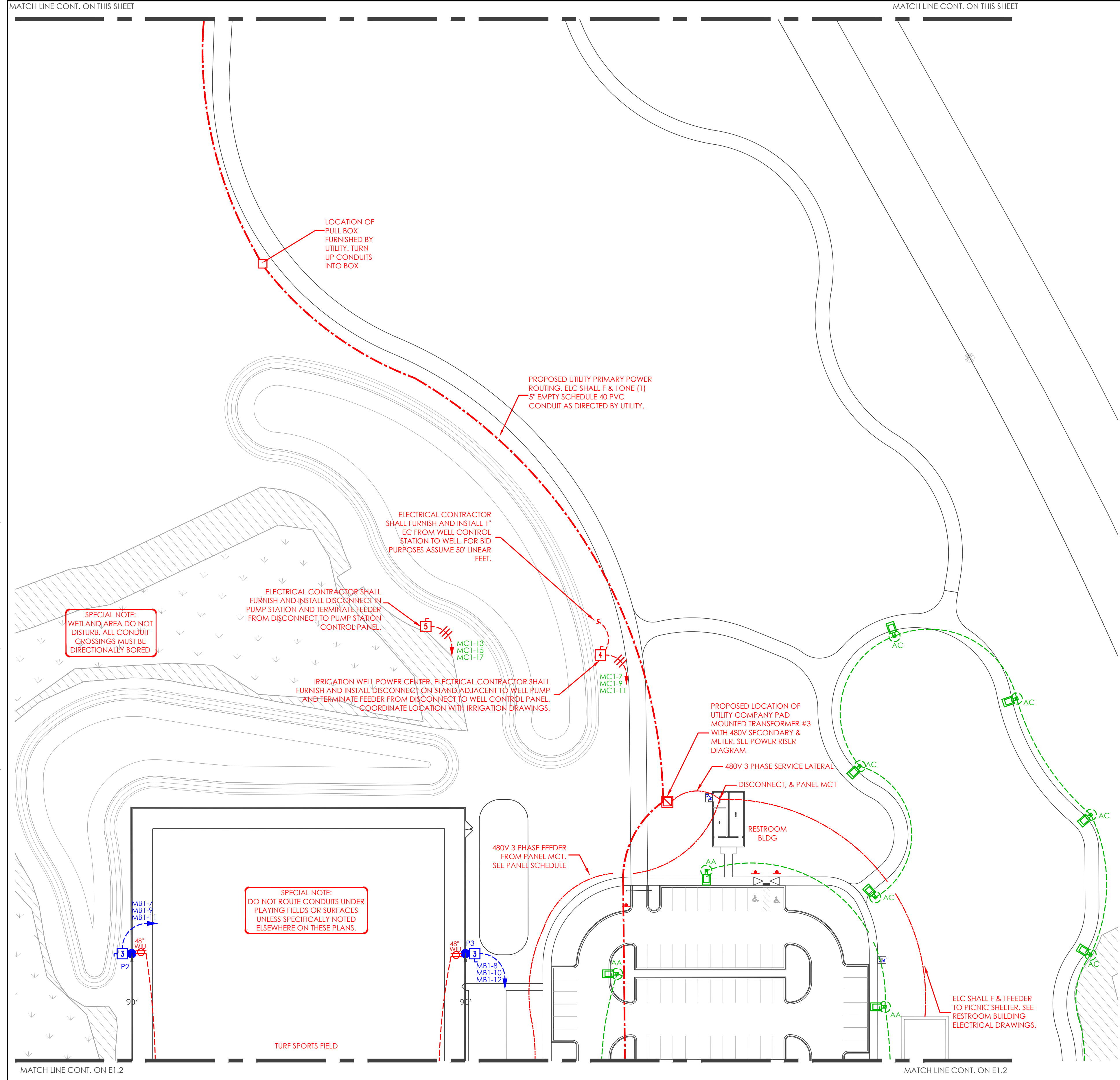
SITE ELECTRICAL PLAN

E-1.2

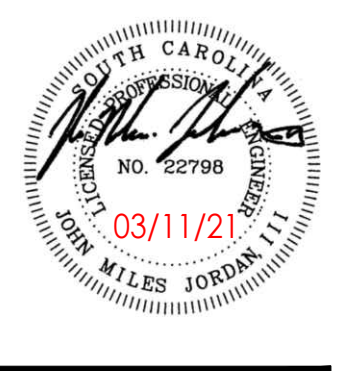
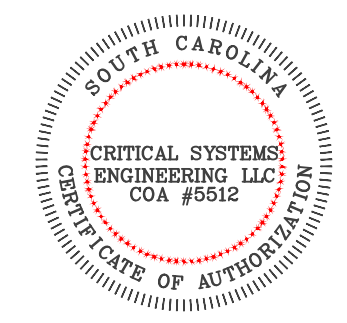




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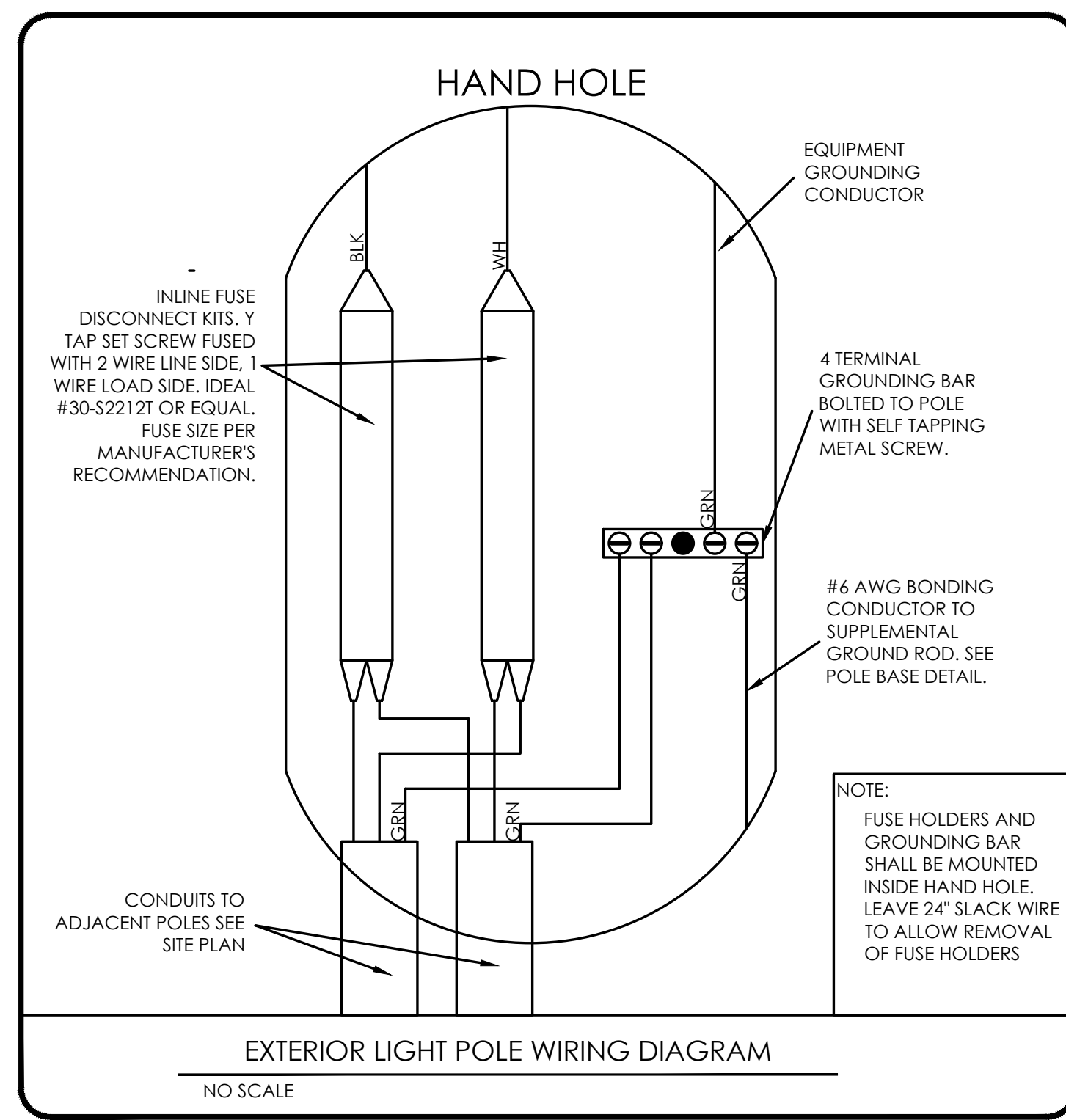
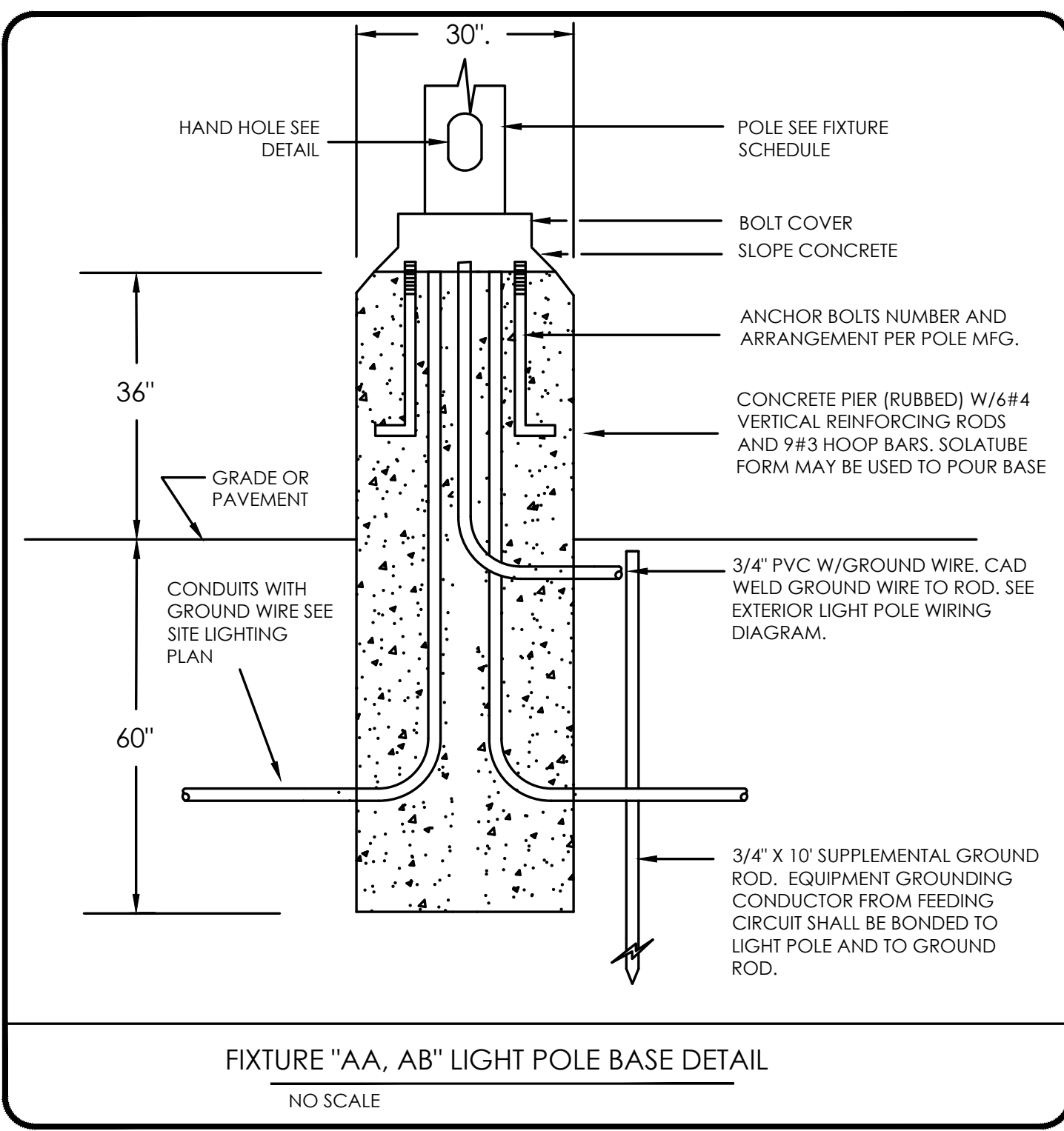
| REVISION HISTORY |          |
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SITE ELECTRICAL PLAN

E-1.3



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- ### GENERAL ELECTRICAL NOTES:
1. DUE TO THE NATURE OF WORK COVERED UNDER THESE PLANS AND SPECIFICATIONS, ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING VISITED THE SITE TO FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID.
  2. ALL CONDUIT PENETRATIONS OF FIRE RATED WALLS AND/OR CEILINGS SHALL BE FIRESTOPPED AS PER UL STANDARDS.
  3. ALL CONDUIT PENETRATIONS OF EXTERIOR WALLS, FLOORS, OR ROOFS SHALL BE SEALED AND MADE WEATHERPROOF.
  4. ALL CONDUIT RUNS SHOWN ON THESE DRAWINGS ARE APPROXIMATE. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY LENGTH AND LOCATION.
  5. ALL WORK SHALL BE IN COMPLIANCE WITH THE CODES AND STANDARDS LISTED IN THE ARCHITECTURAL CODE ANALYSIS FOUND ELSEWHERE IN THESE CONTRACT DOCUMENTS.

### STREET LIGHTING PHOTOMETRIC DESIGN ILLUMINANCE LEVELS

| HORIZONTAL LIGHTING LEVELS        |     | VERTICAL LIGHTING LEVELS          |     |
|-----------------------------------|-----|-----------------------------------|-----|
| MINIMUM LIGHTING LEVEL:           | 1   | MINIMUM LIGHTING LEVEL:           | 0.5 |
| MAXIMUM LIGHTING LEVEL:           | N/A | MAXIMUM LIGHTING LEVEL:           | N/A |
| MAXIMUM / MINIMUM LIGHTING LEVEL: | 15  | MAXIMUM / MINIMUM LIGHTING LEVEL: | N/A |

SOURCE: IESNA RP-20-14  
 NOTES: - ALL VALUES ARE IN FOOTCANDLES

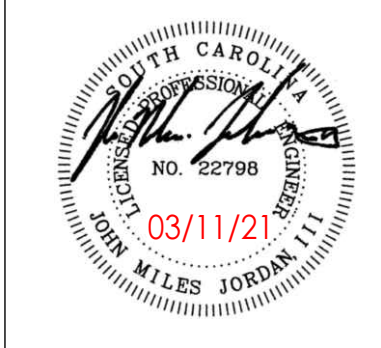
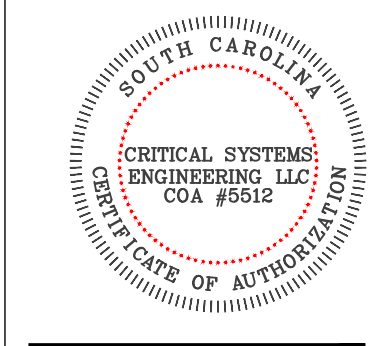
### ELECTRICAL SYMBOL SCHEDULE

|       |  |
|-------|--|
|       | EXTERIOR POLE MOUNTED LIGHT FIXTURE  |
|       | SPORTS LIGHTING POLE   |
|       | DISCONNECT SWITCH, (FUSED SAFETY SWITCH), BY ELECTRICAL CONTRACTOR. SEE "FUSED SAFETY SWITCH SCHEDULE".  |
|       | BRANCH CIRCUIT CONDUIT, CONCEALED IN WALLS AND CEILINGS. TWO WIRES AND GROUND WIRE UNLESS OTHERWISE INDICATED.   |
|       | BRANCH CIRCUIT CONDUIT, CONCEALED UNDER FLOOR OR UNDERGROUND. TWO WIRES AND GROUND WIRE UNLESS OTHERWISE INDICATED.  |
|       | BRANCH CIRCUIT CONDUIT, EXPOSED. TWO WIRES AND GROUND WIRE UNLESS OTHERWISE INDICATED.   |
|       | BRANCH CIRCUIT HOMERUN. NUMBER OF ARROWS INDICATE NUMBER OF CIRCUITS. NUMBER OF CROSSHATCHES INDICATE NUMBER OF WIRES WHEN GREATER THAN TWO. GROUND WIRE IS NOT INDICATED. CONTRACTOR SHALL INSTALL HOMERUN CIRCUITS AS INDICATED ON DRAWINGS. CONTRACTOR SHALL NOT COMBINE HOMERUN CIRCUITS UNLESS INDICATED ON DRAWINGS. |
|       | JUNCTION BOX WITH COVER.   |
| EC    | EMPTY CONDUIT. PROVIDE 16 GAUGE STEEL OR NYLON PULLWIRE.   |
| ELC   | ELECTRICAL CONTRACTOR  |
| F & I | FURNISH AND INSTALL  |
| MC    | METAL CLAD CABLE   |
| RMC   | RIGID METAL CONDUIT  |
| FMC   | FLEXIBLE METAL CONDUIT   |
| LFMC  | LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT  |
| LFNC  | LIQUIDTIGHT FLEXIBLE NON-METALLIC CONDUIT  |
| PVC   | RIGID POLYVINYL CHLORIDE CONDUIT   |
| EMT   | ELECTRICAL METALLIC TUBING   |
|       | WEATHER RESISTANT DUPLEX GFI CONVENIENCE OUTLET WITH DIE CAST ALUMINUM. WET LOCATION LISTED WHILE IN USE COVER. MOUNT BOTTOM OF BOX 16" ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED. 20 AMP, 120 VOLT.   |

### EXTERIOR LIGHT FIXTURE SCHEDULE

| FIXT. | LAMP INFORMATION |            |              |            | MOUNTING | MANUFACTURER & NUMBER   | INPUT WATTS | NOTES   | DESCRIPTION                                  |
|-------|------------------|------------|--------------|------------|----------|---|-------------|---|--|
|       | TYPE             | COLOR TEMP | INIT. LUMENS | VOLTS      |          |   |             |   |  |
| AA    | LED              | 4000K      | 48,000       | 277 OR 240 | POLE     | LITHONIA #DSX2 LED-P8-40K-T4M-RPA-PIRH-DDBXD POLE #RSA-27-6G-DM19AS-VD-FBC-DBDXD        | 431         | ONE FIXTURE WITH ROUND STRAIGHT ALUM POLE. 27'-0", 100 MPH/130 GUST. EPA >1.6 WITH HIGH/LOW/AMBIENT SENSOR                | HIGH OUTPUT PARKING LOT LIGHTING - ONE HEAD  |
| AB    | LED              | 4000K      | 48,000       | 277        | POLE     | LITHONIA # (2) DSX2 LED-P8-40K-T4M-RPA-PIRH-DDBXD POLE #RSA-27-6G-DM19AS-VD-FBC-DBDXD   | 862         | TWO FIXTURES 180 DEG APART WITH ROUND STRAIGHT ALUM POLE. 27'-0", 100 MPH/130 GUST. EPA >3.2 WITH HIGH/LOW/AMBIENT SENSOR | HIGH OUTPUT PARKING LOT LIGHTING - TWO HEADS |
| AC    | LED              | 4000K      | 6250         | 277        | POLE     | BEACON #URB-CAP-21-24L-55-4K7-UNV-3-PCU-BL/AA-39-SX-B POLE #16' AG DIRECT BURY ALUMINUM | 55          | ONE FIXTURE WITH ROUND STRAIGHT ALUM POLE. 16'-0", 100 MPH/130 GUST.  | PATHWAY LIGHTING                             |
| AD    | LED              | 4000K      | 6250         | NONE       | POLE     | SEPCO #SA275PPPC-DMPC-URB40-MPPT21-RB-FZ8 POLE #16' AG DIRECT BURY ALUMINUM             | 40          | TWO FIXTURES 180 DEG APART WITH ROUND STRAIGHT ALUM POLE. 16'-0", 100 MPH/130 GUST.                                       | SOLAR POWERED PATHWAY LIGHT                  |

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 COMPLEX**  
 CITY OF HANAHAN  
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### REVISION HISTORY

| NO. | DATE    | DESCRIPTION |
|-----|---------|-------------|
| 0   | BID SET | 03/11/21    |
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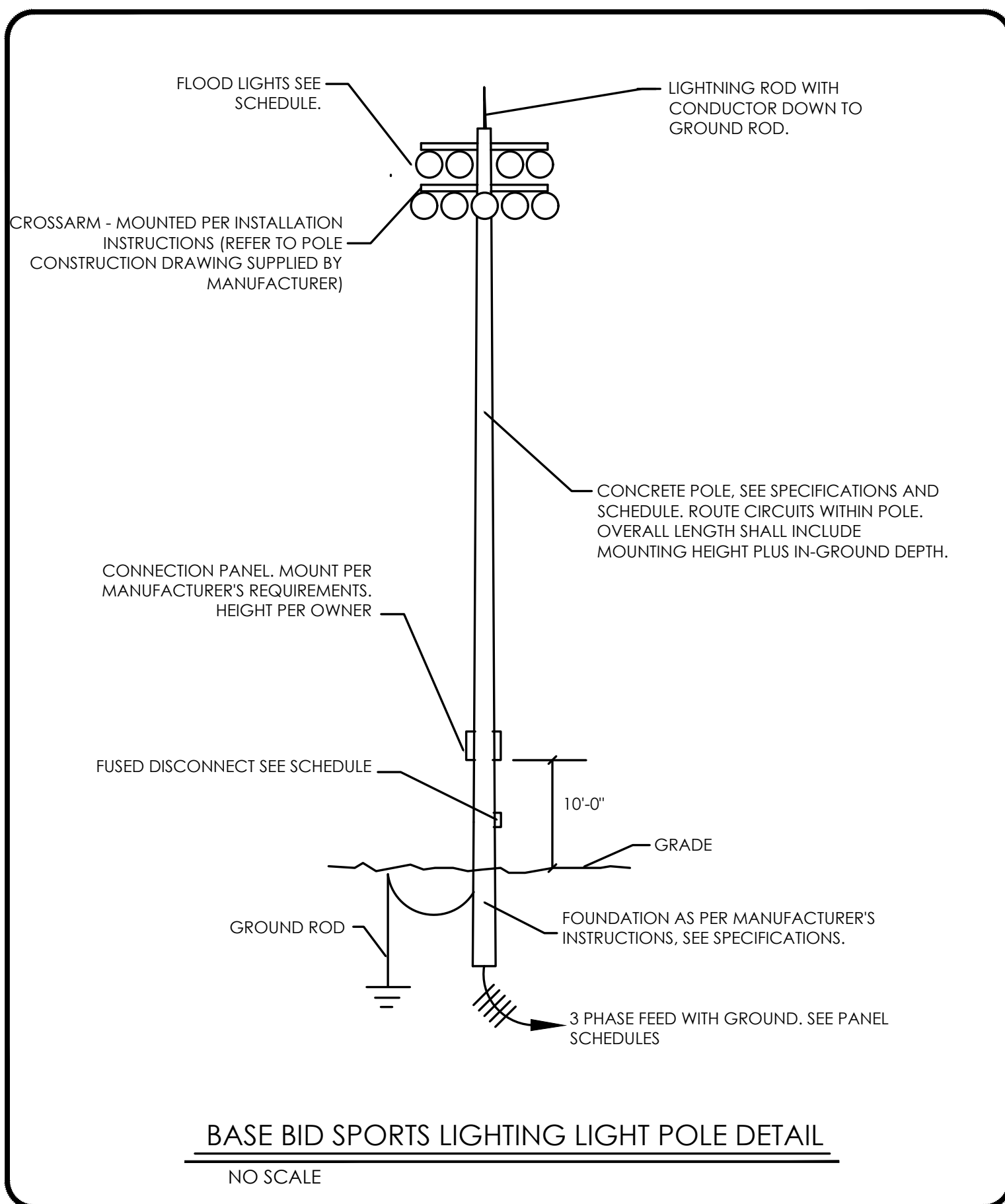
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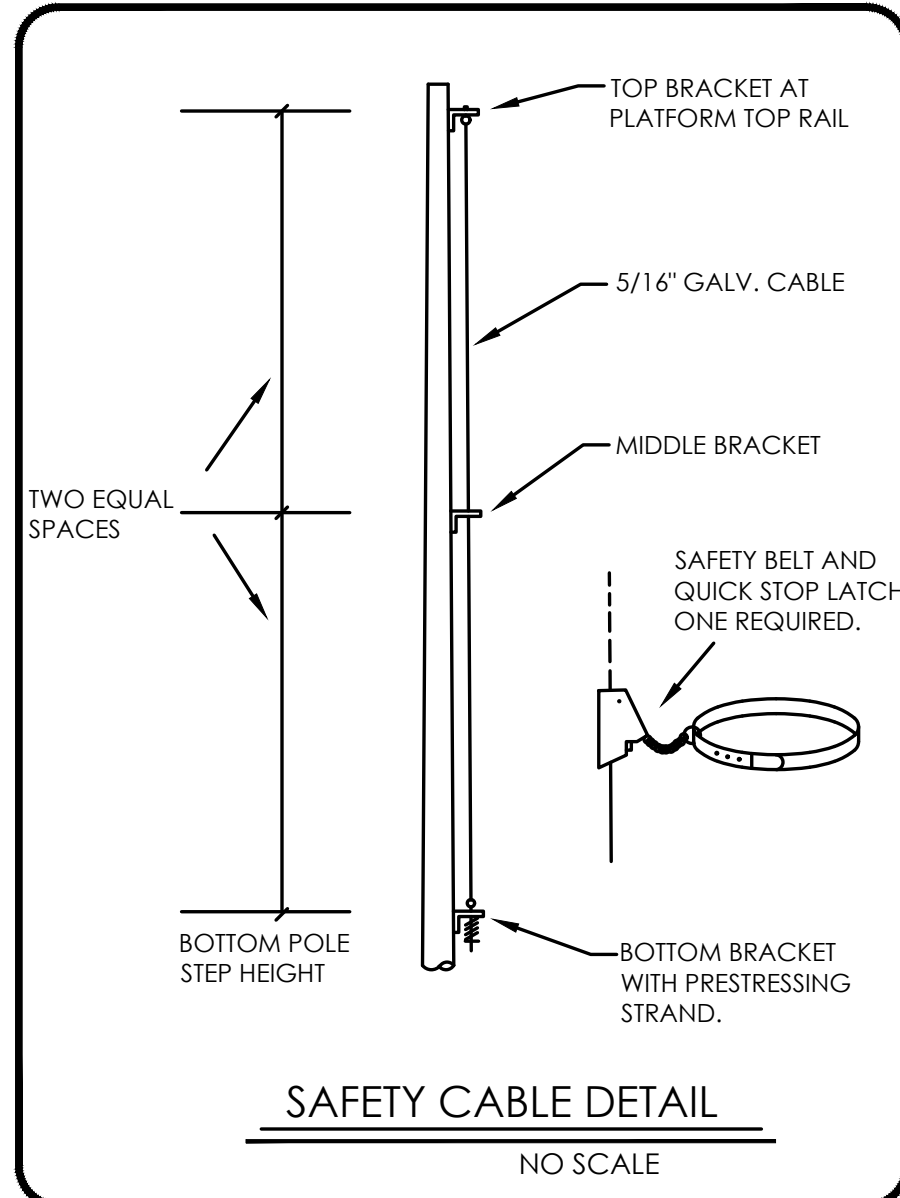
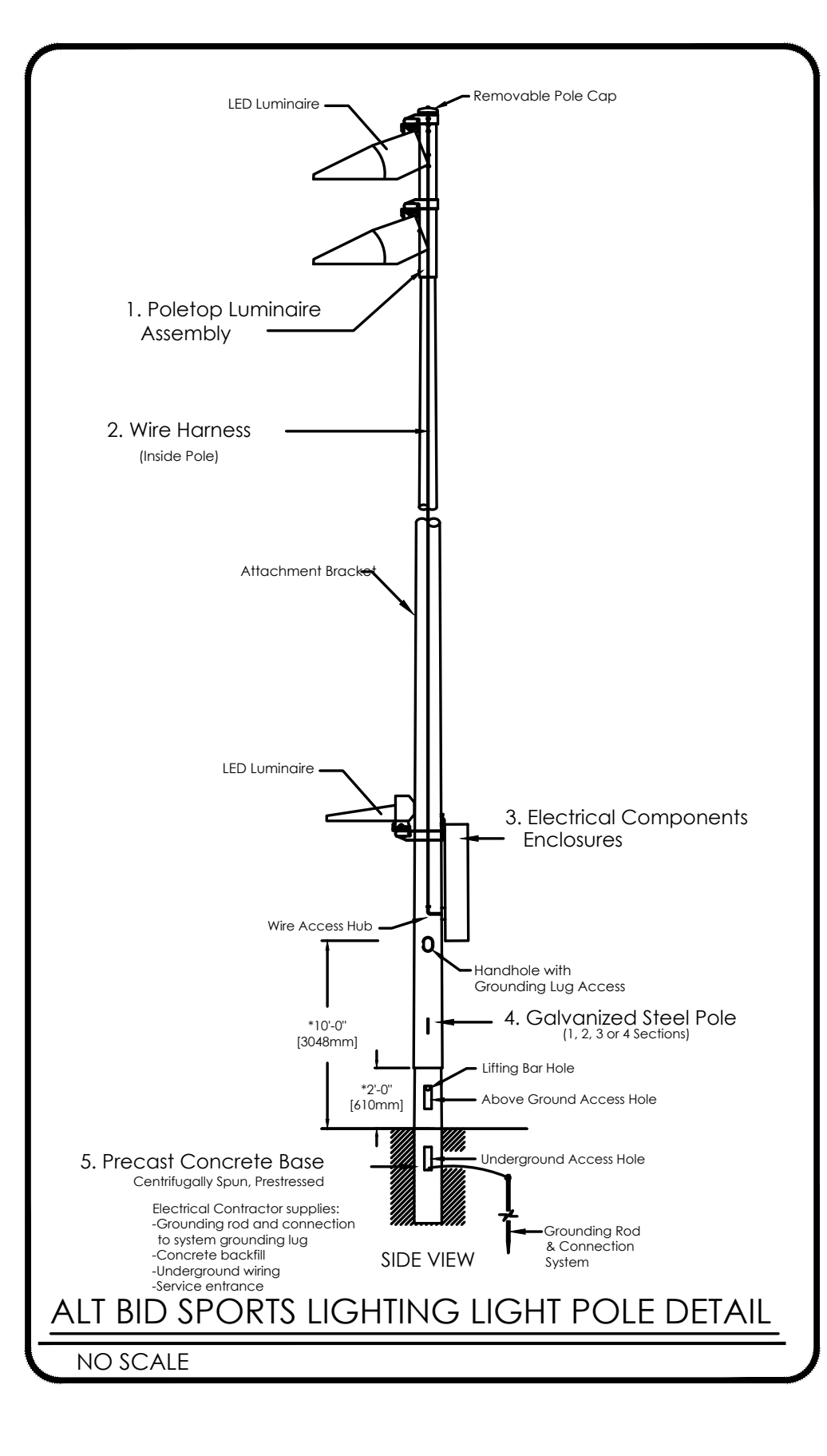
**BASE BID - ELECTRICAL SPORTS LIGHTING NOTES**

- THE LAYOUT FOR THE FIELD LIGHTING IS BASED ON GEO SPORTS LIGHTING AND THE FOLLOWING DESIGN CONDITIONS MUST BE MET.
  - MAINTAINED FOOTCANDLE LEVELS:  
 MULTIPURPOSE FIELD: 30 F.C.  
 TURF SPORTS FIELD: 30 F.C.  
 BASKETBALL COURT: 40 F.C.  
 TENNIS COURTS: 30 F.C.
  - POLES SHALL BE SET BACK FROM THE FIELD AND SPACED AS INDICATED ON THE SITE PLAN.
  - MOUNTING HEIGHT SHALL BE MEASURED FROM THE PLAYING SURFACE TO THE BOTTOM ROW OF FIXTURES. THE MOUNTING HEIGHTS FOR FIXTURES IS INDICATED ON THE "SPORTS LIGHTING POLE SCHEDULE" ON THIS DRAWING. THE ACTUAL POLE LENGTH WILL BE DETERMINED BY THE MANUFACTURER BASED ON REQUIRED EMBEDMENT DEPTH AND FINISHED GRADE ELEVATIONS. REFER TO CIVIL DRAWINGS FOR GRADE ELEVATIONS.
  - THE NUMBER OF FIXTURES REQUIRED SHALL BE ADJUSTED BY THE MANUFACTURER TO ACHIEVE THE LIGHTING CONDITIONS OUTLINED ABOVE.
- RECOVERABLE LIGHT LOSS FACTOR USED TO DETERMINE MAINTAINED LIGHTING LEVELS SHALL BE 0.95.
- MOUNT DRIVER ASSEMBLIES AT HEIGHT AS DIRECTED BY OWNER.
- SPORTS LIGHTING SUPPLIER SHALL PROVIDE INTERNAL AND EXTERNAL SHIELDING TO INDICATED FIXTURES TO LIMIT LIGHT SPILL ACROSS THE PROPERTY LINE
- UNDER THE BASE BID, ALL SPORTS LIGHTING REFERRED TO ON THESE CONTRACT DOCUMENTS ARE BY GEO SPORT LIGHTING. THE ELECTRICAL CONTRACTOR SHALL CONTACT MIKE TORRENCE AT 704-953-0680 FOR FIXTURE, POLE AND CONTACTOR PANEL INFORMATION AND PRICING. NO OTHER MANUFACTURER HAS PRIOR APPROVAL.
- ALL CONDUIT AND WIRE SIZES INDICATED IN THE PANELBOARD SCHEDULES ARE BASED ON VOLTAGE DROP CALCULATIONS USING THE MOST DIRECT ROUTE FROM ONE LOCATION TO THE OTHER (BUT NOT UNDER PLAYING SURFACES). IF THE CIRCUITS ARE ROUTED IN A LESS DIRECT MANNER, THESE SIZES SHALL NOT BE USED. BUT ADDITIONAL CALCULATIONS SHALL BE MADE. ALL CALCULATIONS ARE BASED ON A 2% VOLTAGE DROP FOR ALL FEEDER CIRCUITS.
- SPORTS LIGHTING MANUFACTURER'S FACTORY REPRESENTATIVE SHALL COMMISSION LIGHT POLES & FIXTURES. HE SHALL VERIFY PROPER AIMING OF ALL FIXTURES AND PROVIDE FIELD VERIFICATION OF LIGHT LEVELS. FIELD TESTING SHALL ADHERE TO I.E.S. RP-6 RECOMMENDATIONS.
- SPORTS LIGHTING MANUFACTURER SHALL PROVIDE A TURNKEY SYSTEM INCLUDING THE DESIGN AND INSTALLATION OF POLES, FOUNDATIONS, FIXTURES, CONTROL PANELS AND ALL APPURTENANCES. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND TERMINATE POWER & CONTROL WIRING TO THE SPORTS LIGHTING POLES FROM THE CONTROL PANEL AS DIRECTED BY THE MANUFACTURER.
- NEMA 4/IP66 CONTROL PANELS FOR SPORTS LIGHTING SHALL BE FURNISHED AND INSTALLED BY THE SPORTS LIGHTING MANUFACTURER. THE CONTROL SYSTEM SHALL PROVIDED KEY RESTRICTED LOCAL CONTROL OF THE SPORTS LIGHTING ON A PER FIELD LEVEL. THE LOCAL CONTROL SHALL ALSO PROVIDE REMOTE ACCESS VIA CELLULAR NETWORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN EXTERIOR MOUNTING FRAME AND TERMINATE POWER WIRING TO CONTROL PANELS AS DIRECTED BY THE MANUFACTURER.



**ALTERNATE BID - ELECTRICAL SPORTS LIGHTING NOTES**

- THE LAYOUT FOR THE FIELD LIGHTING IS BASED ON MUSCO SPORTS LIGHTING AND THE FOLLOWING DESIGN CONDITIONS MUST BE MET.
  - MAINTAINED FOOTCANDLE LEVELS:  
 MULTIPURPOSE FIELD: 30 F.C.  
 TURF SPORTS FIELD: 30 F.C.  
 BASKETBALL COURT: 40 F.C.  
 TENNIS COURTS: 30 F.C.
  - POLES SHALL BE SET BACK FROM THE FIELD AND SPACED AS INDICATED ON THE SITE PLAN.
  - MOUNTING HEIGHT SHALL BE MEASURED FROM THE PLAYING SURFACE TO THE BOTTOM ROW OF FIXTURES. THE MOUNTING HEIGHTS FOR FIXTURES IS INDICATED ON THE "SPORTS LIGHTING POLE SCHEDULE" ON THIS DRAWING. THE ACTUAL POLE LENGTH WILL BE DETERMINED BY THE MANUFACTURER BASED ON REQUIRED EMBEDMENT DEPTH AND FINISHED GRADE ELEVATIONS. REFER TO CIVIL DRAWINGS FOR GRADE ELEVATIONS.
  - THE NUMBER OF FIXTURES REQUIRED SHALL BE ADJUSTED BY THE MANUFACTURER TO ACHIEVE THE LIGHTING CONDITIONS OUTLINED ABOVE.
- RECOVERABLE LIGHT LOSS FACTOR USED TO DETERMINE MAINTAINED LIGHTING LEVELS SHALL BE 0.95.
- MOUNT DRIVER ASSEMBLIES AT HEIGHT AS DIRECTED BY OWNER.
- SPORTS LIGHTING SUPPLIER SHALL PROVIDE INTERNAL AND EXTERNAL SHIELDING TO INDICATED FIXTURES TO LIMIT LIGHT SPILL ACROSS THE PROPERTY LINE
- UNDER THE ALTERNATE BID, ALL SPORTS LIGHTING REFERRED TO ON THESE CONTRACT DOCUMENTS ARE BY MUSCO SPORT LIGHTING. THE ELECTRICAL CONTRACTOR SHALL CONTACT BRIAN HARTMAN AT 803-904-0302 FOR FIXTURE, POLE AND CONTACTOR PANEL INFORMATION AND PRICING. NO OTHER MANUFACTURER HAS PRIOR APPROVAL.
- ALL CONDUIT AND WIRE SIZES INDICATED IN THE PANELBOARD SCHEDULES ARE BASED ON VOLTAGE DROP CALCULATIONS USING THE MOST DIRECT ROUTE FROM ONE LOCATION TO THE OTHER (BUT NOT UNDER PLAYING SURFACES). IF THE CIRCUITS ARE ROUTED IN A LESS DIRECT MANNER, THESE SIZES SHALL NOT BE USED. BUT ADDITIONAL CALCULATIONS SHALL BE MADE. ALL CALCULATIONS ARE BASED ON A 2% VOLTAGE DROP FOR ALL FEEDER CIRCUITS.
- SPORTS LIGHTING MANUFACTURER'S FACTORY REPRESENTATIVE SHALL COMMISSION LIGHT POLES & FIXTURES. HE SHALL VERIFY PROPER AIMING OF ALL FIXTURES AND PROVIDE FIELD VERIFICATION OF LIGHT LEVELS. FIELD TESTING SHALL ADHERE TO I.E.S. RP-6 RECOMMENDATIONS.
- SPORTS LIGHTING MANUFACTURER SHALL PROVIDE A TURNKEY SYSTEM INCLUDING THE DESIGN AND INSTALLATION OF POLES, FOUNDATIONS, FIXTURES, CONTROL PANELS AND ALL APPURTENANCES. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND TERMINATE POWER & CONTROL WIRING TO THE SPORTS LIGHTING POLES FROM THE CONTROL PANEL AS DIRECTED BY THE MANUFACTURER.
- NEMA 4/IP66 CONTROL PANELS FOR SPORTS LIGHTING SHALL BE FURNISHED AND INSTALLED BY THE SPORTS LIGHTING MANUFACTURER. THE CONTROL SYSTEM SHALL PROVIDED KEY RESTRICTED LOCAL CONTROL OF THE SPORTS LIGHTING ON A PER FIELD LEVEL. THE LOCAL CONTROL SHALL ALSO PROVIDE REMOTE ACCESS VIA CELLULAR NETWORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN EXTERIOR MOUNTING FRAME AND TERMINATE POWER WIRING TO CONTROL PANELS AS DIRECTED BY THE MANUFACTURER.



**BASE BID OUTDOOR SPORTS LIGHTING SCHEDULE**

| POLE | POLE TYPE | VOLTS    | MOUNTING HEIGHT | NUMBER OF FIXTURES | LAMP WATTAGE | LAMP TYPE | BEAM DISTRIBUTION | GLARE SHIELD | REMARKS |
|------|-----------|----------|-----------------|--------------------|--------------|-----------|-------------------|--------------|---------|
| BB1  | CONCRETE  | 208V 3PH | 40'             | 3                  | 1000         | LED       | EXTRA WIDE        | NO           |         |
|      |           |          |                 | 3                  | 1000         | LED       | EXTRA WIDE        |              |         |
| BB1  | CONCRETE  | 208V 3PH | 40'             | 3                  | 1000         | LED       | EXTRA WIDE        | NO           |         |
|      |           |          |                 | 3                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M1   | CONCRETE  | 480V 3PH | 80'             | 10                 | 1000         | LED       | MEDIUM            | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M2   | CONCRETE  | 480V 3PH | 90'             | 8                  | 1000         | LED       | NARROW            | YES          |         |
|      |           |          |                 | 2                  | 1000         | LED       | MEDIUM            |              |         |
| M3   | CONCRETE  | 480V 3PH | 80'             | 2                  | 1000         | LED       | EXTRA WIDE        | YES          |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M4   | CONCRETE  | 480V 3PH | 80'             | 10                 | 1000         | LED       | MEDIUM            | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M5   | CONCRETE  | 480V 3PH | 80'             | 6                  | 1000         | LED       | NARROW            | YES          |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M6   | CONCRETE  | 480V 3PH | 90'             | 10                 | 1000         | LED       | MEDIUM            | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| M7   | CONCRETE  | 480V 3PH | 80'             | 8                  | 1000         | LED       | NARROW            | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | MEDIUM            |              |         |
| M8   | CONCRETE  | 480V 3PH | 80'             | 2                  | 1000         | LED       | EXTRA WIDE        | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| P1   | CONCRETE  | 480V 3PH | 70'             | 6                  | 1000         | LED       | NARROW            | NO           |         |
|      |           |          |                 | 6                  | 1000         | LED       | NARROW            |              |         |
| P2   | CONCRETE  | 480V 3PH | 70'             | 6                  | 1000         | LED       | NARROW            | NO           |         |
|      |           |          |                 | 6                  | 1000         | LED       | NARROW            |              |         |
| P3   | CONCRETE  | 480V 3PH | 70'             | 6                  | 1000         | LED       | NARROW            | NO           |         |
|      |           |          |                 | 6                  | 1000         | LED       | NARROW            |              |         |
| P4   | CONCRETE  | 480V 3PH | 70'             | 6                  | 1000         | LED       | NARROW            | NO           |         |
|      |           |          |                 | 6                  | 1000         | LED       | NARROW            |              |         |
| T1   | CONCRETE  | 208V 3PH | 50'             | 1                  | 1000         | LED       | WIDE              | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| T2   | CONCRETE  | 208V 3PH | 50'             | 1                  | 1000         | LED       | WIDE              | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| T3   | CONCRETE  | 208V 3PH | 50'             | 3                  | 1000         | LED       | EXTRA WIDE        | NO           |         |
|      |           |          |                 | 3                  | 1000         | LED       | EXTRA WIDE        |              |         |
| T4   | CONCRETE  | 208V 3PH | 50'             | 1                  | 1000         | LED       | WIDE              | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| T5   | CONCRETE  | 208V 3PH | 50'             | 1                  | 1000         | LED       | WIDE              | NO           |         |
|      |           |          |                 | 2                  | 1000         | LED       | EXTRA WIDE        |              |         |
| T6   | CONCRETE  | 208V 3PH | 50'             | 3                  | 1000         | LED       | EXTRA WIDE        | NO           |         |
|      |           |          |                 | 3                  | 1000         | LED       | EXTRA WIDE        |              |         |

**BASE BID SPORTS LIGHTING DETAILS**

**ALT BID OUTDOOR SPORTS LIGHTING SCHEDULE**

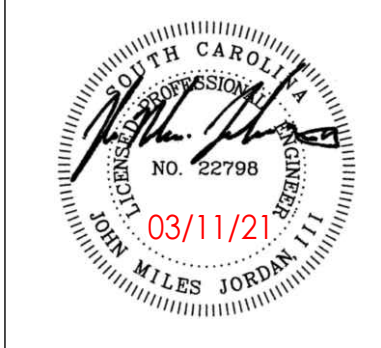
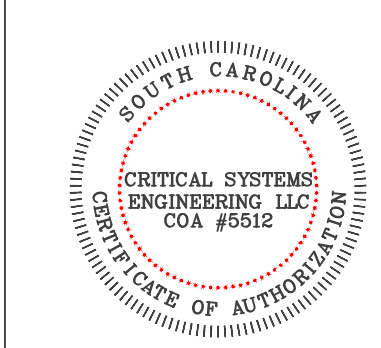
| POLE | POLE TYPE           | VOLTS    | MOUNTING HEIGHT | NUMBER OF FIXTURES | LAMP WATTAGE | LAMP TYPE | FIXTURE TYPE | GLARE SHIELD | REMARKS |
|------|---------------------|----------|-----------------|--------------------|--------------|-----------|--------------|--------------|---------|
| BB1  | STEEL OVER CONCRETE | 208V 3PH | 40'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| BB1  | STEEL OVER CONCRETE | 208V 3PH | 40'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M1   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M2   | STEEL OVER CONCRETE | 480V 3PH | 90'             | 1                  | 575          | LED       | TLC-BT-575   | YES          |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M3   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | YES          |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M4   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M5   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | YES          |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M6   | STEEL OVER CONCRETE | 480V 3PH | 90'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M7   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| M8   | STEEL OVER CONCRETE | 480V 3PH | 80'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| P1   | STEEL OVER CONCRETE | 480V 3PH | 70'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| P2   | STEEL OVER CONCRETE | 480V 3PH | 70'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| P3   | STEEL OVER CONCRETE | 480V 3PH | 70'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| P4   | STEEL OVER CONCRETE | 480V 3PH | 70'             | 1                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T1   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T2   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T3   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T4   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T5   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |
| T6   | STEEL OVER CONCRETE | 208V 3PH | 50'             | 0                  | 575          | LED       | TLC-BT-575   | NO           |         |
|      |                     |          |                 | TBD                | 1150         | LED       | TLC-LED-1150 |              |         |

**ALTERNATE BID SPORTS LIGHTING DETAILS**

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MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 804.272.1272  
 CHARLOTTE, NC 980.312.5450  
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7897  
 DATE: 03/11/21  
 DRAWN BY: JMJ  
 CHECKED BY: JMJ

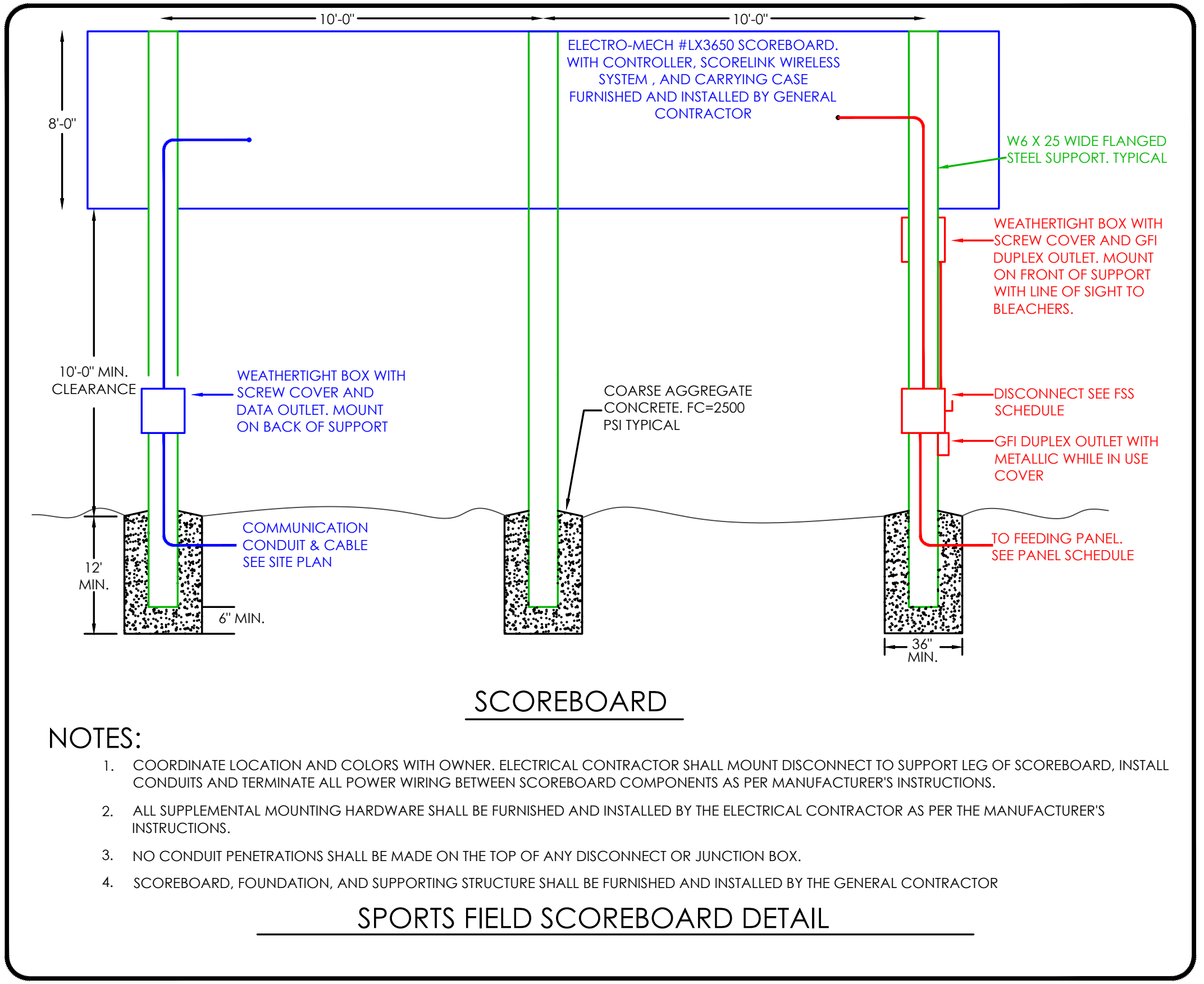
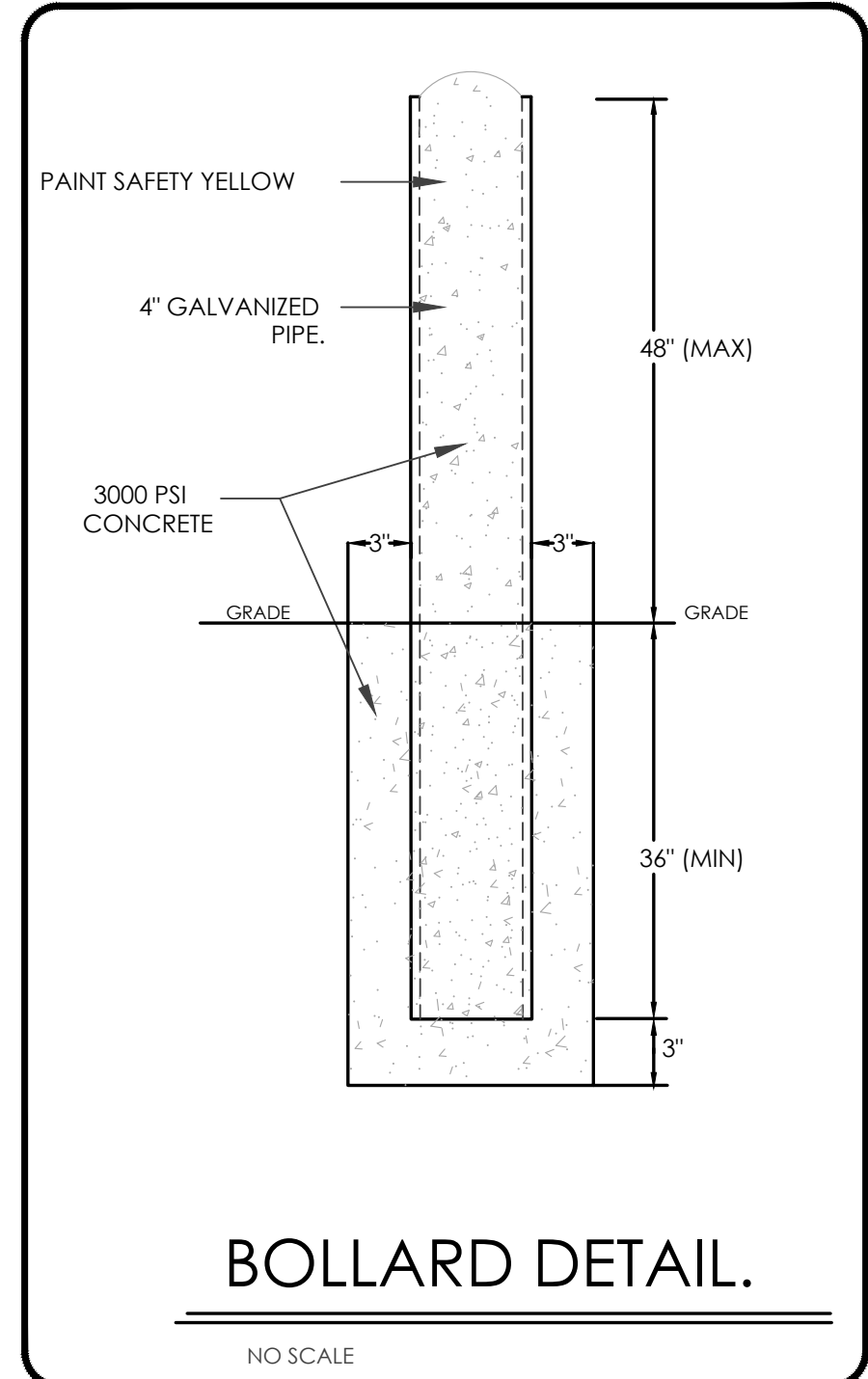
**REVISION HISTORY**

|           |          |
|-----------|----------|
| 0 BID SET | 03/11/21 |
|-----------|----------|

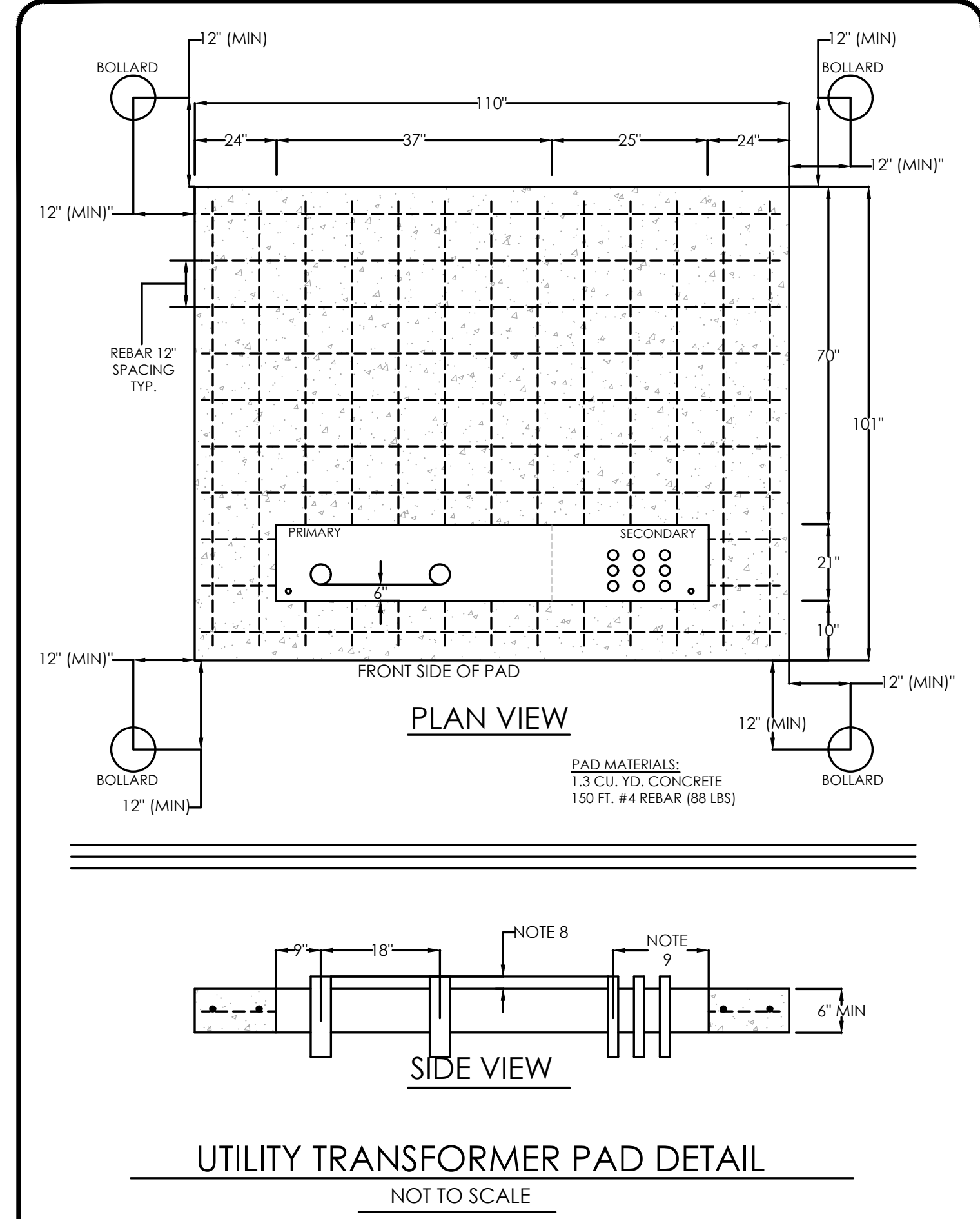
LIGHTING & MISC. DETAILS



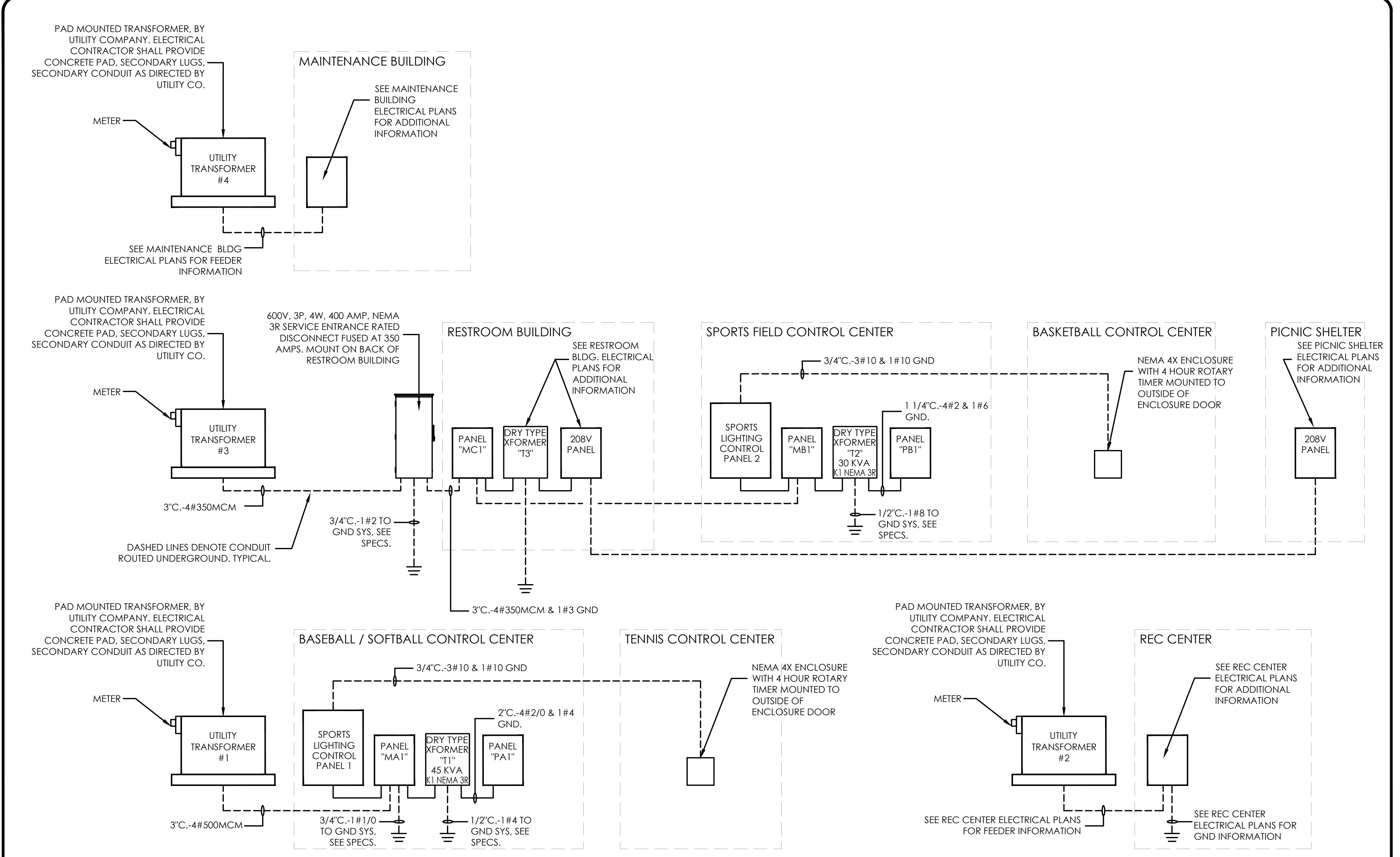
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- NOTES:**
- COORDINATE LOCATION AND COLORS WITH OWNER. ELECTRICAL CONTRACTOR SHALL MOUNT DISCONNECT TO SUPPORT LEG OF SCOREBOARD. INSTALL CONDUITS AND TERMINATE ALL POWER WIRING BETWEEN SCOREBOARD COMPONENTS AS PER MANUFACTURER'S INSTRUCTIONS.
  - ALL SUPPLEMENTAL MOUNTING HARDWARE SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR AS PER THE MANUFACTURER'S INSTRUCTIONS.
  - NO CONDUIT PENETRATIONS SHALL BE MADE ON THE TOP OF ANY DISCONNECT OR JUNCTION BOX.
  - SCOREBOARD, FOUNDATION, AND SUPPORTING STRUCTURE SHALL BE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR



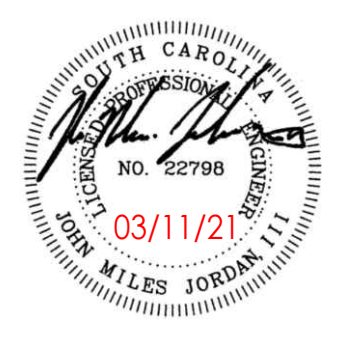
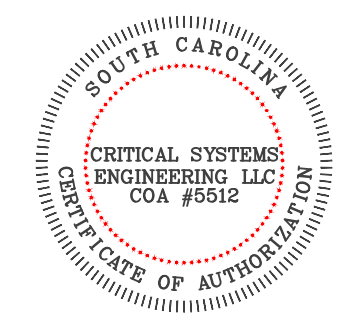
- PAD IS TO BE SPOTTED BY UTILITY CO. REPRESENTATIVE BEFORE FORMING OR POURING CONCRETE.
- PAD MUST BE BUILT TO DIMENSIONS GIVEN AND CONDUITS MUST BE INSTALLED CORRECTLY.
- PAD FOUNDATION MUST SUPPORT THE 23000 LB WEIGHT OF THE TRANSFORMER. IF SOIL CONDITION WILL NOT SUPPORT 500 LBS/FT<sup>2</sup>, THEN THE AREA THE OF PAD MUST BE INCREASED OR PILINGS INSTALLED TO MEET THE WEIGHT REQUIREMENT.
- STEEL REINFORCING REBAR SHALL BE INTERMEDIATE GRADE BILLET STEEL WITH 40,000 PSI MINIMUM YIELD STRENGTH, CONFORMING TO ASTM A615 GRADE40.
- CONCRETE OF PAD TO CONFORM TO CLASS A STRUCTURAL CONCRETE. SHALL HAVE 28 DAY STRENGTH OF 4000PSI. CONTAIN NO MORE THAN 6 PERCENT ENTRAINED AIR AND HAVE NO LARGER THAN 1 INCH AGGREGATE MIXTURE.
- LIMESTONE AGGREGATE IS NOT ACCEPTABLE. ALL OTHER CONCRETE MATERIALS SHALL BE IN ACCORDANCE WITH PORTLAND CEMENT STANDARD ASTM C150.
- IF PAD IS LOCATED IN AREA SUBJECT TO FLOODING, IT MUST BE ELEVATED ABOVE WATER LINE.
- CONDUITS MUST BE 1 INCH ABOVE FINISHED PAD.
- SECONDARY CONDUIT(S) MUST NOT BE INSTALLED MORE THAN 20 INCHES FROM RIGHT EDGE OF WINDOW. CONDUIT(S) EDGE SHOULD BE MINIMUM OF 2 INCHES FROM EDGE OF WINDOW OPENING.
- CUSTOMER MUST PROVIDE AND MARK TWO (2) SUITABLE LOCATIONS WITHIN WINDOW FOR INSTALLATION OF 2-10 FOOT GROUND RODS. ONE LOCATED ON PRIMARY SIDE AND ONE ON SECONDARY SIDE. CONDUIT WINDOW MUST BE OPEN. NO REBAR, FORMS OR CONCRETE ALLOWED.
- ALL METAL CONDUITS MUST HAVE GROUNDING BUSHINGS AND BONDED TO GROUND ROD.
- SECONDARY CONDUCTOR IS ALLOWED ONLY IN SECONDARY COMPARTMENT.
- BOLLARDS ARE REQUIRED WHERE VEHICLE TRAFFIC IS EXPECTED. THESE DEVICES ARE TO PROTECT THE PAD-MOUNTED GEAR FROM VEHICLE DAMAGE.
- BOLLARDS ARE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR.
- DO NOT LOCATE A BOLLARD WHERE DOOR(S) ACCESS WILL BE IMPEDED.



**SPECIAL NOTE:**  
REFER TO PANEL SCHEDULES FOR CONDUIT AND CONDUCTOR SIZES NOT SHOWN ON THIS RISER

**SW**  
SEAMONWHITESIDE

MOUNT PLEASANT, SC 29464  
GREENVILLE, SC 29601  
SUMMERVILLE, SC 29572  
SPARTANBURG, SC 29172  
CHARLOTTE, NC 28202  
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**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

|                         |          |
|-------------------------|----------|
| SW+ PROJECT:            | 7897     |
| DATE:                   | 03/11/21 |
| DRAWN BY:               | JMJ      |
| CHECKED BY:             | JMJ      |
| <b>REVISION HISTORY</b> |          |
| 0 BID SET               | 03/11/21 |
|                         |          |
|                         |          |
|                         |          |

**POWER DISTRIBUTION DETAILS**



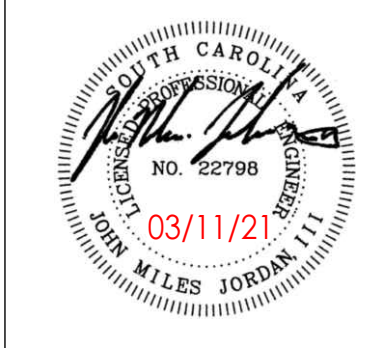
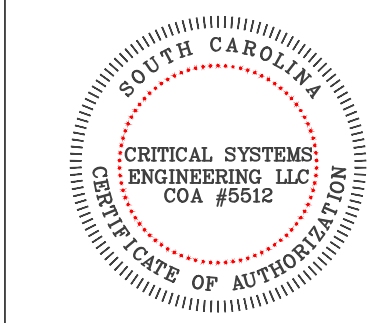
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|         |         | PANEL LABEL: MA1<br>FULLY RATED SYM SCCR: 50000<br>VOLTAGE: 277/480<br>SYSTEM: 3 PHASE, 4 WIRE |   |  |     | TRIM: SURFACE - NEMA 3R<br>RATING: 400 AMP<br>MAIN: 400 AMP MAIN BREAKER<br>NOTES: SERVICE ENTRANCE RATED |                 |     |   |         |         |         |
|---------|---------|--|---|--|-----|---|-----------------|-----|---|---------|---------|---------|
| A Phase | B Phase | C Phase  | LOAD DESCRIPTION                                    |  | NUM | BKR SIZE  | PHASE A   B   C | NUM | LOAD DESCRIPTION                                    | A Phase | B Phase | C Phase |
|         | 3448    |  | PARKING LOT LIGHTING                                |  | 1   |   |                 | 2   | SPARE   |         |         |         |
|         | 2586    |  | PARKING LOT LIGHTING                                |  | 3   |   |                 | 4   | SPARE   |         |         |         |
|         |         |  | SPARE   |  | 5   |   |                 | 6   | SPARE   |         |         |         |
|         | 8600    |  | SPORTS LIGHTING POLE PM4<br>1 1/4" C - 3#8 & #8 GND |  | 7   | 50  |                 | 8   |   | 8600    |         |         |
|         |         | 8600   | SPORTS LIGHTING POLE PM5<br>1 1/4" C - 3#8 & #8 GND |  | 9   | 50  |                 | 10  | SPORTS LIGHTING POLE PM1<br>1 1/4" C - 3#8 & #8 GND |         | 8600    |         |
|         |         |  | SPORTS LIGHTING POLE PM3<br>1" C - 3#4 & #8 GND     |  | 11  |   |                 | 12  |   |         | 8600    |         |
|         | 8600    |  | SPORTS LIGHTING POLE PM6<br>1" C - 3#4 & #8 GND     |  | 13  |   |                 | 14  |   | 8600    |         |         |
|         |         | 8600   | SPORTS LIGHTING POLE PM2<br>1" C - 3#6 & #10 GND    |  | 15  | 50  |                 | 16  | SPORTS LIGHTING POLE PM7<br>1" C - 3#4 & #8 GND     |         | 8600    |         |
|         |         |  | SPORTS LIGHTING POLE PM5<br>1" C - 3#8 & #10 GND    |  | 17  |   |                 | 18  | 1" C - 3#4 & #8 GND                                 |         | 8600    |         |
|         | 8600    |  | SPORTS LIGHTING POLE PM8<br>1" C - 3#8 & #10 GND    |  | 19  |   |                 | 20  |   | 8600    |         |         |
|         |         | 8600   | SPACE   |  | 21  | 50  |                 | 22  | SPORTS LIGHTING POLE PT1<br>1" C - 4#6 & #10 GND    |         | 8600    |         |
|         |         |  | SPACE   |  | 23  |   |                 | 24  | 1" C - 3#4 & #8 GND                                 |         | 8600    |         |
|         | 15995   |  | SPACE   |  | 25  |   |                 | 26  |   | 8600    |         |         |
|         |         | 15795  | SPACE   |  | 27  | 50  |                 | 28  | SPORTS LIGHTING POLE PT2<br>1" C - 3#8 & #10 GND    |         | 8600    |         |
|         |         |  | SPACE   |  | 29  |   |                 | 30  | 1" C - 3#8 & #10 GND                                |         | 8600    |         |
|         |         |  | SPACE   |  | 31  |   |                 | 32  |   |         |         |         |
|         |         |  | SPACE   |  | 33  |   |                 | 34  |   |         |         |         |
|         |         |  | SPACE   |  | 35  |   |                 | 36  |   |         |         |         |
|         |         |  | SPACE   |  | 37  |   |                 | 38  |   |         |         |         |
|         |         |  | SPACE   |  | 39  | 70  |                 | 40  | SPACE   |         |         |         |
|         |         |  | SPACE   |  | 41  |   |                 | 42  |   |         |         |         |
|         | 53843   | 52781  | SPACE   |  | 43  |   |                 | 44  |   |         |         |         |
|         |         | 47598  | SPACE   |  | 45  |   |                 | 46  |   |         |         |         |
|         |         |  | SPACE   |  | 47  |   |                 | 48  |   |         |         |         |
|         |         |  | SPACE   |  | 49  |   |                 | 50  |   |         |         |         |
|         |         |  | SPACE   |  | 51  |   |                 | 52  |   |         |         |         |
|         |         |  | SPACE   |  | 53  |   |                 | 54  |   |         |         |         |
|         |         |  | SPACE   |  | 55  |   |                 | 56  |   |         |         |         |
|         |         |  | SPACE   |  | 57  |   |                 | 58  |   |         |         |         |
|         |         |  | SPACE   |  | 59  |   |                 | 60  |   |         |         |         |
|         |         |  | SPACE   |  | 61  |   |                 | 62  |   |         |         |         |
|         |         |  | SPACE   |  | 63  |   |                 | 64  |   |         |         |         |
|         |         |  | SPACE   |  | 65  |   |                 | 66  |   |         |         |         |
|         |         |  | SPACE   |  | 67  |   |                 | 68  |   |         |         |         |
|         |         |  | SPACE   |  | 69  |   |                 | 70  |   |         |         |         |
|         |         |  | SPACE   |  | 71  |   |                 | 72  |   |         |         |         |
|         |         |  | SPACE   |  | 73  |   |                 | 74  |   |         |         |         |
|         |         |  | SPACE   |  | 75  |   |                 | 76  |   |         |         |         |
|         |         |  | SPACE   |  | 77  |   |                 | 78  |   |         |         |         |
|         |         |  | SPACE   |  | 79  |   |                 | 80  |   |         |         |         |
|         |         |  | SPACE   |  | 81  |   |                 | 82  |   |         |         |         |
|         |         |  | SPACE   |  | 83  |   |                 | 84  |   |         |         |         |
|         |         |  | SPACE   |  | 85  |   |                 | 86  |   |         |         |         |
|         |         |  | SPACE   |  | 87  |   |                 | 88  |   |         |         |         |
|         |         |  | SPACE   |  | 89  |   |                 | 90  |   |         |         |         |
|         |         |  | SPACE   |  | 91  |   |                 | 92  |   |         |         |         |
|         |         |  | SPACE   |  | 93  |   |                 | 94  |   |         |         |         |
|         |         |  | SPACE   |  | 95  |   |                 | 96  |   |         |         |         |
|         |         |  | SPACE   |  | 97  |   |                 | 98  |   |         |         |         |
|         |         |  | SPACE   |  | 99  |   |                 | 100 |   |         |         |         |
|         |         |  | SPACE   |  | 101 |   |                 | 102 |   |         |         |         |
|         |         |  | SPACE   |  | 103 |   |                 | 104 |   |         |         |         |
|         |         |  | SPACE   |  | 105 |   |                 | 106 |   |         |         |         |
|         |         |  | SPACE   |  | 107 |   |                 | 108 |   |         |         |         |
|         |         |  | SPACE   |  | 109 |   |                 | 110 |   |         |         |         |
|         |         |  | SPACE   |  | 111 |   |                 | 112 |   |         |         |         |
|         |         |  | SPACE   |  | 113 |   |                 | 114 |   |         |         |         |
|         |         |  | SPACE   |  | 115 |   |                 | 116 |   |         |         |         |
|         |         |  | SPACE   |  | 117 |   |                 | 118 |   |         |         |         |
|         |         |  | SPACE   |  | 119 |   |                 | 120 |   |         |         |         |
|         |         |  | SPACE   |  | 121 |   |                 | 122 |   |         |         |         |
|         |         |  | SPACE   |  | 123 |   |                 | 124 |   |         |         |         |
|         |         |  | SPACE   |  | 125 |   |                 | 126 |   |         |         |         |
|         |         |  | SPACE   |  | 127 |   |                 | 128 |   |         |         |         |
|         |         |  | SPACE   |  | 129 |   |                 | 130 |   |         |         |         |
|         |         |  | SPACE   |  | 131 |   |                 | 132 |   |         |         |         |
|         |         |  | SPACE   |  | 133 |   |                 | 134 |   |         |         |         |
|         |         |  | SPACE   |  | 135 |   |                 | 136 |   |         |         |         |
|         |         |  | SPACE   |  | 137 |   |                 | 138 |   |         |         |         |
|         |         |  | SPACE   |  | 139 |   |                 | 140 |   |         |         |         |
|         |         |  | SPACE   |  | 141 |   |                 | 142 |   |         |         |         |
|         |         |  | SPACE   |  | 143 |   |                 | 144 |   |         |         |         |
|         |         |  | SPACE   |  | 145 |   |                 | 146 |   |         |         |         |
|         |         |  | SPACE   |  | 147 |   |                 | 148 |   |         |         |         |
|         |         |  | SPACE   |  | 149 |   |                 | 150 |   |         |         |         |
|         |         |  | SPACE   |  | 151 |   |                 | 152 |   |         |         |         |
|         |         |  | SPACE   |  | 153 |   |                 | 154 |   |         |         |         |
|         |         |  | SPACE   |  | 155 |   |                 | 156 |   |         |         |         |
|         |         |  | SPACE   |  | 157 |   |                 | 158 |   |         |         |         |
|         |         |  | SPACE   |  | 159 |   |                 | 160 |   |         |         |         |
|         |         |  | SPACE   |  | 161 |   |                 | 162 |   |         |         |         |
|         |         |  | SPACE   |  | 163 |   |                 | 164 |   |         |         |         |
|         |         |  | SPACE   |  | 165 |   |                 | 166 |   |         |         |         |
|         |         |  | SPACE   |  | 167 |   |                 | 168 |   |         |         |         |
|         |         |  | SPACE   |  | 169 |   |                 | 170 |   |         |         |         |
|         |         |  | SPACE   |  | 171 |   |                 | 172 |   |         |         |         |
|         |         |  | SPACE   |  | 173 |   |                 | 174 |   |         |         |         |
|         |         |  | SPACE   |  | 175 |   |                 | 176 |   |         |         |         |
|         |         |  | SPACE   |  | 177 |   |                 | 178 |   |         |         |         |
|         |         |  | SPACE   |  | 179 |   |                 | 180 |   |         |         |         |
|         |         |  | SPACE   |  | 181 |   |                 | 182 |   |         |         |         |
|         |         |  | SPACE   |  | 183 |   |                 | 184 |   |         |         |         |
|         |         |  | SPACE   |  | 185 |   |                 | 186 |   |         |         |         |
|         |         |  | SPACE   |  | 187 |   |                 | 188 |   |         |         |         |
|         |         |  | SPACE   |  | 189 |   |                 | 190 |   |         |         |         |
|         |         |  | SPACE   |  | 191 |   |                 | 192 |   |         |         |         |
|         |         |  | SPACE   |  | 193 |   |                 | 194 |   |         |         |         |
|         |         |  | SPACE   |  | 195 |   |                 | 196 |   |         |         |         |
|         |         |  | SPACE   |  | 197 |   |                 | 198 |   |         |         |         |
|         |         |  | SPACE   |  | 199 |   |                 | 200 |   |         |         |         |
|         |         |  | SPACE   |  | 201 |   |                 | 202 |   |         |         |         |
|         |         |  | SPACE   |  | 203 |   |                 | 204 |   |         |         |         |
|         |         |  | SPACE   |  | 205 |   |                 | 206 |   |         |         |         |
|         |         |  | SPACE   |  | 207 |   |                 | 208 |   |         |         |         |
|         |         |  | SPACE   |  | 209 |   |                 | 210 |   |         |         |         |
|         |         |  | SPACE   |  | 211 |   |                 | 212 |   |         |         |         |
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|         |         |  | SPACE   |  | 227 |   |                 | 228 |   |         |         |         |
|         |         |  | SPACE   |  | 229 |   |                 | 230 |   |         |         |         |
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|         |         |  | SPACE   |  | 233 |   |                 | 234 |   |         |         |         |
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|         |         |  | SPACE   |  | 291 |   |                 | 292 |   |         |         |         |

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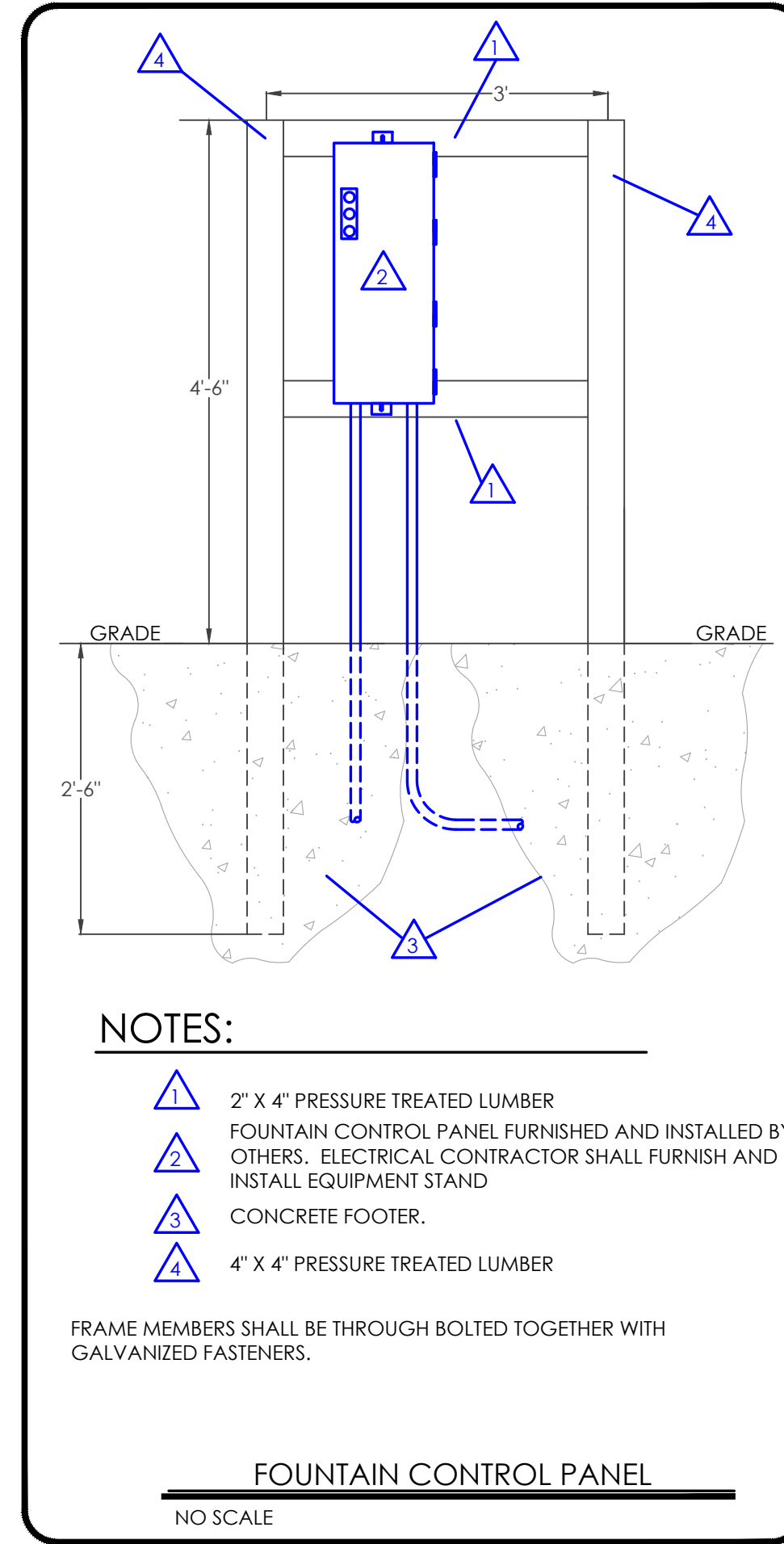
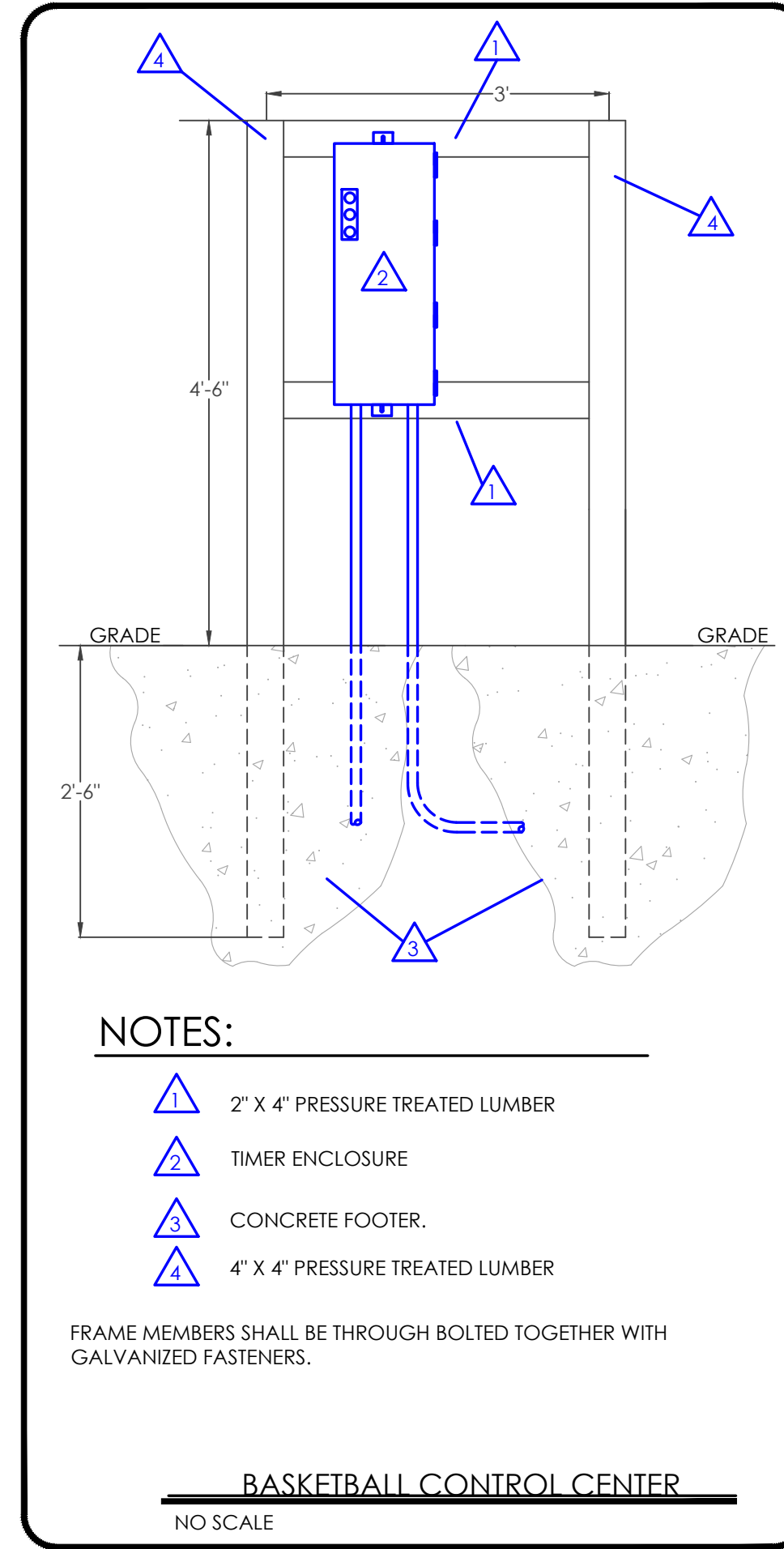
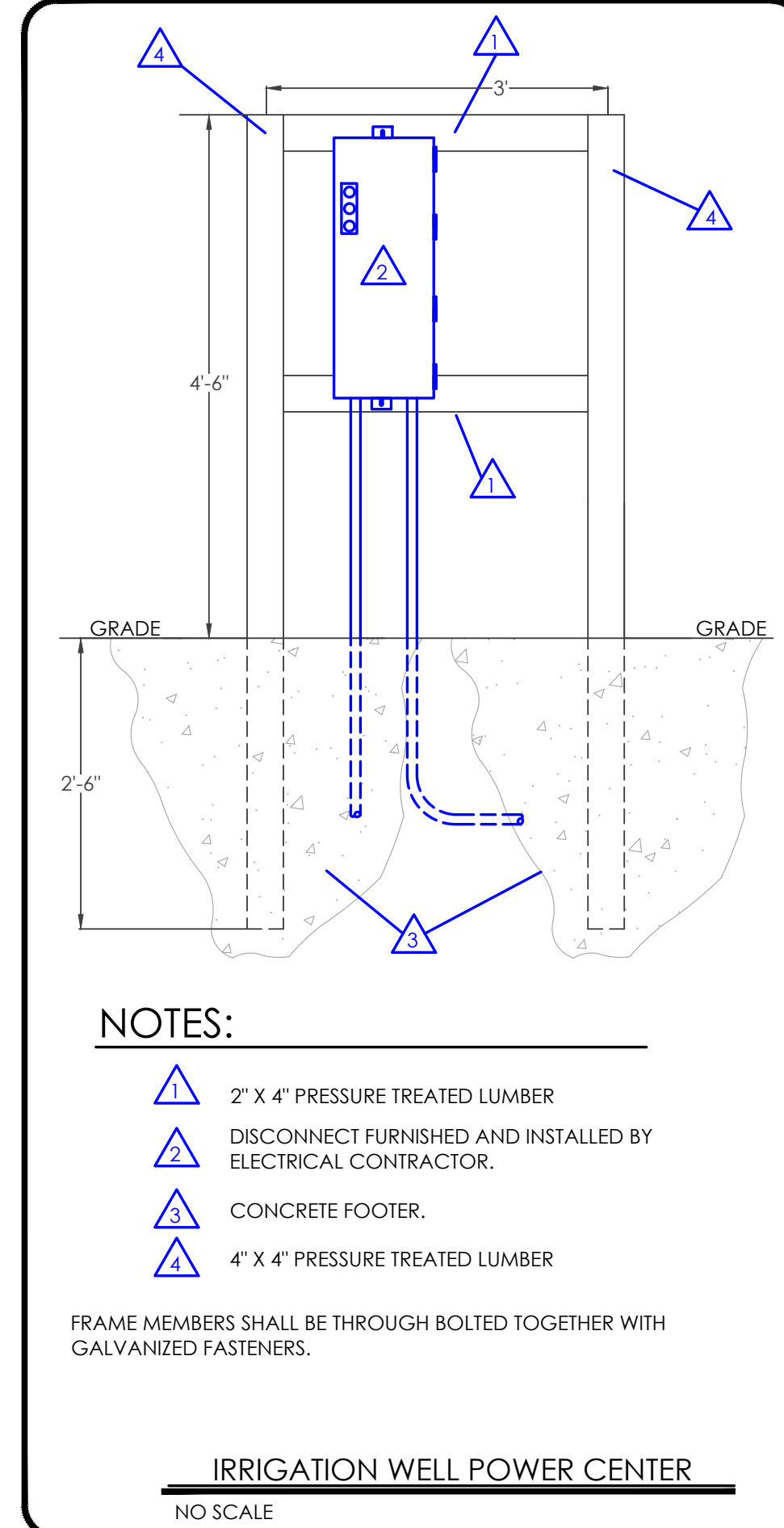
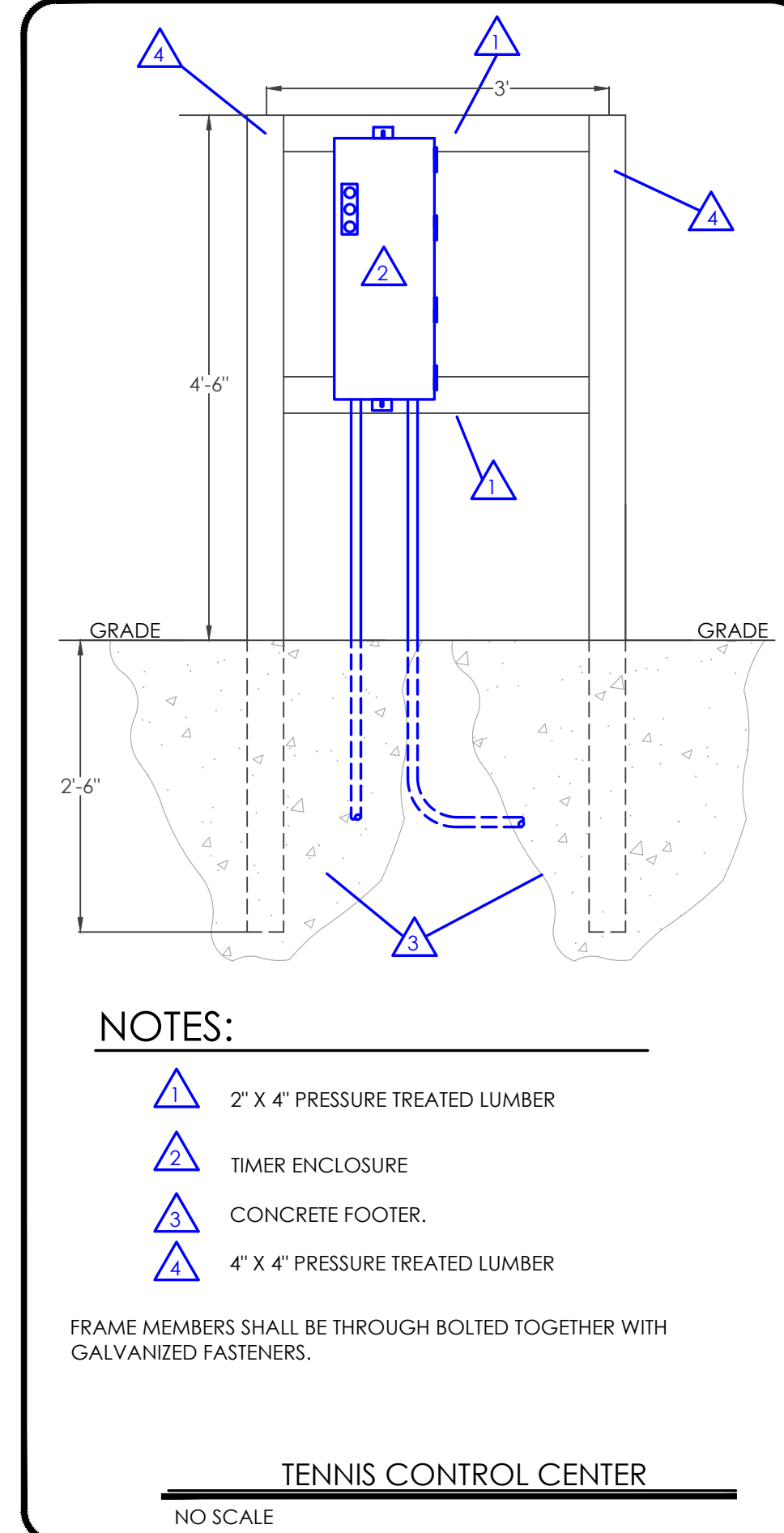
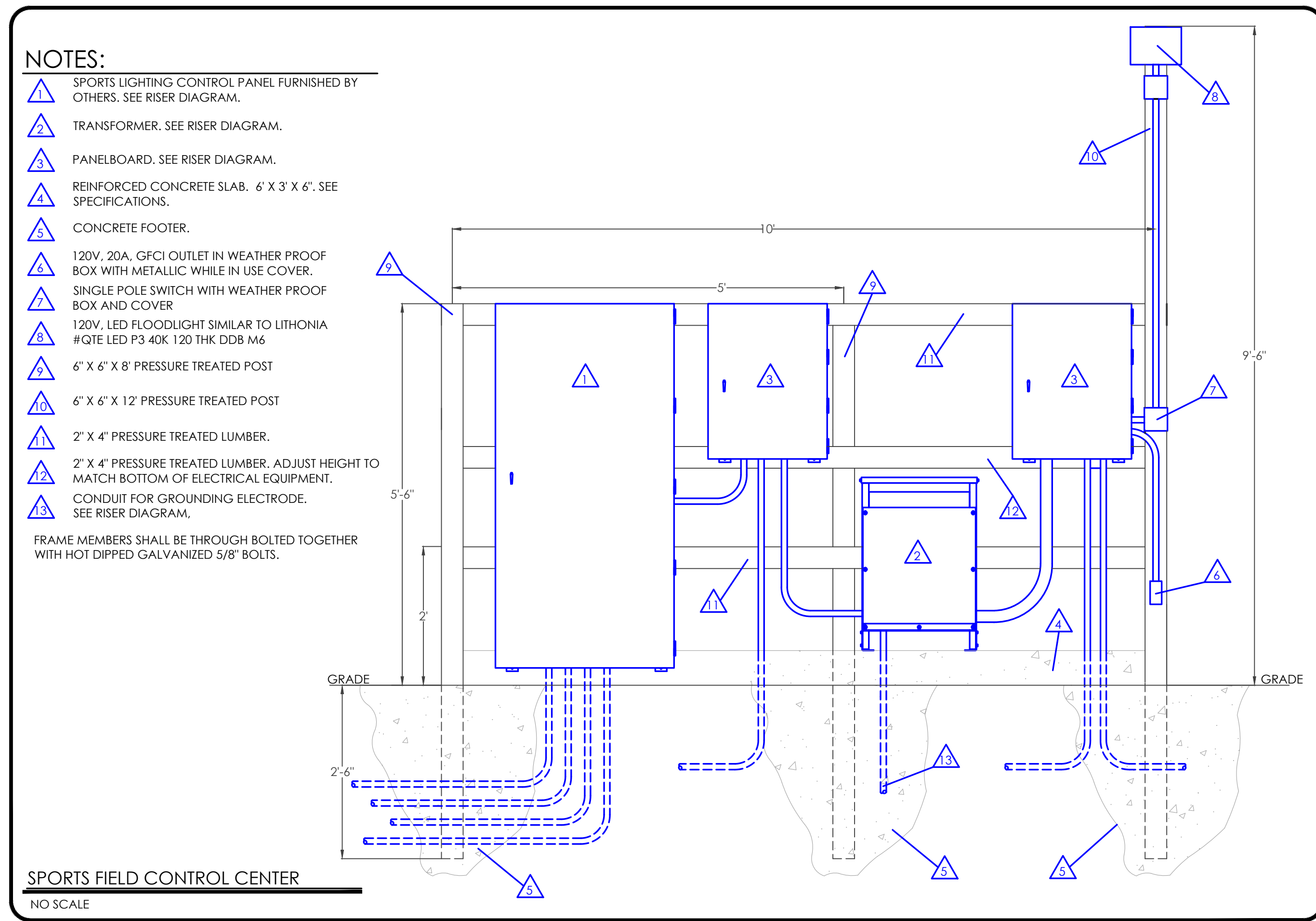
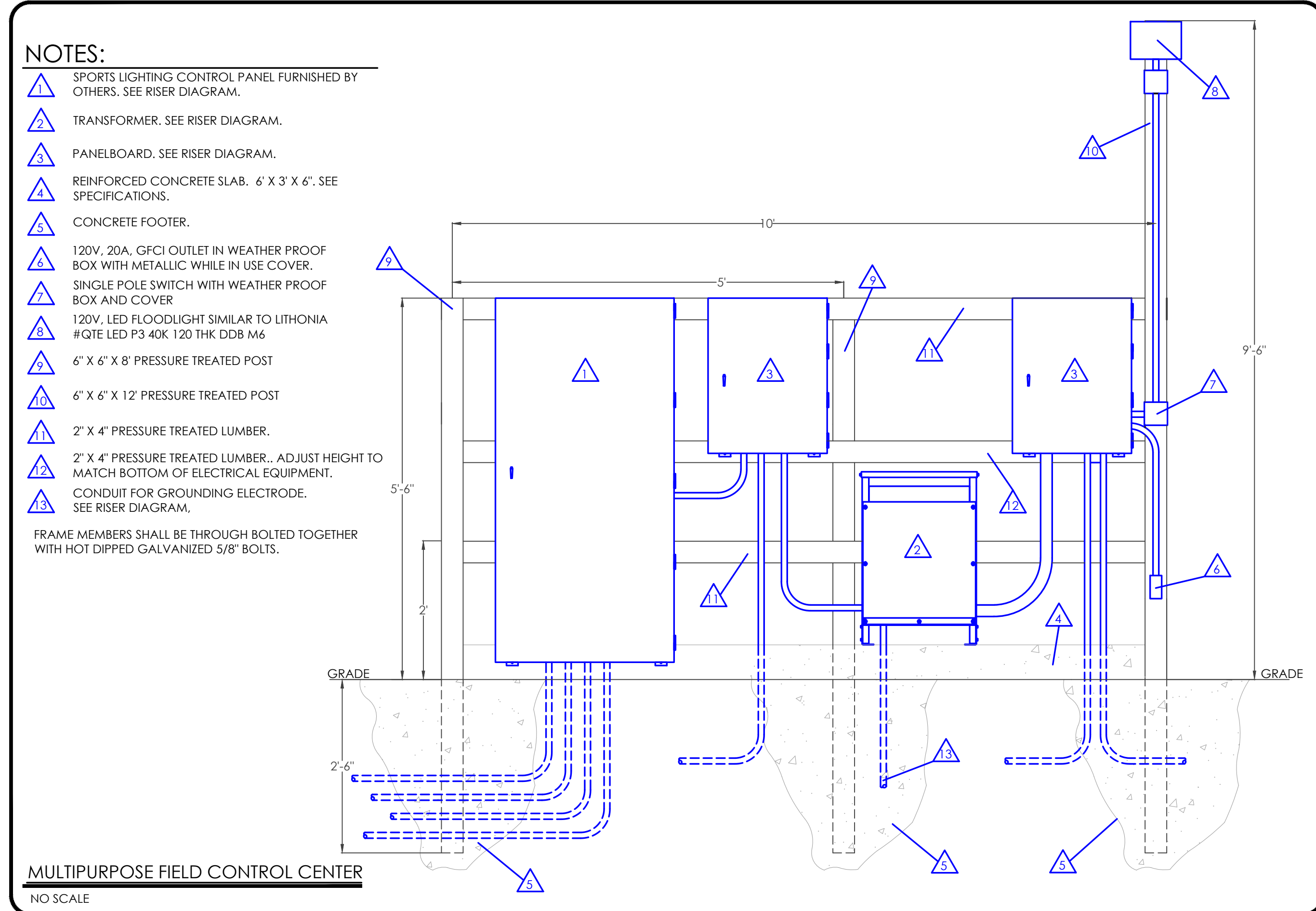


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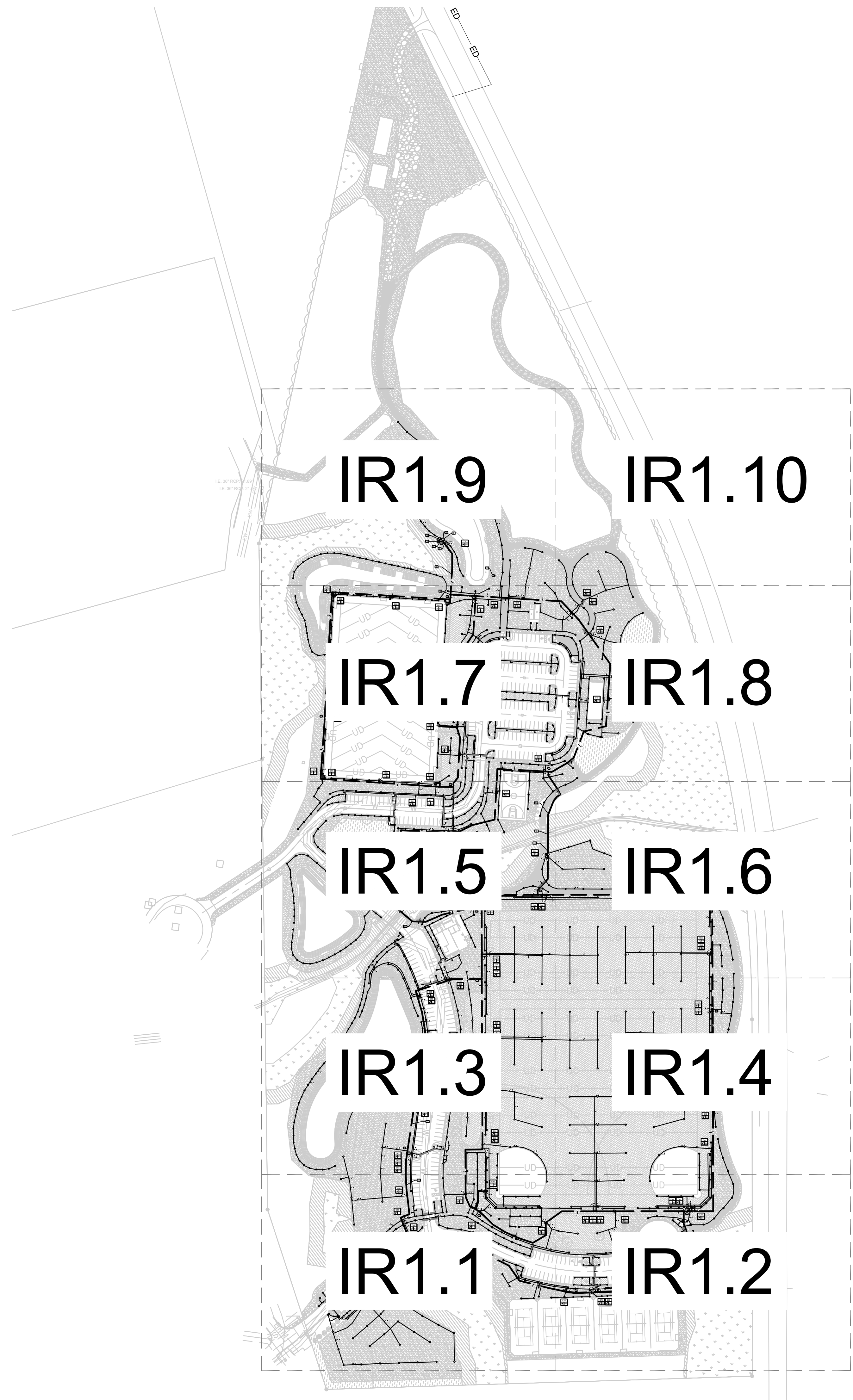
SW+ PROJECT: 7897  
 DATE: 03/11/21  
 DRAWN BY: JMJ  
 CHECKED BY: JMJ

| REVISION HISTORY |          |
|------------------|----------|
| 0 BID SET        | 03/11/21 |
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|                  |          |

**EXTERIOR EQUIPMENT MOUNTING DETAILS**



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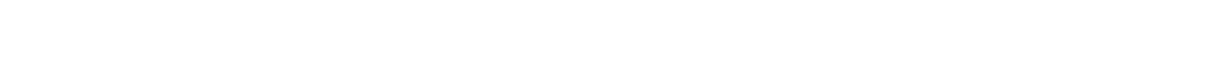
### IRRIGATION SCHEDULE

| SYMBOL | MANUFACTURER/MODEL/DESCRIPTION   |
|--------|--|
|        | Hunter PROS-12-PRS30-CV 5' strip spray Shrub Spray, 30 psi regulated 12.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.  |
|        | Hunter PROS-12-PRS30-CV 10' radius Shrub Spray, 30 psi regulated 12.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.  |
|        | Hunter PROS-12-PRS30-CV Adjustable Arc Shrub Spray, 30 psi regulated 12.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.  |
|        | Hunter MP Corner PROS-06-PRS40-CV Turf Rotator, 6" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. T=Turquoise adj arc 45-105.                                   |
|        | Hunter MP Strip PROS-06-PRS40-CV Turf Rotator, 6" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. LST=Ivory left strip, SST=Copper right strip.                  |
|        | Hunter MP1000 PROS-06-PRS40-CV Turf Rotator, 6" pop-up with check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.          |
|        | Hunter MP2000 PROS-06-PRS40-CV Turf Rotator, 6" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.  |
|        | Hunter MP3000 PROS-06-PRS40-CV Turf Rotator, 6" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc. |
|        | Hunter MP Corner PROS-12-PRS40-CV Shrub Rotator, 12" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle. T=Turquoise adj arc 45-105.   |
|        | Hunter MP Strip PROS-12-PRS40-CV Shrub Rotator, 12" pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle. LST=Ivory left strip, SST=Copper right strip.                              |
|        | Hunter MP1000 PROS-12-PRS40-CV Shrub Rotator, 12" pop-up with check valve, pressure regulated to 40 psi, MP Rotator nozzle. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.                      |
|        | Hunter MP2000 PROS-12-PRS40-CV Shrub Rotator, 12" pop-up with check valve, pressure regulated to 40 psi, MP Rotator nozzle. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.                                |

| SYMBOL | MANUFACTURER/MODEL/DESCRIPTION  |
|--------|---|
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-20-04-PRB Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Plastic Riser. Pressure Regulated to 45 psi, Drain Check Valve. Standard Nozzle.                    |
|        | Hunter I-25-04-SS Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Stainless Steel Riser. Drain Check Valve. Standard Nozzle.   |
|        | Hunter I-25-04-SS Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Stainless Steel Riser. Drain Check Valve. Standard Nozzle.   |
|        | Hunter I-25-04-SS Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Stainless Steel Riser. Drain Check Valve. Standard Nozzle.   |
|        | Hunter I-25-04-SS Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Stainless Steel Riser. Drain Check Valve. Standard Nozzle.   |
|        | Hunter I-25-04-SS Turf Rotor, 4.0" Pop-Up, Adjustable and Full Circle. Stainless Steel Riser. Drain Check Valve. Standard Nozzle.   |
|        | Hunter STK-2 STK kit. STG-900 rotor, ST Vault, ST swing joint, ST valve and fitting kit, ST adapter elbow, ST rotor adapter fitting, Rubber cover kit, quick coupler valve. |

### IRRIGATION SCHEDULE

| SYMBOL | MANUFACTURER/MODEL/DESCRIPTION   |
|--------|--|
|        | Hunter ICV-G-FS 1", 1-1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use. With Filter Sentry.  |
|        | Hunter HQ-44LRC-AW Quick coupler valve, yellow rubber locking cover, red brass and stainless steel, with 1" NPT inlet, 2-piece body. Acme key with Anti-Rotation Wings.  |
|        | Matco-Norca 10RT 2" to 8" cast iron gate isolation valve. Ring-Tite Gasket Ends. Resilient wedge with epoxy coating and optional nut. For IPS pipe. Same size as mainline pipe.  |
|        | Nibco T-113 Class 125 bronze gate shut off valve with wheel handle, same size as mainline pipe diameter at valve location. Size Range - 1/4" - 3"  |
|        | Rain Bird ESP-LXD-LXMMSS-LXMMSSPED with (1) ESPLXD-SM75 125 station 2-wire, exterior stainless steel pedestal. Flow sensing.   |
|        | Rain Bird IQ-NCC-4G IQ NCC 4G Cell data cartridge.   |
|        | Rain Bird WR2-RFS Wireless Rain/Freeze Sensor.   |
|        | Creative Sensor Technology FSI-S30-001 3" PVC Saddle Type Flow Sensor, custom mounting saddle and ultra-lightweight impeller enhances low flow measurement. Two wire digital output compatible with all irrigation controllers. Flow range: 6-300 GPM. |
|        | 2-Wire Grounding Point Install as per plan detail and manufacturers instructions.  |
|        | Pond Recharge Well 60 gpm with a discharge pressure of 20 psi. See plans Recharge Well Notes.  |
|        | Pump Station: Watertronics WMLV-7000-2-30-4620-3-200-13  |
|        | Irrigation Lateral Line: PVC Class 200 SDR 21  |
|        | Irrigation Mainline: PVC Class 200 SDR 21  |
|        | Irrigation Mainline: HDPE PE4710 DR 11   |
|        | Pipe Sleeve: PVC Schedule 40 Valve Callout   |



### REFERENCE NOTES SCHEDULE

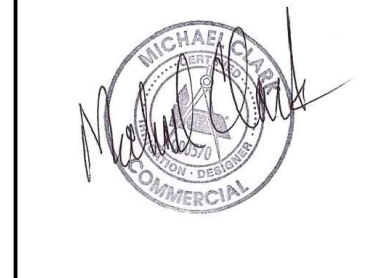
| SYMBOL | DESCRIPTION   |
|--------|---|
|        | Irrigation system water source to be a pump station pumping out of the retention basin. System requirements are 200 gpm with a discharge pressure of 130 psi.   |
|        | See pump station detail and specifications sheet IR1.12.  |
|        | Install pedestal controller and pump station on a concrete pad as per detail on sheet IR1.12. Power for the controller will be located in the pump station control panel. All power wire to be in SCH 40 PVC conduit. |
|        | Install data modem cartridge in the controller and connect to Rain Bird IQ4. Contact Rain Bird rep Donn Mann, 520-904-1146, for IQ4 subscription and set up.  |
|        | Mount the wireless Rain/Freeze sensor on either the pump station enclosure or the side of the controller.   |
|        | Install the flow sensor as per plan detail and manufacturers instructions. Program controller to learn flow of all zones, maximize flow and shut down and alert on zone over-flow.                                    |
|        | Recharge well to provide 60 gpm at a discharge pressure of 20 psi. See well recharge notes on sheet IR1.12.   |
|        | All mainline piping 3" and larger to be gasket joint with ductile iron gasket joint fittings with manufacturers recommended joint restraint.  |
|        | All ductile iron fittings change of direction fittings to have concrete thrust blocks as well as joint restraint.   |
|        | Install control valve off of the synthetic turf and pipe to the STK-2 package. Install 1" mainline from the mainline prior to the valve to the Quick Coupler valve in the STK-2.                                      |
|        | Install mainline and control wire 4' off of the back of the curb in the area of the over-flow parking.  |
|        | Convert to HDPE via Ductile Iron fittings and restraints.   |
|        | Directional bore 3" HDPE mainline and control wire under the wetland. Maintain 36" of cover over the HDPE pipe.   |

### CRITICAL ANALYSIS

|                                    |                  |
|------------------------------------|------------------|
| Generated:                         | 2020-06-08 16:06 |
| P.O.C. NUMBER: 01                  |                  |
| Water Source Information:          |                  |
| FLOW AVAILABLE                     |                  |
| Custom Max Flow:                   | 200.00 gpm       |
| Flow Available:                    | 200.00 gpm       |
| PRESSURE AVAILABLE                 |                  |
| Static Pressure at POC:            | 130.00 psi       |
| Pressure Available:                | 130.00 psi       |
| DESIGN ANALYSIS                    |                  |
| Maximum Multi-valve Flow:          | 200.00 gpm       |
| Flow Available at POC:             | 200.00 gpm       |
| Residual Flow Available:           | 0.00 gpm         |
| Pressure Req. at Critical Station: | 113.11 psi       |
| Loss for Fittings:                 | 0.71 psi         |
| Loss for Main Line:                | 7.10 psi         |
| Loss for POC to Valve Elevation:   | 0.00 psi         |
| Loss for Backflow:                 | 0.00 psi         |
| Critical Station Pressure at POC:  | 120.92 psi       |
| Pressure Available:                | 130.00 psi       |
| Residual Pressure Available:       | 9.08 psi         |



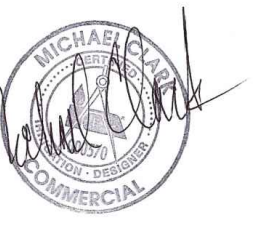
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| SW+ PROJECT:     | 7867     |
| DATE:            | 6/12/20  |
| DRAWN BY:        | MDC      |
| CHECKED BY:      | CPC      |
| REVISION HISTORY |          |
| 0                | 03/11/21 |

IRRIGATION SHEET LAYOUT PLAN



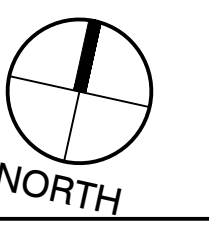
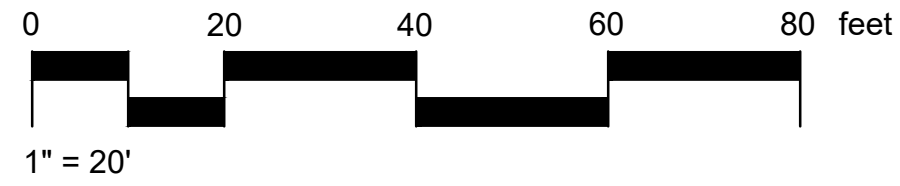
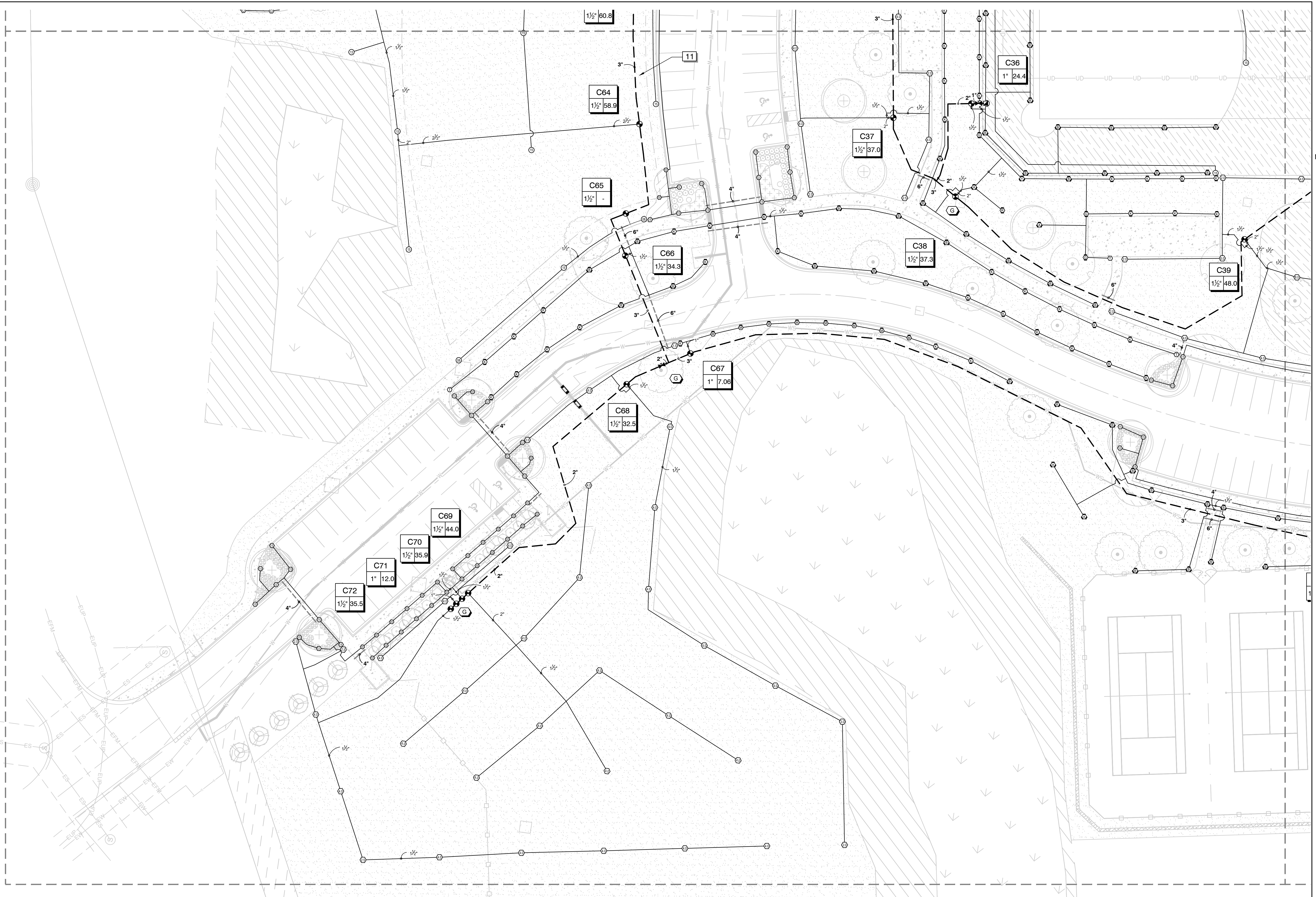
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 CITY OF HANAHAN  
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SW+ PROJECT: 7867  
 DATE: 6/12/20  
 DRAWN BY: MDC  
 CHECKED BY: CPC

| REVISION HISTORY |          |
|------------------|----------|
| 0                | 03/11/21 |

IRRIGATION  
 PLAN

IR1.1

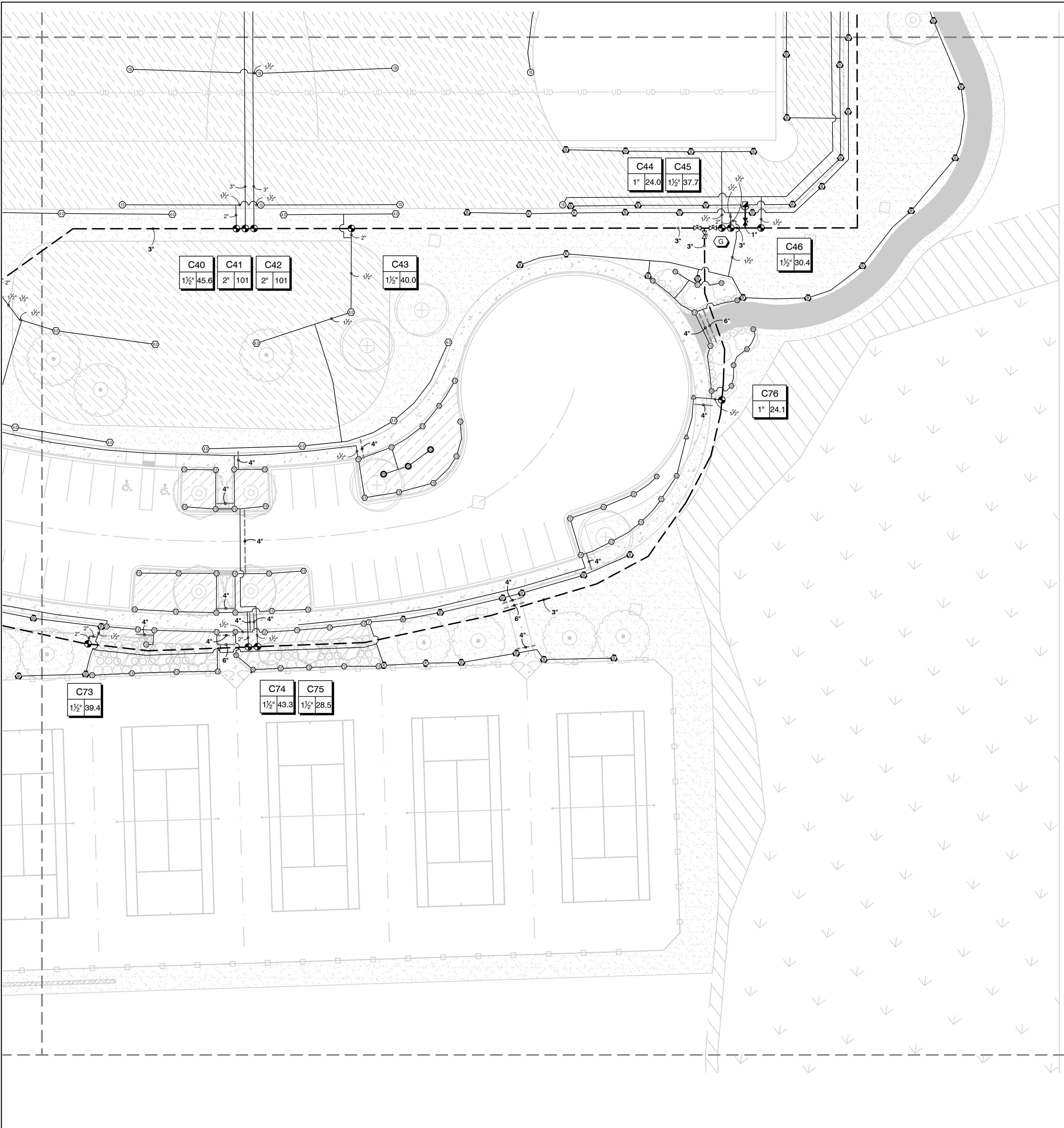


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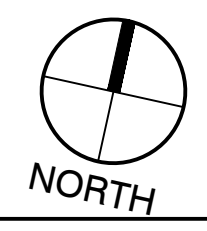
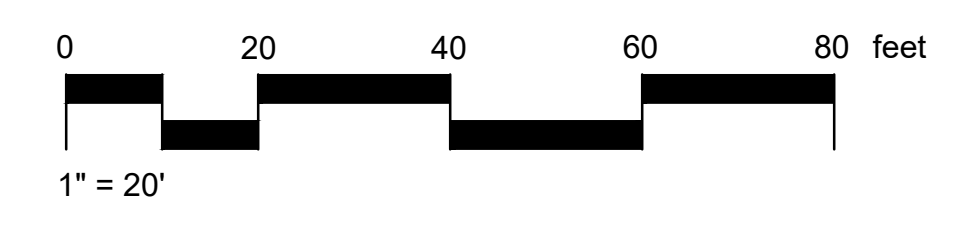


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### VALVE SCHEDULE

| NUMBER | MODEL           | SIZE   | TYPE         | GPM    | PSI    | PSI @ POC | PRECIP    |
|--------|-----------------|--------|--------------|--------|--------|-----------|-----------|
| C1     | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 26.88  | 48.19  | 46.33     | 0.21 in/h |
| C2     | Hunter ICV-G-FS | 1"     | Turf Rotary  | 71.29  | 44.16  | 46.47     | 0.35 in/h |
| C3     | Hunter ICV-G-FS | 1"     | Turf Rotary  | 18.20  | 43.43  | 49.04     | 0.53 in/h |
| C4     | Hunter ICV-G-FS | 1-1/2" | Shrub Rotary | 37.80  | 44.75  | 50.41     | 0.41 in/h |
| C5     | Hunter ICV-G-FS | 1"     | Shrub Spray  | 9.15   | 33.75  | 39.47     | 1.44 in/h |
| C6     | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 40.28  | 42.81  | 50.30     | 0.41 in/h |
| C7     | Hunter ICV-G-FS | 1"     | Shrub Spray  | 24.09  | 39.19  | 46.86     | 1.41 in/h |
| C8     | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 42.51  | 44.13  | 51.90     | 0.37 in/h |
| C9     | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 50.68  | 43.73  | 52.21     | 0.39 in/h |
| C10    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 32.80  | 42.52  | 50.88     | 0.35 in/h |
| C11    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 37.95  | 42.62  | 50.99     | 0.36 in/h |
| C12    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 47.50  | 49.56  | 57.62     | 0.50 in/h |
| C13    | Hunter ICV-G-FS | 1"     | Turf Rotary  | 17.91  | 44.46  | 52.23     | 0.37 in/h |
| C14    | Hunter ICV-G-FS | 1"     | Shrub Spray  | 8.34   | 34.02  | 41.77     | 0.96 in/h |
| C15    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 58.00  | 49.88  | 56.73     | 0.48 in/h |
| C16    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 48.00  | 51.17  | 57.23     | 0.53 in/h |
| C17    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 56.83  | 49.82  | 55.83     | 0.60 in/h |
| C18    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 44.84  | 48.75  | 52.74     | 0.54 in/h |
| C19    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 26.11  | 48.07  | 50.96     | 0.20 in/h |
| C20    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 33.80  | 85.06  | 96.64     | 1.64 in/h |
| C21    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 76.98  | 88.53     | 0.86 in/h |
| C22    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 32.82  | 42.38  | 54.19     | 0.38 in/h |
| C23    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 79.31  | 91.39     | 0.45 in/h |
| C24    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 78.27  | 90.37     | 0.45 in/h |
| C25    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 77.31  | 89.44     | 1.12 in/h |
| C26    | Hunter ICV-G-FS | 1-1/2" | Shrub Spray  | 28.10  | 33.43  | 46.56     | 1.62 in/h |
| C27    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 78.44  | 92.09     | 0.45 in/h |
| C28    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 79.30  | 92.97     | 0.45 in/h |
| C29    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 44.00  | 49.97  | 63.68     | 0.56 in/h |
| C30    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 42.00  | 50.00  | 63.73     | 0.29 in/h |
| C31    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 46.00  | 50.76  | 64.53     | 0.59 in/h |
| C32    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 76.71  | 91.32     | 1.31 in/h |
| C33    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 77.84  | 92.49     | 0.44 in/h |
| C34    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 45.60  | 75.91  | 91.58     | 0.70 in/h |
| C35    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 30.40  | 78.53  | 94.26     | 4.00 in/h |
| C36    | Hunter ICV-G-FS | 1"     | Turf Rotary  | 24.38  | 47.18  | 64.70     | 0.47 in/h |
| C37    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 37.00  | 49.02  | 65.92     | 0.76 in/h |
| C38    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 37.33  | 43.16  | 60.52     | 0.48 in/h |
| C39    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 48.00  | 48.79  | 67.84     | 0.59 in/h |
| C40    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 45.60  | 74.10  | 94.09     | 0.89 in/h |
| C41    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 79.42  | 99.44     | 0.45 in/h |
| C42    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 78.25  | 98.31     | 0.48 in/h |
| C43    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 49.60  | 70.01  | 84.00     | 0.47 in/h |
| C44    | Hunter ICV-G-FS | 1"     | Turf Rotary  | 24.02  | 47.38  | 68.42     | 0.46 in/h |
| C45    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 37.73  | 44.59  | 65.59     | 0.31 in/h |
| C46    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 30.40  | 75.90  | 96.79     | 2.22 in/h |
| C47    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 45.60  | 75.82  | 95.19     | 0.73 in/h |
| C48    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 33.80  | 72.94  | 91.69     | 0.83 in/h |
| C49    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 77.92  | 98.27     | 0.41 in/h |
| C50    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 50.70  | 75.58  | 92.87     | 0.45 in/h |
| C51    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 79.12  | 96.38     | 0.45 in/h |
| C52    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 84.50  | 78.74  | 95.54     | 0.85 in/h |
| C53    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 42.11  | 43.36  | 60.13     | 0.31 in/h |
| C54    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 50.70  | 75.57  | 91.29     | 0.45 in/h |
| C55    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 101.40 | 78.87  | 94.56     | 0.44 in/h |
| C56    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 42.57  | 45.01  | 59.48     | 0.41 in/h |
| C57    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 67.60  | 78.04  | 92.13     | 0.86 in/h |
| C58    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 32.23  | 49.05  | 62.95     | 0.21 in/h |
| C59    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 49.00  | 44.50  | 58.45     | 0.35 in/h |
| C60    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 60.80  | 76.53  | 92.82     | 1.05 in/h |
| C61    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 60.80  | 76.21  | 93.08     | 0.44 in/h |
| C62    | Hunter ICV-G-FS | 1-1/2" | Shrub Spray  | 42.45  | 35.09  | 51.99     | 1.45 in/h |
| C63    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 60.80  | 75.57  | 92.50     | 0.89 in/h |
| C64    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 58.90  | 76.07  | 93.92     | 1.16 in/h |
| C65    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 35.00  | 73.41  | 91.47     | 1.26 in/h |
| C66    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 34.29  | 43.53  | 61.81     | 0.39 in/h |
| C67    | Hunter ICV-G-FS | 1"     | Turf Rotary  | 7.06   | 43.30  | 62.18     | 0.21 in/h |
| C68    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 32.50  | 50.59  | 69.74     | 0.56 in/h |
| C69    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 44.00  | 48.72  | 70.68     | 0.25 in/h |
| C70    | Hunter ICV-G-FS | 1-1/2" | Shrub Spray  | 35.88  | 33.36  | 55.39     | 1.72 in/h |
| C71    | Hunter ICV-G-FS | 1"     | Turf Rotor   | 12.00  | 48.24  | 70.34     | 0.50 in/h |
| C72    | Hunter ICV-G-FS | 1-1/2" | Turf Rotor   | 35.50  | 52.74  | 74.88     | 0.61 in/h |
| C73    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 39.43  | 45.56  | 67.42     | 0.32 in/h |
| C74    | Hunter ICV-G-FS | 1-1/2" | Shrub Spray  | 43.27  | 32.68  | 55.10     | 1.21 in/h |
| C75    | Hunter ICV-G-FS | 1-1/2" | Shrub Spray  | 28.50  | 33.61  | 56        | 1.45 in/h |
| C76    | Hunter ICV-G-FS | 1"     | Shrub Spray  | 24.07  | 37.22  | 58.91     | 1.35 in/h |
| C77    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 43.67  | 47.04  | 58.09     | 0.25 in/h |
| C78    | Hunter ICV-G-FS | 1"     | Turf Rotary  | 19.87  | 45.25  | 56.95     | 0.25 in/h |
| C79    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 20.23  | 44.72  | 52.32     | 0.24 in/h |
| C80    | Hunter ICV-G-FS | 1-1/2" | Turf Rotary  | 43.01  | 49.51  | 58.25     | 0.21 in/h |
| C81    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.12 | 114.42    | 2.50 in/h |
| C82    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.18 | 118.16    | 1.25 in/h |
| C83    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.18 | 120.23    | 1.25 in/h |
| C84    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.12 | 120.92    | 2.47 in/h |
| C85    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 120.76    | 1.20 in/h |
| C86    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 120.64    | 2.47 in/h |
| C87    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 120.90    | 1.24 in/h |
| C88    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 120.52    | 1.26 in/h |
| C89    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 119.42    | 2.43 in/h |
| C90    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 88.10  | 113.11 | 117.43    | 1.18 in/h |
| C91    | Hunter ICV-G-FS | 2"     | Turf Rotor   | 71.00  | 78.3   | 55.34     | 0.44 in/h |



**HANAHAN RECREATION  
COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 6/12/20  
DRAWN BY: MDC  
CHECKED BY: CPC

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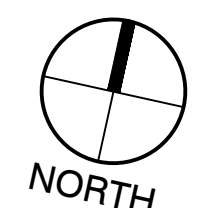
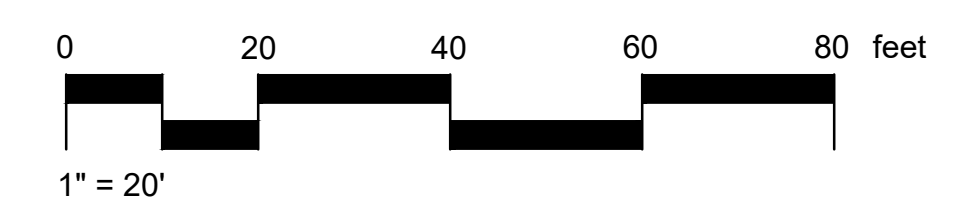


**HANAHAN RECREATION  
 COMPLEX**  
 CITY OF HANAHAN  
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 CHECKED BY: CPC

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IRRIGATION  
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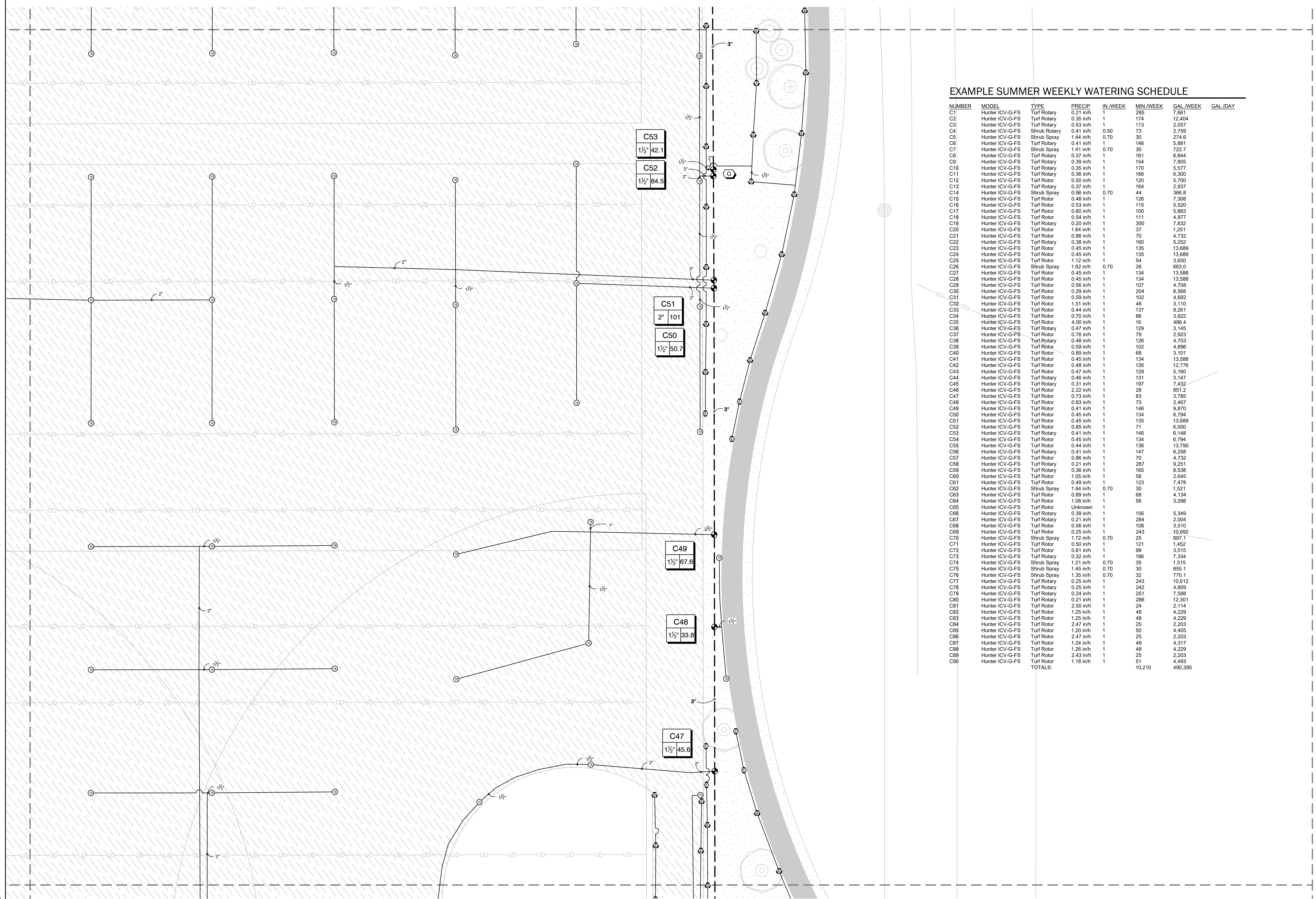
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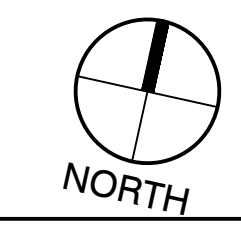
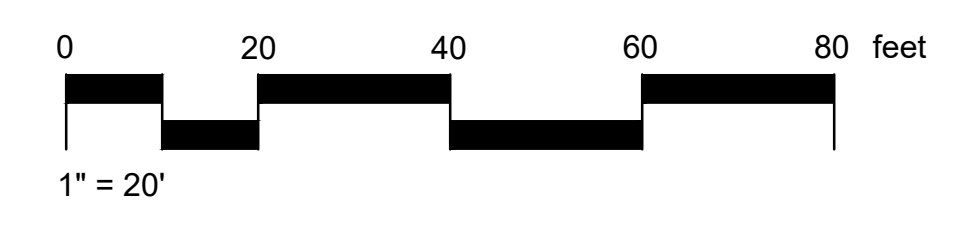
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### EXAMPLE SUMMER WEEKLY WATERING SCHEDULE

| NUMBER  | MODEL           | TYPE         | PRECIP    | IN/WEEK | MIN/WEEK | GAL/WEEK | GAL/DAY |
|---------|-----------------|--------------|-----------|---------|----------|----------|---------|
| C1      | Hunter ICV-G-FS | Turf Rotary  | 0.21 in/h | 1       | 285      | 7,661    | 12,404  |
| C2      | Hunter ICV-G-FS | Turf Rotary  | 0.35 in/h | 1       | 174      | 2,057    | 2,759   |
| C3      | Hunter ICV-G-FS | Turf Rotary  | 0.53 in/h | 1       | 113      | 2,759    | 2,759   |
| C4      | Hunter ICV-G-FS | Shrub Rotary | 0.41 in/h | 0.50    | 73       | 274.6    | 5,881   |
| C5      | Hunter ICV-G-FS | Shrub Spray  | 1.44 in/h | 0.70    | 30       | 722.7    | 6,844   |
| C6      | Hunter ICV-G-FS | Turf Rotary  | 0.41 in/h | 1       | 146      | 7,805    | 5,577   |
| C7      | Hunter ICV-G-FS | Shrub Spray  | 1.41 in/h | 0.70    | 30       | 6,300    | 5,250   |
| C8      | Hunter ICV-G-FS | Turf Rotary  | 0.37 in/h | 1       | 164      | 2,937    | 366.8   |
| C9      | Hunter ICV-G-FS | Turf Rotary  | 0.39 in/h | 1       | 154      | 7,308    | 5,520   |
| C10     | Hunter ICV-G-FS | Turf Rotary  | 0.35 in/h | 1       | 170      | 5,250    | 5,700   |
| C11     | Hunter ICV-G-FS | Turf Rotary  | 0.36 in/h | 1       | 166      | 2,937    | 366.8   |
| C12     | Hunter ICV-G-FS | Turf Rotary  | 0.50 in/h | 1       | 120      | 7,832    | 1,251   |
| C13     | Hunter ICV-G-FS | Turf Rotary  | 0.37 in/h | 1       | 164      | 4,732    | 3,110   |
| C14     | Hunter ICV-G-FS | Shrub Spray  | 0.96 in/h | 0.70    | 44       | 5,252    | 13,689  |
| C15     | Hunter ICV-G-FS | Turf Rotator | 0.48 in/h | 1       | 126      | 13,689   | 3,650   |
| C16     | Hunter ICV-G-FS | Turf Rotator | 0.53 in/h | 1       | 115      | 70       | 4,732   |
| C17     | Hunter ICV-G-FS | Turf Rotator | 0.60 in/h | 1       | 100      | 13,588   | 13,588  |
| C18     | Hunter ICV-G-FS | Turf Rotator | 0.54 in/h | 1       | 111      | 4,708    | 8,568   |
| C19     | Hunter ICV-G-FS | Turf Rotator | 0.20 in/h | 1       | 300      | 8,568    | 3,101   |
| C20     | Hunter ICV-G-FS | Turf Rotator | 1.64 in/h | 1       | 37       | 129      | 3,145   |
| C21     | Hunter ICV-G-FS | Turf Rotator | 0.86 in/h | 1       | 70       | 2,523    | 2,523   |
| C22     | Hunter ICV-G-FS | Turf Rotator | 0.38 in/h | 1       | 160      | 4,703    | 4,703   |
| C23     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 135      | 4,896    | 3,101   |
| C24     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 135      | 13,588   | 13,588  |
| C25     | Hunter ICV-G-FS | Turf Rotator | 1.12 in/h | 1       | 54       | 6,794    | 6,794   |
| C26     | Hunter ICV-G-FS | Shrub Spray  | 1.62 in/h | 0.70    | 26       | 6,000    | 6,000   |
| C27     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 134      | 6,148    | 6,148   |
| C28     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 134      | 6,794    | 6,794   |
| C29     | Hunter ICV-G-FS | Turf Rotator | 0.56 in/h | 1       | 107      | 13,790   | 6,258   |
| C30     | Hunter ICV-G-FS | Turf Rotator | 0.29 in/h | 1       | 204      | 4,732    | 4,732   |
| C31     | Hunter ICV-G-FS | Turf Rotator | 0.59 in/h | 1       | 102      | 9,251    | 9,251   |
| C32     | Hunter ICV-G-FS | Turf Rotator | 1.31 in/h | 1       | 46       | 8,538    | 8,538   |
| C33     | Hunter ICV-G-FS | Turf Rotator | 0.44 in/h | 1       | 137      | 2,645    | 2,645   |
| C34     | Hunter ICV-G-FS | Turf Rotator | 0.70 in/h | 1       | 86       | 7,478    | 123     |
| C35     | Hunter ICV-G-FS | Turf Rotator | 4.00 in/h | 1       | 16       | 1,521    | 66      |
| C36     | Hunter ICV-G-FS | Turf Rotator | 0.47 in/h | 1       | 129      | 4,134    | 56      |
| C37     | Hunter ICV-G-FS | Turf Rotator | 0.76 in/h | 1       | 79       | 3,298    | 3,298   |
| C38     | Hunter ICV-G-FS | Turf Rotator | 0.48 in/h | 1       | 126      | 1,566    | 1,566   |
| C39     | Hunter ICV-G-FS | Turf Rotator | 0.59 in/h | 1       | 102      | 1,566    | 1,566   |
| C40     | Hunter ICV-G-FS | Turf Rotator | 0.89 in/h | 1       | 68       | 3,147    | 3,147   |
| C41     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 134      | 7,432    | 7,432   |
| C42     | Hunter ICV-G-FS | Turf Rotator | 0.48 in/h | 1       | 126      | 851.2    | 28      |
| C43     | Hunter ICV-G-FS | Turf Rotator | 0.47 in/h | 1       | 129      | 3,785    | 2,467   |
| C44     | Hunter ICV-G-FS | Turf Rotator | 0.46 in/h | 1       | 131      | 9,870    | 9,870   |
| C45     | Hunter ICV-G-FS | Turf Rotator | 0.31 in/h | 1       | 197      | 6,794    | 134     |
| C46     | Hunter ICV-G-FS | Turf Rotator | 2.22 in/h | 1       | 28       | 13,689   | 135     |
| C47     | Hunter ICV-G-FS | Turf Rotator | 0.73 in/h | 1       | 83       | 6,000    | 71      |
| C48     | Hunter ICV-G-FS | Turf Rotator | 0.83 in/h | 1       | 73       | 6,148    | 146     |
| C49     | Hunter ICV-G-FS | Turf Rotator | 0.41 in/h | 1       | 146      | 6,794    | 134     |
| C50     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 134      | 13,790   | 136     |
| C51     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 135      | 6,258    | 147     |
| C52     | Hunter ICV-G-FS | Turf Rotator | 0.85 in/h | 1       | 71       | 4,732    | 70      |
| C53     | Hunter ICV-G-FS | Turf Rotary  | 0.41 in/h | 1       | 146      | 9,251    | 287     |
| C54     | Hunter ICV-G-FS | Turf Rotator | 0.45 in/h | 1       | 134      | 165      | 165     |
| C55     | Hunter ICV-G-FS | Turf Rotator | 0.44 in/h | 1       | 136      | 58       | 2,645   |
| C56     | Hunter ICV-G-FS | Turf Rotator | 0.41 in/h | 1       | 147      | 123      | 123     |
| C57     | Hunter ICV-G-FS | Turf Rotator | 0.86 in/h | 1       | 70       | 1,521    | 30      |
| C58     | Hunter ICV-G-FS | Turf Rotary  | 0.21 in/h | 1       | 287      | 4,134    | 66      |
| C59     | Hunter ICV-G-FS | Turf Rotary  | 0.36 in/h | 1       | 165      | 56       | 3,298   |
| C60     | Hunter ICV-G-FS | Turf Rotator | 1.05 in/h | 1       | 58       | 1,566    | 1,566   |
| C61     | Hunter ICV-G-FS | Turf Rotator | 0.49 in/h | 1       | 123      | 1,566    | 1,566   |
| C62     | Hunter ICV-G-FS | Shrub Spray  | 1.44 in/h | 0.70    | 30       | 2,004    | 2,004   |
| C63     | Hunter ICV-G-FS | Turf Rotator | 0.89 in/h | 1       | 66       | 3,510    | 108     |
| C64     | Hunter ICV-G-FS | Turf Rotator | 1.08 in/h | 1       | 56       | 10,892   | 243     |
| C65     | Hunter ICV-G-FS | Turf Rotator | Unknown   | 1       |          | 897.1    | 25      |
| C66     | Hunter ICV-G-FS | Turf Rotary  | 0.39 in/h | 1       | 156      | 1,452    | 121     |
| C67     | Hunter ICV-G-FS | Turf Rotary  | 0.21 in/h | 1       | 284      | 3,515    | 99      |
| C68     | Hunter ICV-G-FS | Turf Rotary  | 0.56 in/h | 1       | 108      | 7,334    | 186     |
| C69     | Hunter ICV-G-FS | Turf Rotary  | 0.25 in/h | 1       | 243      | 1,515    | 35      |
| C70     | Hunter ICV-G-FS | Shrub Spray  | 1.72 in/h | 0.70    | 25       | 855.1    | 30      |
| C71     | Hunter ICV-G-FS | Turf Rotator | 0.50 in/h | 1       | 121      | 770.1    | 32      |
| C72     | Hunter ICV-G-FS | Turf Rotator | 0.61 in/h | 1       | 99       | 10,612   | 243     |
| C73     | Hunter ICV-G-FS | Turf Rotary  | 0.32 in/h | 1       | 186      | 4,809    | 242     |
| C74     | Hunter ICV-G-FS | Shrub Spray  | 1.21 in/h | 0.70    | 35       | 7,588    | 251     |
| C75     | Hunter ICV-G-FS | Shrub Spray  | 1.45 in/h | 0.70    | 30       | 12,301   | 286     |
| C76     | Hunter ICV-G-FS | Shrub Spray  | 1.35 in/h | 0.70    | 32       | 2,114    | 24      |
| C77     | Hunter ICV-G-FS | Turf Rotator | 0.25 in/h | 1       | 243      | 4,229    | 48      |
| C78     | Hunter ICV-G-FS | Turf Rotator | 0.25 in/h | 1       | 242      | 4,229    | 48      |
| C79     | Hunter ICV-G-FS | Turf Rotator | 0.24 in/h | 1       | 251      | 2,203    | 25      |
| C80     | Hunter ICV-G-FS | Turf Rotator | 0.21 in/h | 1       | 286      | 4,405    | 50      |
| C81     | Hunter ICV-G-FS | Turf Rotator | 2.50 in/h | 1       | 24       | 2,203    | 25      |
| C82     | Hunter ICV-G-FS | Turf Rotator | 1.25 in/h | 1       | 48       | 4,317    | 49      |
| C83     | Hunter ICV-G-FS | Turf Rotator | 1.25 in/h | 1       | 48       | 4,229    | 48      |
| C84     | Hunter ICV-G-FS | Turf Rotator | 2.47 in/h | 1       | 25       | 2,203    | 25      |
| C85     | Hunter ICV-G-FS | Turf Rotator | 1.20 in/h | 1       | 50       | 4,483    | 51      |
| C86     | Hunter ICV-G-FS | Turf Rotator | 2.47 in/h | 1       | 25       | 4,483    | 51      |
| C87     | Hunter ICV-G-FS | Turf Rotator | 1.24 in/h | 1       | 49       | 4,483    | 51      |
| C88     | Hunter ICV-G-FS | Turf Rotator | 1.26 in/h | 1       | 48       | 4,483    | 51      |
| C89     | Hunter ICV-G-FS | Turf Rotator | 2.43 in/h | 1       | 25       | 4,483    | 51      |
| C90     | Hunter ICV-G-FS | Turf Rotator | 1.18 in/h | 1       | 51       | 10,210   | 490.395 |
| TOTALS: |                 |              |           |         |          |          |         |



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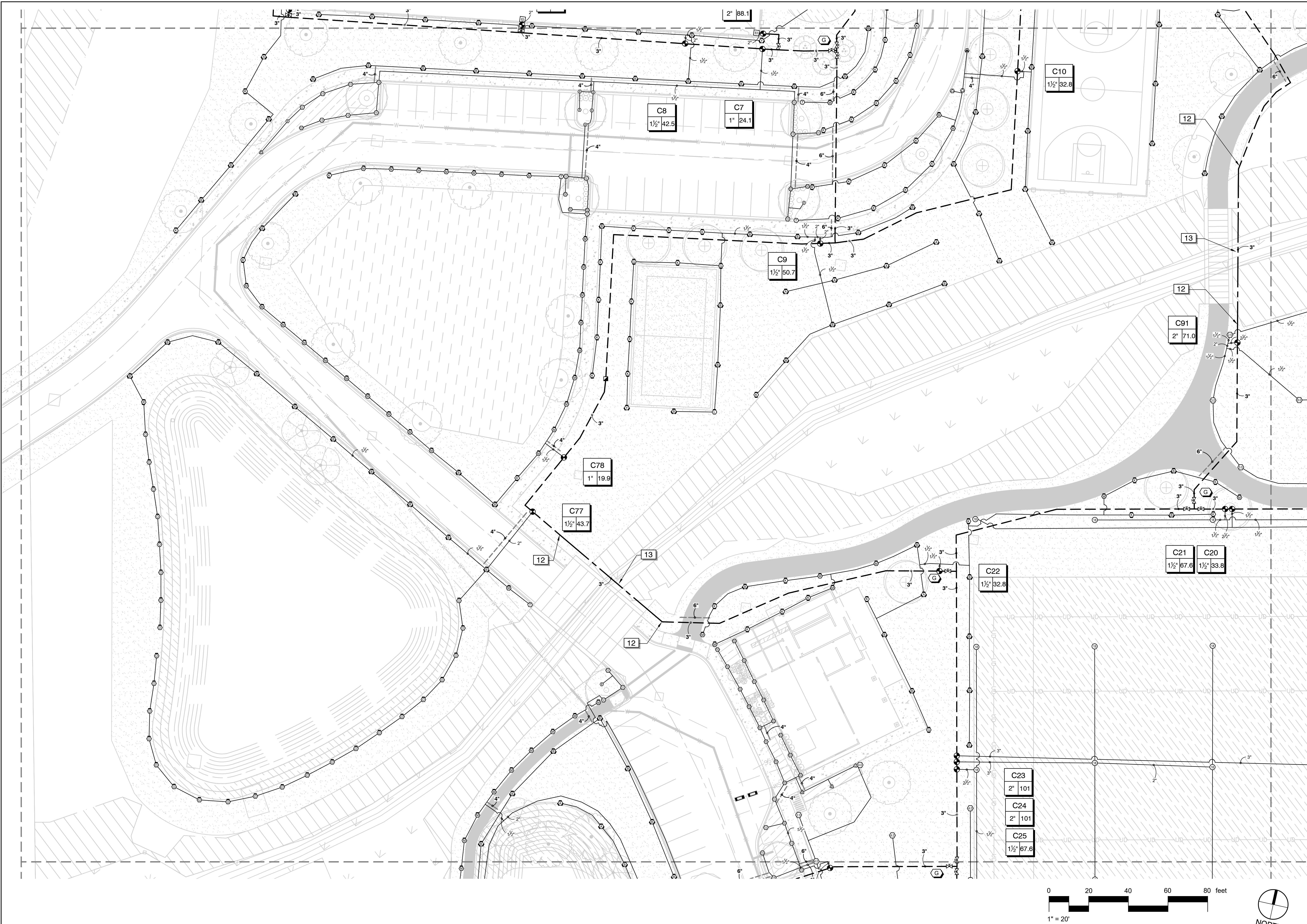
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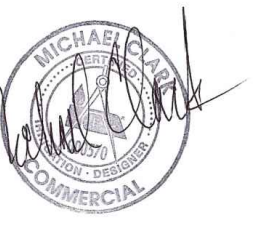
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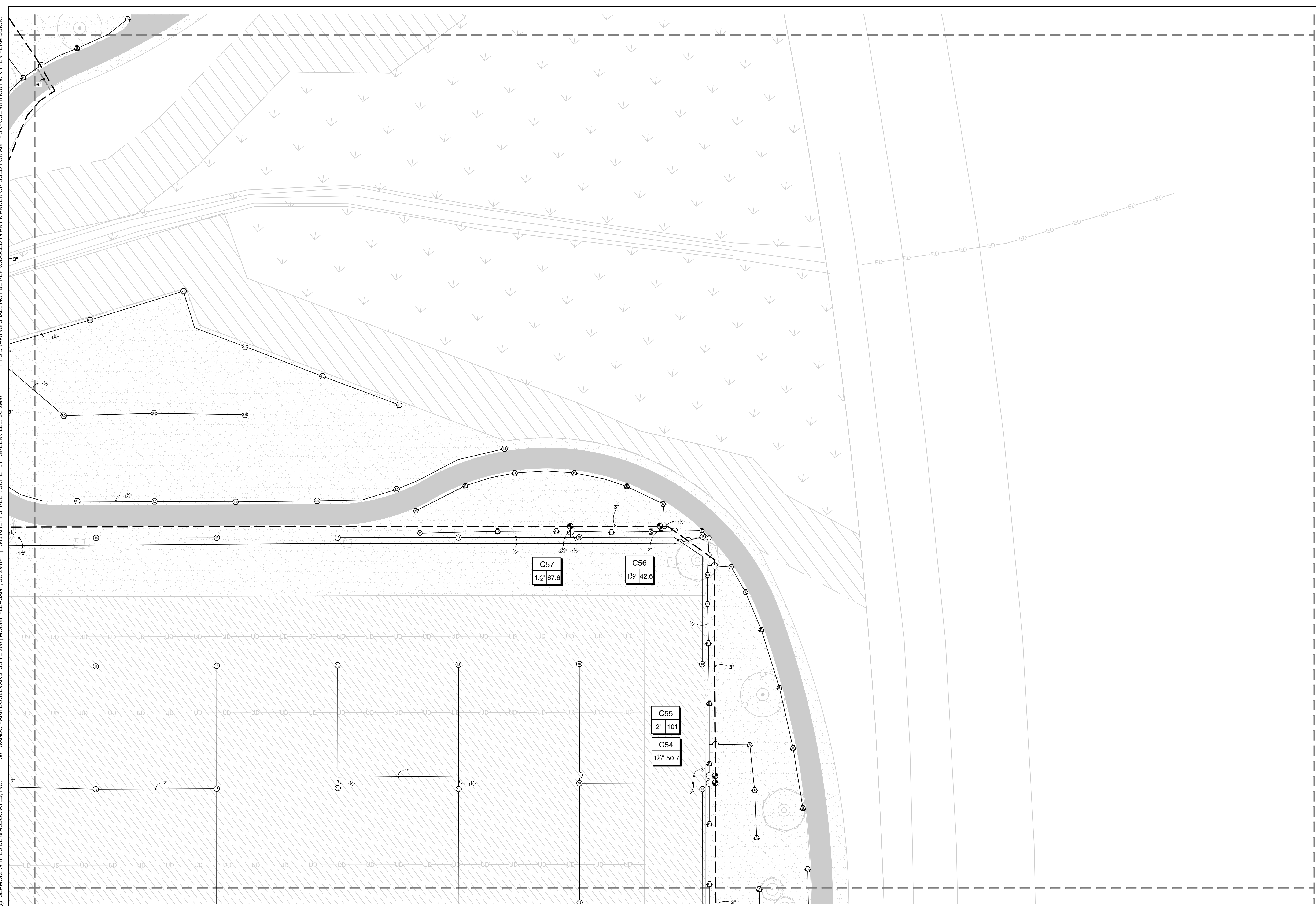


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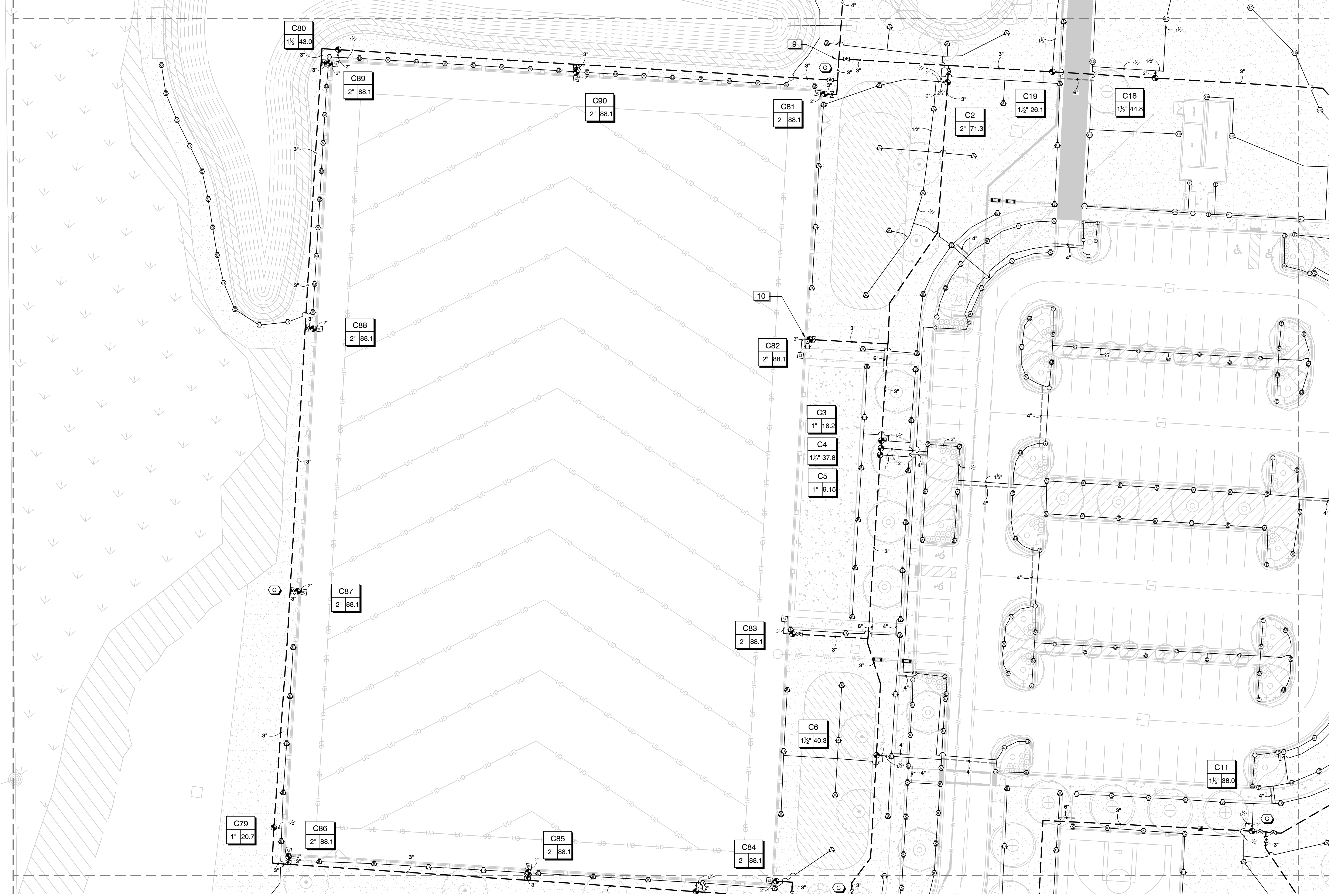
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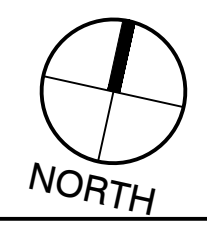
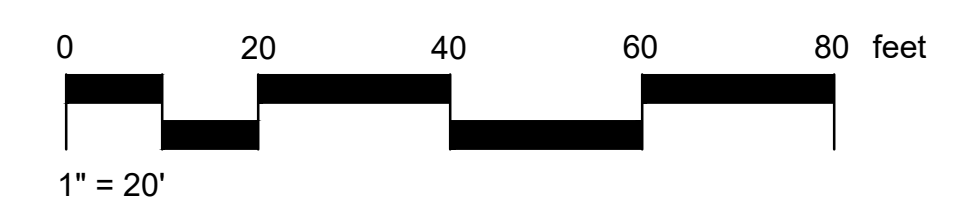


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CITY OF HANAHAN  
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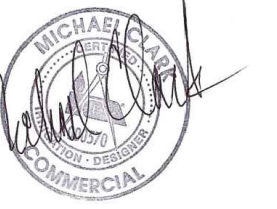
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IRRIGATION PLAN



IR1.7

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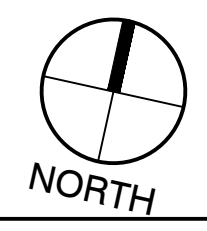
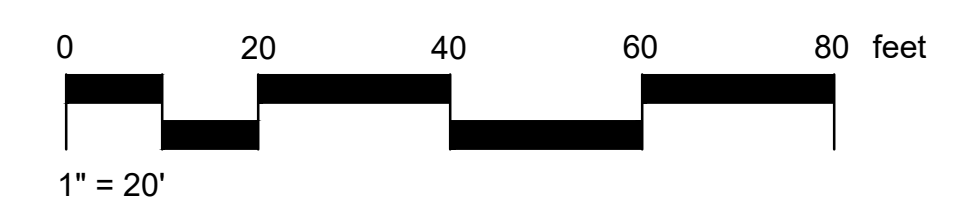


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IRRIGATION  
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IRRIGATION  
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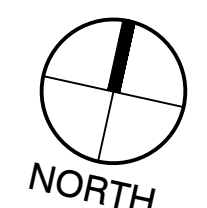
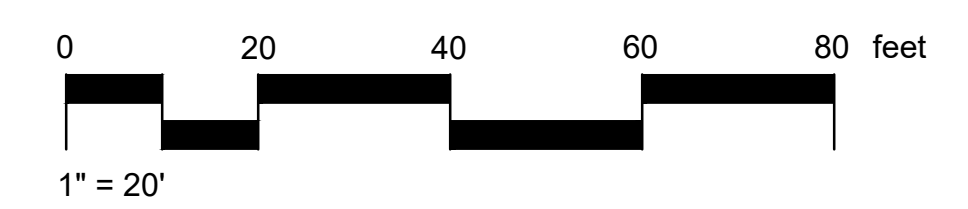
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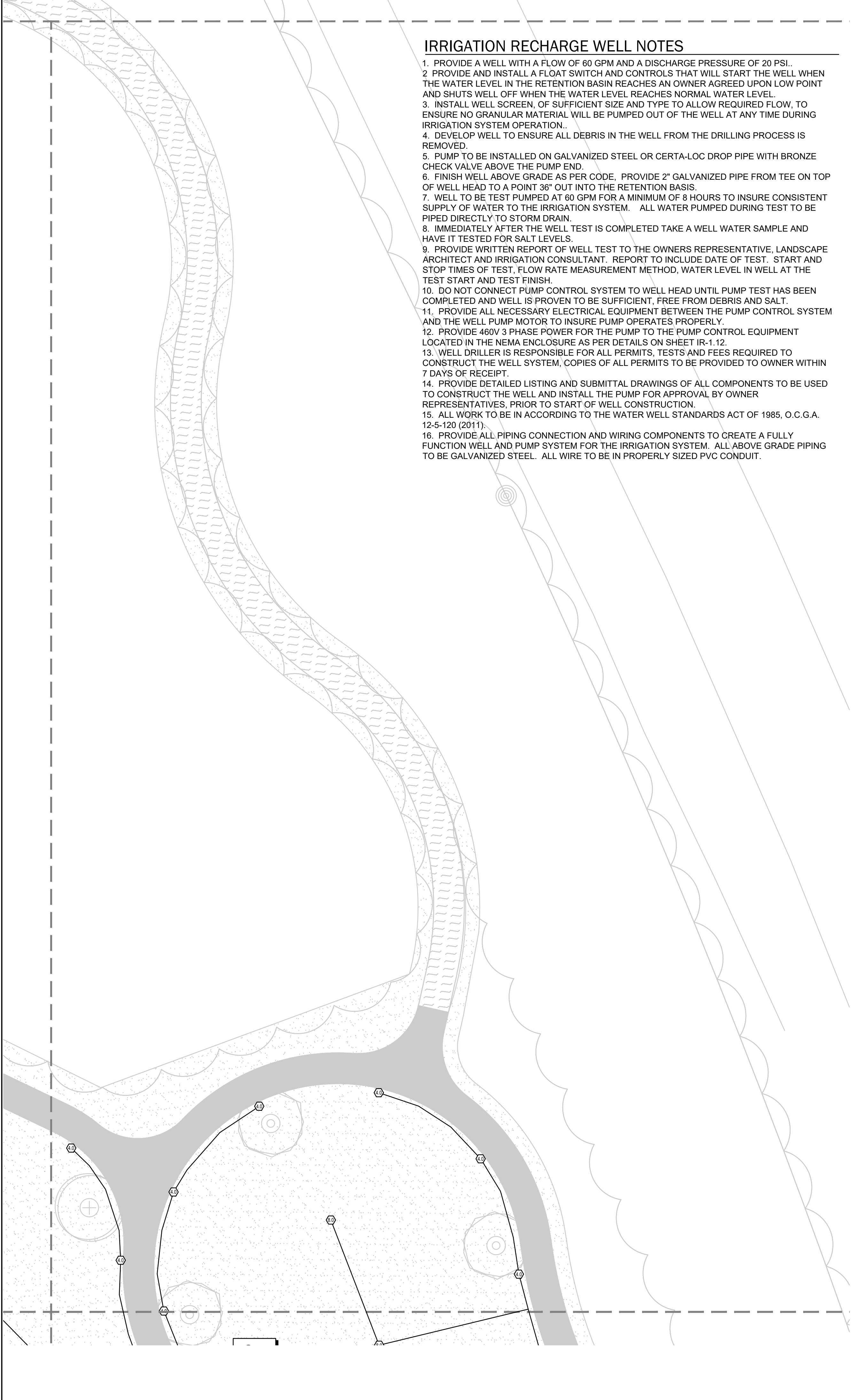
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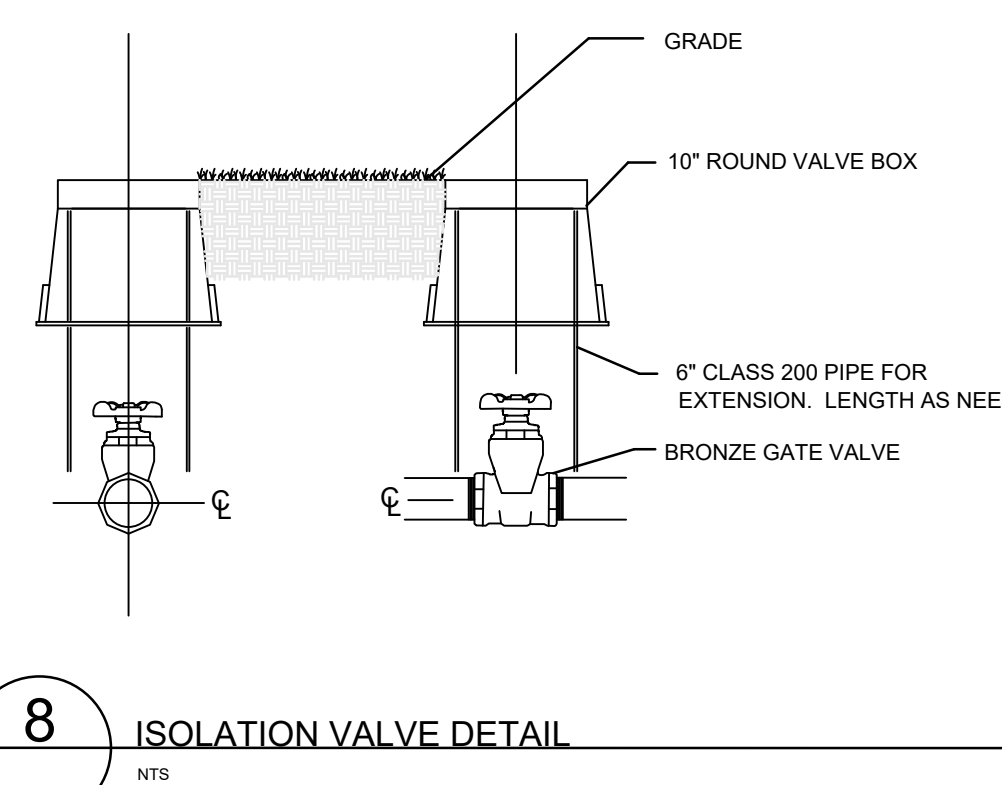
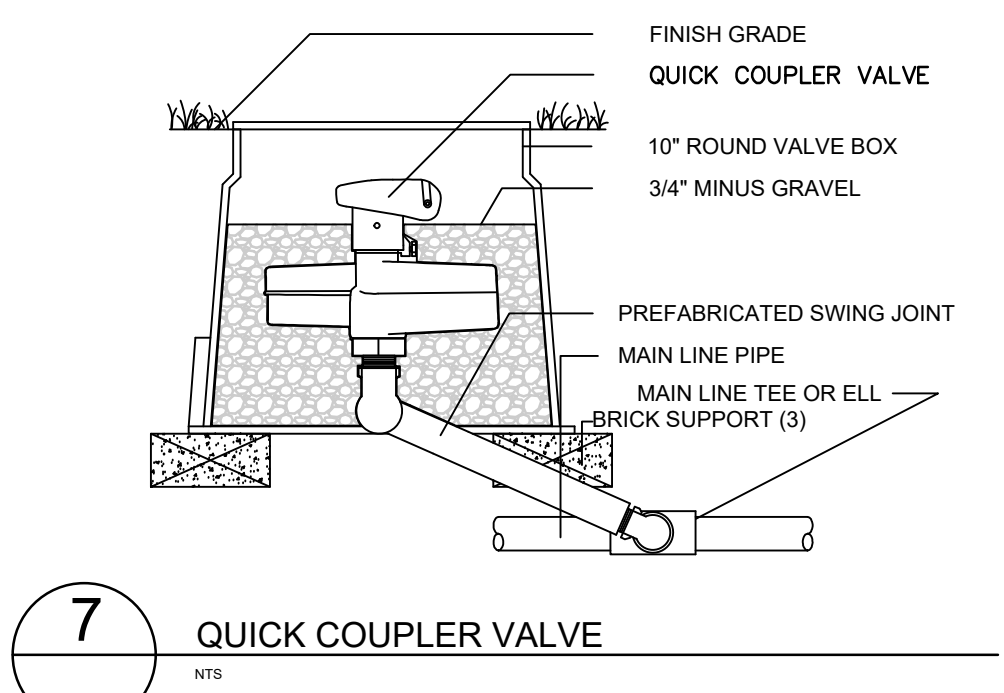
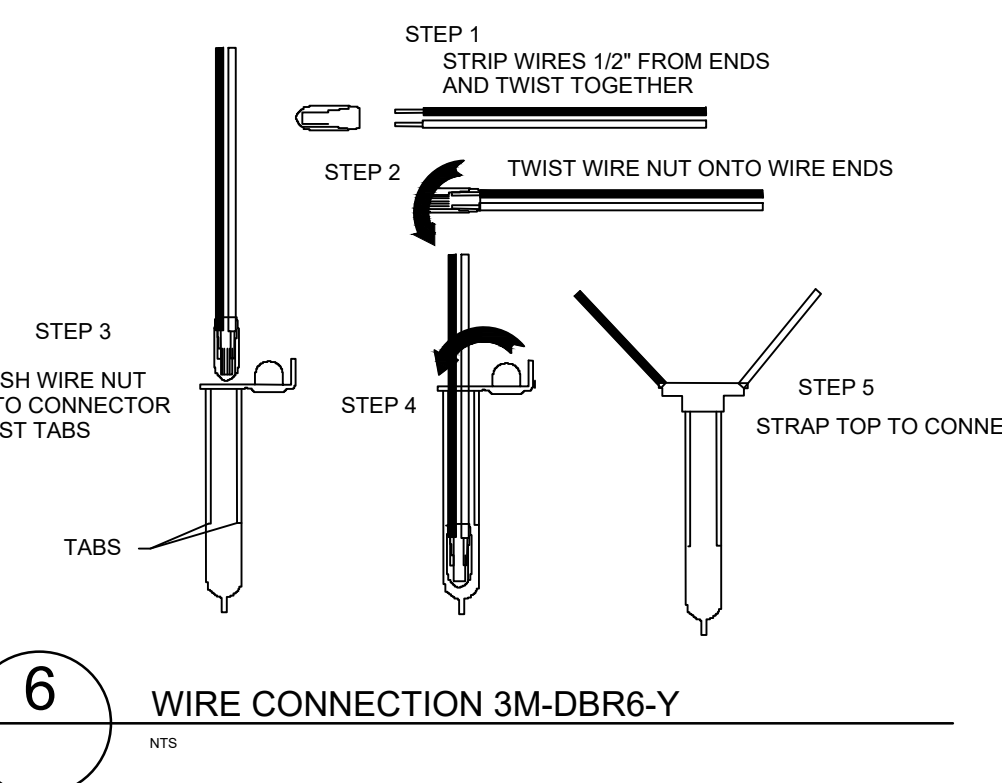
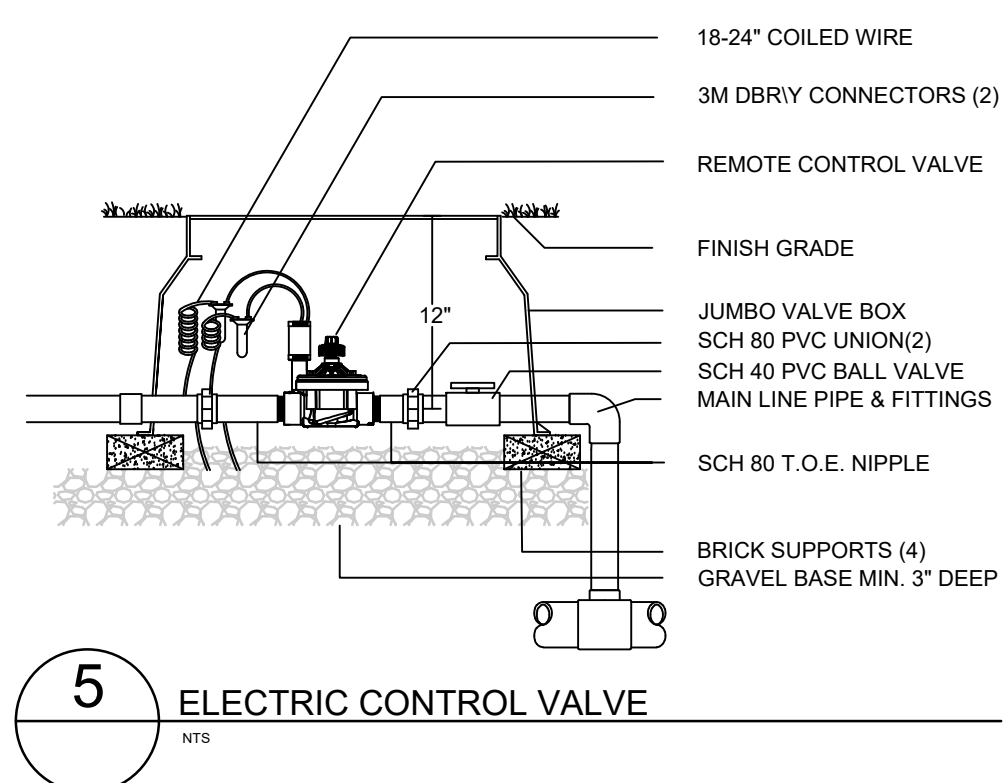
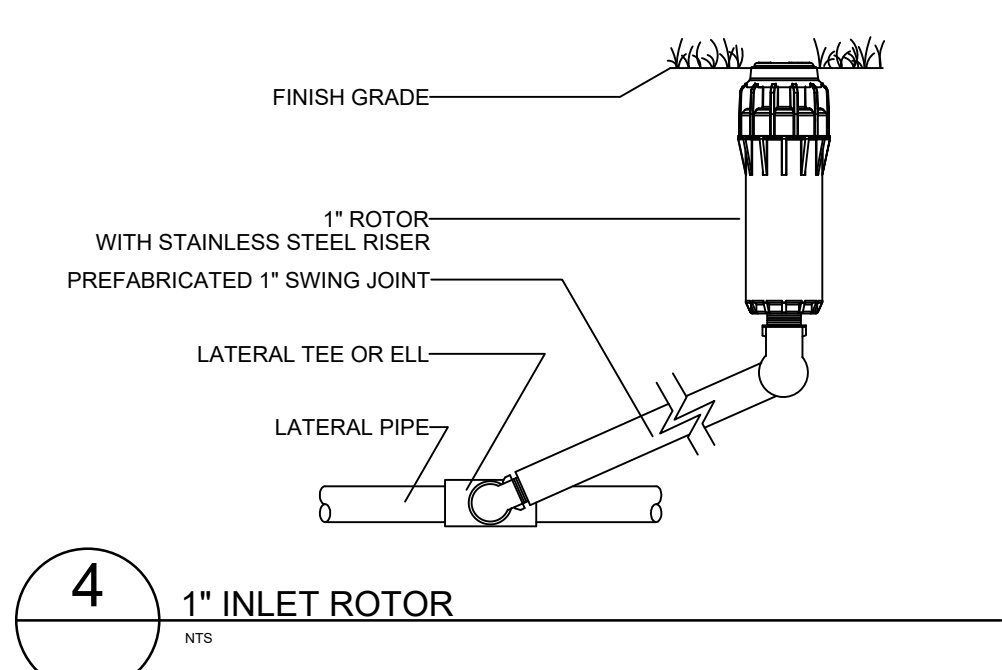
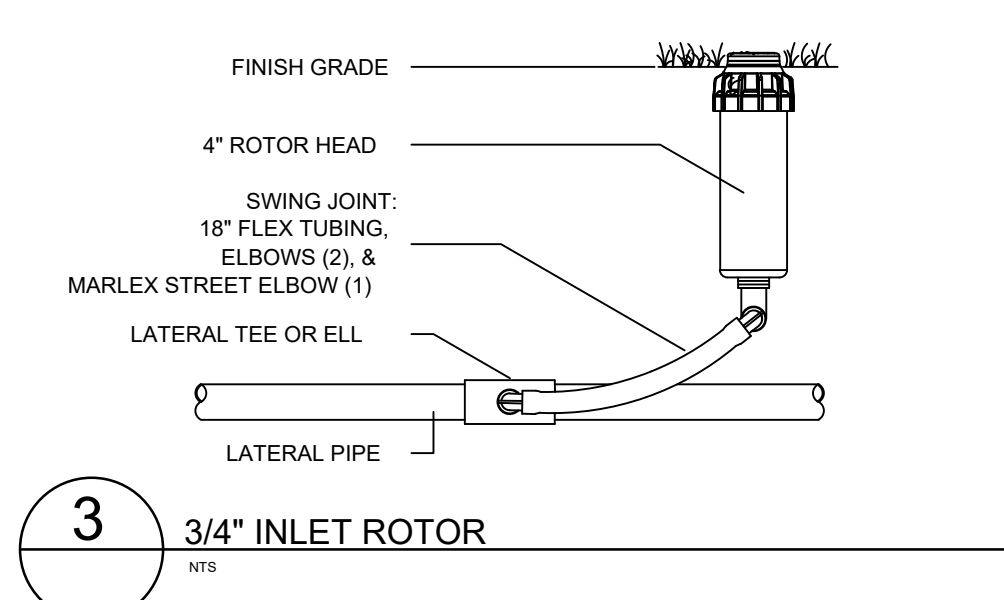
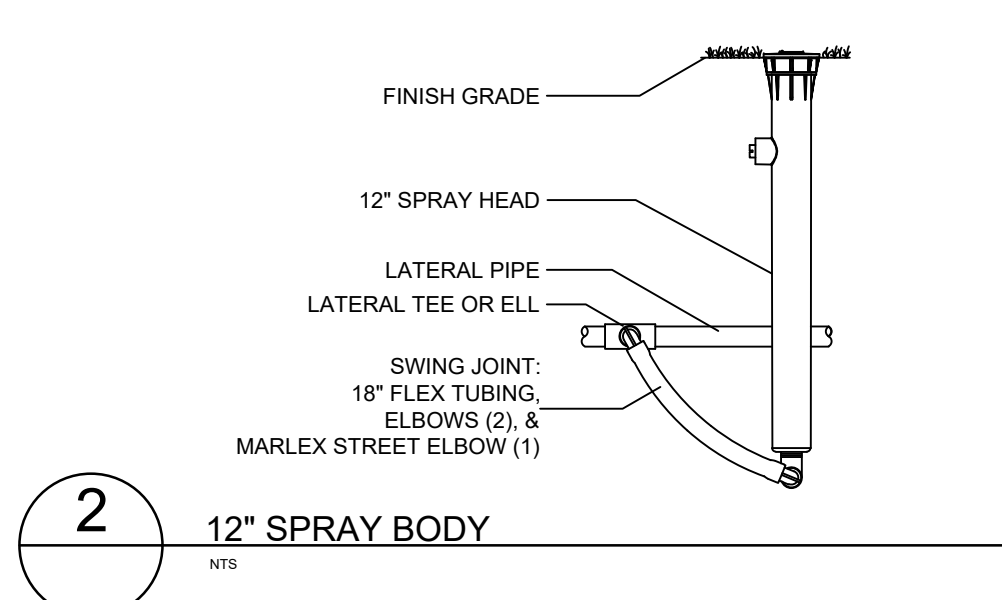
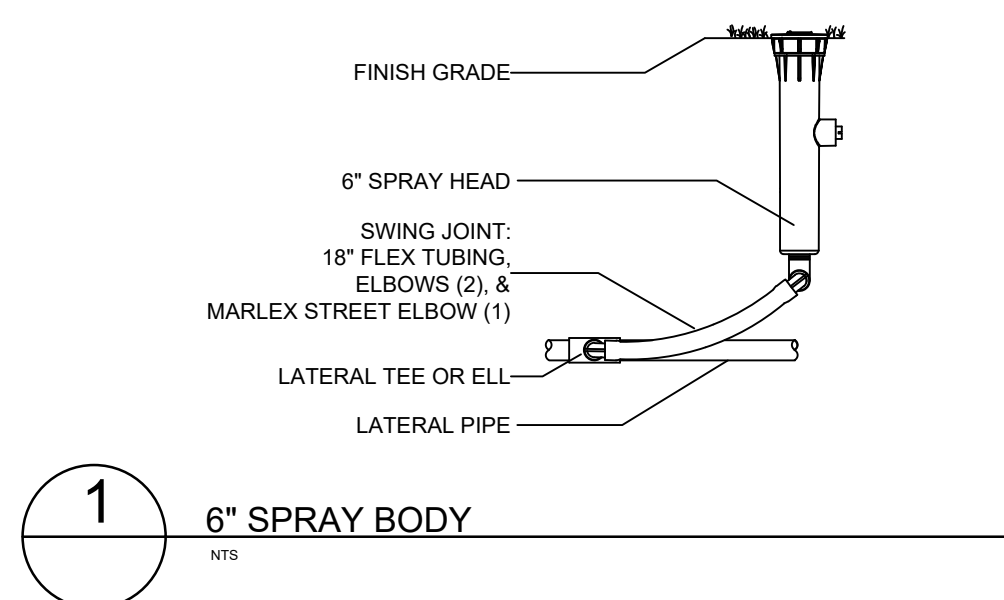


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### IRRIGATION RECHARGE WELL NOTES

1. PROVIDE A WELL WITH A FLOW OF 60 GPM AND A DISCHARGE PRESSURE OF 20 PSI.
2. PROVIDE AND INSTALL A FLOAT SWITCH AND CONTROLS THAT WILL START THE WELL WHEN THE WATER LEVEL IN THE RETENTION BASIN REACHES AN OWNER AGREED UPON LOW POINT AND SHUTS WELL OFF WHEN THE WATER LEVEL REACHES NORMAL WATER LEVEL.
3. INSTALL WELL SCREEN, OF SUFFICIENT SIZE AND TYPE TO ALLOW REQUIRED FLOW, TO ENSURE NO GRANULAR MATERIAL WILL BE PUMPED OUT OF THE WELL AT ANY TIME DURING IRRIGATION SYSTEM OPERATION.
4. DEVELOP WELL TO ENSURE ALL DEBRIS IN THE WELL FROM THE DRILLING PROCESS IS REMOVED.
5. PUMP TO BE INSTALLED ON GALVANIZED STEEL OR CERTA-LOC DROP PIPE WITH BRONZE CHECK VALVE ABOVE THE PUMP END.
6. FINISH WELL ABOVE GRADE AS PER CODE. PROVIDE 2" GALVANIZED PIPE FROM TEE ON TOP OF WELL HEAD TO A POINT 36" OUT INTO THE RETENTION BASIN.
7. WELL TO BE TEST PUMPED AT 60 GPM FOR A MINIMUM OF 8 HOURS TO INSURE CONSISTENT SUPPLY OF WATER TO THE IRRIGATION SYSTEM. ALL WATER PUMPED DURING TEST TO BE PIPED DIRECTLY TO STORM DRAIN.
8. IMMEDIATELY AFTER THE WELL TEST IS COMPLETED TAKE A WELL WATER SAMPLE AND HAVE IT TESTED FOR SALT LEVELS.
9. PROVIDE WRITTEN REPORT OF WELL TEST TO THE OWNERS REPRESENTATIVE, LANDSCAPE ARCHITECT AND IRRIGATION CONSULTANT. REPORT TO INCLUDE DATE OF TEST. START AND STOP TIMES OF TEST, FLOW RATE MEASUREMENT METHOD, WATER LEVEL IN WELL AT THE TEST START AND TEST FINISH.
10. DO NOT CONNECT PUMP CONTROL SYSTEM TO WELL HEAD UNTIL PUMP TEST HAS BEEN COMPLETED AND WELL IS PROVEN TO BE SUFFICIENT, FREE FROM DEBRIS AND SALT.
11. PROVIDE ALL NECESSARY ELECTRICAL EQUIPMENT BETWEEN THE PUMP CONTROL SYSTEM AND THE WELL PUMP MOTOR TO INSURE PUMP OPERATES PROPERLY.
12. PROVIDE 480V 3 PHASE POWER FOR THE PUMP TO THE PUMP CONTROL EQUIPMENT LOCATED IN THE NEMA ENCLOSURE AS PER DETAILS ON SHEET IR-1.12
13. WELL DRILLER IS RESPONSIBLE FOR ALL PERMITS, TESTS AND FEES REQUIRED TO CONSTRUCT THE WELL SYSTEM. COPIES OF ALL PERMITS TO BE PROVIDED TO OWNER WITHIN 7 DAYS OF RECEIPT.
14. PROVIDE DETAILED LISTING AND SUBMITTAL DRAWINGS OF ALL COMPONENTS TO BE USED TO CONSTRUCT THE WELL AND INSTALL THE PUMP FOR APPROVAL BY OWNER REPRESENTATIVES, PRIOR TO START OF WELL CONSTRUCTION.
15. ALL WORK TO BE IN ACCORDING TO THE WATER WELL STANDARDS ACT OF 1985, O.C.G.A. 12-5-120 (2011).
16. PROVIDE ALL PIPING CONNECTION AND WIRING COMPONENTS TO CREATE A FULLY FUNCTION WELL AND PUMP SYSTEM FOR THE IRRIGATION SYSTEM. ALL ABOVE GRADE PIPING TO BE GALVANIZED STEEL. ALL WIRE TO BE IN PROPERLY SIZED PVC CONDUIT.



### GENERAL NOTES

1. ALL TRENCHING TO BE OUTSIDE OF TREE DRIP LINE
2. MAINLINE TO HAVE MINIMUM OF 24" OF COVER AND A MINIMUM OF 18" OFF OF THE HARDSCAPE
3. LATERALS TO HAVE MINIMUM OF 18" OF COVER AND A MINIMUM OF 12" OFF OF THE HARDSCAPE
4. NO ROCKS, BOULDERS OR SHARP OBJECTS TO BE IN TRENCH BACKFILL
5. ALL PIPE TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS
6. SPRINKLERS AND RELATED EQUIPMENT TO BE INSTALLED AS PER DETAILS
7. TWO WIRE CONTROL WIRE TO BE 14 GA UL 2 CONDUCTOR, JACKETED AND APPROVED BY 2-WIRE CONTROLLER MANUFACTURER
8. WIRE SPLICES TO BE DONE AS PER DETAILS
9. ALL WIRE SPLICES OUTSIDE OF CONTROL VALVE BOX TO BE IN 10" VALVE BOX
10. TWO WIRE CONDUCTORS TO BE COLOR CODED
11. CONTRACTOR SHALL INSTALL MANUFACTURERS GROUNDING EQUIPMENT ON BOTH THE POWER AND OUTPUT SIDES OF CONTROLLER. ALL GROUNDING POINTS TO BE INSTALLED AS PER PLANS AND DETAILS
12. AT EACH VALVE AND CHANGE IN MAINLINE DIRECTION CONTRACTOR TO INSTALL A 30" LOOP OF EXTRA WIRE
13. SPRINKLERS ARE TO BE ADJUSTED TO AVOID OVER-SPRAY INTO NON-IRRIGATED AREAS
14. ELECTRIC CONTROL VALVES ARE TO BE INSTALLED IN VALVE BOXES AS FOLLOWS  
14" RECTANGULAR MINIMUM FOR EACH ELECTRIC CONTROL VALVE
15. SPRINKLERS TO BE INSTALLED 12" FROM FOUNDATIONS AND 2" FROM HARDSCAPE
16. CONTRACTOR TO ADD RISER EXTENSIONS TO SPRINKLERS IF REQUIRED TO MAINTAIN PROPER COVERAGE
17. ALL PIPING TO BE FLUSHED PRIOR TO INSTALLATION OF SPRINKLERS
18. ALL VALVES, QUICK COUPLER VALVES, WIRE SPLICES TO BE IN LANDSCAPED BEDS WHEREVER POSSIBLE
19. CONTRACTOR IS RESPONSIBLE FOR OBTAINING PROPER COVERAGE OF AREA TO BE IRRIGATED. MAKE ADJUSTMENTS AS NECESSARY
20. CONTRACTOR SHALL EXERCISE CARE NOT TO DAMAGE EXISTING UTILITIES REPAIRING ANY DAMAGES AT HIS OWN COST
21. PLAN IS DIAGRAMMATIC TO IMPROVE CLARITY ALL IRRIGATION EQUIPMENT TO BE INSTALLED WITHIN PROPERTY LINES AND LANDSCAPED AREAS
22. ANY DISCREPANCIES BETWEEN THE PLAN AND THE SITE TO BE REFERRED TO THE OWNERS REPRESENTATIVE PRIOR TO CONSTRUCTION
23. CONTRACTOR TO PROVIDE 1 YEAR WARRANTY OF ALL PRODUCTS AND WORKMANSHIP TO INCLUDE WINTERIZATION AND SPRING START-UP
24. CONTRACTOR TO PROVIDE OWNER AND OR LANDSCAPE ARCHITECT RECORD DRAWING PRIOR TO SUBSTANTIAL COMPLETION
25. INSTALLATION OF IRRIGATION SLEEVES IS THE IRRIGATION CONTRACTORS RESPONSIBILITY. IRRIGATION CONTRACTOR TO COORDINATE WITH GENERAL CONTRACTOR SLEEVE INSTALLATION PRIOR TO PAVEMENT INSTALLATION
26. CLEANUP AND DISPOSE OF ALL DEBRIS, WASTE AND EXCESS CONSTRUCTION MATERIALS LEAVE AREA NEAT, CLEAN AND READY FOR OWNERS USE PROVIDE CLEAN PAVEMENT SURFACES INCLUDING AREAS OF PUBLIC R.O.W.

### TWO WIRE CONTROL SYSTEM NOTES

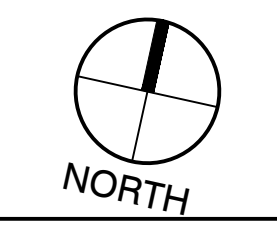
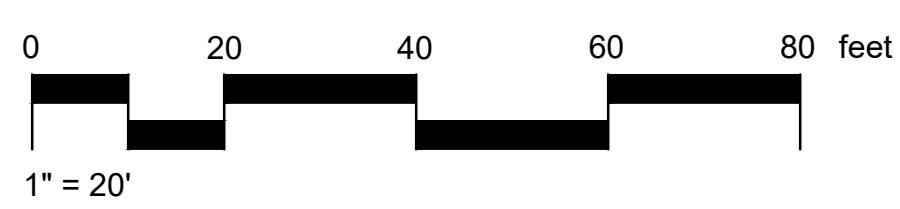
1. ALL DECODER WIRE SPLICE CONNECTORS TO BE 3M DBY-6 OR BETTER.
2. ALL DECODER TO VALVE SOLENOID SPLICE CONNECTORS TO BE 3M DBY-6 OR BETTER
3. ALL GROUNDING POINTS TO HAVE RAIN BIRLS LSP-01 LIGHTNING ARRESTOR INSTALLED INLINE AS PER MANUFACTURER'S REQUIREMENTS AND INSTALLED AS PER DETAIL.
4. ALL 2-WIRE CONTROL SYSTEM PRODUCTS TO BE INSTALLED AND OPERATED AS PER THE MANUFACTURER'S RECOMMENDATIONS AND OR REQUIREMENTS.
5. IRRIGATION CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSULTANT WHEN TRAINING HAS BEEN COMPLETED.
6. IRRIGATION CONTRACTOR IS RESPONSIBLE FOR TRAINING OWNERS STAFF, AS NEEDED, ON THE OPERATION AND MAINTENANCE OF THE CONTROL SYSTEM.
7. IRRIGATION CONTRACTOR IS RESPONSIBLE FOR COMPLETE PROGRAMMING AND OPERATION OF THE CONTROL SYSTEM FOR 6 MONTHS FROM THE DAY OF FINAL ACCEPTANCE. CONTRACTOR TO PROVIDE THE OWNERS REPRESENTATIVE A COMPUTER SPREAD SHEET THAT SHOWS EACH PROGRAM, OPERATIONAL DAYS AND RUN TIMES PER ZONE.
8. CONTROLLER AND THE PUMP STATION FLOW SENSOR ARE TO BE PROGRAMMED FOR FLOW MAXIMIZATION UP TO 200 GPM.

### CONTROLLER INSTALLATION NOTES

1. IRRIGATION CONTRACTOR TO COORDINATE EXACT LOCATION OF CONTROLLER WITH OWNER'S REPRESENTATIVE.
2. PROVIDE 120VAC 20 AMP POWER TO JUNCTION BOX INSIDE THE CONTROLLER PEDESTAL.
3. IRRIGATION CONTRACTOR TO HARD WIRE CONTROLLER TO POWER SUPPLY AS PER PREVAILING CODE.
4. CONTROLLER TO BE SECURELY ATTACHED TO THE CONCRETE PEDESTAL BASE USING METALLIC CONCRETE ANCHORS.
5. ALL IRRIGATION CONTROL WIRE ABOVE GRADE TO BE ENCASED IN PVC ELECTRICAL CONDUIT.
6. IRRIGATION CONTRACTOR IS RESPONSIBLE FOR ALL POTENTIAL WALL PENETRATIONS AND THE SEALING OF THOSE PENETRATIONS
7. CONTROLLER TO BE GROUNDED AS PER MANUFACTURERS RECOMMENDATIONS.

### RAIN BIRD IQ4 REMOTE ACCESS NOTES

1. PROVIDE 3 YEAR SUBSCRIPTION, FOR THE OWNER, TO THE RAIN BIRD IQ4 REMOTE ACCESS CLOUD BASED SYSTEM.
2. PROVIDE 3 YEAR CELL MODEM DATA PLAN FOR IQ4 ACCESS.
3. FULLY SET UP IQ4 TO ACCESS THE CONTROLLER AND ALLOW FOR ALL CONTROL SYSTEM ALERTS, CONTROLLER PROGRAMING, FLOW MANGMENT, AUTOMATED ET/WEATHER DOWNLOAD, AND PROGRAM SET UP.
4. PROVIDE A MINIMUM OF 4 HOURS OF RAIN BIRD IQ4 MANUFACTURERS TRAINING FOR THE OWNERS REPRESENTATIVES.



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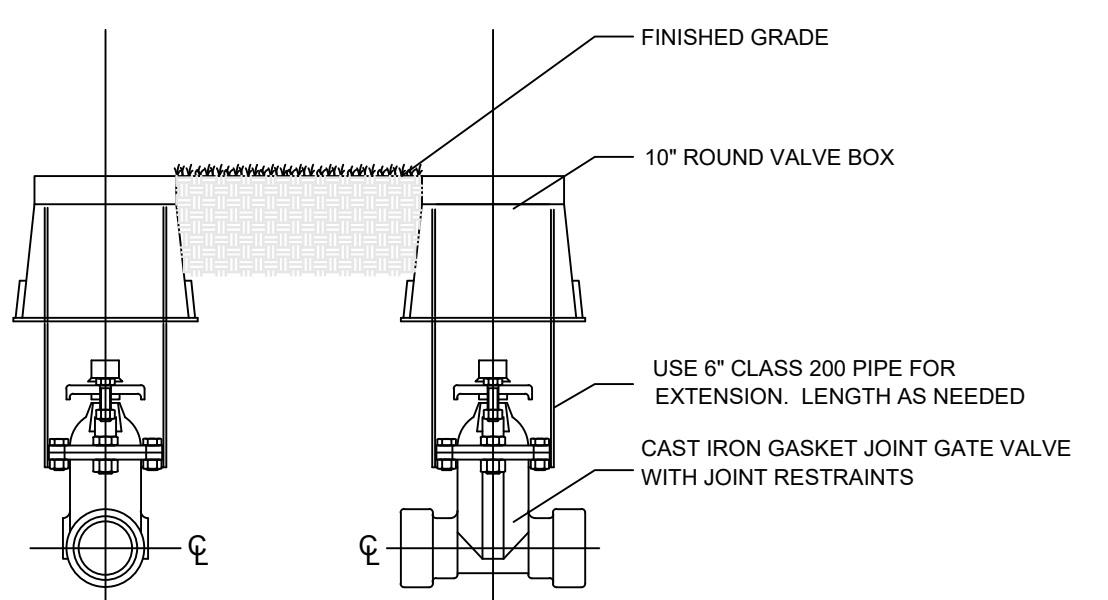
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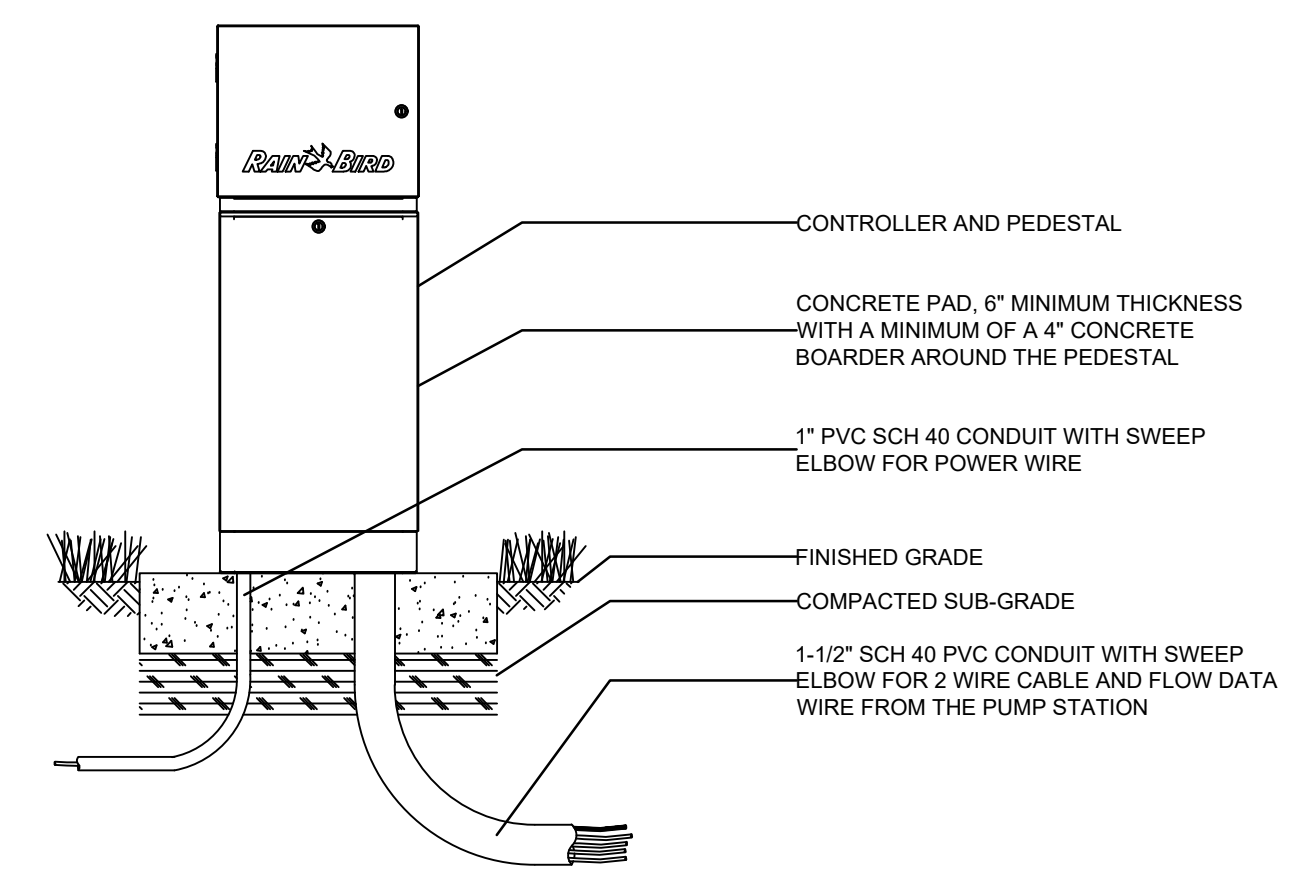
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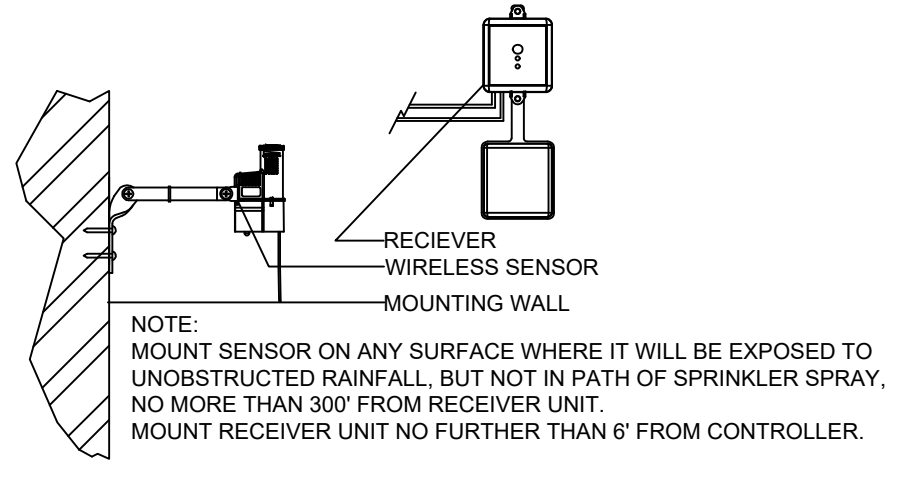
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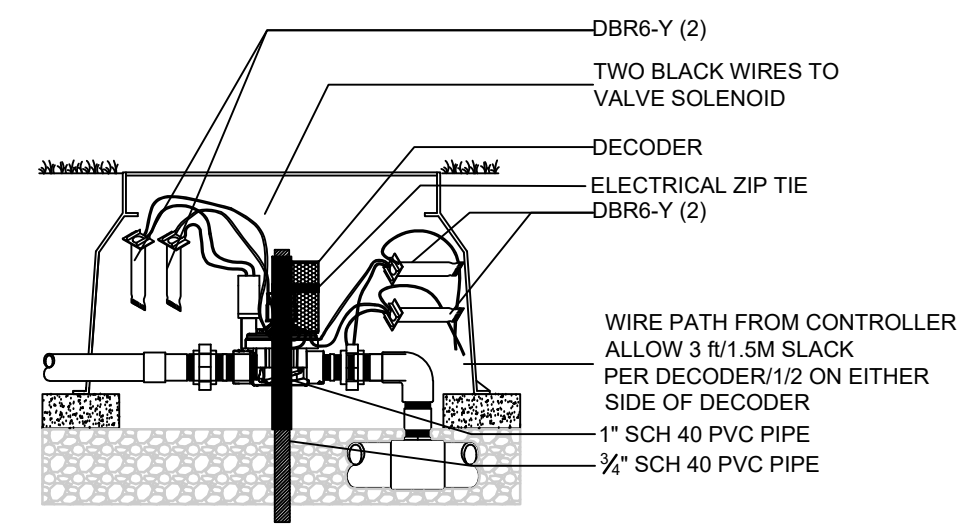
**9** ISOLATION VALVE DETAIL 2 1/2" AND LARGER  
NTS



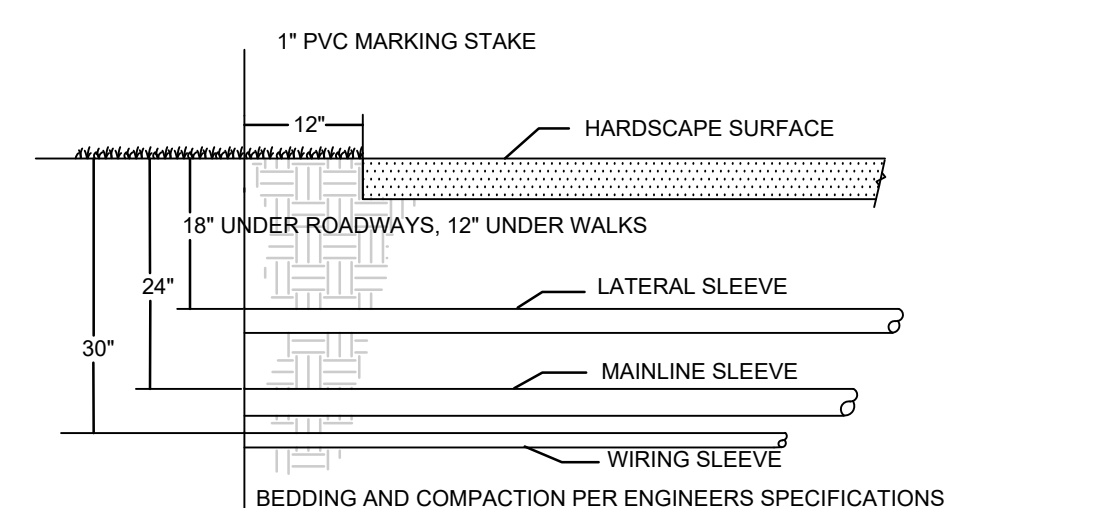
**10** PEDESTAL MOUNT CONTROLLER  
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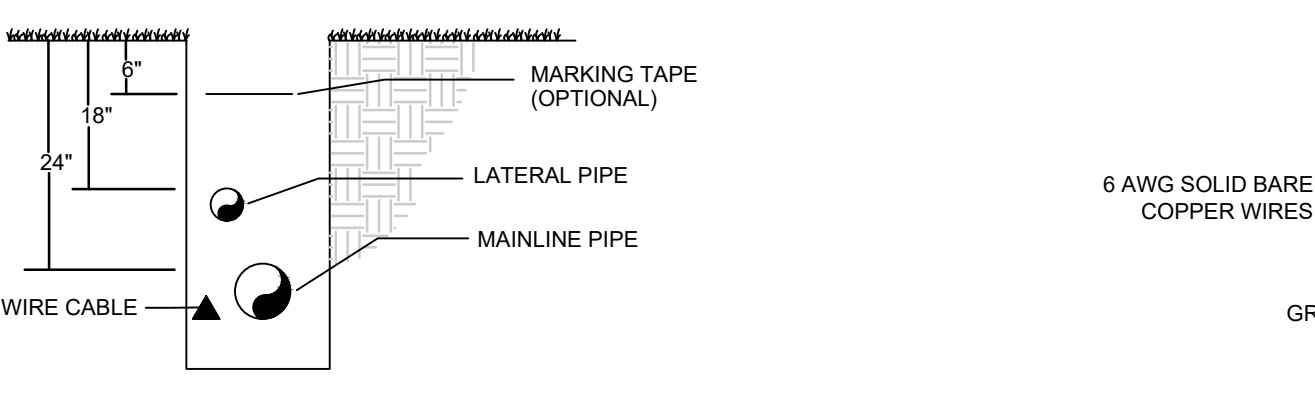
**11** WIRELESS RAIN SENSOR  
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**12** DECODER VALVE BOX INSTALLATION  
NTS

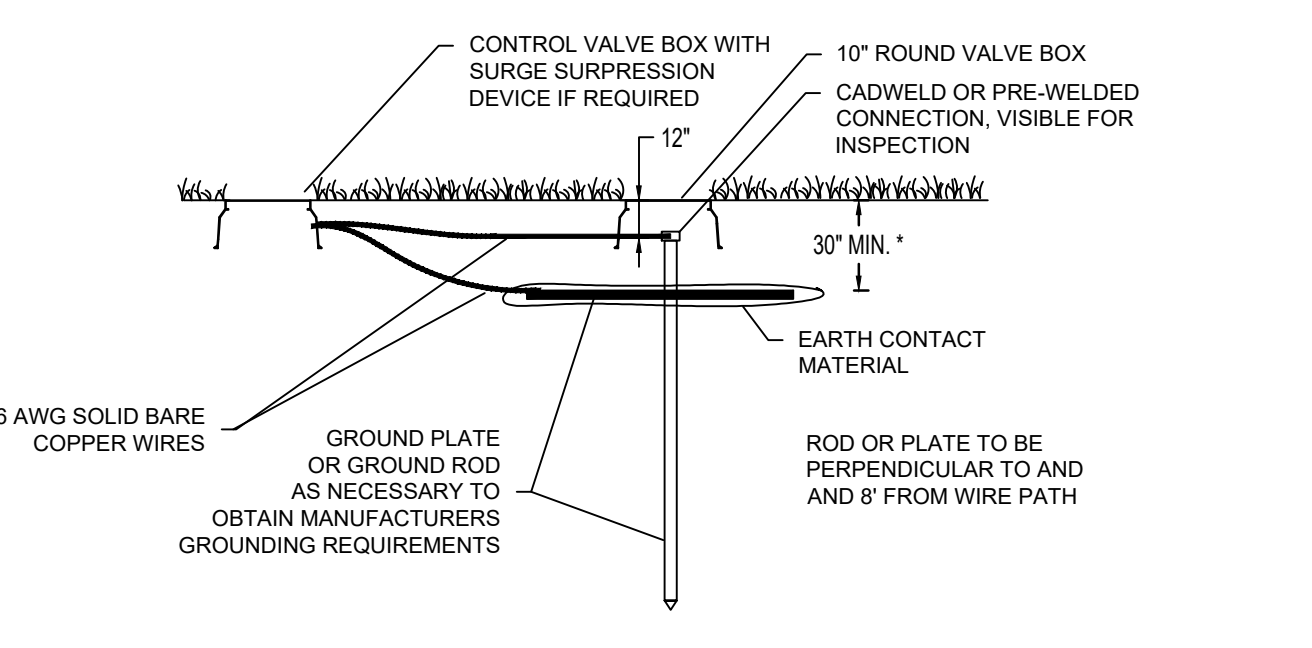


**13** SLEEVING  
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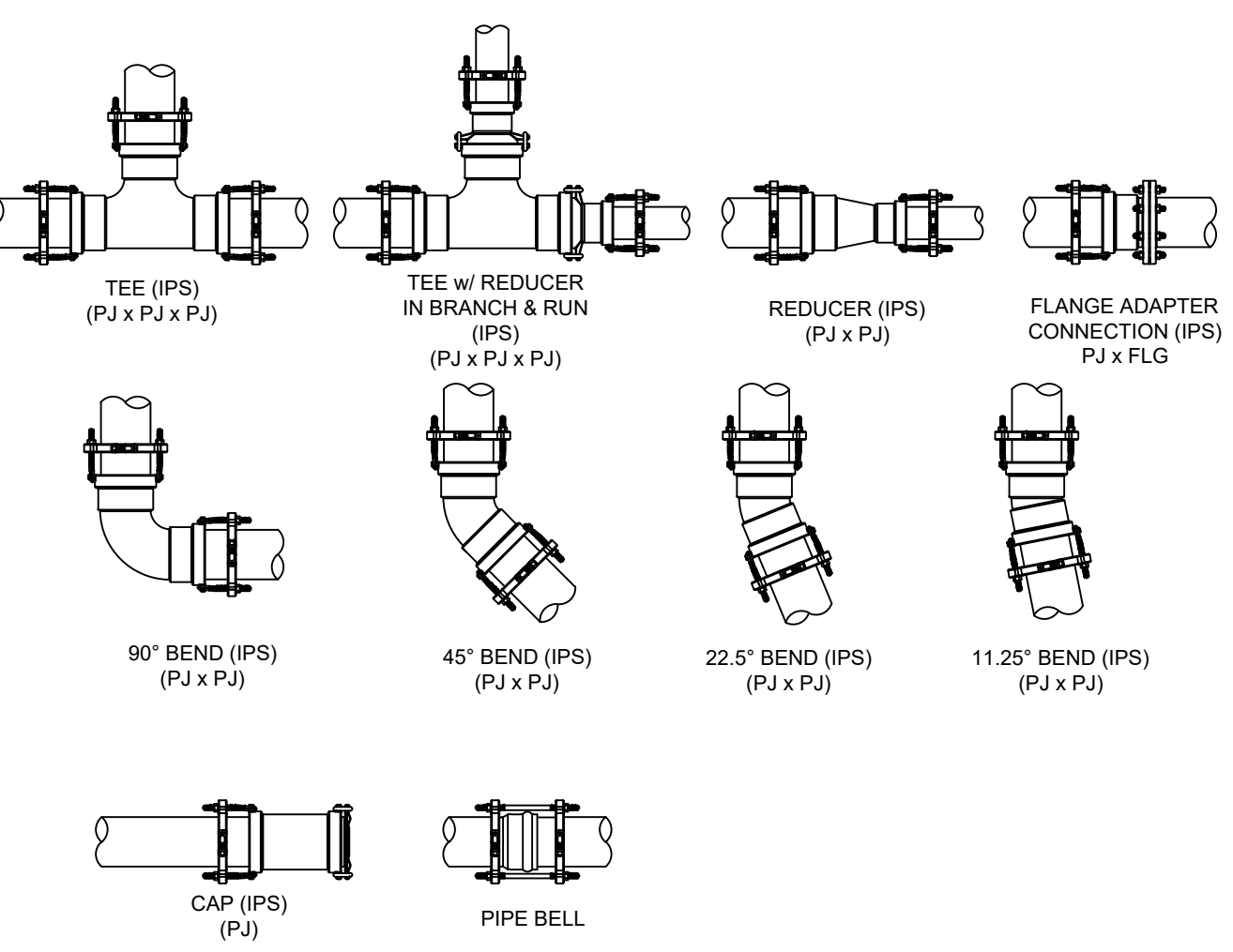


**14** TRENCH, PIPE AND WIRE  
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SIDE VIEW

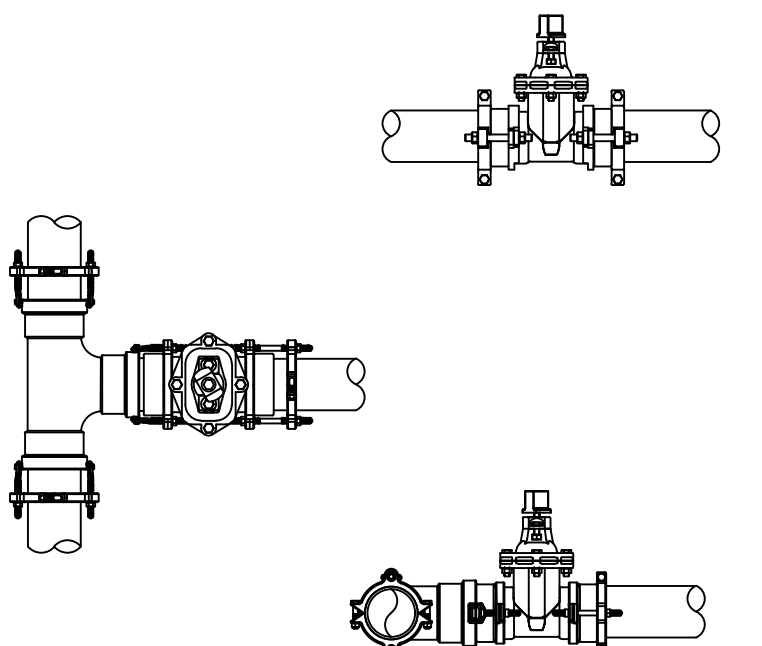


**15** TWO WIRE GROUNDING POINT DETAIL  
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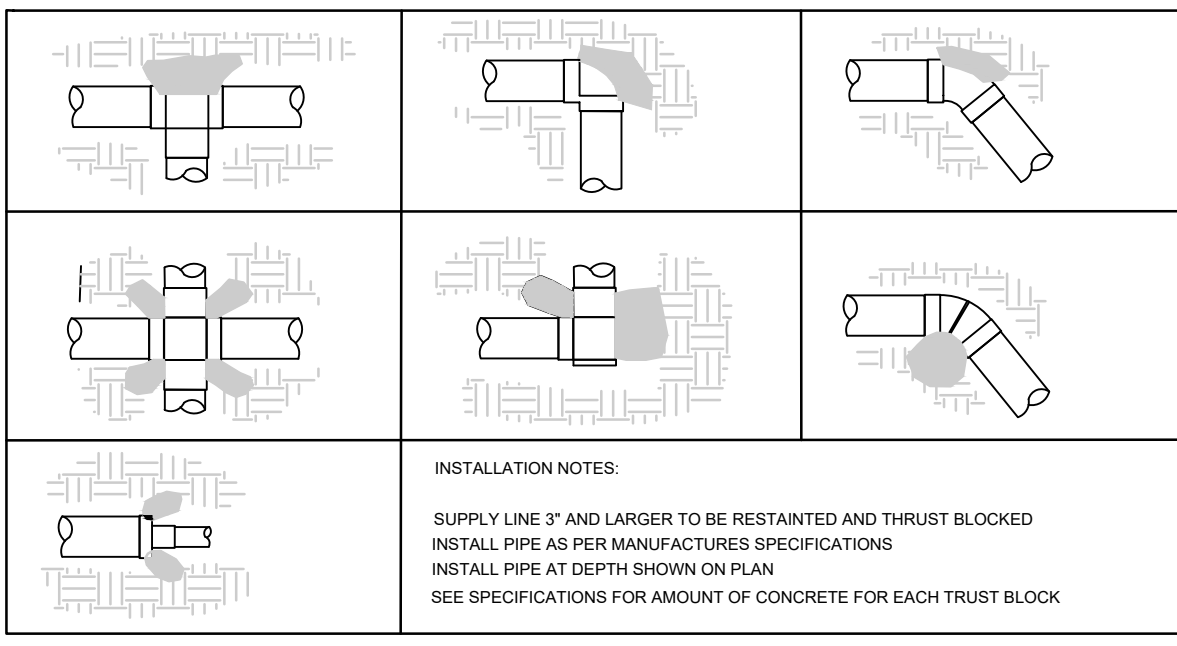
ALL FITTING, VALVE AND PIPE JOINT RESTRAINT TO BE INSTALLED AS PER MANUFACTURERS REQUIREMENTS. SEE WWW.HARCOFITTINGS.COM FOR JOINT RESTRAINT INSTALLATION INFORMATION.

**16** GASKET FITTING JOINT RESTRAINT  
NTS

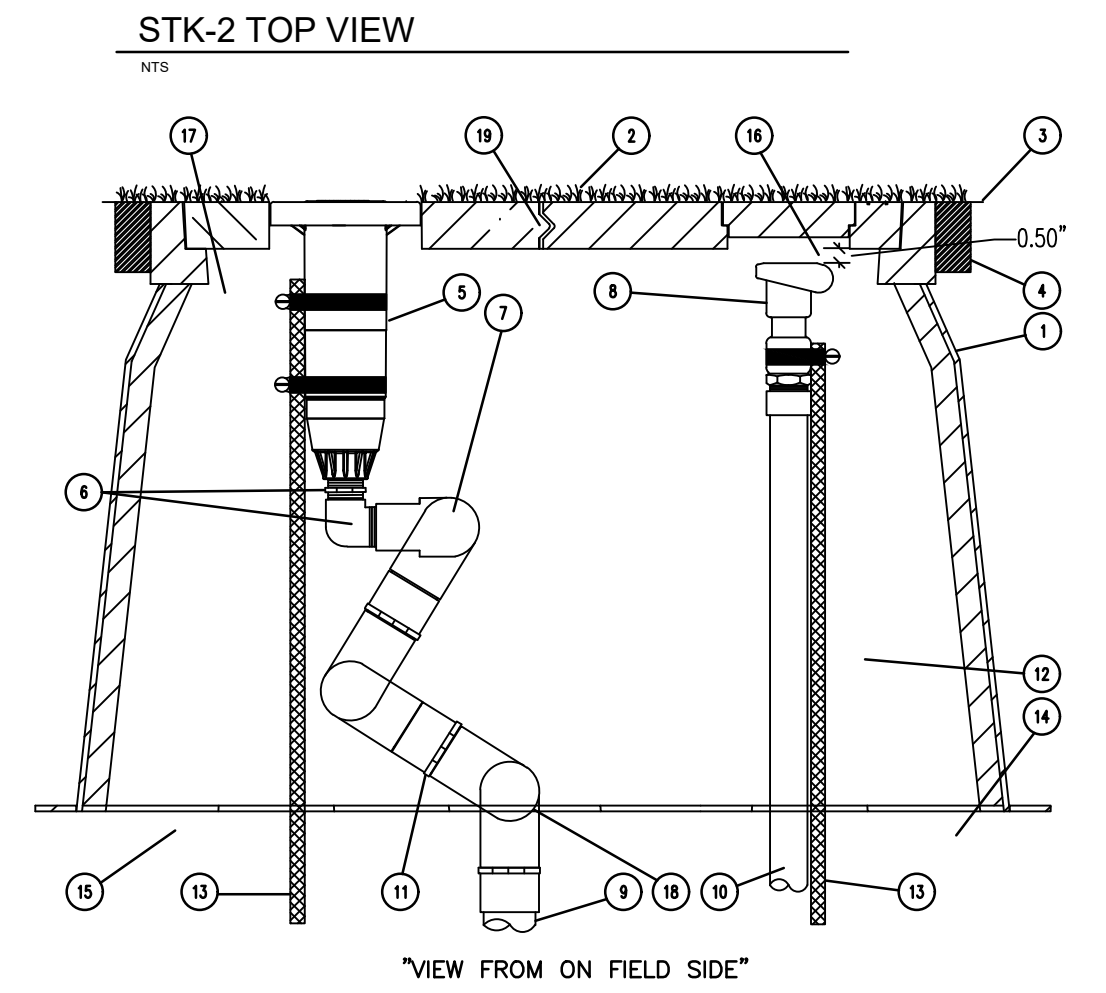
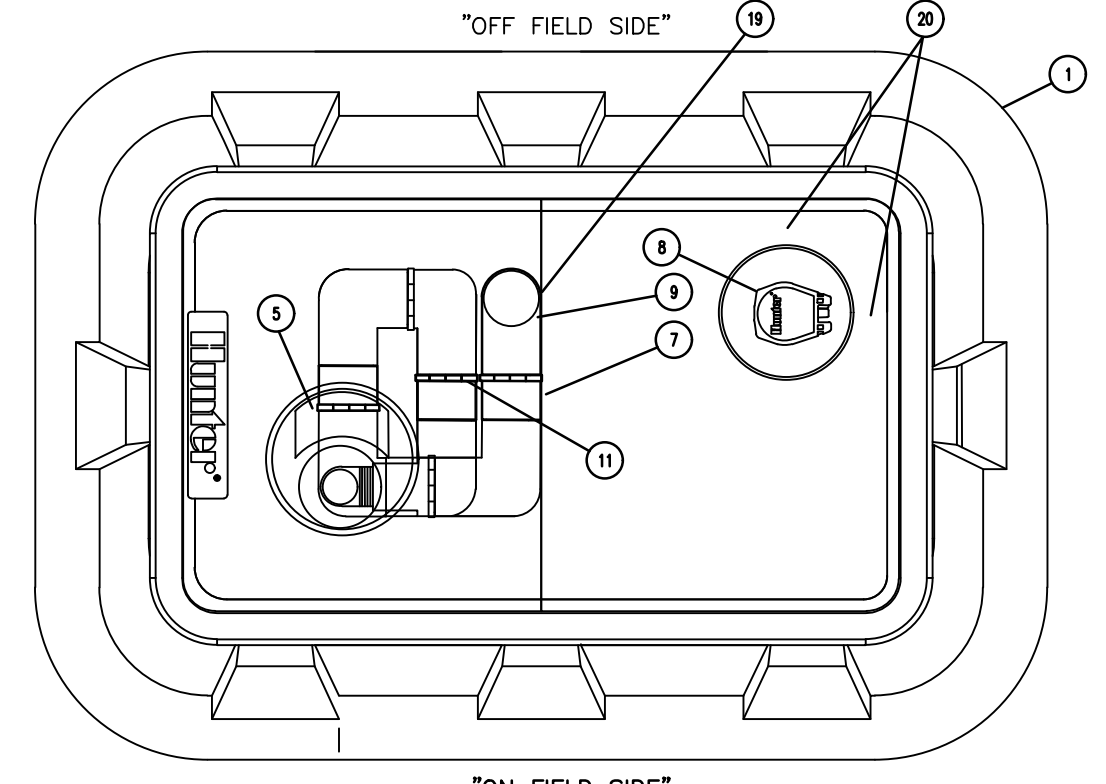


ALL FITTING, VALVE AND PIPE JOINT RESTRAINT TO BE INSTALLED AS PER MANUFACTURERS REQUIREMENTS. SEE WWW.HARCOFITTINGS.COM FOR JOINT RESTRAINT INSTALLATION INFORMATION.

**17** VALVE TO PIPE RESTRAINT  
NTS



**18** THRUST BLOCKS  
NTS



- 1 HUNTER ST173026P COMPOSITE BOX & 2-PIECE POLYMER-CONCRETE LID ASSEMBLY WITH CAST-IN OPENING TO SUPPORT ROTOR LATERAL THRUST PLUS CAST IN OPENING WITH CIRCULAR COVER FOR QUICK COUPLER ACCESS
  - 2 OPTIONAL - SYNTHETIC TURF OR RUNNING TRACK MATERIAL ATTACHED TO COVERS
  - 3 FINISHED GRADE SET TO FIELD PERIMETER TACK/GLUE BOARD OR AS PER SPECIFICATION
  - 4 2" x 4" TACK/GLUE BOARD AS PER SPECIFICATION ALL SIDES
  - 5 HUNTER ST6-900 WITH RUBBER COVER KIT 473900 INSTALLED
  - 6 HUNTER 238800 & 238300 ROTOR ADAPTER FITTING WITH 3 ACME PIVOT POINTS
  - 7 HUNTER ST2008VA PREFABRICATED 2" SCH 80 PVC SWING JOINT WITH 6 ACME PIVOT POINTS TO PROVIDE MULTI-AXIS ARTICULATION AND ALIGNMENT OF ROTOR TO THE OPENING IN ENCLOSURE COVER
  - 8 HUNTER HG3RC QUICK COUPLING VALVE
  - 9 LATERAL PIPING AND FITTINGS - 2" MINIMUM AS PER SPECIFICATION FROM CONTROL VALVE THROUGH TO ST2008VA SWING JOINT
  - 10 SCH 80 PVC RISER SUPPLY PIPING AND FITTINGS - 1" MINIMUM
  - 11 ACME THREADED PIVOTING POINTS (9 TOTAL)
  - 12 3/4" MINUS WASHED GRAVEL
  - 13 3/8" X 30" REBAR STAKE AND STAINLESS STEEL STRAPPING
  - 14 COMPACTED FIELD BASE MATERIAL AS PER SPECIFICATION
  - 15 PROVIDE DRAINAGE VIA ACCESS TO FIELD DRAINAGE SYSTEM
  - 16 TOP OF QUICK COUPLER SET 1/2" BELOW UNDERSIDE OF ENCLOSURE COVER
  - 17 GRAVEL LEVEL 5" BELOW UNDERSIDE OF ENCLOSURE COVER (TO BOTTOM OF ROTOR'S COMPARTMENT)
  - 18 ELEVATION OF SWING JOINT'S INLET - SET SECOND PIVOT POINT ON SWING JOINT WITH BOTTOM OF ENCLOSURE PER SIDE VIEW DETAIL DRAWING (26" BELOW ENCLOSURE TOP)
  - 19 LOCATION OF SWING JOINT'S INLET - SET INLET AT EDGE BETWEEN ENCLOSURE COVERS & LOCATE 5" FROM THE TOP OF COVER PER TOP VIEW DETAIL DRAWING. INLET MUST NOT BE SET CLOSER TO ROTOR THAN SHOWN.
  - 20 LOCATION OF QUICK COUPLER INLET PIPING - MEASURE INLET PIPING LOCATION AT TOP RIGHT HAND CORNER OF ENCLOSURE - 5" FROM TOP EDGE AND 5" FROM SIDE EDGE.
- \*ENCLOSURE DIMENSIONS  
 2 - PIECE COVER - 17" X 30"  
 EXPOSED RM - 20" X 33"  
 OVERALL HEIGHT - 26"  
 BASE PAD - 27" X 41"

**19** STK-2 SIDE VIEW  
NTS



MOUNT PLEASANT, SC 843.884.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.272.1272  
 CHARLOTTE, NC 980.312.5450  
 WWW.SEAMONWHITESIDE.COM



**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 6/12/20  
 DRAWN BY: MDC  
 CHECKED BY: CPC

| REVISION HISTORY |          |
|------------------|----------|
| 0                | 03/11/21 |
|                  |          |
|                  |          |
|                  |          |

IRRIGATION DETAILS

COPYRIGHT © SEAMON, WHITESIDE & ASSOCIATES, INC. 501 WANDOO PARK BOULEVARD, SUITE 200 | MOUNT PLEASANT, SC 29464 | 509 RHETT STREET | GREENVILLE, SC 29601  
THIS DRAWING SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WITHOUT WRITTEN PERMISSION.

**FLOW SENSOR**

The pump station discharge manifold shall incorporate an insertion type, pulse frequency output flow sensor for continuous output to pump station controls. The flow sensor output pulse shall be conditioned and fed directly to the processor for conversion and display in Gallons per Minute and totalize. Flow sensor accuracy shall be no less than 2% for flow velocities ranging from 1 - 30 feet per second.

**4.4 PRESSURE TRANSDUCER**

A solid state pressure transducer shall provide a noise free, linear output proportional to discharge pressure. Transducer shall be solid state, strain gauge type with integral voltage regulating and output accuracy not less than 0.5%. Transducer shall be constructed of stainless steel and rated for the maximum pump station discharge pressure.

**4.5 VARIABLE FREQUENCY DRIVE (VFD)**

The variable frequency drive shall be IGBT based with selectable carrier frequency up to 15 KHZ. The VFD shall include terminals for incoming power, motor output power and control terminals. The VFD shall generate a sine-coded, variable voltage/frequency, three-phase output for optimum speed control. The VFD shall incorporate power loss ride-through, VFD protective features shall include current limit, short circuit protection, electronic motor overload protection and ground fault protection. The VFD shall have push button programming display for easy access to operation parameters. VFD must be designed for operation in 50 degree C temperature condition.

**4.6 NATIONAL ELECTRICAL CODE STANDARDS**

Electrical controls shall conform to National Electrical Code Standards.

**CONTROL ALARMS:**

**4.7 LOW SYSTEM PRESSURE SAFETY SHUTDOWN**

When the station discharge pressure remains below an adjustable set point for the time called out in the Technical Specifications, the pumps will be de-energized and remain so until the alarm is manually reset. The Low Pressure alarm will be indicated on the processor display.

**4.8 HIGH SYSTEM PRESSURE SAFETY SHUTDOWN**

When the station discharge pressure remains above an adjustable set point for the time called out in the Technical Specifications, the pumps will be de-energized and remain so until the alarm is manually reset. The High Pressure alarm will be indicated on the processor display.

**4.9 HIGH PUMP VOLUME TEMPERATURE SHUTDOWN**

If the pump volume case temperature rises above 120 degrees F for the pre-programmed time, the pump will be de-energized and remain so until the alarm is manually reset. The High Temperature alarm will be indicated on the processor display.

**4.10 MOTOR OVERLOAD SHUTDOWN**

If the over current condition lasts longer than the pre-programmed limit the motor will be de-energized and remain so until the alarm is manually reset. The overload alarm will be indicated on the processor display.

**4.10 PHASE LOSS**

The controls will sense a phase loss on the incoming power supply. If the phase loss is longer than the drive ride through time, the motor will be de-energized and remain so until the alarm is manually reset. The Phase Loss alarm will be indicated on the processor display.

**4.11 VFD FAULT SHUTDOWN**

The VFD shall sense additional internal faults that will cause the VFD to shutdown for system protection. These faults will be indicated on the processor display.

**4.13 LIGHTNING ARRESTOR**

The main power supply to the pump station shall be equipped with a secondary lightning arrester having a shutdown current rating of not less than 60,000 Amperes at 14,000 Volts discharge. Power supplies 200 Volts and less shall use a 200 Volt arrester with an 800 Volt spark-over Voltage. Power supplies up to 600 Volts shall use a 600 Volt rated arrester with a 1,000 Volt spark-over Voltage.

**4.14 CORROSION INHIBITING MODULES**

Corrosion inhibiting modules shall be installed in the main electrical control enclosure in accordance with the manufacturer's recommendations.

**SECTION 5: MOUNTING BASE AND ENCLOSURE**

**5.1 MOUNTING BASE**

Construction shall include a fabricated base assembly to support all components during shipping and to serve as the installed mounting base. Pump station base shall be formed from a single sheet of 1/4" plate resulting in a seamless, one-piece base with rounded edges and corners. Height is to be 3-1/2" inches. The base shall be strategically reinforced beneath as required to provide additional support and strength. The base shall be drilled and tapped allowing the pump to be secured to the base. The base shall be shot blasted to bare metal prior to painting process.

**5.2 ENCLOSURE**

Construction shall include a weather resistant, 14 gauge or equivalent, all metal enclosure. The front side of the enclosure shall have oversized cooling vents. The enclosure is to be supplied with a two internally mounted gas struts that shall extend to keep the access door open. All components are to be accessible from top and front sides with the door completely open. Enclosure is to be suitable for mounting to the pump station base and shall include openings for suction and discharge piping.

**5.3 EXHAUST FAN**

For the purpose of cooling the pump motor, switchgear and control logic, an exhaust fan shall be located inside the pump enclosure, mounted to the enclosure lid. The exhaust fan shall be activated upon pump start and shall run until the pump stops. The fan shall be black die-cast aluminum construction with UL347-D rated polycarbonate propeller and rated for not less than 240 CFM. Fan motor shall be permanent split capacitor type with stainless steel ball bearings, class B insulation and automatic thermal protection.

**SECTION 6: PAINTING**

Painting of the entire pump station shall consist of a multi-step coating system which includes metal preparation, rust inhibitive baked epoxy prime coat, and a two part ultraviolet light insensitive baked polyurethane finish having total dry film thickness of not less than 5 mils. Prime coat and finish coat shall be baked at 165 degrees for not less than 30 minutes to achieve a high gloss, corrosion resistant finish. Exterior pump station components shall be painted Sandstone.

**SECTION 7: ADDITIONAL EQUIPMENT INCLUDED**

- 7.1 HDPE SUCTION PIPE ASSEMBLY w/ FOOT VALVE AND SCREEN
- 7.2 120V 1PH CONVENIENCE RECEPTACLE (4A MAX)

**SECTION 8: TESTING**

The pump station and all its component parts shall undergo a complete hydraulic and electrical test prior to shipment from the factory. Testing shall be dynamic and include operation over the entire flow range of the pump station under specified suction and net discharge pressure conditions. A plot containing actual flow, pressure, KW consumption and motor RPM shall be furnished as part of the owner's manual.

**SECTION 9: OWNERS MANUAL**

Complete start up instructions shall be provided by the manufacturer in the form of an owner's manual.

**SECTION 10: WARRANTY**

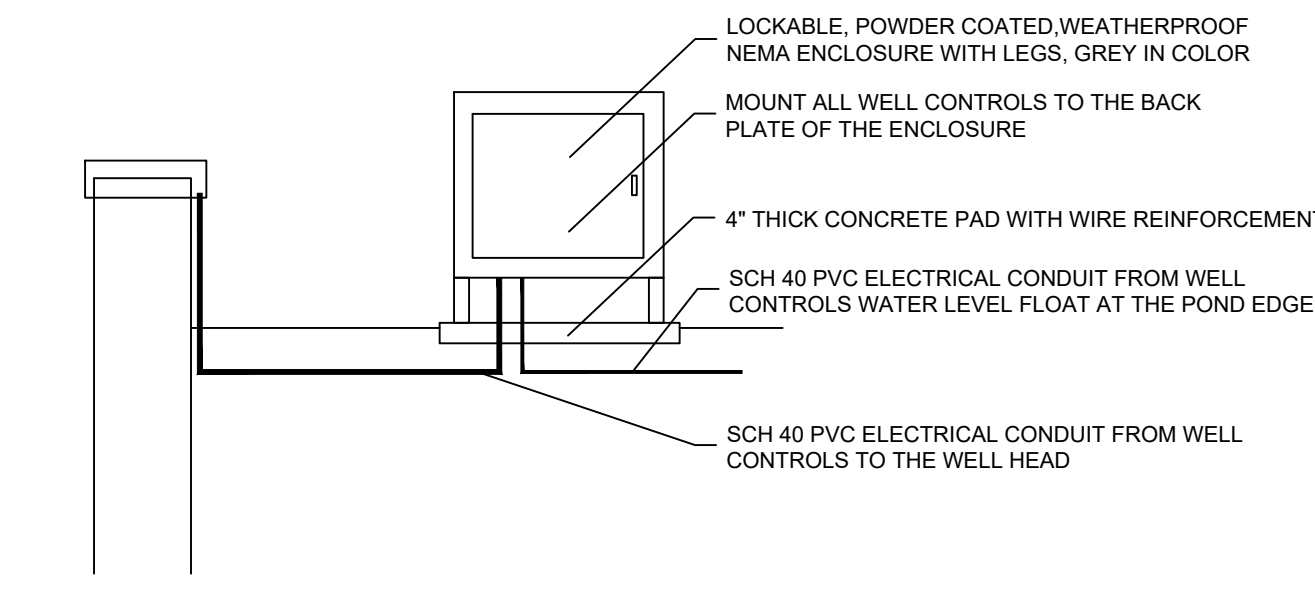
The manufacturer shall warrant the pump station to be free of defects for one year from date of start up or fifteen months after shipment, whichever occurs first. Failures caused by lightning strikes, power surges, vandalism, operator abuse, or acts of God are excluded from warranty coverage.

**SECTION 11: MANUFACTURER**

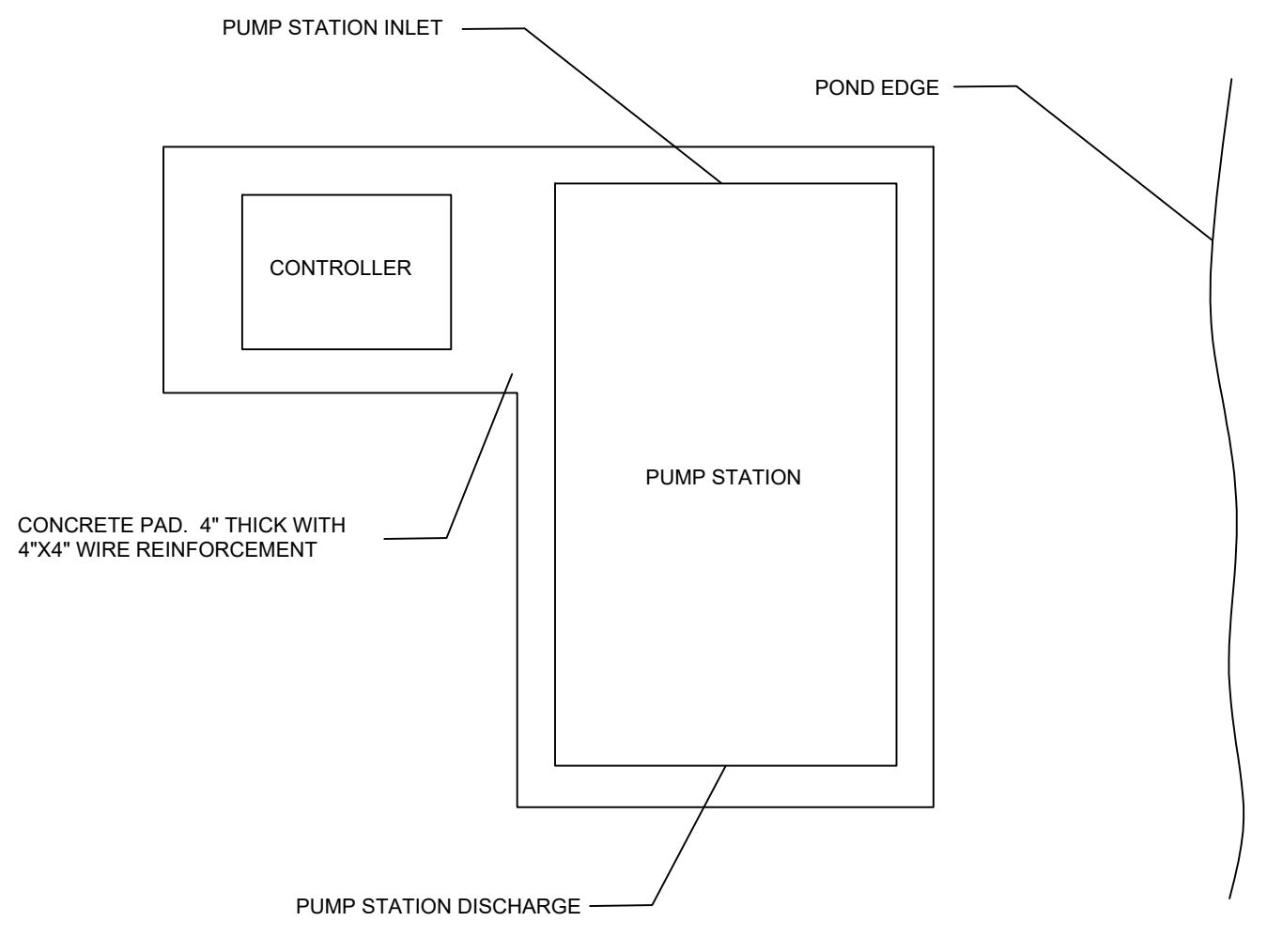
The pump station shall be manufactured by **Watertronics, Inc.**, Hartland, Wisconsin.

To be considered as "equal" the following information must be furnished by the contractor or manufacturer's representative at least 10 days prior to the date of the bid opening:

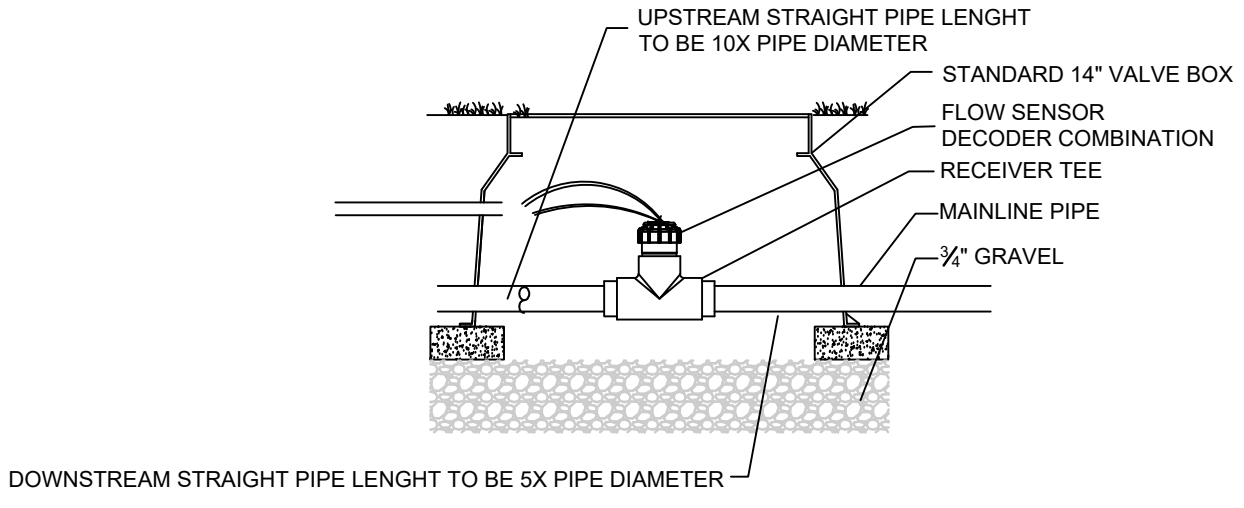
1. A complete specification and submittal of all major components for the proposed pump station with individual pump performance verification.
2. A detailed pumping station proposal drawing complete with component location, sizes and dimensions specific to the installation.
3. A complete electrical schematic for all high and low voltage circuits showing all circuit breakers, fuses and wire sizes. All wire numbering and colors must also be designated.
4. Pump station manufacturer's U.L. file number for the electrical controls and pump station.
5. A copy of the manufacturer's certificate of insurance.
6. Product support technicians shall be capable of accessing all information pertaining to the pumping equipment, e.g. electrical schematics, pump curves, program data, bill of materials, etc. The manufacturer shall have no less than two technicians on call seven days a week.
7. The pump station manufacturer shall provide factory authorized or factory direct service personnel for the set, start-up, preventative maintenance and general service of the pump system. A factory authorized or factory direct service technician must be located within one-hundred (100) mile radius of the project site. The pump systems technician must have a minimum of 5 years' experience. The pump station manufacturer shall provide technical phone support twenty-four hours a day seven days a week.



**22 RECHARGE WELL AND CONTROLS**  
NTS



**21 PUMP STATION AND CONTROLLER LAYOUT**  
NTS



**20 FLOW SENSOR**  
NTS

**PUMP STATION SPECIFICATIONS:**  
NAME: HANAHAN CITY PARK  
STATION MODEL: WMLV-7000-2-30-460-3-200-130  
STATION TOTAL PERFORMANCE: 200 GPM @ 130 PSI

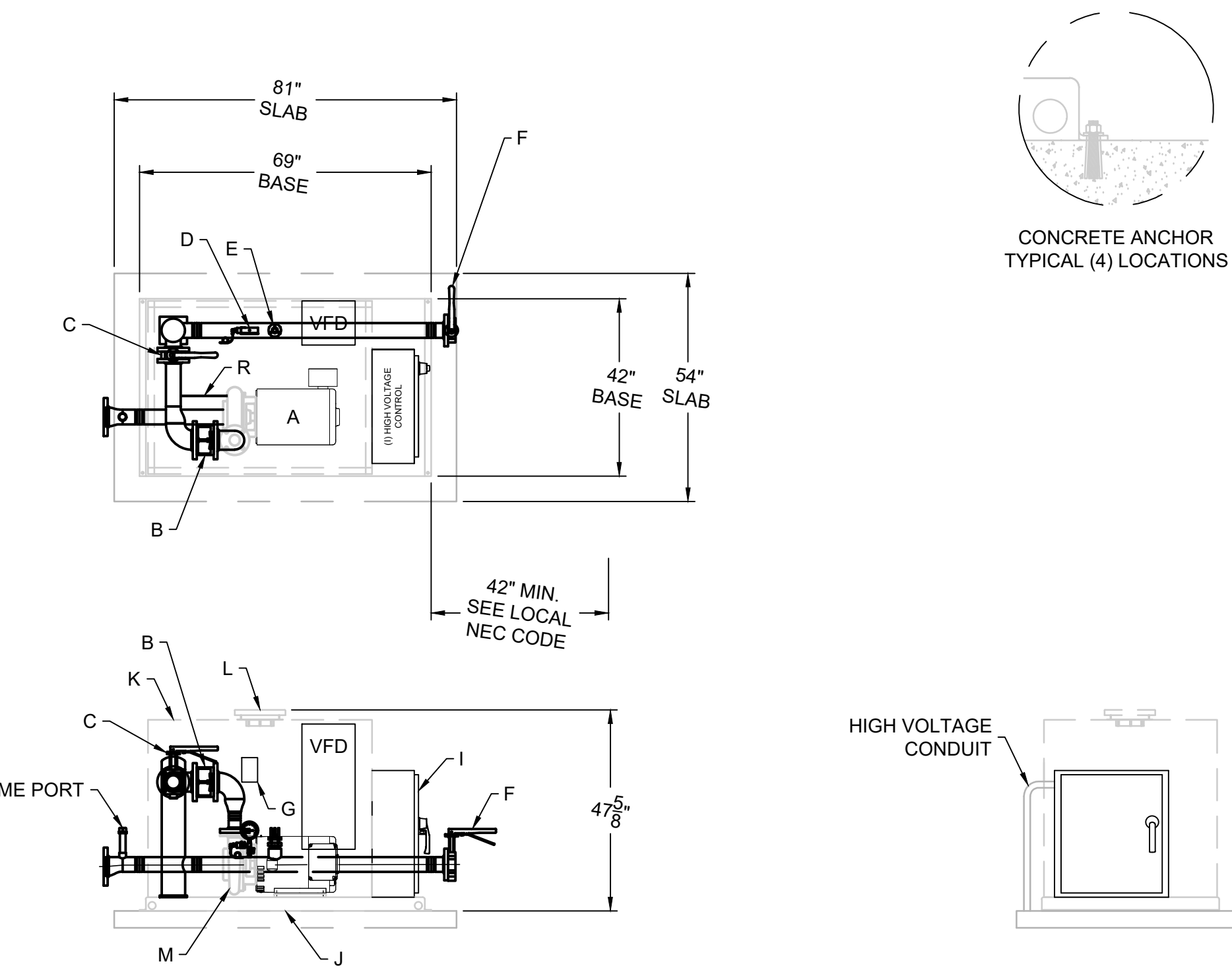
**MAXIMUM LIFT = 6'-0" FT.**

**PRESSURE DROP START**  
PUMP HORSEPOWER:  
PUMP NO. 1: 30HP (3600 RPM)

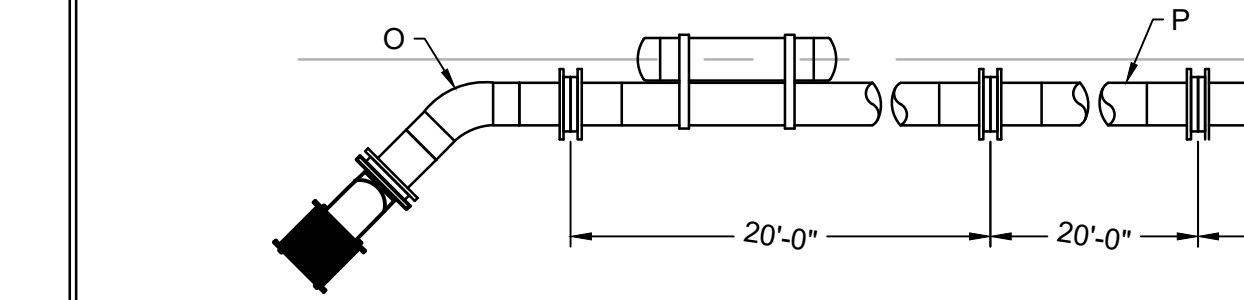
**CHECK VALVE SIZES:**  
PUMP NO. 1: 4"  
ISOLATION VALVE SIZES:  
PUMP DISCHARGE ISOLATION VALVE: 3"  
DISCHARGE ISOLATION VALVE SIZE: 3"

**POWER REQUIREMENTS: 460, 3PH, 60HZ, 48 FLA (EST.)**

**STATION COMPONENTS:**  
A PUMP AND MOTOR  
B CHECK VALVE  
C ISOLATION VALVE  
D PRESSURE TRANSDUCER w/ GAUGE  
E PUMP FLOW SENSOR  
F 3" STATION DISCHARGE ISOLATION VALVE  
G 120V 1PH CONVENIENCE RECEPTACLE (4A MAX)  
H N/A  
I NEMA 3R HIGH VOLTAGE PANEL - DEAD-FRONT  
J PAINTED STEEL BASE (SANDSTONE)  
K PAINTED STEEL ENCLOSURE (SANDSTONE)  
L ENCLOSURE COOLING FAN, HOOD MOUNTED  
M PUMP TEMP SENSOR  
O 4" X 20'-0" HDPE FLOATING INTAKE ASSEMBLY w/ FOOT VALVE w/ S.S. HARDWARE & SCREEN  
P 4" X 20'-0" HDPE INTAKE PIPE ASSEMBLY (QTY. 2)  
Q N/A  
R POSITIVE PRIME ASSEMBLY



CONCRETE ANCHOR TYPICAL (4) LOCATIONS



|  |    |      |     |             |  |
|--|----|------|-----|-------------|--|
| <input type="checkbox"/> APPROVED AS SUBMITTED | 7  |      |     |             |  |
| <input type="checkbox"/> APPROVED AS NOTED     | 6  |      |     |             |  |
| <input type="checkbox"/> REVISE AND RESUBMIT   | 5  |      |     |             |  |
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| NAME: _____                                    |    |      |     |             |  |
| DATE: _____                                    |    |      |     |             |  |
|  | NO | DATE | BY  | DESCRIPTION |  |

DRAWN BY: PJB DATE: 06/09/2020  
CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

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**WATERTRONICS**

SCALE: NTS SHEET 1 OF 1 SHEETS  
JOB NO.: DRAWING NO. PRST14142

**TITLE:**  
HANAHAN CITY PARK  
IRRIGATION PUMP STATION

**23 PUMP STATION**  
NTS

**WATERMAX-7000-2**

**VARIABLE FREQUENCY DRIVE PUMP STATION**  
**GENERAL SPECIFICATION**  
Project: Hanahan City Park  
Location: Hanahan, SC

**SCOPE OF WORK**

It is the intention of this specification to describe a self-enclosed automatic pump station for a turf irrigation system. This shall be accomplished by using a completely prefabricated pump station conforming to the following specifications. Supply shall be suction lift.

The pumping station shall be **WaterMax Model Number WMLV-7000-2-30-460-3-200-130** as manufactured by WATERTRONICS, INC. 525 Industrial Drive, P.O. Box 530, Hartland, Wisconsin 53029-0530. [www.watertronics.com](http://www.watertronics.com)

**SECTION 1: GENERAL**

- 1.1 The station shall be completely wired, piped, dynamically flow and pressure tested prior to shipment.
- 1.2 Operational sequence: The pump shall activate automatically upon detecting a drop in pressure in the irrigation main line. Operation shall be maintained at an adjustable minimum demand. The pump shall be automatically reset when the demand falls below the minimum adjustable set point for an adjustable time delay.
- 1.3 Construction: Construction shall be of modular form utilizing a base structurally adequate to support pumps, piping, and electrical equipment as a single integral assembly. All nuts, bolts washers, and fasteners shall be stainless steel, zinc or cadmium plated for corrosion resistance.

**SECTION 2: PUMP AND MOTOR**

**2.1 PUMP**

Pump shall be electric motor driven, horizontal centrifugal with mechanical shaft seal, volute case and impeller. The shaft seal shall be a self-adjusting mechanical type to prevent leakage and eliminate the need for a drain piping. The volute case shall be precision machined from gray cast iron and engineered to modern hydraulic standards. It shall be possible to rotate the discharge connection to any of four positions. A heavy cast iron bracket shall maintain alignment between the motor and volute case. The impeller shall be an enclosed type and balanced to provide smooth operation. The impeller shall be keyed to the shaft and locked with a special cap screw and washer. The motor shaft is to be manufactured from high grade steel and of reduced length to increase shaft rigidity, extend bearing life, and reduce the overall length of the pump and motor assembly. The pump shaft shall be protected with a replaceable stainless steel sleeve. The pump, motor and impeller shall be removable from the back of volute case for service without disturbing the plumbing.

**2.2 MOTOR**

Pump motor shall be a squirrel cage induction horizontal solid shaft type. The pump impeller shall be direct mounted and keyed to the motor shaft with a stainless steel protective sleeve. The temperature rise of the motor shall be to NEMA Standard for class B or Class F insulation. Radial and thrust bearings of ample capacity to accommodate the hydraulic thrust of the pump shall be incorporated into the motor.

**SECTION 3: PIPING MANIFOLD, VALVES, GAUGES AND OTHER MECHANICAL EQUIPMENT**

**3.1 FABRICATED PIPING**

All fabricated piping shall conform to ASTM specifications: A53 for Grade B welded or seamless schedule 40 pipe. All welded fittings shall be forged steel, slip-on or weld neck type. All welded fittings shall be seamless, ASTM Specification A234, with pressure rating not less than 150 PSI.

**3.2 CHECK VALVE**

On flooded suction and booster stations the pump check valve shall be cast iron bodded with a spring loaded single disc. Check valves shall be sized according to the maximum discharge flow of the pump. Pressure drop across the check valve shall not exceed 2.5 PSI at full flow. On suction lift stations the check valve will be removed and a pressure rated foot valve will be supplied to attach on the end of the suction pipe.

**3.3 STATION DISCHARGE ISOLATION VALVE**

Pump shall be isolated by means of a butterfly valve after the check valve and before the piping exits the station enclosure. Isolation valves shall be butterfly type with ten position lever, rated for 200 PSI WOG working pressure. Trim shall include stainless steel stem, bronze or nickel coated iron stem/nut disk with full faced resilient seat design to eliminate need for flange gaskets.

**3.4 DRAIN VALVES**

Drains shall be provided from all low points in the system and shall consist of 1/4" petcocks or ball valves.

**3.5 PRESSURE GAUGES**

Pressure gauges shall be located upstream and downstream of the pump for easy reading of the intake and discharge pressure. Pressure gauges shall be 3/4" stainless steel case and brass construction. Gauges shall be 2-1/2" diameter, liquid filled. Pressure sensing connection shall be 1/4" NPT low gauge connection.

**SECTION 4: ELECTRICAL CONTROLS**

**All control panels must meet or exceed the Federal Communications Commission (FCC) Standard #15 for emitted and conducted noise**

**4.1 DEAD-FRONT MAIN STATION DISCONNECT**

A three-pole service rated main station disconnect shall be mounted in a separate NEMA 4 enclosure outside the pump station enclosure to completely isolate the pump station electrical system from incoming power.

The incoming high voltage disconnect shall be supplied as a Dead Front style.

**4.2 PUMP THERMAL SWITCH**

The temperature of the pump shall be sensed by a thermal switch. The thermal switch shall be located on the pump volute. Externally mounted snap disc type thermal switches will not be accepted. The thermal switch shall activate upon a temperature rise above 120 degrees Fahrenheit.

**PROJECT OVERVIEW:**

THE CITY OF HANAHAN PROPOSES TO CONSTRUCT A NEW RECREATION CENTER MAINTENANCE FACILITY AND POUND KENNEL AT THE SUBJECT SITE. SANITARY SEWER SERVICE IS NOT AVAILABLE AT THE SITE, AS SUCH, AN INDIVIDUAL ONSITE WASTEWATER TREATMENT SYSTEM IS PROPOSED.

THE EFFLUENT FROM THE PROPOSED MAINTENANCE FACILITY STRUCTURE WILL GRAVITY FLOW TO A NEW 1,000 GALLON MIN. SEPTIC TANK WITH INTEGRATED FILTERED PUMP VAULT, WHICH WILL BE PUMPED TO A 1,500 GALLON MIN. SEPTIC TANK LOCATED NEAR THE PROPOSED POUND KENNEL. EFFLUENT FROM THE 1,500 GALLON PRIMARY TREATMENT TANK WILL GRAVITY FLOW TO AN 800 GALLON ADVANCED TREATMENT SYSTEM AND PUMP CHAMBER. EFFLUENT WILL BE RECIRCULATED AND DISCHARGED TO A DRIP TUBE DRAIN FIELD SYSTEM TO BE INSTALLED TO THE NORTH OF THE STRUCTURES AS SHOWN ON THE ENCLOSED SITE PLAN. THE REPAIR AREA IS PROVIDED EAST OF THE PROPOSED DRAIN FIELD AND SHALL BE LEFT UNDISTURBED AND UNDEVELOPED.

THE SPECIALIZED SYSTEM DESIGNED HEREIN HAS BEEN DESIGNED REFERENCING THE PROVIDED SOILS REPORT BY LICENSED SOIL CLASSIFIER MR. JOHN H. THORP, DATED APRIL 24, 2020. THE SYSTEM, INSTALLED PER THE ENCLOSED DESIGN, WILL FUNCTION AS INTENDED AND MEET OR EXCEED ALL REQUIREMENTS OF SCDHEC REGULATION 61-56/ PROGRAM 362/610.

**GENERAL NOTES:**

- THESE DRAWINGS INDICATE A GENERAL SCOPE OF WORK AND MAY NOT DESCRIBE THE ENTIRE EXTENT OF WORK REQUIRED FOR PROJECT COMPLETION. CONTRACTOR AND OWNER ARE RESPONSIBLE FOR ALL LABOR, MATERIALS, SUPERVISION, UNSPECIFIED MATERIAL SELECTION, ADHERENCE TO SCDHEC AND LOCAL STANDARDS, AND QUALITY CONTROL.
- CONSTRUCTION SHALL CONFORM TO SCDHEC SPECIFICATIONS
- CONSTRUCTION SHALL BE PERFORMED BY A LICENSED SEPTIC INSTALLATION CONTRACTOR
- ALL ELECTRICAL AND PLUMBING WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS
- OWNER/CONTRACTOR TO PROVIDE ADEQUATE BARRIERS AROUND PERIMETER OF SEPTIC SYSTEM TO PREVENT VEHICLE PARKING AND TRAFFIC IN DRAIN FIELD AND REPAIR AREA. BOTH AREAS ARE TO REMAIN COMPLETELY UNDISTURBED.
- INSTALLATION OF DRAINAGE SWALES, DITCHES, DIVERSION DRAINS, OR RAIN GUTTERS MAY BE REQUIRED TO DIVERT OR INTERCEPT WATER AWAY FROM THE ONSITE WASTEWATER SYSTEM LOCATION. THE SEPTIC TANK(S) AND DRAIN FIELD AREA SHALL BE BACKFILLED AND SHAPED TO PROMOTE POSITIVE DRAINAGE.
- TRENCH SUB-GRADE SHALL BE LEVEL ALONG ITS LENGTH.
- USDA NRCS CLASS I FILL SAND (LESS THAN 10% FINES) SHALL BE USED TO FILL CUT AREAS SURROUNDING TRENCHES.
- TRENCH AGGREGATE (IF APPLICABLE) SHALL BE GRANITE OR APPROVED ALTERNATE TO MEET SCDHEC SPECIFICATIONS.
- BASE OF TRENCH TO MAINTAIN 6" MINIMUM OFFSET FROM ZOS/SHWT.
- WELL SYSTEMS, IF REQUIRED, SHALL BE INSTALLED MINIMUM OF 75' FROM SEPTIC SYSTEM
- THE SEPTIC SYSTEM SHALL NOT BE INSTALLED IN WETLANDS; A REVIEW OF THE CIVIL PLANS PROVIDED CONFIRMED THE SYSTEM IS NOT BEING INSTALLED IN WETLANDS. OWNER/CONTRACTOR SHALL NOTIFY ENGINEER OF ANY CHANGE IN SITE CONDITIONS.
- UPON COMPLETION OF CONSTRUCTION AN AS-BUILT, CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER, MUST BE SUBMITTED TO SCDHEC.
- CONSTRUCTION SHALL BE INSPECTED AND SUPERVISED BY A REGISTERED PROFESSIONAL ENGINEER.

**OPERATIONS AND MAINTENANCE PLAN:**

**1. GENERAL MAINTENANCE CONSIDERATIONS:**

- 1.1. ESTABLISH VEGETATIVE COVER (SOD OR SEED) IMMEDIATELY UPON CONSTRUCTION COMPLETION.
  - 1.2. ONLY EFFLUENT DISCHARGE FROM THE SEPTIC TREATMENT SYSTEM SHALL BE DISCHARGED TO THE TREATMENT SYSTEM.
  - 1.3. MAINTAIN ALL PLUMBING FIXTURES TO PREVENT EXCESS WATER FROM ENTERING THE DISPOSAL SYSTEM.
  - 1.4. PROVIDE ADEQUATE PROTECTION TO PREVENT CARS, TRUCKS, OR OTHER HEAVY EQUIPMENT FROM DRIVING OVER THE DRIP TUBE DRAIN FIELD, REPAIR AREA, AND ASSOCIATED EQUIPMENT WHICH MAY DAMAGE THE SYSTEM AND CAUSE MAL FUNCTION.
  - 1.5. DO NOT DRIVE TENT STAKES, GOLF PUTTING HOLES, SURVEY STAKES, VOLLEYBALL NET POSTS, ETC. INTO THE DRAIN FIELD.
  - 1.6. CONTACT YOUR SERVICE PROVIDER IF YOUR HIGH WATER ALARM SHOULD SOUND. REFRAIN FROM EXCESSIVE WATER USAGE UNTIL UN HAS BEEN SERVICED.
  - 1.7. CONTACT YOUR SERVICE PROVIDER PRIOR TO AND UPON RETURN OF TEMPORARY LONG DURATION SHUT DOWN DUE TO A VACATION OR OTHER REASON TO ENSURE UNIT IS STARTED UP PROPERLY UPON RETURN.
  - 1.8. NOTIFY YOUR SERVICE PROVIDER IF ANY AREAS OF EXCESSIVE WETNESS ARE NOTICED WITHIN THE DRAIN FIELD AREA.
2. TO ENSURE THAT THE SYSTEMS DESIGNED HEREIN CONTINUE TO OPERATE RELIABLY AND WITHOUT PROBLEMS, THE PROPERTY OWNER SHALL ENTER INTO AN ONGOING MONITORING & MAINTENANCE SERVICE CONTRACT WITH A CERTIFIED SERVICE PROVIDER OF ORENCO SYSTEMS.
  3. THE SERVICE CONTRACT SHALL ALSO CONTAIN AN ACKNOWLEDGEMENT OF UNDERSTANDING THAT THE OWNER UNDERSTANDS AND ACCEPT RESPONSIBILITY TO OPERATE THE SYSTEM IN ACCORDANCE TO THE OWNER'S MANUAL AND TO MAINTAIN AND FULLY CONVEY A FULLY PA SERVICE CONTRACT OF MINIMUM 1 YEAR TERM TO A SUBSEQUENT BUYER, AND THAT FUTURE BUYER ARE RESPONSIBLE FOR FUTURE MAINTENANCE CONTRACTS UPON CONVEYANCE.
  4. UPON COMPLETION OF THE INSTALLATION, THE EQUIPMENT DISTRIBUTOR, INSTALLATION CONTRACTOR AND THE SERVICE PROVIDER SHALL GIVE THE PROPERTY OWNER AN OWNER'S MANUAL AND OWNER SHALL SIGN FOR RECEIPT THEREOF, CONCURRENTLY, THE DISTRIBUTOR, CONTRACTOR AND SERVICE PROVIDER SHALL CONDUCT AN ORIENTATION WITH THE PROPERTY OWNER AND CONDUCT A SYSTEM OPERATIONAL TEST TO VERIFY PROPER INSTALLATION.

**OPERATION & MAINTENANCE BY COMPONENT:**

**KENNEL WASTE MANAGEMENT:** COLLECTION AND DISPOSAL OF SOLID WASTE PRIOR TO WATER WASH DOWN OF KENNELS IS REQUIRED FOR SATISFACTORY LONG-TERM OPERATION OF THE SEPTIC SYSTEM.

**SEPTIC TANK EFFLUENT FILTER:** AN EFFLUENT FILTER SHALL BE INSTALLED AND MAINTAINED IN THE OUTLET TEE OF THE PRIMARY 1,500 GALLON SEPTIC TANK. THE EFFLUENT FILTER SHALL BE REMOVED AND CLEANED EVERY 6 MONTHS TO REMOVE ACCUMULATIONS OF ANIMAL HAIR AND OTHER SOLIDS.

**SEPTIC TANK:** THE SEPTIC TANK SHALL BE PUMPED AT LEAST ONCE EVERY TWO YEARS BY A LICENSED SEPTIC CONTRACTOR. PUMPING SCHEDULE MAY BE ADJUSTED BASED UPON SITE SPECIFIC CONDITIONS. PUMPING IS NECESSARY WHEN SOLIDS ARE OBSERVED BETWEEN ONE-THIRD AND ONE-HALF THE HEIGHT OF THE TANK. SEPTIC CONTRACTOR SHALL BE CONTACTED TO INSPECT THE SOLIDS LEVEL AND PUMP SOLIDS. INSPECTOR SHALL NOTE THE FOLLOWING AND RECOMMEND PUMPING WHEN THE THE BOTTOM OF THE SCUM LAYER IS WITHIN 6 INCHES OF THE OUTLET TEE AND/OR WHEN THE TOP OF THE SLUDGE LAYER IS WITHIN 12 INCHES OF THE OUTLET TEE.

**DRAIN FIELD:** DRAIN FIELD SHALL BE INSPECTED ONCE EVERY 6 MONTHS FOR AT LEAST THE FIRST YEAR OF OPERATION BY A LICENSED SEPTIC CONTRACTOR TO ENSURE IT IS FUNCTIONING ADEQUATELY. THE INSPECTION SCHEDULE CAN BE ADJUSTED BY THE LICENSED CONTRACTOR AFTER THE FIRST YEAR, DEPENDENT UPON SITE SPECIFIC CONDITIONS.

**PUMPS:** PUMP SYSTEMS SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS AND SHALL BE SERVICED AS NEEDED DURING THE LIFE OF THE PUMP. FRANKLIN PUMPS ARE DESIGNED WITH A 7-10 YEAR LIFE SPAN, DEPENDENT UPON SITE SPECIFIC CONDITIONS, REPLACE AS NECESSARY (BY A QUALIFIED SEPTIC CONTRACTOR).

**PROJECT REFERENCES:**

- CIVIL BASE FILE DRAWING WITH TOPO SURVEY AND SITE PLAN BY SEAMON WHITESIDE, FILE NAME 7867\_BASE, PROVIDED 4/28/20.
- SOILS REPORTS BY LICENSED SOIL CLASSIFIER MR. JOHN H. THORP DATED APRIL 24, 2020.

**PROJECT NAME: HANAHAN RECREATION COMPLEX**

**PROJECT LOCATION: HENRY BROWN JR. BLVD.**

**HANAHAN, SC 29410**

**BERKELEY COUNTY, SC**

**TMS: 253-00-00-001 (PART)**

**WATER SUPPLY: BCWSA (PUBLIC UTILITY)**

**\*\*WELL TO REMAIN 100' FROM DRAIN FIELD IF INSTALLED.**

**\*\*INSTALLER MUST CONTACT ENGINEER FOR PRE-CONSTRUCTION MEETING & TO SCHEDULE INSTALL INSPECTIONS PRIOR TO INSTALL\*\***

**SHEET LIST TABLE**

| SHEET | DRAWING NUMBER | SHEET TITLE  |
|-------|----------------|--|
| SP1   | 20200124-0     | GENERAL NOTES & DESIGN CRITERIA                                  |
| SP2   | 20200124-1     | SITE PLAN & SEPTIC LAYOUT  |
| SP3   | 20200124-2     | TYPICAL SEPTIC TANK AND TREATMENT SYSTEM CONFIGURATION & DETAILS |
| SP4   | 20200124-3     | TYPICAL SEPTIC TANK AND TREATMENT SYSTEM ELEVATIONS & DETAILS    |
| SP5   | 20200124-4     | SEPTIC DRAIN FIELD SECTION & DETAILS                             |
| SP6   | 20200124-5     | SEPTIC DRAIN FIELD DRIP TUBE DETAILS                             |

**DESIGN SUMMARY – HANAHAN REC COMPLEX MAINT. BUILDING AND POUND:**

LTAR= 0.5 PER SOIL CLASSIFICATION REPORT BY MR. JOHN THORP, SOILS REPORT DATED APRIL 24, 2020

ZONE OF SATURATION= 7" (ASSUMED ELEVATION=96.63') AT SOIL BORING #1

LOADING= 3 EMPLOYEES PER SHIFT @ 1 SHIFT PER DAY  
POUND WASTE @ 6 KENNEL RUNS

DESIGN FLOWRATE= 345 GPD (15 GAL/DAY/EMPLOYEE & 50 GAL/DAY/KENNEL  
RUN REF. R.61-56 APP. R)

TOTAL MIN. REQUIRED SYSTEM AREA= 690 SF DESIGN, 50% REPAIR AREA= 345 SF

DESIGN SYSTEM AREA= 1190 SF, 2400 SF REPAIR AREA

**EQUIPMENT SELECTION:**

DRIP TUBE= 1,000 LF MIN. OF GEOFLOW WASTEFLOW PC 1/2 GPH, INSTALLED PER MANUFACTURER SPECIFICATIONS.  
TUBE SPACING: 12" O.C.  
EMITTERS SPACING: 24" O.C.

MAINT. BUILDING SEPTIC TANK= ROTH INJECTION MOLDED 1,000 GALLON TANK AQWA STEP TANK W/ INTEGRATED FILTERED EFFLUENT PUMP SYSTEM PER MANUFACTURER SPECIFICATIONS.

POUND FACILITY SEPTIC TANK= ROTH INJECTION MOLDED 1,500 GALLON TANK INSTALLED PER MANUFACTURER SPECIFICATIONS. NOTE, MAINTENANCE ACCESS RISERS AND EFFLUENT FILTER REQUIRED PER ENCLOSED SPECIFICATIONS AND DETAILS.

TREATMENT RECIRCULATION TANK= ROTH INJECTION MOLDED 1,060 GALLON TANK W/ INTEGRATED PUMP VAULT INSTALLED PER MANUFACTURER SPECIFICATIONS AND PER PLAN DETAILS.

DRAIN FIELD DOSING TANK= ROTH INJECTION MOLDED 1,060 GALLON TANK W/ INTEGRATED PUMP VAULT INSTALLED PER MANUFACTURER SPECIFICATIONS AND PER PLAN DETAILS.

TREATMENT TANK SYSTEM= ORENCO ADVANTEX AX20 TREATMENT POD, INSTALLED PER MANUFACTURER SPECIFICATIONS.

MAINT. BUILD LIFT STATION PUMP SELECTION= ORENCO SYSTEMS PF20005, 20 GPM PUMP. INSTALL PER MANUFACTURER SPECIFICATIONS.

REGIRC PUMP SELECTION= ORENCO SYSTEMS PF50005, 50 GPM PUMP. INSTALL PER MANUFACTURER SPECIFICATIONS.

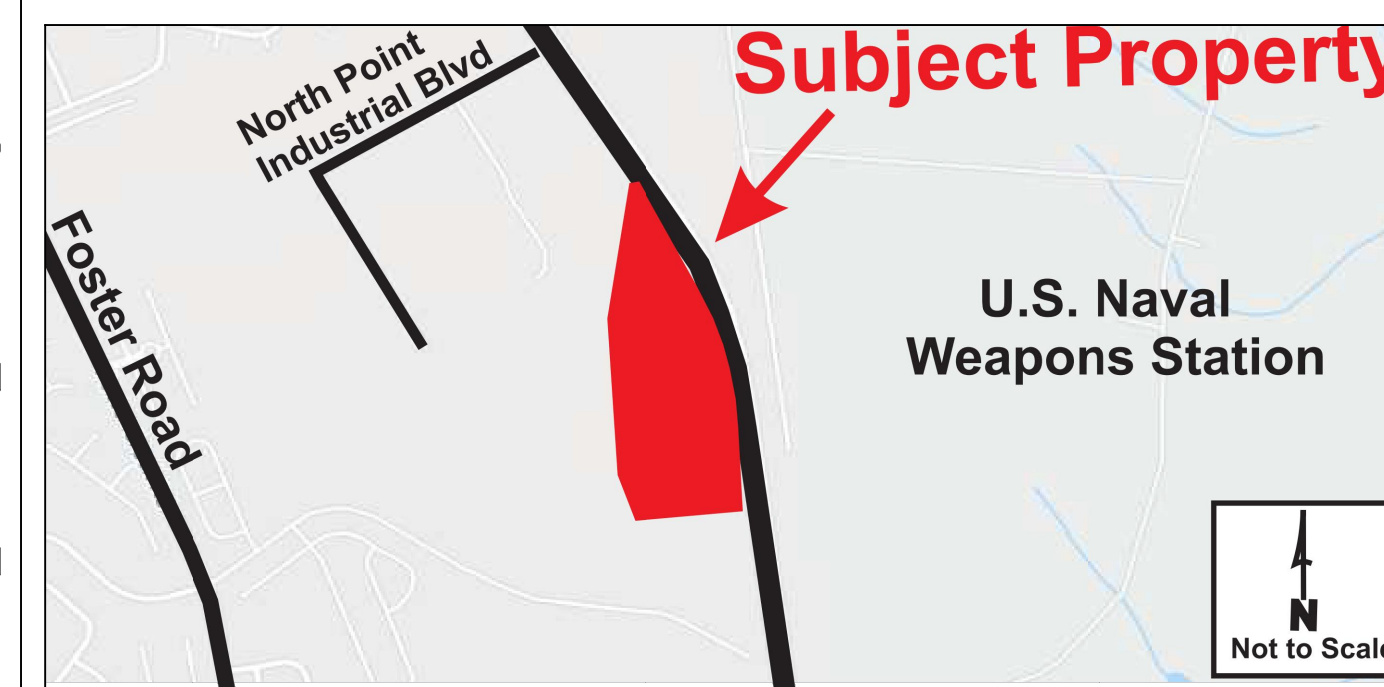
DISCHARGE PUMP SELECTION= ORENCO SYSTEMS PF20005, 20 GPM PUMP. INSTALL PER MANUFACTURER SPECIFICATIONS.

**\*\*NOTE: CONTRACTOR PROPOSED ALTERNATIVES SHALL BE SUBMITTED TO ENGINEER FOR REVIEW AND APPROVAL.**

**CLIENT:**

**SEAMON WHITESIDE  
ATTN: MRS. JENNIFER PALMER  
128 S. MAIN ST. #B  
SUMMERVILLE, SC 29483**

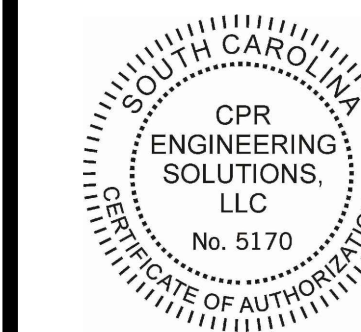
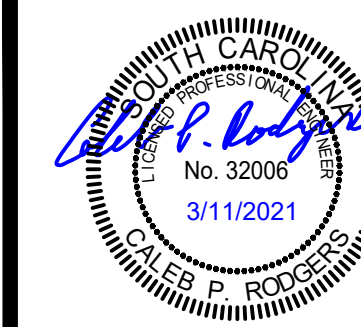
**EQUIPMENT PROVIDER:**



**VICINITY MAP  
N.T.S.**



**Know what's below.  
Call before you dig.**



**CPR  
ENGINEERING SOLUTIONS, LLC  
P.O. BOX 67  
PINOPOLIS, SC 29469  
(843)860-3293**

| CPR | BID SET | 3/11/21 | 0 | REV. DATE | DESCRIPTION | DES. ENG. |
|-----|---------|---------|---|-----------|-------------|-----------|
|     |         |         |   |           |             |           |

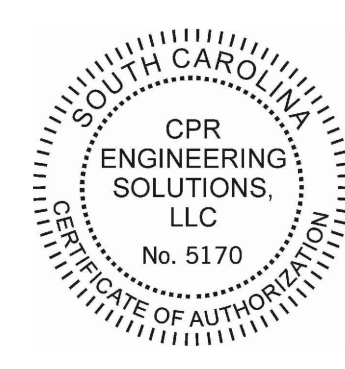
| DESIGN SUPERVISOR    | DES. ENG. | DRAFTER | DATE       | PROJ. NO. | SCALE | AS SHOWN |
|----------------------|-----------|---------|------------|-----------|-------|----------|
| CALEB P. RODGERS, PE | CPR       | CPR     | 05/18/2020 | 20200124  | SCALE | AS SHOWN |

HANAHAN REC. COMPLEX – MAINT. & POUND FACILITY SEPTIC  
**GENERAL NOTES & PROJECT OVERVIEW**

DWG. NO. 20200124-0

SHEET

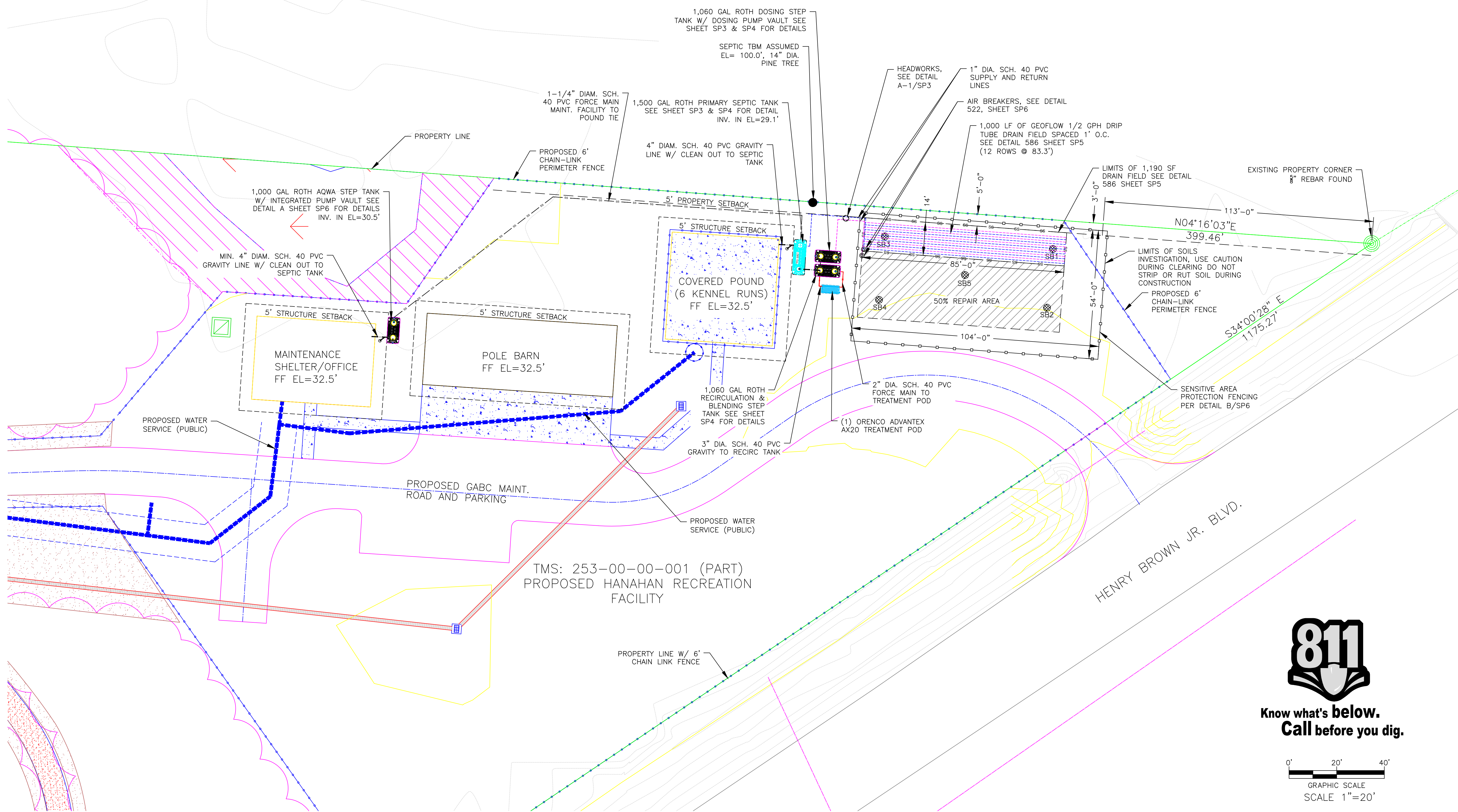
**SP1**



- SEPTIC PLAN NOTES:**
1. CIVIL SITE PLAN PROVIDED AND DEVELOPED BY SEAMON WHITESIDE, DATED APRIL 24, 2020.
  2. REFERENCE SHEET SP5 AND SP6 FOR DRIP TUBE INSTALLATION DETAILS.
  3. REFERENCE SHEET SP3, SP4 & SP5 FOR TANK AND EQUIPMENT DETAILS

⊗ DENOTES SOIL BORING LOCATION

TMS: 259-00-00-096  
WEST-SIGNAL INDUSTRIAL  
PROPERTY A LLC

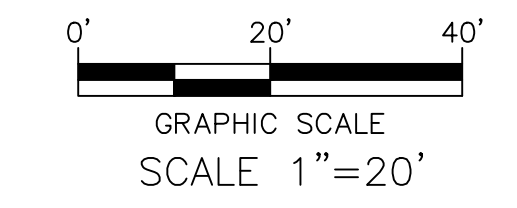


TMS: 253-00-00-001 (PART)  
PROPOSED HANAHAN RECREATION  
FACILITY

HENRY BROWN JR. BLVD.



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**SEPTIC PLAN**

**CPR**  
ENGINEERING SOLUTIONS, LLC  
P.O. BOX 67  
PINOPOLIS, SC 29469  
(843)860-3293

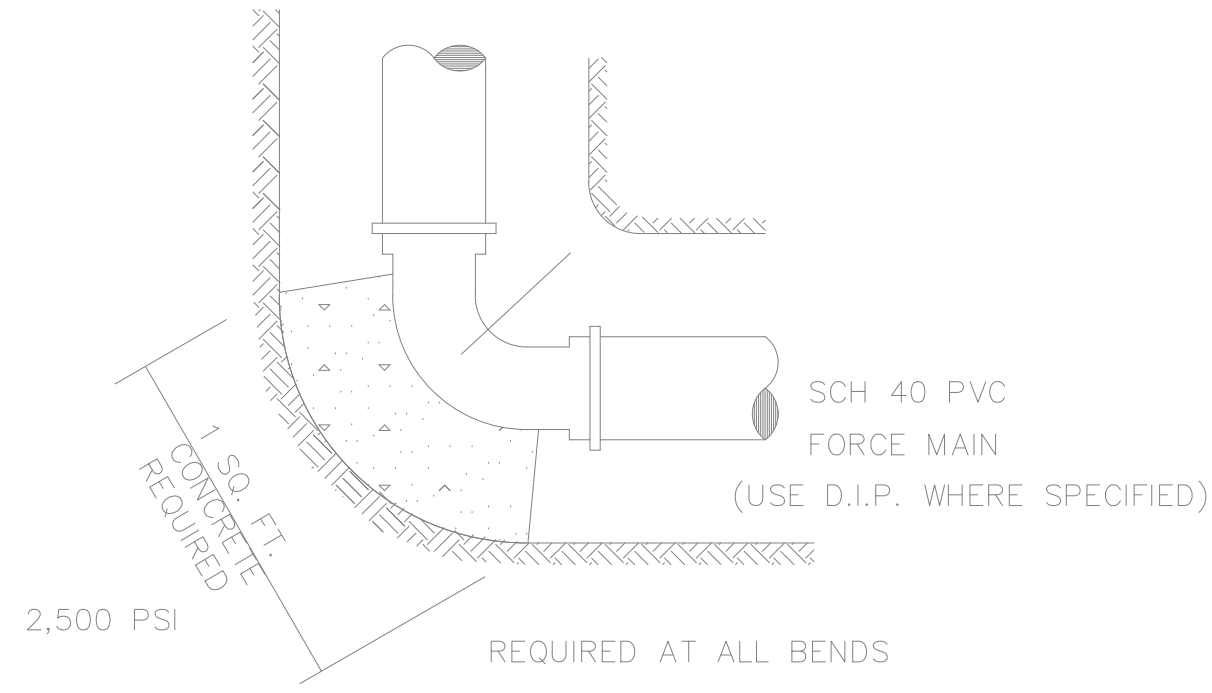
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|------|---------|-------------|-----------|
| 0    | 3/11/21 |             |           |
|      |         | BID SET     |           |
|      |         | CPR         |           |

|                   |  |
|-------------------|--|
| DESIGN SUPERVISOR | CALEB P. RODGERS, PE                                     |
| DES. ENG.         | CPR  |
| DRAFTER           | CPR  |
| DATE              | 03/11/2021   |
| FILE              | CPR\ENGINEERING\PROJECTS\20200124 - HANAHAN REC. COMPLEX |
| CHECKED           | CHECKER  |
| CHECKED           | CHECKER  |
| SCALE             | AS SHOWN   |
| PROJ. NO.         | 20200124   |

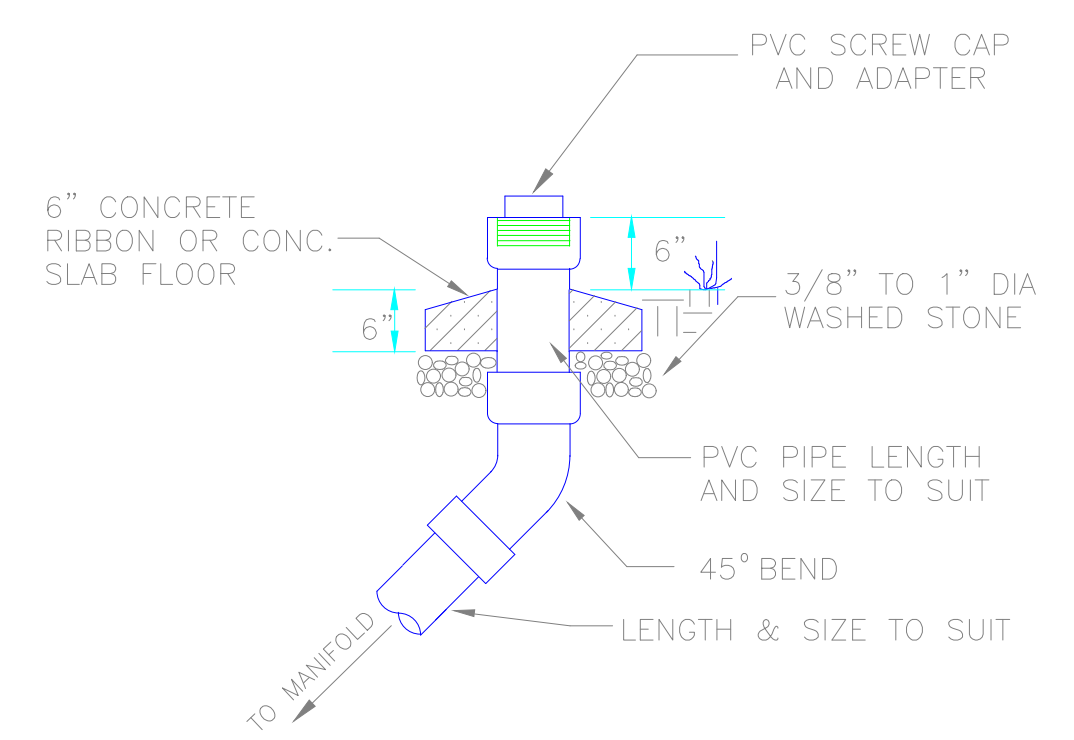
HANAHAN REC. COMPLEX - MAINT. & POUND FACILITY SEPTIC  
SEPTIC SITE PLAN &  
LAYOUT

DWG. NO.  
20200124-1

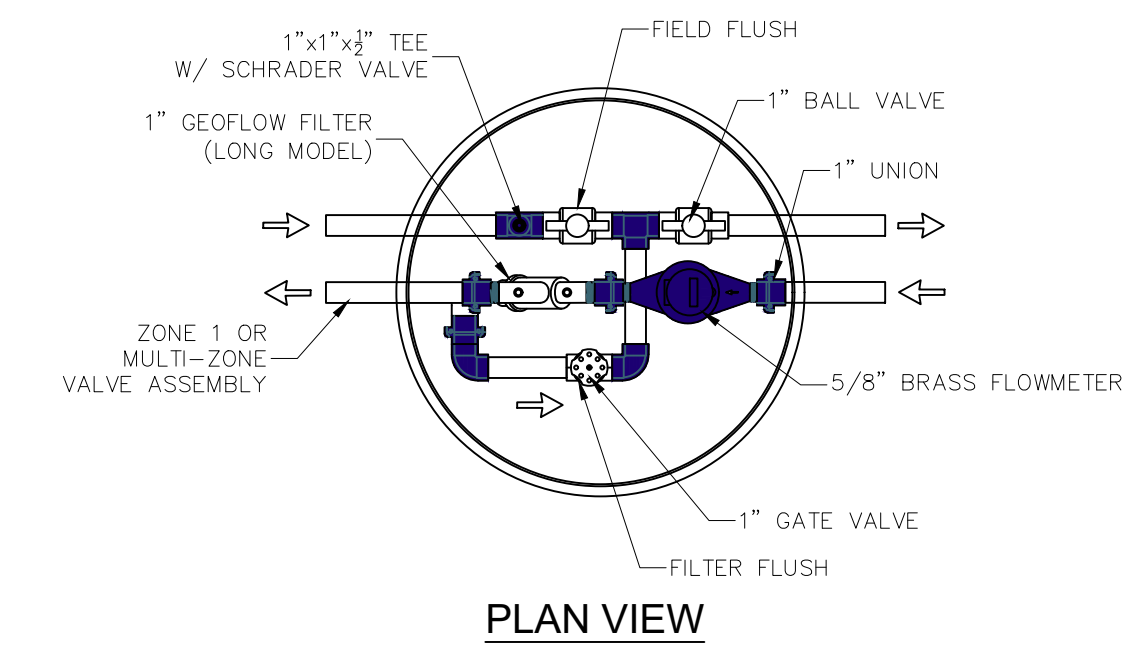
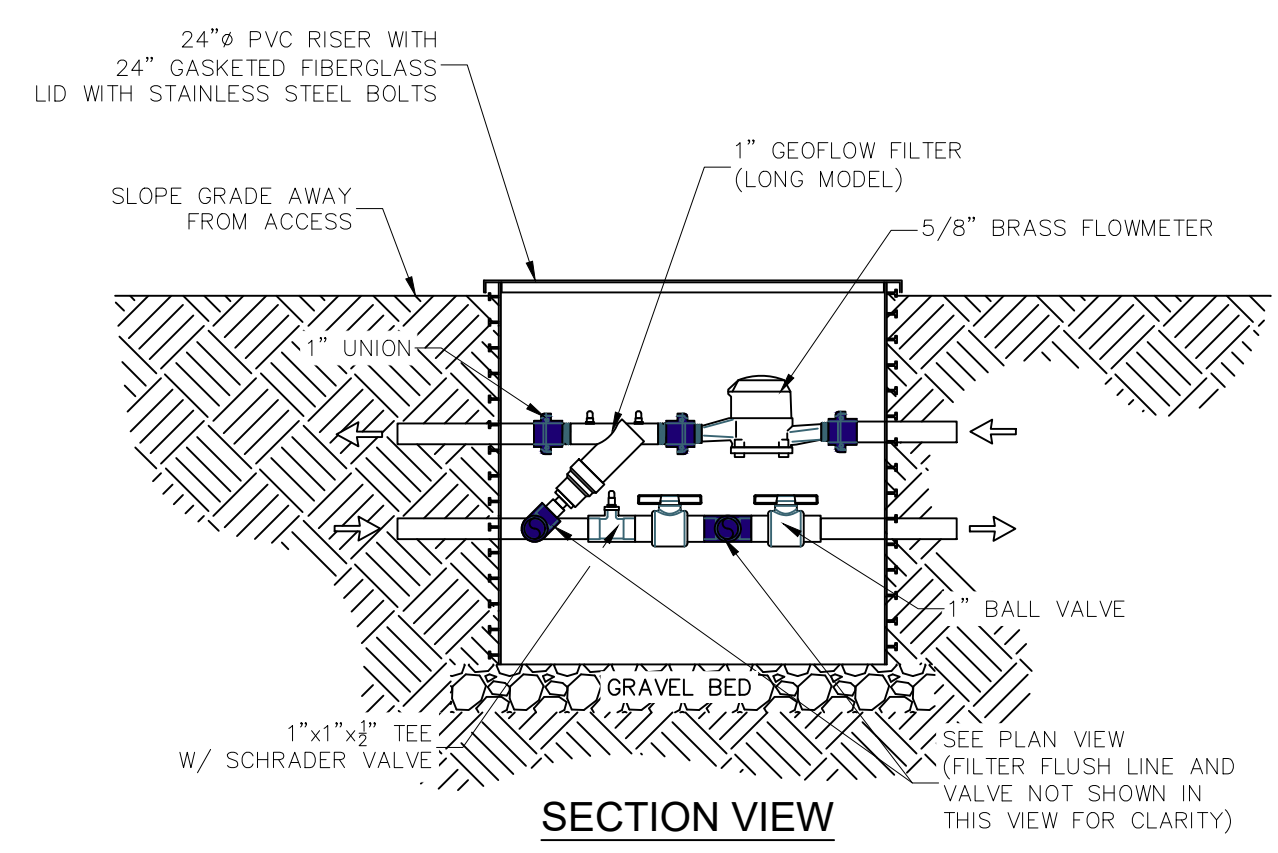
SHEET  
**SP2**



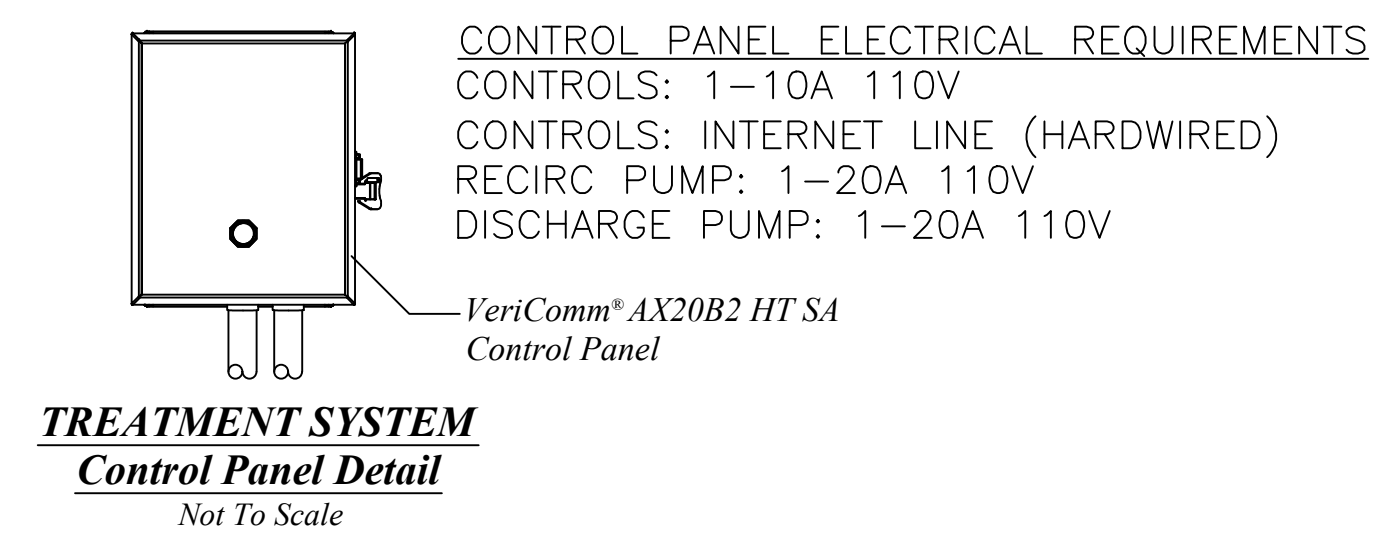
**FORCE MAIN THRUST BLOCKS @ BENDS**  
N.T.S.



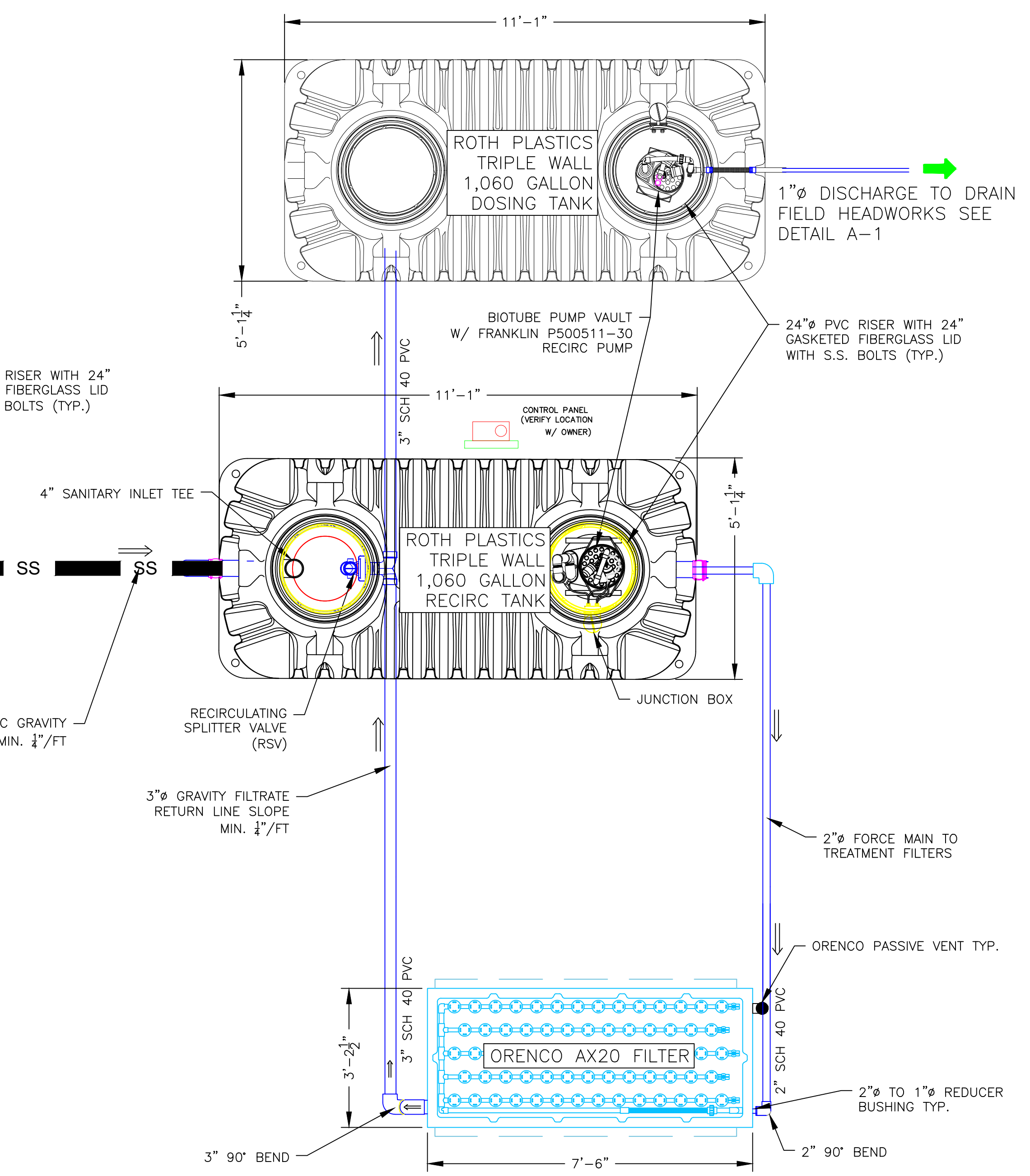
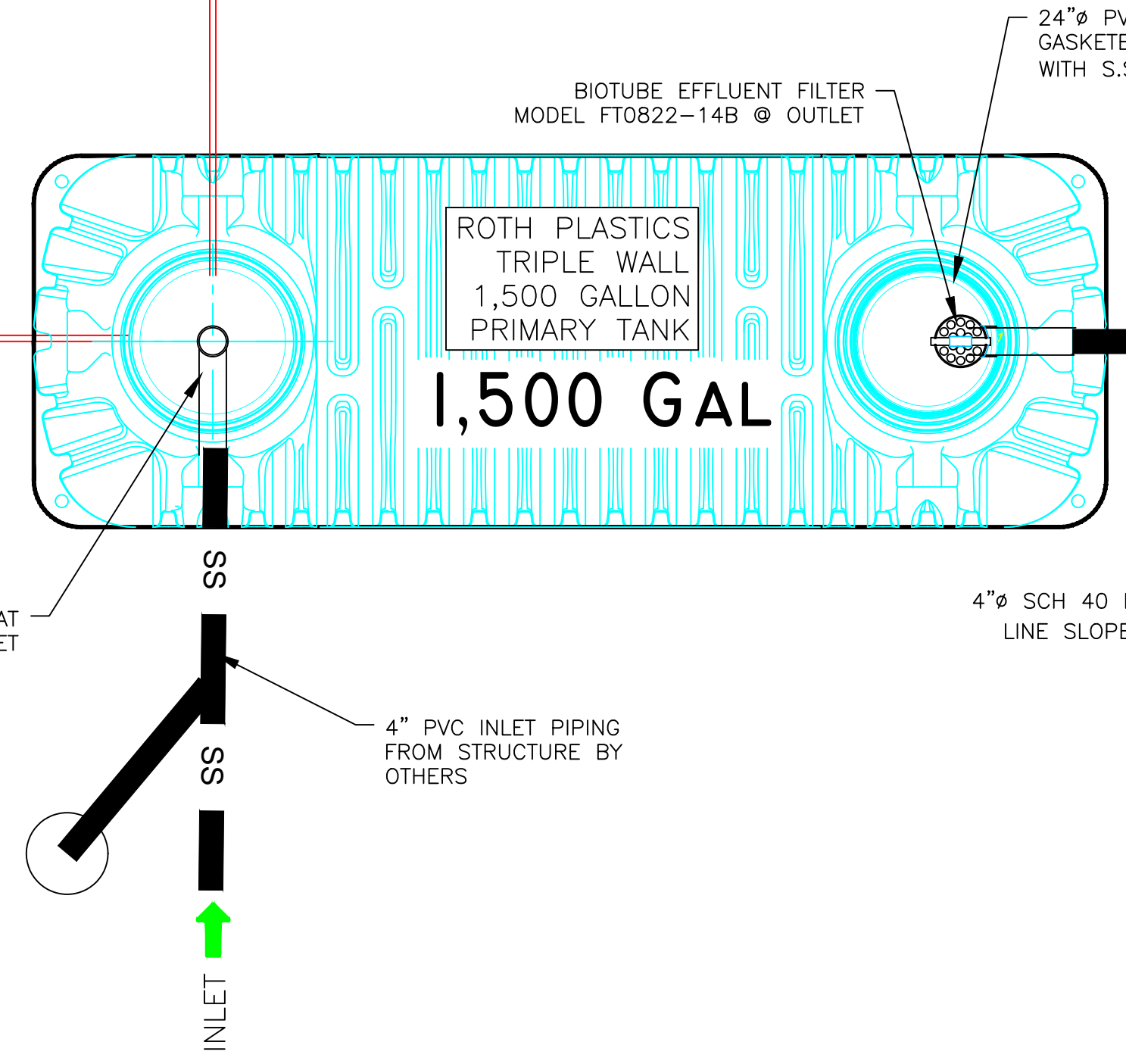
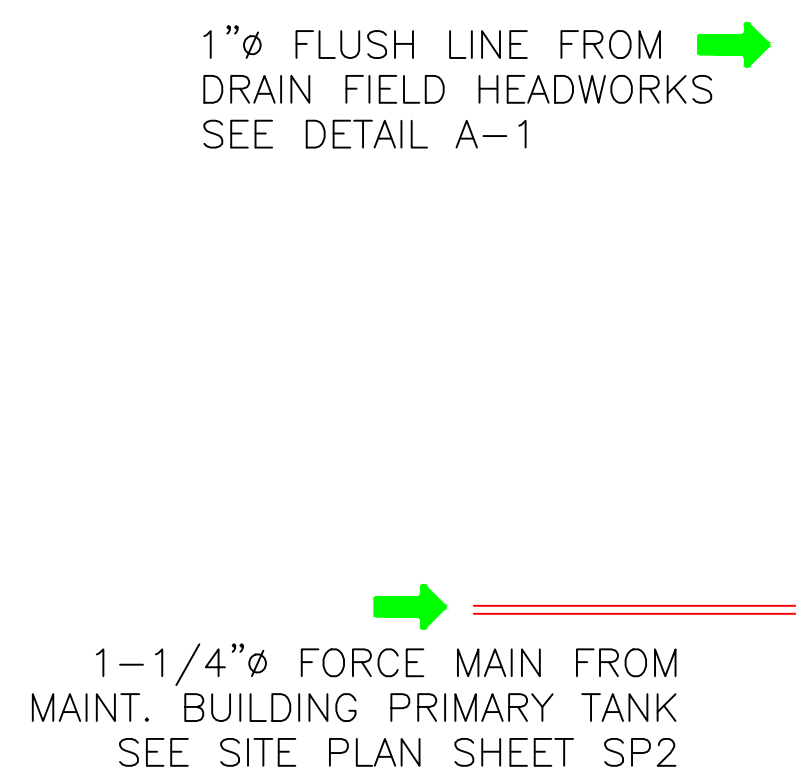
**STANDARD SEWER CLEAN-OUT**  
TYP. FOR UNPAVED NO-TRAFFIC AREAS



**DETAIL A-1/SP3**  
AQWA SINGLE ZONE HEADWORKS  
SCALE N.T.S.



**TREATMENT SYSTEM**  
*Control Panel Detail*  
Not To Scale



EQUIPMENT PROVIDER:

**TANK AND TREATMENT SYSTEM CONFIGURATION & LAYOUT**  
SCALE 1/2" = 1'



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| 0    | 3/11/21 |             |           |

| DESIGN SUPERVISOR    | CHECKED | CHECKER |
|----------------------|---------|---------|
| CALEB P. RODGERS, PE | CPR     | CPR     |

HANAHAN REC. COMPLEX - MAINT. & POUND FACILITY SEPTIC TANK, & TREATMENT SYSTEM & CONFIGURATION & DETAILS

DWG. NO. 20200124-2

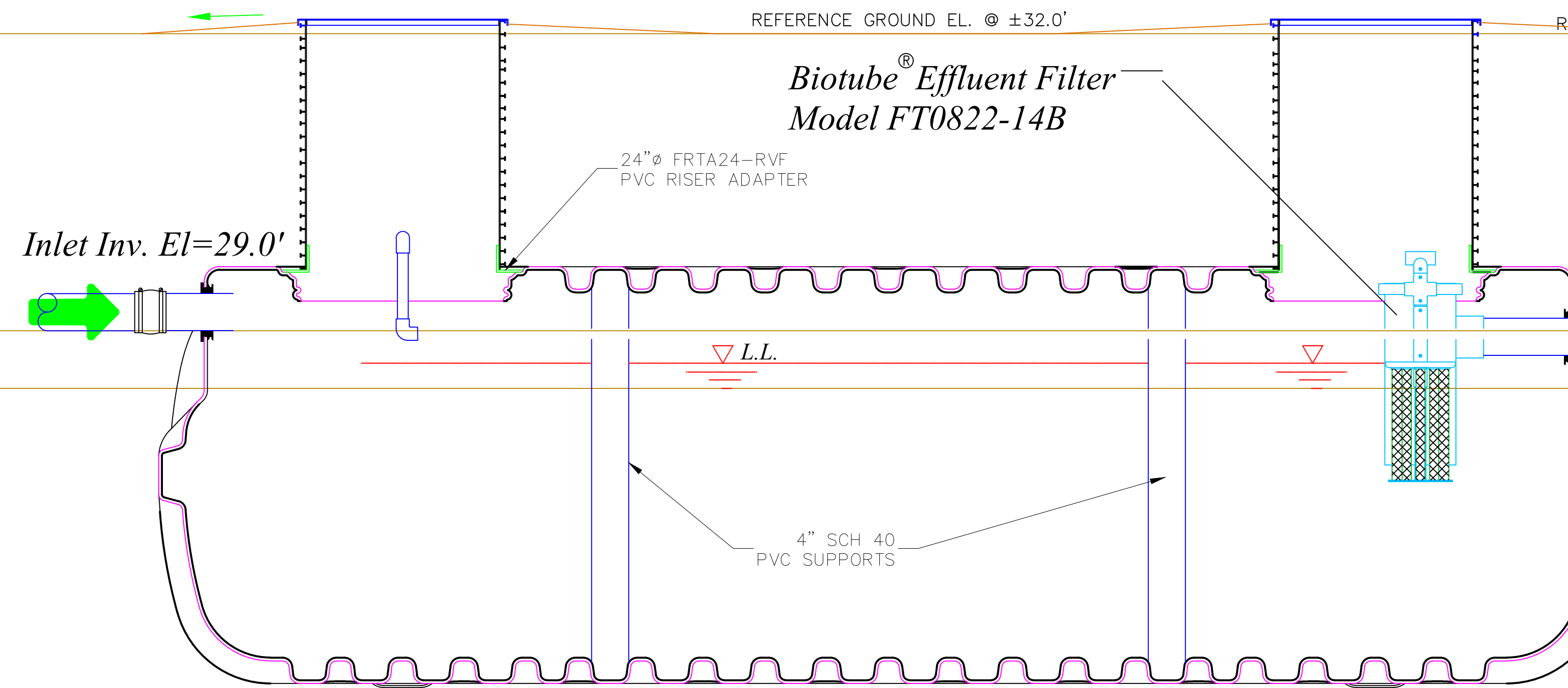
SHEET

**SP3**

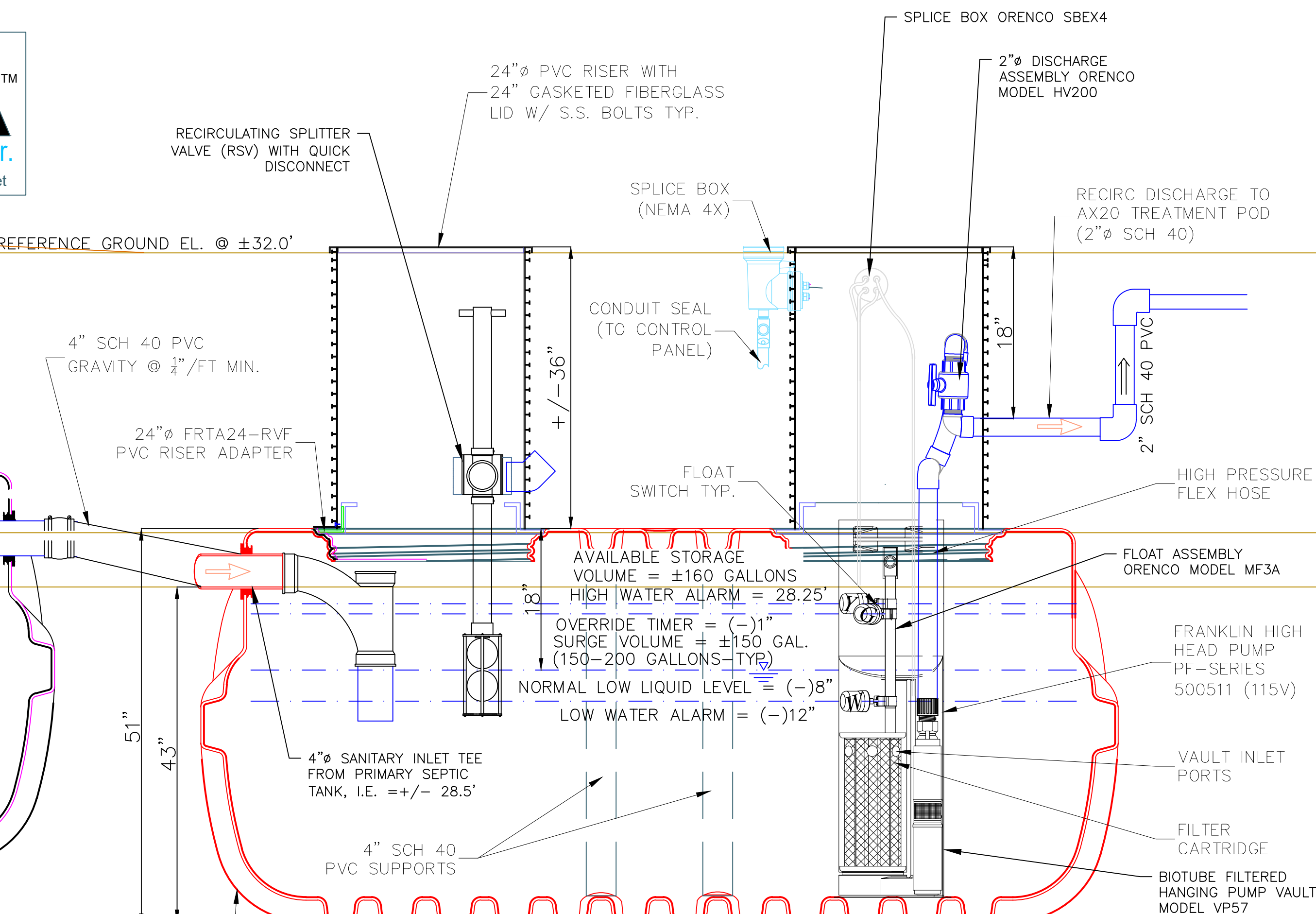
EQUIPMENT PROVIDER:



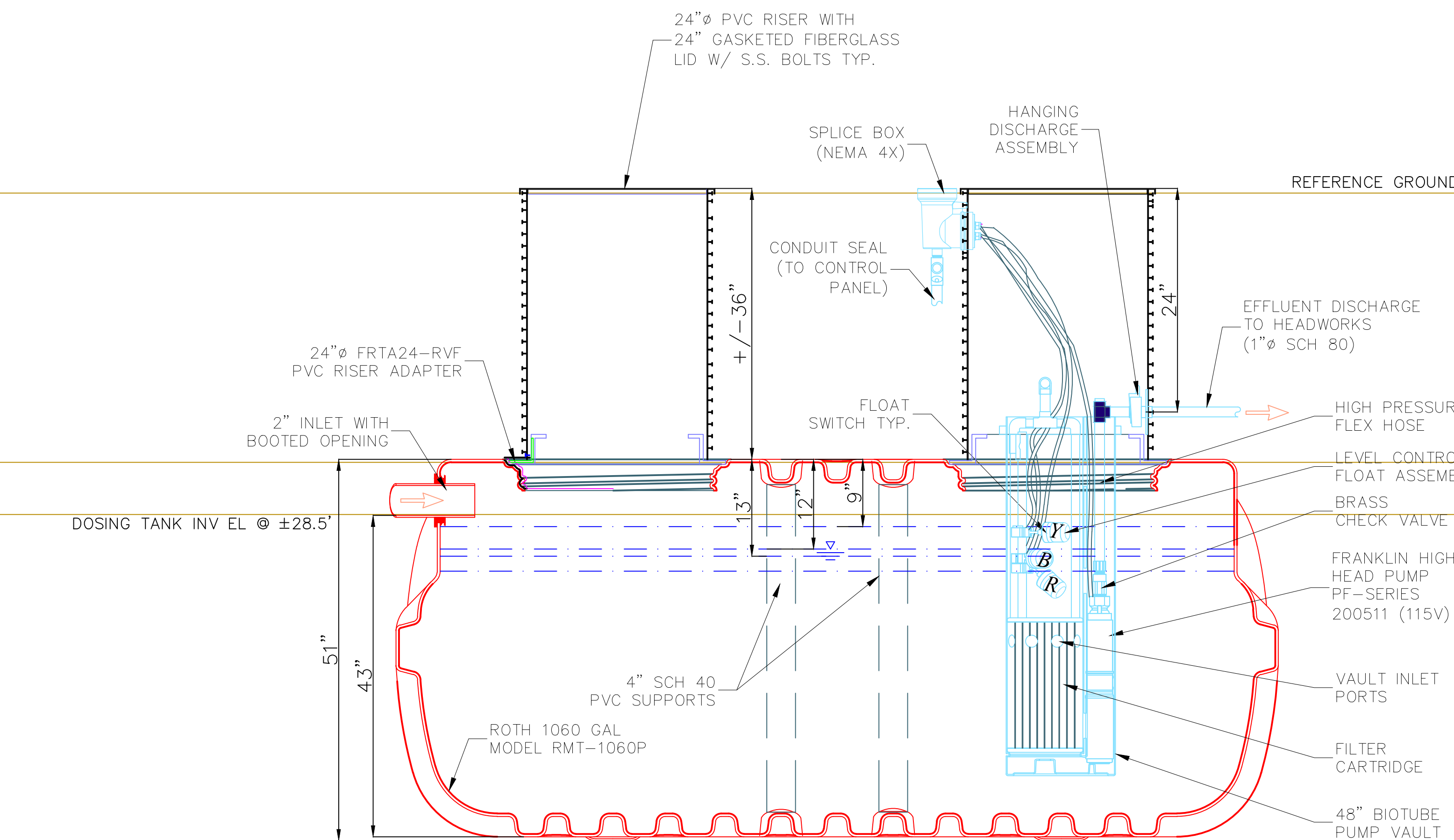
Slope to drain away from lid (typ)



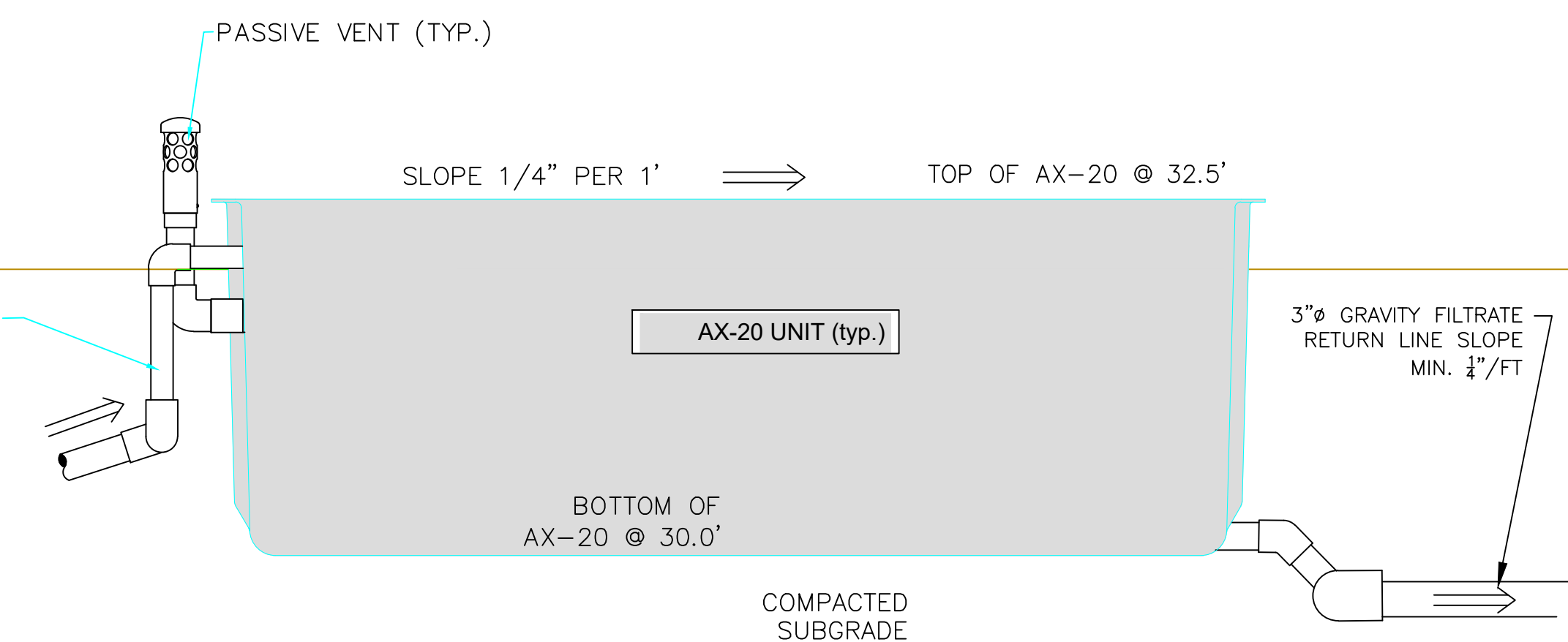
ELEVATION VIEW  
1500 GALLON ROTH PRIMARY TANK



ELEVATION VIEW  
1060 GALLON ROTH RECIRC TANK



ELEVATION VIEW  
1060 GALLON ROTH DOSING TANK

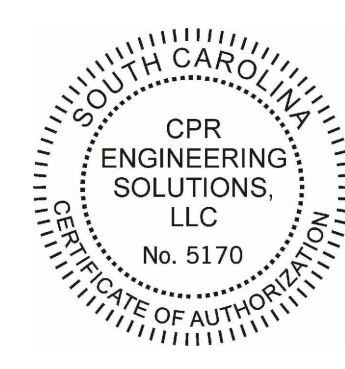
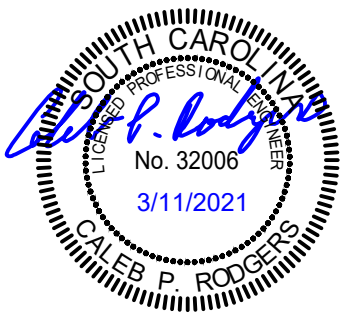


ELEVATION VIEW  
AdvanTex AX-20 UNIT

**Float Functions**

|          |                              |
|----------|------------------------------|
| <i>Y</i> | <i>High Level Alarm</i>      |
| <i>G</i> | <i>Override Timer ON/OFF</i> |
| <i>W</i> | <i>LLA/RO</i>                |
| <i>B</i> | <i>Pump On</i>               |
| <i>R</i> | <i>Pump Off</i>              |

TANK AND TREATMENT SYSTEM ELEVATIONS  
SCALE 1"=1'



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(843)860-3293

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| 0    | 3/11/21 |             |           |

|                   |  |
|-------------------|--|
| DESIGN SUPERVISOR | CALEB P. RODGERS, PE   |
| DES. ENG.         | CHECKED  |
| DRAFTER           | CHECKED  |
| DATE              | 03/11/2021   |
| PROJ. NO.         | 20200124   |
| SCALE             | AS SHOWN   |
| FILE              | CPR\ENGINEERING\PROJECTS\2020\20200124 - HANAHAN REC COMPLEX |

HANAHAN REC. COMPLEX - MAINT. & POUND FACILITY SEPTIC  
SEPTIC TANK,  
RECIRCULATING TANK  
& DOSING TANK  
ELEVATIONS & DETAILS

DWG. NO.  
20200124-3

SHEET

**SP4**



NOTIFY UNDERGROUND UTILITIES LOCATOR PRIOR TO ANY EXCAVATION. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF ALL TRADES AND SUBCONTRACTORS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS, ELEVATIONS, AND LOCATION OF ALL EXISTING CONDITIONS AND UTILITIES.

**GENERAL NOTES:**

ALL PIPING SHALL BE SCH 40 PVC UNLESS OTHERWISE NOTED ON PLANS. ALL PVC PIPES SHALL BE BURIED A MINIMUM OF 18" UNLESS SHOWN OTHERWISE.

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL REQUIREMENTS.

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OSHA, AND OTHER RELATED SAFETY REQUIREMENTS.

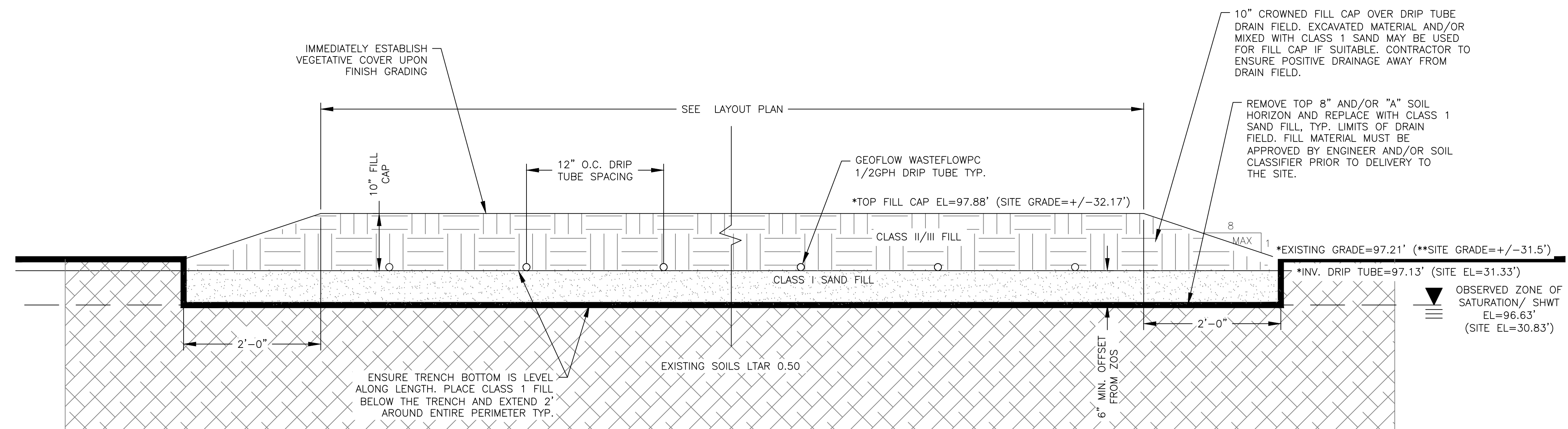
CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, COUNTY, AND LOCAL REGULATIONS. IN EVENT OF DISCREPANCY CONSULT MANUFACTURER AND ENGINEER OF RECORD. FAILURE TO DO SO VOIDS LIABILITY OF EQUIPMENT MANUFACTURER AND ENGINEER OF RECORD.

SYSTEM DESIGN SHALL BE PERMITTED BY SCDHEC EOC PRIOR TO INSTALLATION.

CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL CONSTRUCTION DAMAGE EXPEDITIOUSLY AND AT NO ADDITIONAL COST TO THE OWNER.

ALL TANKS AND EFFLUENT FILTERS SHALL BE APPROVED BY ONSITE WASTEWATER ENGINEERING, LLC. EFFLUENT FILTERS SHALL BE SIZED FOR DESIGN FLOW AND EXTEND DOWN TO 50-PERCENT OF LIQUID LEVEL.

ALL TANKS MUST MEET STATE OR LOCAL CODES.



**DRAIN FIELD SECTION B-B**  
SCALE N.T.S.

**\*ELEVATION NOTE:** ALL ELEVATIONS ARE FOR ILLUSTRATIVE PURPOSES ONLY AND REFERENCE TEMPORARY BENCHMARK ESTABLISHED AT SITE BY JOHN H. THORP, SOIL CLASSIFIER. TBM IS A LARGE NAIL IN THE BASE OF A 14 INCH DIAMETER PINE TREE (SEE PLANS FOR LOCATION) CONTRACTOR TO FIELD VERIFY CONSTRUCTION ELEVATIONS AND MAINTAIN OFFSETS FROM ZONE OF SATURATION SHOWN HEREIN.

**\*\*SITE ELEVATION NOTE:** REFERENCES NGVD88 DATUM AND REFERENCES EXISTING AND PROPOSED GRADES PROVIDED BY SEAMON WHITESIDE, CONTRACTOR TO VERIFY ASSUMED TBM TO SITE ELEVATION CONVERSION PRIOR TO INSTALLATION.

**GEOFLOW SUBSURFACE DRIP**

Updated Mar 2015

**FIELD FLOW**

|                  |  |
|------------------|--|
| Job Description: | SW - Hanahan Rec. Center Maint Building & Pound Facility Septic  |
| Contact:         | Mr. Taylor Hart  |
| Prepared by:     | Caleb Rodgers, CPR Eng. Solutions, LLC, calebrodgers@outlook.com |
| Date:            | 5/19/2020 REV. 1/17/2021   |

Please fill in the shaded areas and drop down menus:  
This spreadsheet is a guide for small systems with residential waste & is not a complete

**Worksheet 1- Field Flow**

| Total field                                       |     |                        |      |
|---|-----|------------------------|------|
| Total Quantity of effluent to be disposed per day | 345 | gallons / day          | note |
| Hydraulic loading rate                            | 0.5 | gallons / sq.ft. / day | note |
| Minimum Dispersal Field Area                      | 690 | square ft.             | note |
| Total Dispersal Field Area                        | 690 | square ft.             | note |

| Flow per zone                                  |                       |                   |      |
|--|-----------------------|-------------------|------|
| Number of Zones                                | 1                     | zone(s)           | note |
| Dispersal area per zone                        | 690                   | square ft.        | note |
| Choose line spacing between WASTEFLOW lines    | 1                     | ft.               | note |
| Choose emitter spacing between WASTEFLOW emit  | 2                     | ft.               | note |
| Total linear ft. per zone (minimum required)   | 690                   | ft. per zone      | note |
| Total number of emitters per zone              | 345                   | emitters per zone | note |
| Select Wasteflow dripline (16mm)               | Wasteflow PC - 1/2gph | dripline          | note |
|  | Wasteflow Classic     |                   |      |
|  | Wasteflow PC - 1/2gph |                   |      |
|  | Wasteflow PC - 1 gph  |                   |      |
| Pressure at the beginning of the dripfield     | 25                    | psi               | note |
| Feet of Head at the beginning of the dripfield | 57.75                 | ft.               | note |
| What is the flow rate per emitter in gph?      | 0.53                  | gph               | note |
| Dose flow per zone                             | 3.05                  | gpm               | note |

|   |      |        |      |
|---|------|--------|------|
| If required, choose flush velocity                    | 0.5  | ft/sec | note |
| How many lines of WASTEFLOW per zone?                 | 6    | lines  | note |
| Fill in the actual length of longest dripline lateral | 83   | ft.    | note |
| Flush flow required at the end of each dripline       | 0.37 | gpm    | note |
| Total Flow required to achieve flushing velocity      | 2.22 | gpm    | note |
| Total Flow per zone- worst case scenario              | 5.27 | gpm    | note |

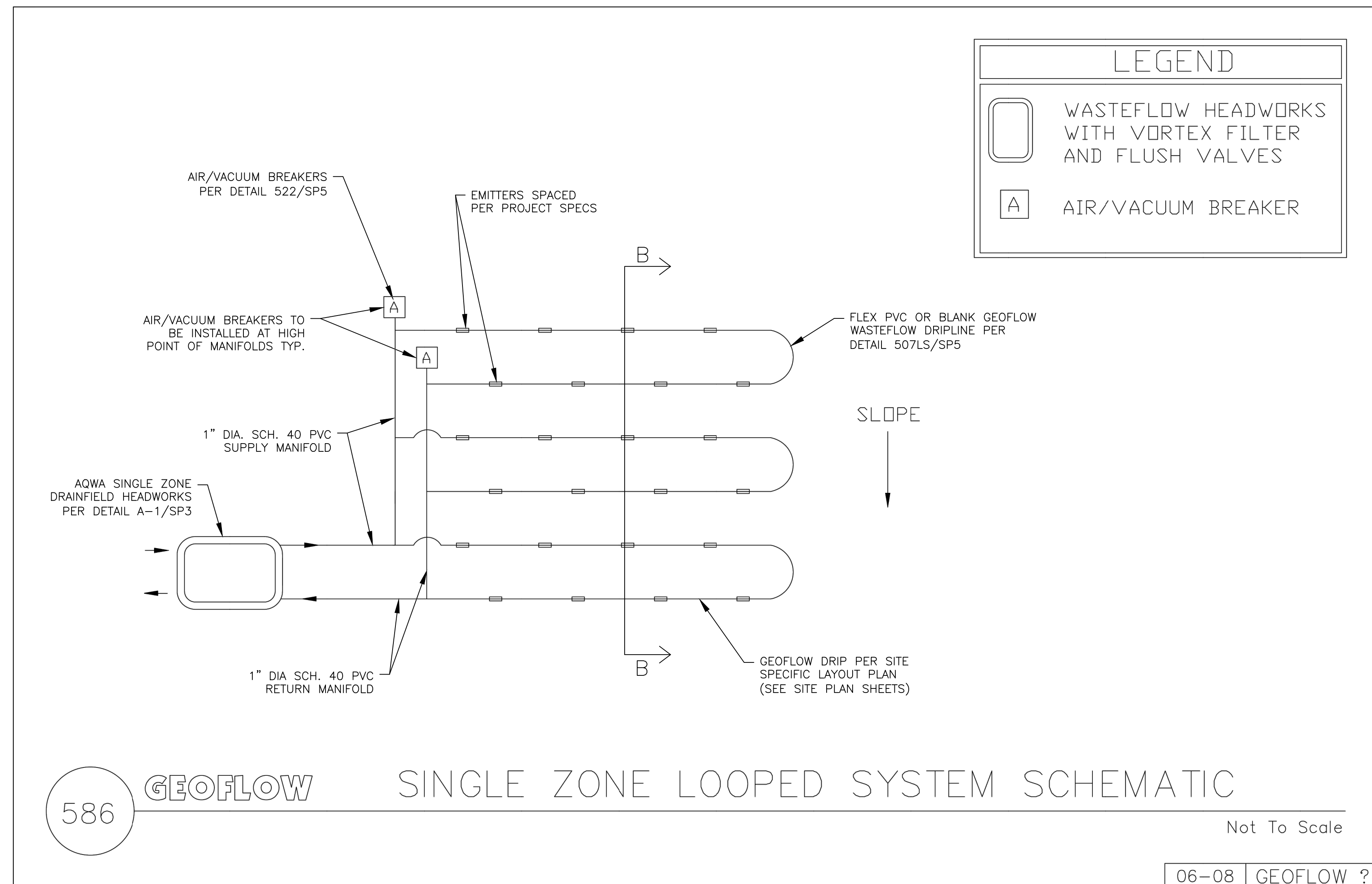
**Select Filters and zone valves**

|                                   |                            |      |
|-----------------------------------|----------------------------|------|
| Select Filter Type                | Vortex Screen Filter       | note |
| Recommended Filter (item no.)     | AP4E-1F Screen Filter 0-20 | note |
| Select Zone Valve Type            | None                       | note |
| Recommended Zone Valve (item no.) | 0                          | note |

**Dosing**

|   |         |                  |        |
|---|---------|------------------|--------|
| Number of doses per day / zone:                 | 12      | doses            | note   |
| Timer ON. Pump run time per dose/zone:          | 9.26    | mins:secs        | 9.43   |
| Timer OFF. Pump off time between doses          | 1:50    | hrs:mins         | 1.84   |
| Per Zone - Pump run time per day/zone:          | 1:53    | hrs:mins         | 1.89   |
| All Zones - Number of doses per day / all zones | 12      | doses / day      |        |
| Allow time for field to pressurize              | 0:00:30 | hrs:mins:secs    | 0.500  |
| Filter flush timer                              | 0:00:20 | hrs:mins:secs    | 0.333  |
| Drain timer                                     | 0:05:00 | hrs:mins:secs    | 5.000  |
| Field flush timer                               | 0:01:00 | hrs:mins:secs    | 1.000  |
| Field flush counter                             | 3       | cycles           | note   |
| Time required to complete all functions per day | 3:15    | hrs:mins         | 3.2535 |
| Dose volume per zone                            | 29      | gallons per dose | note   |

Allow time in the day for controller to have pressurization and drainage time.



586

**GEOFLOW SINGLE ZONE LOOPED SYSTEM SCHEMATIC**

Not To Scale

06-08 | GEOFLOW ?



**CPR**  
ENGINEERING SOLUTIONS, LLC  
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PINOPOLIS, SC 29469  
(843)860-3293

| REV. | DATE    | DESCRIPTION | DES. ENG. |
|------|---------|-------------|-----------|
| 0    | 3/11/21 |             |           |
|      |         |             |           |
|      |         |             |           |
|      |         |             |           |
|      |         |             |           |
|      |         |             |           |

| DESIGN SUPERVISOR    | CHECKED | CHECKER | SCALE       | FILE  |
|----------------------|---------|---------|-------------|---|
| CALEB P. RODGERS, PE | CHECKED | CHECKER | SCALE SHOWN | CPR\ENGINEERING\PROJECTS\SW - HANAHAN REC COMPLEX |
| DES. ENG. CPR        | CHECKED | CHECKER |             |   |
| DRAFTER CPR          | CHECKED | CHECKER |             |   |
| DATE 05/18/2020      |         |         |             |   |
| PROJ. NO. 20200124   |         |         |             |   |

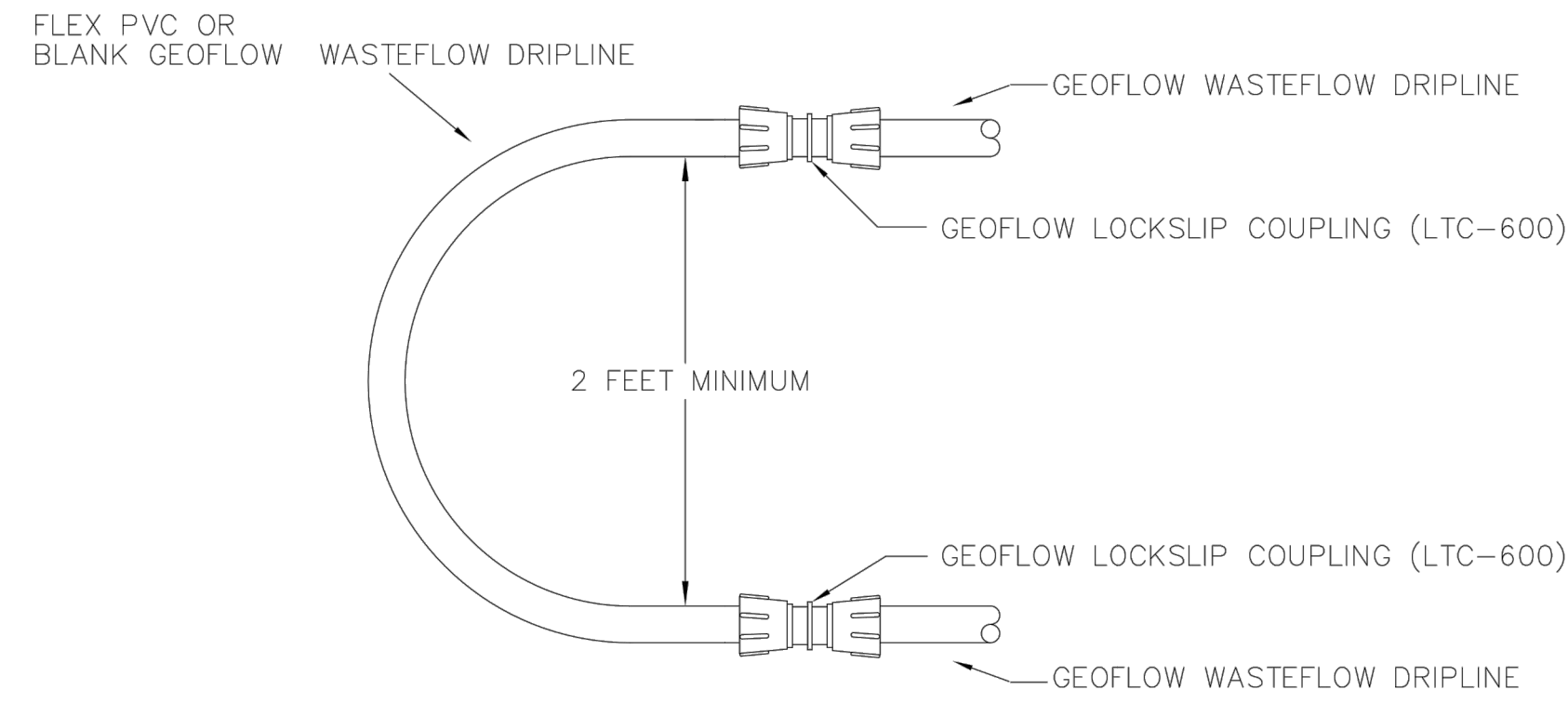
HANAHAN REC. COMPLEX - MAINT. & POUND FACILITY SEPTIC  
SEPTIC DRAIN FIELD CALCULATIONS, SECTION & DETAILS

DWG. NO. 20200124-4

SHEET

**SP5**





NOTE: IF USING FLEX PVC LOOP, CONNECTIONS SHALL BE GEOFLOW LOCKSLIP ADAPTER (LTSLIP-600) TO PVC COUPLING

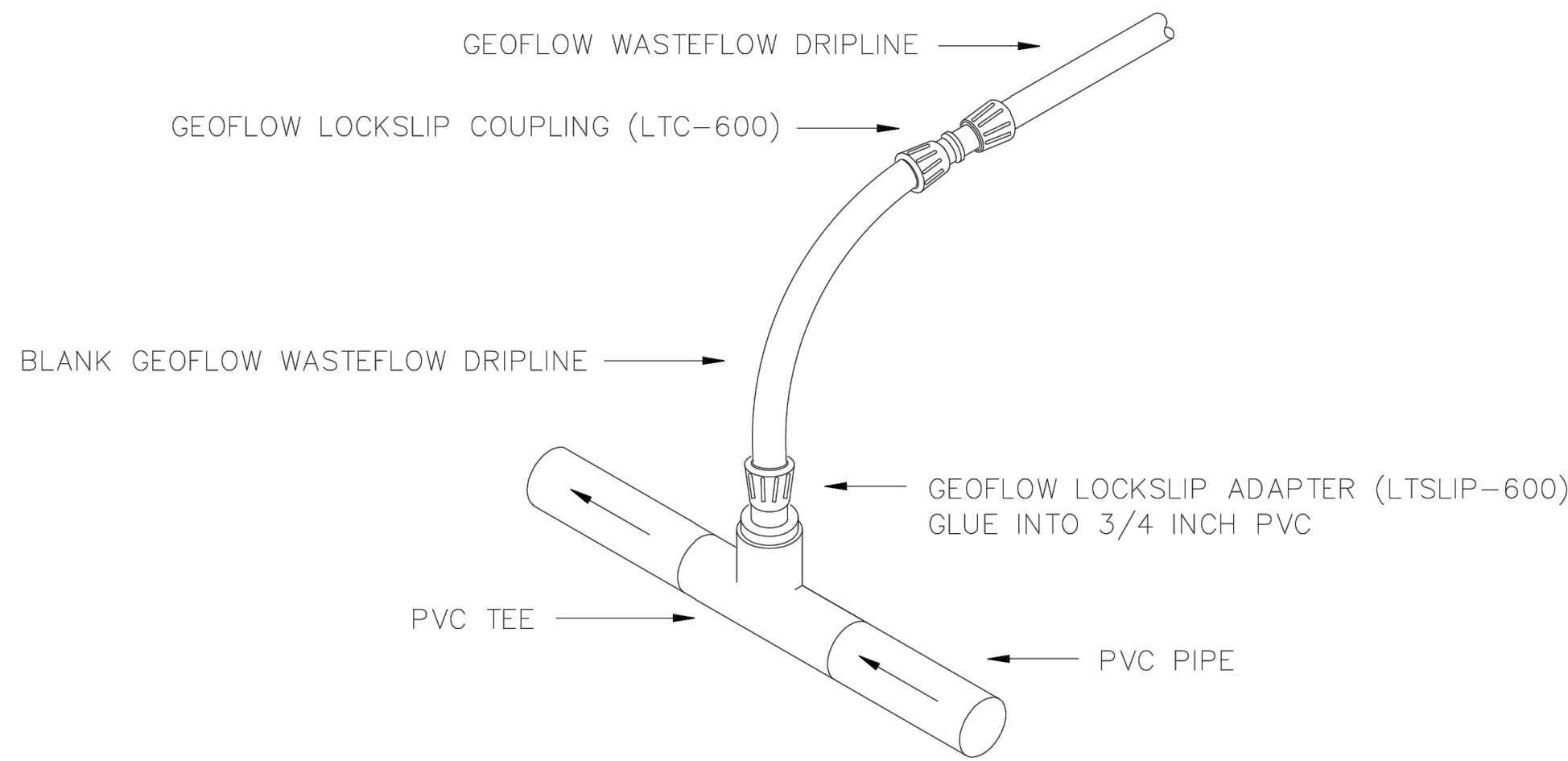
507LS GEOFLOW LOCKSLIP COUPLING LOOP SECTION Not To Scale

06-08 GEOFLOW ?



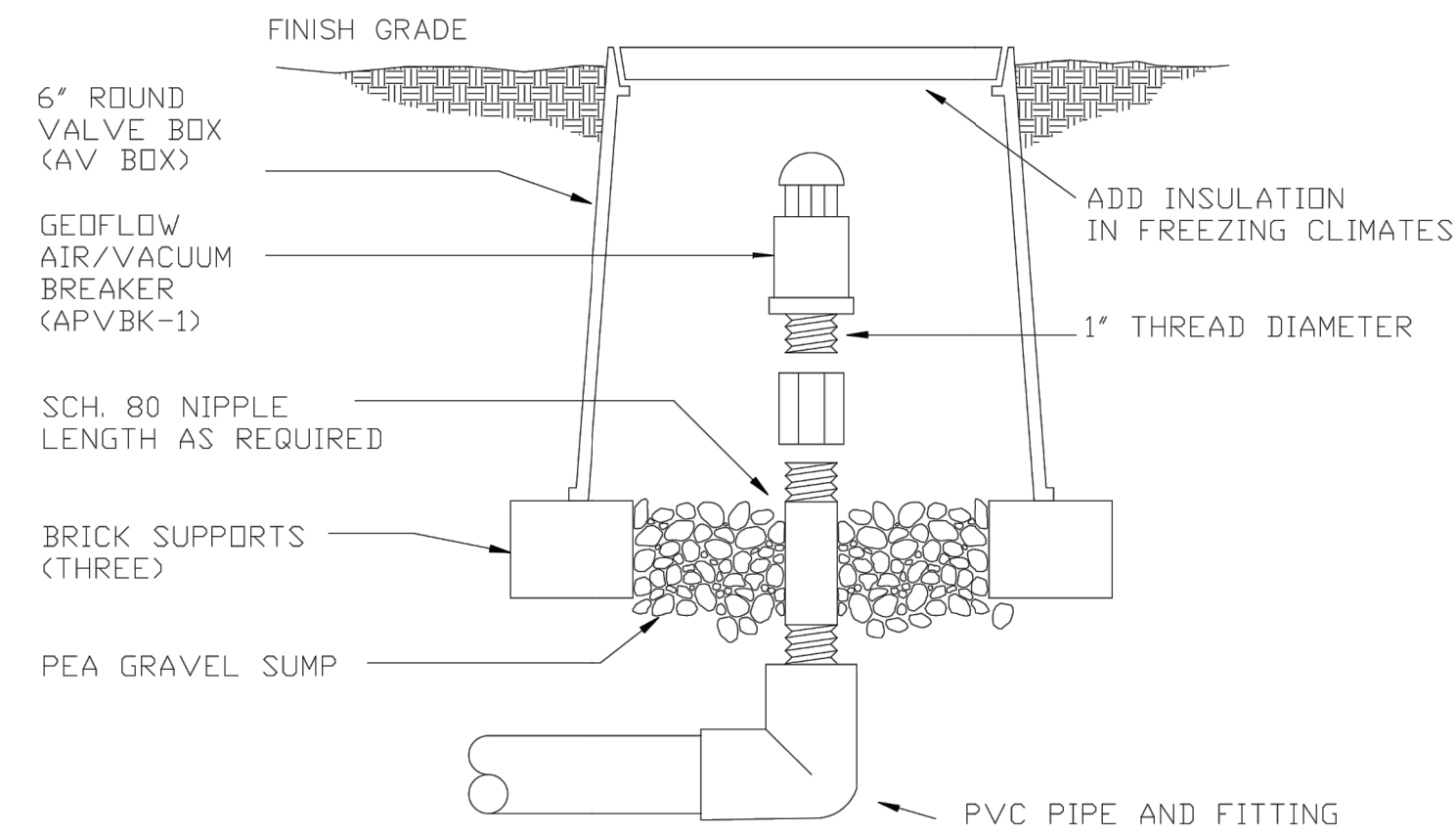
501LS GEOFLOW LOCKSLIP COUPLING (LTC-600) SECTION Not To Scale

06-08 GEOFLOW ?



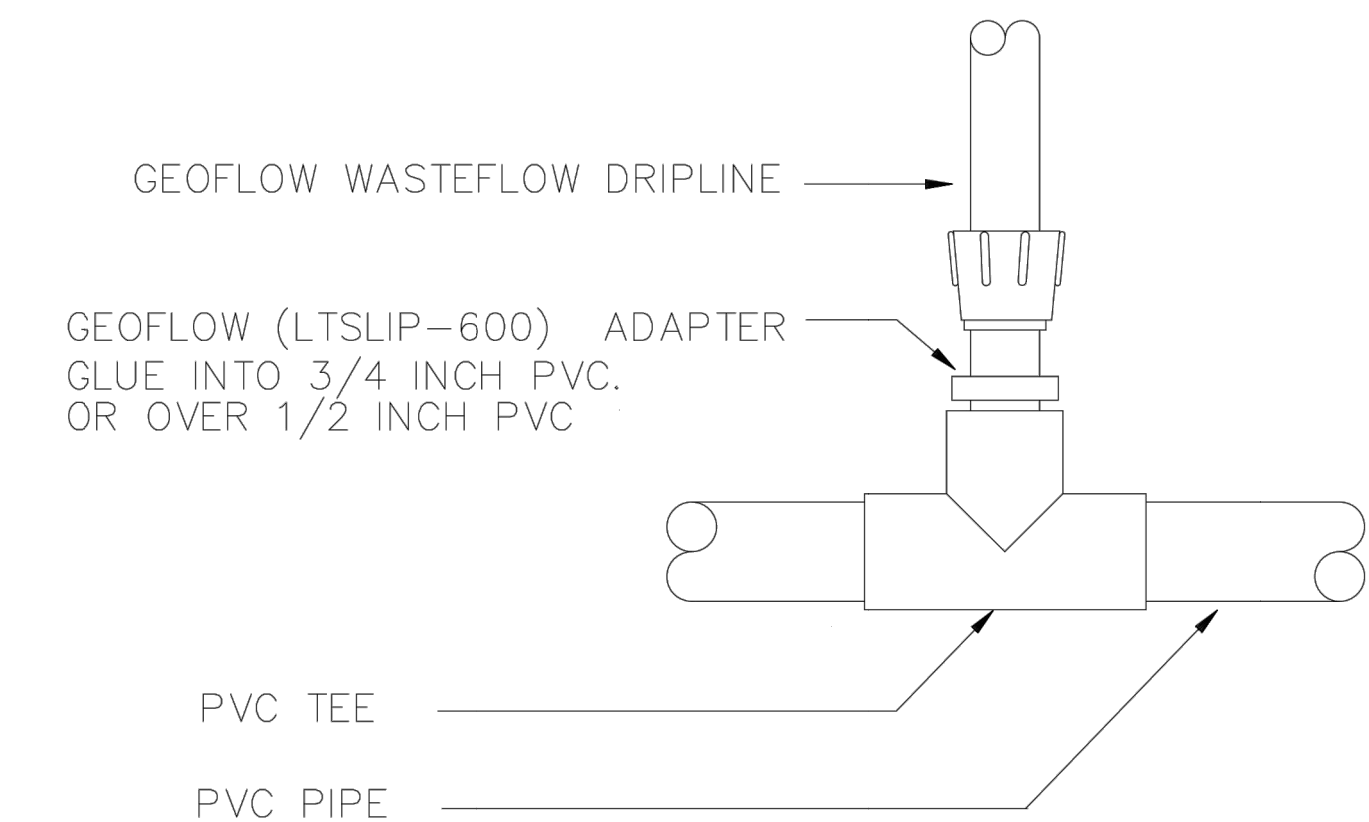
511 GEOFLOW MANIFOLD CONNECTION (END FEED) SECTION BLANK GEOFLOW WASTEFLOW DRIPLINE RISER Not To Scale

06-08 GEOFLOW ?



522 GEOFLOW 1" AIR/VACUUM BREAKER SECTION (PLUMBED TO PVC) Not To Scale

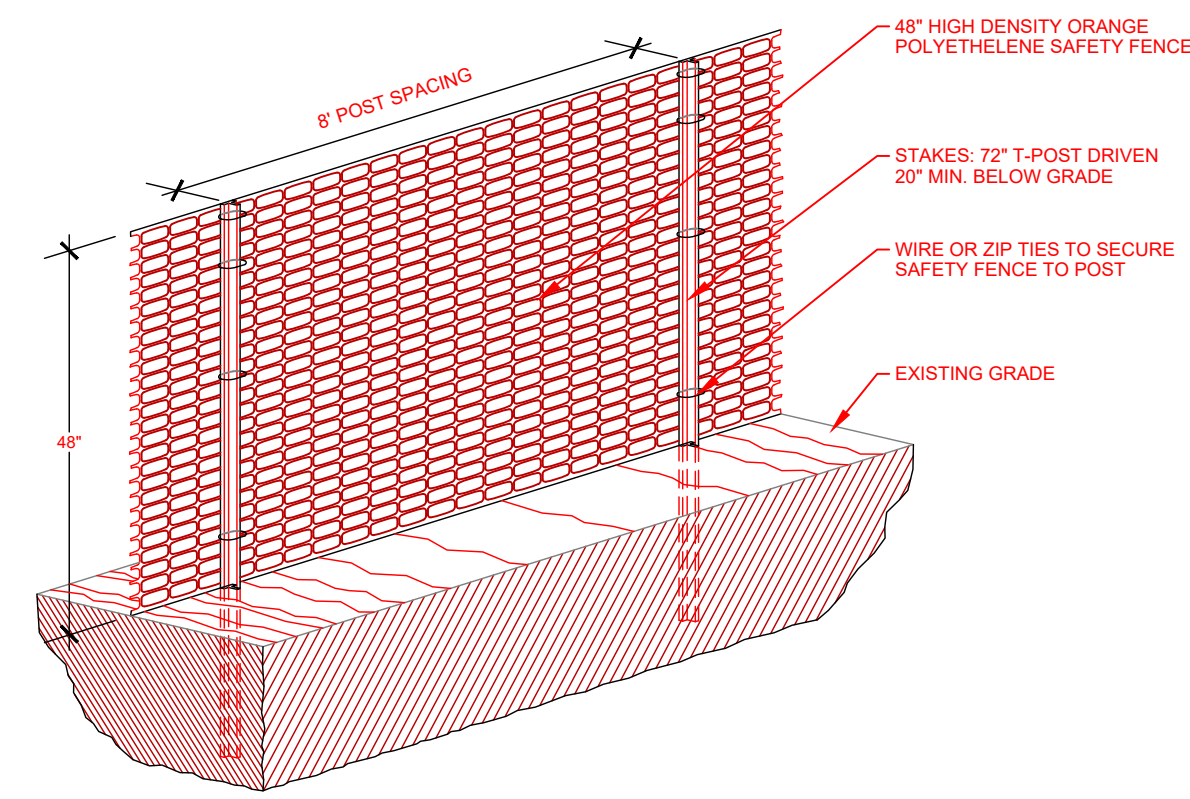
06-08 GEOFLOW ?



504LS GEOFLOW MANIFOLD CONNECTION (PVC TO ADAPTER) SECTION Not To Scale

06-08 GEOFLOW ?

Sensitive Area Protection  
48" Safety Fence, 72" T-Posts



1. ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
2. SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE T-POSTS.
3. THE FENCING MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION. ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

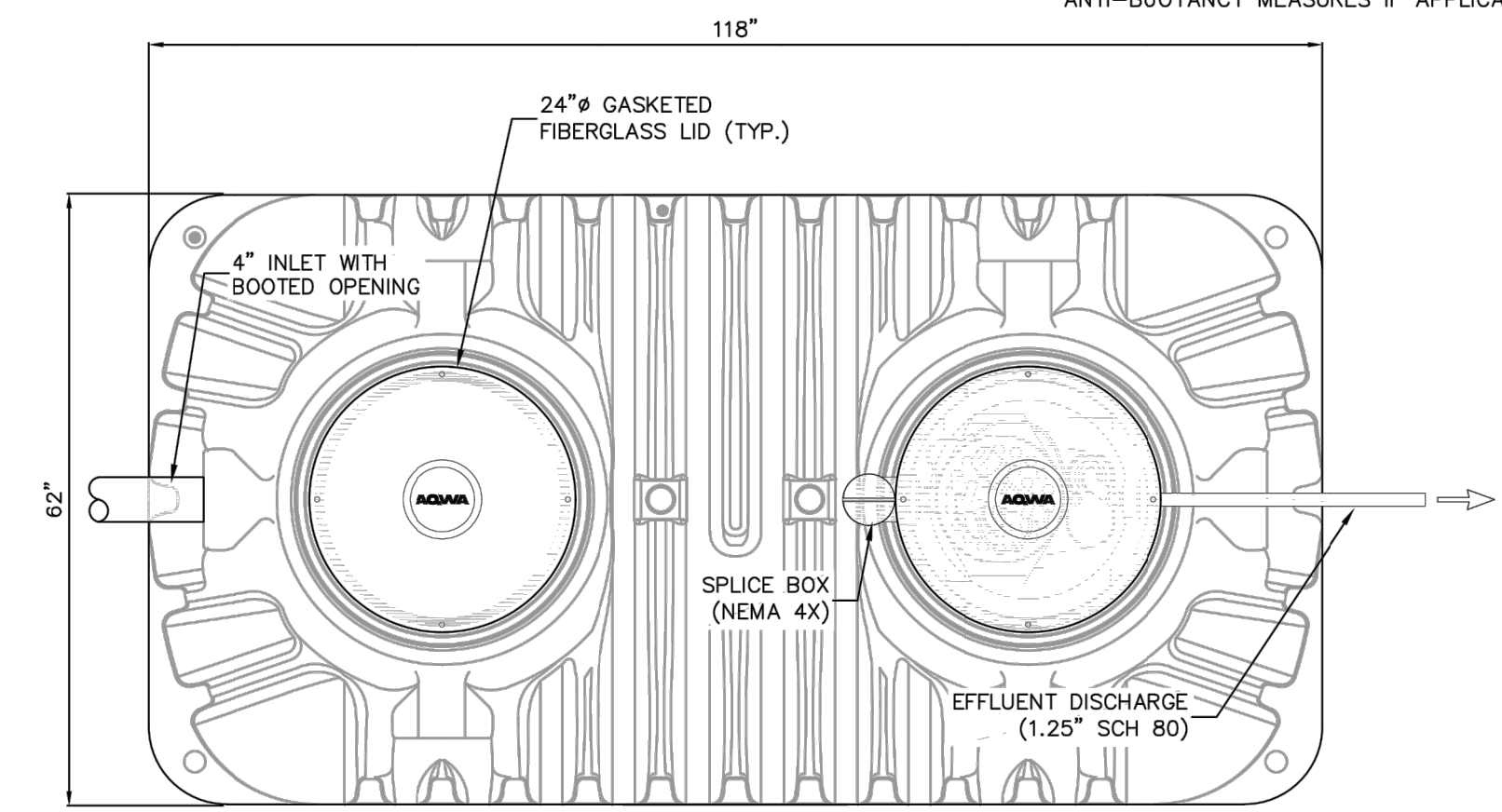
DETAIL B/SP6 DRAIN FIELD PROTECTION FENCING SCALE N.T.S.

(888) 552-AQWA info@aqwa.net

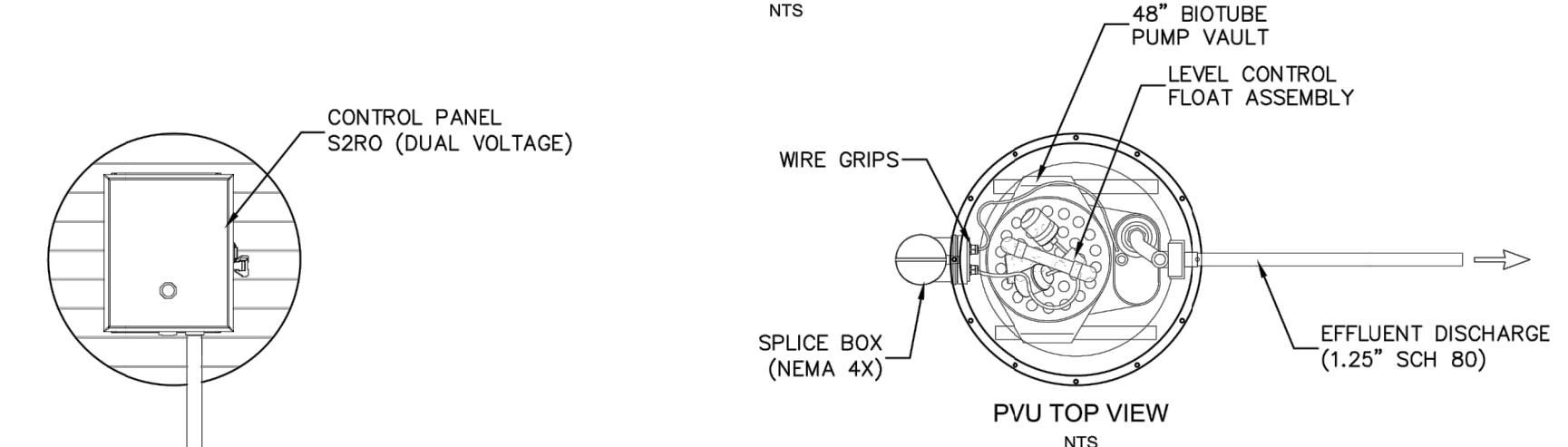
STEP PACKAGE INFORMATION:

|                  |                                 |
|------------------|---------------------------------|
| TANK:            | 1000 GALLON ROTH TANK           |
| BAFFLE:          | NO                              |
| CONTROL PANEL:   | S2RO (DUAL VOLTAGE)             |
| FLOAT TYPE:      | MFP, B, N-21V                   |
| FLOAT SETTINGS:  | 9", 12", 13" (FROM TOP OF TANK) |
| FLOAT FUNCTIONS: | HIGH LEVEL, ON/OFF, RO          |
| DOSE VOLUME:     | 85 GALLONS                      |
| DRAWDOWN:        | 4"                              |

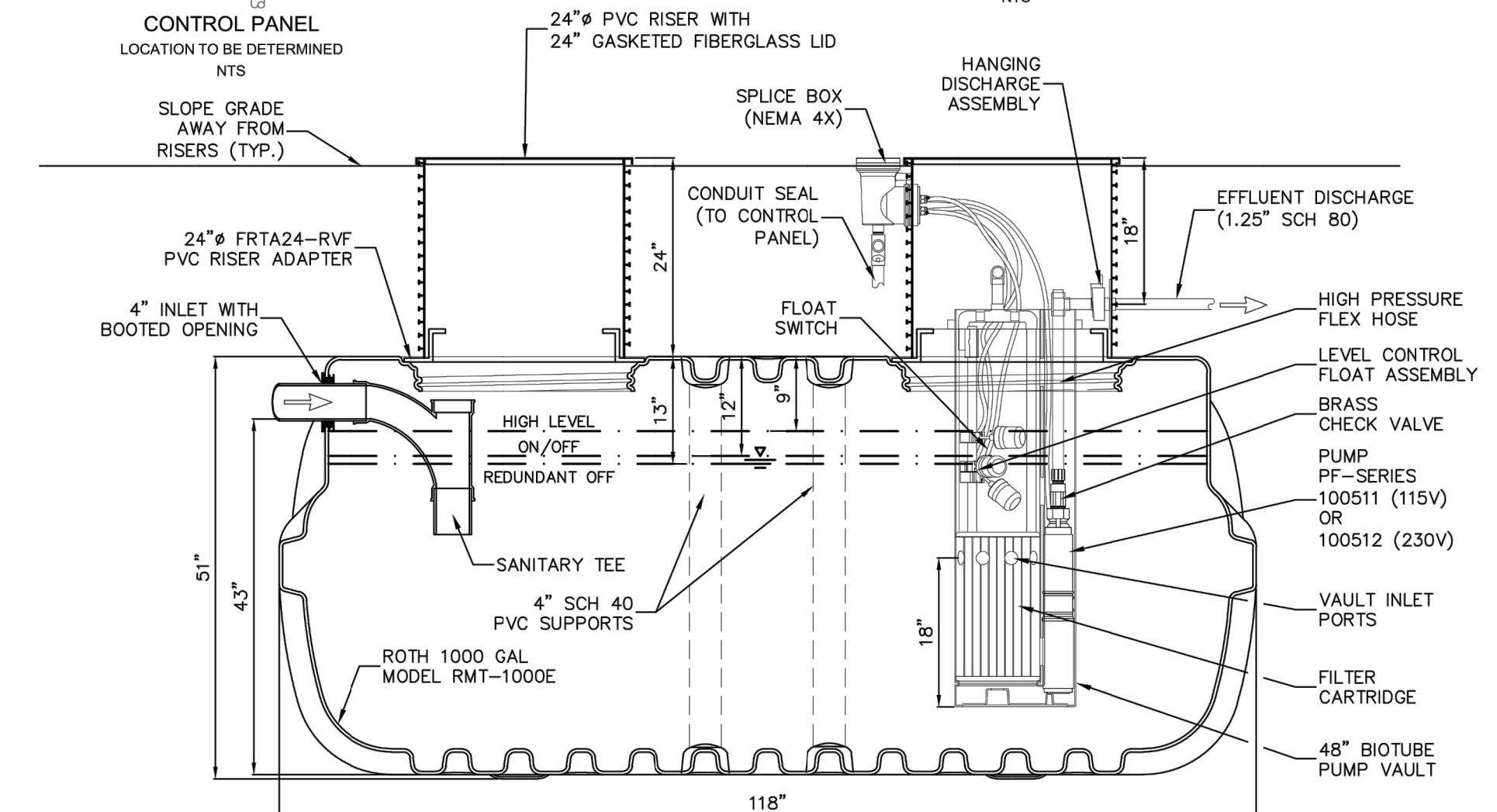
CONTACT AQWA WITH QUESTIONS ABOUT ANTI-BUOYANCY MEASURES IF APPLICABLE



PLAN VIEW NTS



PVU TOP VIEW NTS

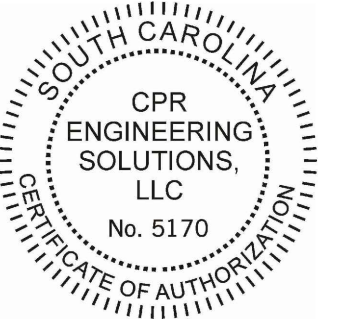
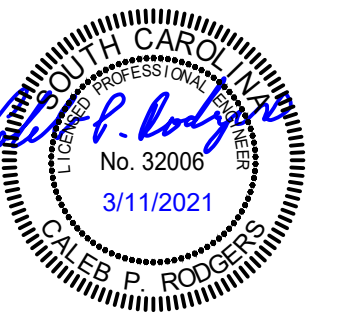


SECTION VIEW NTS

1001S

1000 GALLON STEP PACKAGE

DETAIL A/SP6  
AQWA 1,000 STEP TANK



CPR ENGINEERING SOLUTIONS, LLC  
P.O. BOX 67  
PINOPOLIS, SC 29469  
(843)860-3293

| REV. | DATE    | DESCRIPTION | DES. ENG. |
|------|---------|-------------|-----------|
| 0    | 3/11/21 |             |           |

|                   |  |
|-------------------|--|
| DESIGN SUPERVISOR | CALEB P. RODGERS, PE                           |
| DES. ENG.         | CHECKED  |
| DRAFTER           | CHECKED  |
| DATE              | 05/18/2020                                     |
| PROJ. NO.         | 20200124                                       |
| FILE              | CPR\ENGINEERING\PROJECTS\2020\HANA REC COMPLEX |

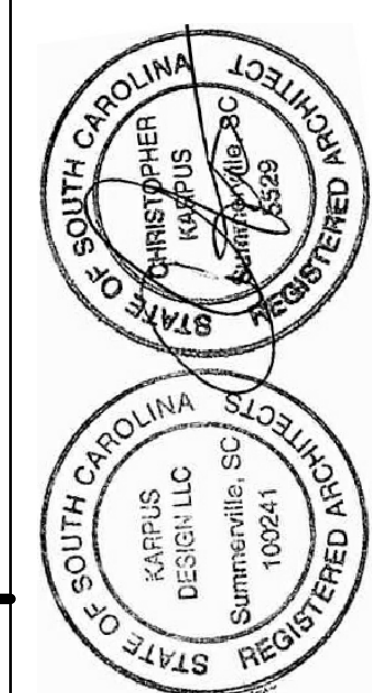
HANAHAN REC. COMPLEX - MAINT. & POUND FACILITY SEPTIC  
SEPTIC STEP TANK AND DRAIN FIELD DRIP TUBING DETAILS

DWG. NO. 20200124-5

SHEET

SP6

MOUNT PLEASANT, SC 29566  
843.884.1667  
GREENVILLE, SC 29615  
864.298.0534  
SUMMERVILLE, SC 29585  
843.972.0710  
SPARTANBURG, SC 29583  
864.298.0534  
CHARLOTTE, NC 28202  
980.312.5450  
WWW.SEAMONWHITESIDE.COM



# Hanahan Recreation Complex

## City of Hanahan

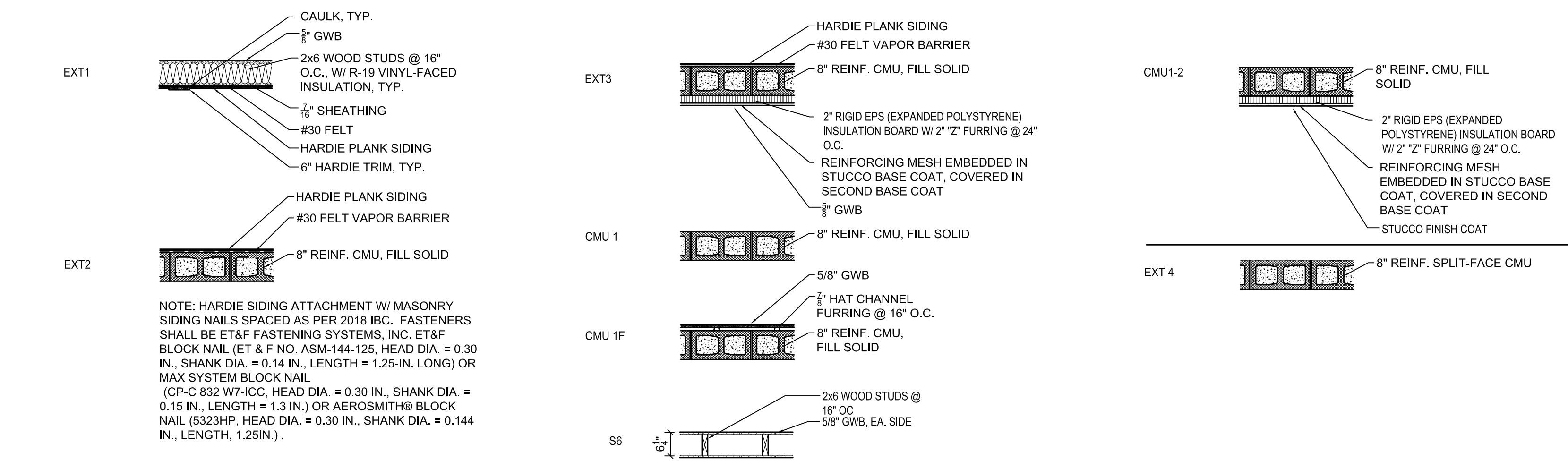
### Hanahan, South Carolina

#### Architectural Cover Sheet

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| M001 | MECHANICAL GENERAL NOTES, LEGENDS & ABBREVIATIONS |
| M002 | MECHANICAL SCHEDULES                              |
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| M102 | RESTROOMS BLDG. MECHANICAL PLAN                   |
| M501 | MECHANICAL DETAILS                                |

| NO. OR # & @ | NUMBER OR POUND AND AT | ELEV. EQUIP. EQ | ELEVATION EQUIPMENT EQUAL SPACE EXISTING | MFR. MIN. METAL | MANUFACTURER MINIMUM METAL   |
|--------------|------------------------|-----------------|--|-----------------|------------------------------|
| A.B.         | ANCHOR BOLT            | EXP.            | EXPANSION                                | NIC             | NOT IN CONTRACT              |
| AFF          | ABOVE FINISH FLOOR     | EXT.            | EXTERIOR                                 | NOM.            | NOMINAL                      |
| ADJ.         | ADJUSTABLE             | EXT.            | EXTERIOR                                 | OC              | ON CENTER                    |
| ALT.         | ALTERNATE              | F.D.            | FLOOR DRAIN                              | O.H.            | OPPOSITE HAND                |
| ALUM.        | ALUMINUM               | FEC             | FIRE EXTINGUISHER CABINET                | P.E.M.B.        | PRE-ENGINEERED BLG. SUPPLIER |
| ANOD.        | ANODIZED               | F.O.B.          | FACE OF BLOCK OR FACE OF BRICK           | P.T.            | PRESSURE TREATED             |
| APPROX.      | APPROXIMATE            | F.O.S.          | FACE OF STUD                             | PLYWD.          | PLYWOOD                      |
| ARCH.        | ARCHITECTURAL          | F.V.            | FIELD VERIFY                             | Q.T.            | QUARRY TILE                  |
| BLDG.        | BUILDING               | FD              | FIRE DAMPER                              | R.D.            | ROUGH OPENING                |
| BLK.         | BLOCK                  | FE              | FIRE EXTINGUISHER                        | R.O.            | ROUGH OPENING                |
| BRDG.        | BRIDGING               | FF              | FINISH FLOOR                             | RENIF.          | REINFORCEMENT                |
| CPT          | CARPET                 | FIN             | FINISH                                   | REQ'D           | REQUIRED                     |
| CJ           | CONTROL JOINT          | FLR.            | FLOOR                                    | RM.             | ROOM                         |
| CT           | CERAMIC TILE           | FLUOR           | FLUORESCENT                              | SAB             | SOUND ATTENUATION BATTS      |
| CB           | CATCH BASIN            | FND.            | FOUNDATION                               | S.S.            | STAINLESS STEEL              |
| CDX          | TYPE OF WOOD           | F.O.M.          | FACE OF MASONRY                          | SIM.            | SIMILAR                      |
| CLG.         | CEILING                | F.O.S.          | FACE OF STUD                             | SPEC.           | SPECIFICATIONS               |
| CMU          | CONCRETE MASONRY UNIT  | FTG.            | FOOTING                                  | SQ.             | SQUARE                       |
| CO           | CASED OPENING          | GA.             | GAUGE                                    | STD.            | STANDARD                     |
| COL.         | COLUMN                 | GALV.           | GALVANIZED                               | STL.            | STEEL                        |
| CONC.        | CONCRETE               | GB              | GRAB BAR                                 | TEMP.           | TEMPERED                     |
| CONST.       | CONSTRUCTION           | GL.             | GLASS                                    | THK.            | THICKNESS                    |
| CONT.        | CONTINUOUS             | GWB             | GYPNUM WALL BOARD                        | T.O.J.          | TOP OF JOIST                 |
| CORR.        | CORRUGATED             | GYP             | GYPNUM                                   | T.O.S.          | TOP OF STEEL                 |
| CU           | CUBIC                  | HM              | HOLLOW METAL                             | T.O.W.          | TOP OF WALL                  |
| DF           | DRINKING FOUNTAIN      | HORIZ.          | HORIZONTAL                               | TYP.            | TYPICAL                      |
| DS           | DOWNSPOUT              | HT.             | HEIGHT                                   | U.L.            | UNDERWRITERS LAB             |
| DBL          | DOUBLE                 | HVAC            | MECHANICAL                               | UNO             | UNLESS NOTED OTHERWISE       |
| DIA.         | DIAMETER               | INSUL.          | INSULATION                               | V.B.            | VAPOR BARRIER                |
| DIM.         | DIMENSION              | INT.            | INTERIOR                                 | VCT             | VINYL COMPOSITION TILE       |
| DN.          | DOWN                   | JAN.            | JANITOR                                  | VERT.           | VERTICAL                     |
| DWG.         | DRAWING                | JST             | JOIST                                    | W.C.            | WATER CLOSET                 |
| E.J.         | EXPANSION JOINT        | LAM             | LAMINATE                                 | W.H.            | WATER HEATER                 |
| E.O.F.       | EDGE OF FRAME          | LAV.            | LAVATORY                                 | W/W.F.          | WELDED WIRE FABRIC           |
| E.W.         | EACH WAY               | M.O.            | MASONRY OPENING                          | W/              | WITH                         |
| EWC          | ELECTRIC WATER COOLER  | M.R.            | MOISTURE RESISTANT                       | WD.             | WOOD                         |
| ELEC.        | ELECTRICAL             | M.T.            | METAL THRESHOLD                          |                 |                              |
|              |                        | MAR             | MARBLE                                   |                 |                              |
|              |                        | MAX.            | MAXIMUM                                  |                 |                              |



### ABBREVIATIONS

|                             |   |
|-----------------------------|---|
| ROOM NAME                   | ROOM NAME & NUMBER  |
| 128                         | 128   |
| A1 A2.3                     | DETAIL NUMBER   |
| A1 A2.3                     | PLAN OR SECTION DETAIL                                    |
| 117 A                       | SHEET NO.   |
| 117 A                       | ROOM NUMBER   |
| 117 A                       | DOOR NUMBER, SEE SCHEDULE                                 |
| 117 A                       | DOOR INDICATION   |
| A1 A2.1                     | DETAIL NUMBER   |
| A1 A2.1                     | EXTERIOR ELEVATION DETAIL                                 |
| A1 A2.1                     | SHEET NO.   |
| FE                          | FIRE EXTINGUISHER, TYPE ABC DRY CHEMICAL RECESSED CABINET |
| ILLUMINATED EXIT SIGN ABOVE | ILLUMINATED EXIT SIGN ABOVE                               |

### Code Analysis

#### Hanahan recreation Complex

#### Hanahan, SC

## A-3

Occupancy: A-3 (Assembly)

|  |                                    |  |  |                             |  |                                  |   |   |
|--|------------------------------------|--|--|-----------------------------|--|----------------------------------|---|---|
| 2018 International Building Code with SC modifications | 2018 International Mechanical Code | 2018 International Fuel Gas Code with SC modifications | 2018 International Fire Code with SC modifications | 2017 National Electric Code | 2018 International Building Code with SC modifications | 2019 International Plumbing Code | 2017 ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities | 2009 International Energy Conservation Code |
| Recreation Center: 3,321 SF                            |                                    |  |  |                             |  |                                  |   |   |

| Type                              | VB                   | 6,000 sf                            | 3,321 sf                           | 1 story 40'-0"         | 1 story 23'-2"               | N/A                                 | N/A          |
|-----------------------------------|----------------------|-------------------------------------|------------------------------------|------------------------|------------------------------|-------------------------------------|--------------|
| Allowable Building Area (T.506.2) | Actual Building Area | Allowable Building Height (T.504.3) | Allowable No. of Stories (T.504.4) | Actual Building Height | Incidental Use Areas (T.509) | Separation of Occupancies (T.509.4) | (T.707.3.10) |
| Type of Construction (602.3)      |                      |                                     |                                    |                        |                              |                                     |              |

#### PLUMBING FIXTURE COUNT

| Water Closets      | MEN: 1 per 125   | WOMEN: 1 per 65  | req'd | prov. |
|--------------------|------------------|------------------|-------|-------|
|                    |                  |                  | 2     | 4     |
| Lavatories         | MEN: 1 per 200   | WOMEN: 1 PER 200 |       | 2     |
|                    |                  |                  | 1     | 2     |
| Drinking Fountains | 1 per (pair) 100 |                  | 2     | 2     |
| Service Sink       |                  |                  | 1     | 1     |

Occupant Load: Total Occupant Load: 133  
Men: 67  
Women: 66

See structural notes for required special inspections

#### FIRE PROTECTION REQUIREMENTS (T.601) type VB

| Building Component                         | Fire Rating (hrs) |
|--|-------------------|
| Structural Frame-columns, girders, trusses | 0                 |
| Exterior Bearing Walls                     | 0                 |
| Interior Bearing Walls                     | 0                 |
| Exterior non-bearing walls and partitions  | 0                 |
| Interior non-bearing walls and partitions  | 0                 |
| Floor Construction                         | 0                 |
| Roof Construction                          | 0                 |

#### FIRE RATING REQUIREMENTS FOR EXTERIOR WALLS (T.602)

| Fire Separation Distance              | Fire Rating (hrs) |
|---------------------------------------|-------------------|
| <5' from property line                | 1                 |
| > or = 5' to <10' from property line  | 1                 |
| > or = 10' to <30' from property line | 0                 |
| > or = 30'                            | 0                 |

#### MEANS OF EGRESS (Chapter 10)

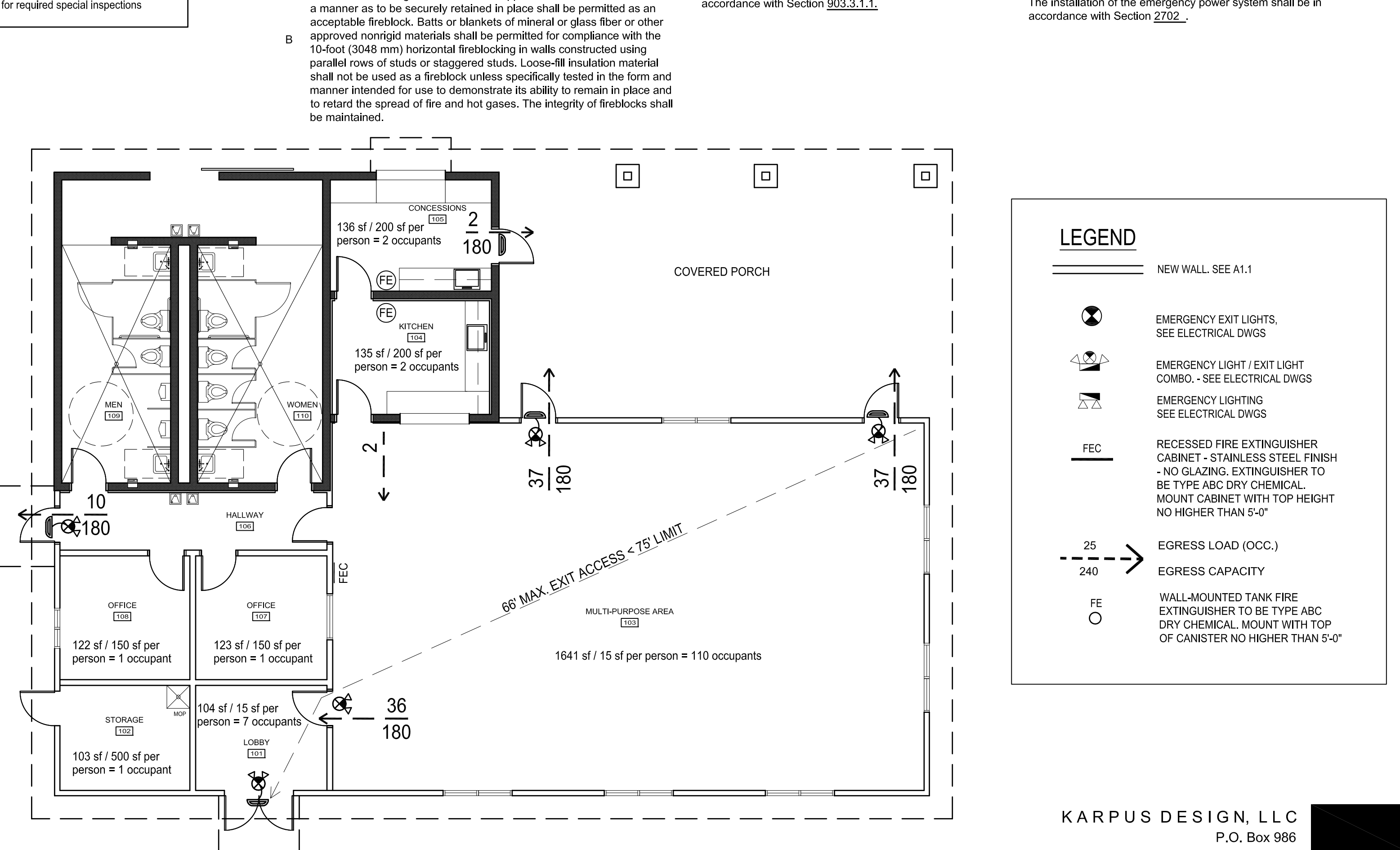
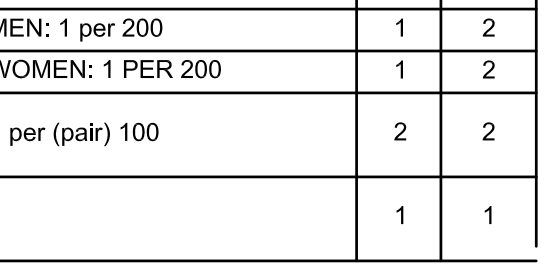
|   |                      |
|---|----------------------|
| Occupant Load (T.1004.1.2)                          | 133 occupants        |
| Egress width / person - stairways (Sect. 1005.3.1)  | 0.3" per person      |
| Egress width per person - other Sect. 1005.3.2      | 0.2" per person      |
| Spaces with One Exit... (T. 1006.2.1)               | 75' max              |
| Stories w/ spaces with One Exit... (T. 1006.3.3(2)) | N/A                  |
| Common Path of Egress Travel (T. 1006.2.1)          | 75'                  |
| Min. Mo. of Exits Required (1006.3.1)               | 2 req'd / 3 provided |
| illumination Emergency Power (Sect 1008.3.1)        | (m)                  |
| Accessible Means of Egress (Sect. 1009.1)           | ground floor         |
| Accessible Means of Egress (Sect. 1104.4)           | ground floor         |
| Size of Doors (Sect. 1010.1)                        | 32" min.             |
| Panic Hardware (Section 1010.1.10)                  | required             |
| Width of Stairways (Sect. 1011.2, exception 1)      | 36" clear            |
| Width of Ramp (1012.5.1)                            | 36" clear (N/A)      |
| Handrails (Section 1014.2)                          | 34"-38"              |
| Guard Rails (Sect. 1015.3)                          | 42"                  |
| Max. Exit Access Travel Dist. (T.1017.2)            | 200'                 |
| Corridor Construction (T.1020.1)                    | 1hr (if >30 in B)    |
| Min. Corridor Width (T. 1020.2)                     | existing             |
| Max. Dead End Corridor (Sect. 1020.4)               | 20'                  |
| Interior Exit Stair (Sect. 1023.2)                  | 1 hr (NA)            |
| Exit Access Stair (Sect. 1019.3) - exception 1      | open                 |

#### MISC. REQUIREMENTS NP: not permitted NL: no limit

| Building Component                               | Requirement  |
|--|--------------|
| Opening Fire Protection Assemblies (T716.1)      | N/A          |
| Fire Damper Rating (T.717.3.2.1)                 | 1.5 hr / N/A |
| Flame Spread Index-vert exit and exit passages   | Class A      |
| Flame Spread Index-exit access corridors         | Class B      |
| Flame Spread Index-rooms & enclosed spaces       | Class C      |
| Sprinkler System (Section 903)                   | NR           |
| Portable Fire Extinguishers                      | (a,b,c)      |
| Fire Alarm & Detection Systems - (Sect. 907.2.2) | NR           |

### WALL TYPES

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



### GENERAL NOTES

- FOR THE PURPOSE OF THESE DRAWINGS AND ANY ACCOMPANYING SPECIFICATIONS THE TERM "BY G.C." WILL REFER TO ITEMS PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR, THEIR SUBCONTRACTORS AND OR AGENTS. THE TERM "OFC" WILL REFER TO ITEMS PROVIDED BY THE OWNER AND INSTALLED BY THE GENERAL CONTRACTOR. THE TERM "NIC" WILL REFER TO ITEMS NOT IN CONTRACT OR PROVIDED AND INSTALLED BY THE OWNER AND OR THEIR AGENTS.
- UNLESS NOTED OTHERWISE, ALL ITEMS ARE ASSUMED TO BE BY "G.C."
- ALL WORK TO BE PERFORMED SHALL COMPLY WITH ALL GOVERNING FEDERAL, STATE AND MUNICIPAL CODES AND ORDINANCES.
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND CONDITIONS AND NOTIFY ARCHITECT OF ANY POSSIBLE CONFLICTS PRIOR TO INITIATING ANY WORK IN QUESTION.
- ALL CONTRACTORS AND SUB CONTRACTORS ARE TO REVIEW ARCHITECTS DRAWINGS AS WELL AS ENGINEERS DRAWINGS AND COORDINATE EACH WITH THEIR SPECIFIC FIELD. REFER ANY QUESTIONS OR CONFLICTS TO ARCHITECT BEFORE BEGINNING CONSTRUCTION
- GENERAL CONTRACTOR SHALL VERIFY EXISTENCE OF ALL UNDERGROUND UTILITIES AND PIPING AND PROTECT BEFORE BEGINNING WORK. GENERAL CONTRACTOR SHALL EMPLOYEE A LOCATION SERVICE AT HIS EXPENSE AND WILL BE RESPONSIBLE FOR ANY REPAIR NECESSARY AS A RESULT OF DAMAGES CAUSED BY CONSTRUCTION OPERATIONS.
- ANY REFERENCES TO STRUCTURAL REINFORCING IN THE ARCHITECTURAL DRAWINGS IS FOR REPRESENTATIONAL USE ONLY. SEE STRUCTURAL DRAWINGS FOR ALL REQUIRED REINFORCING. LOCATE ALL BOND BEAMS AS PER STRUCTURAL DRAWINGS.

### HANAHAN RECREATION COMPLEX

#### CITY OF HANAHAN

HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 3/11/21  
DRAWN BY: CMK  
CHECKED BY: JRP

#### REVISION HISTORY

|   |         |         |
|---|---------|---------|
| 0 | BID SET | 2/25/21 |
|---|---------|---------|

KARPUS DESIGN, LLC  
P.O. Box 986  
Summerville, South Carolina, 29484  
ph: 843.425.4124 | fax: 843.832.7331  
karpusdesign.com

**GO.0**

ARCHITECTURAL COVER

1.0 CONSTRUCTION AND SAFETY

- 1. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL SAFETY REGULATIONS, PROGRAMS AND PRECAUTIONS RELATED TO ALL WORK ON THIS PROJECT.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE PROTECTION OF PERSONS AND PROPERTY EITHER ON OR ADJACENT TO THE PROJECT AND SHALL PROTECT SAME AGAINST INJURY, DAMAGE OR LOSS.
3. MEANS AND METHODS OF CONSTRUCTION AND ERECTION OF STRUCTURAL MATERIALS ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY AND ALL NECESSARY ITEMS (SLEEVES, EXTRA REINFORCEMENT, HANGARS, RAISED PADS, STEPPED FOOTINGS ETC.) TO PROVIDE THE REQUIRED DISTRIBUTION OF ELECTRICAL AND MECHANICAL UTILITIES THROUGHOUT THE STRUCTURE.
5. STRUCTURAL DRAWINGS ARE INTENDED TO BE USED IN CONJUNCTION WITH THE DRAWINGS OF OTHER CONSULTANTS AND TRADES. THE CONTRACTOR SHALL COORDINATE THE VARIOUS REQUIREMENTS.
6. ANY EMBEDS, PITS, OR RECESSES REQUIRED BY OTHER TRADES OR VENDORS SHALL BE NOTED BY THE CONTRACTOR FROM TRADE OR VENDOR DRAWINGS.
7. ANY FLOOR DEPRESSION DIMENSIONS WHICH ARE REQUIRED SHALL BE CONFIRMED BY THE CONTRACTOR AS MEETING THE INTENT OF THE ARCHITECTURAL DRAWINGS.
8. THE ACTUAL LOCATIONS OF EXISTING UNDERGROUND OR OVERHEAD UTILITIES AND LINES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
9. REFER TO ARCHITECTURAL DRAWINGS FOR ALL WALL AND DOOR OPENINGS, REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR SIZE AND LOCATION OF ALL OPENINGS FOR DUCTS, PIPING CONDUITS, ETC. NOT SHOWN.
10. ALL ELEVATIONS ARE REFERENCED FROM FIRST FLOOR FINISHED ELEVATION.
11. ANY DISCREPANCIES, INTERFERENCE, OR CONFLICTS BETWEEN THE STRUCTURAL DRAWINGS AND THOSE OF OTHER DISCIPLINES SHALL BE REPORTED PRIOR TO THE SUBMISSION OF CHECKED SHOP DRAWINGS BY THE CONTRACTOR FOR REVIEW.
12. NO OPENINGS NOR ANY CHANGES IN SIZE, DIMENSION OR LOCATION SHALL BE MADE IN ANY STRUCTURAL ELEMENTS WITHOUT WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.
13. OPENINGS 12" OR LESS ON A SIDE ARE GENERALLY NOT SHOWN ON THE STRUCTURAL DRAWINGS. REFER TO DRAWINGS OF OTHER CONSULTANTS FOR SUCH OPENINGS.
14. FIREPROOFING OF STRUCTURAL ELEMENTS IS NOT SHOWN ON THE STRUCTURAL DRAWINGS, REFER TO THE SPECIFICATIONS AND ARCHITECTURAL DRAWINGS FOR FIRE RATING REQUIREMENTS, MATERIALS AND METHODS.
15. THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED ON THE STRUCTURE. SUCH LOADS SHALL NOT EXCEED THE CAPACITY OF THE STRUCTURE AT ANY TIME.
16. SAFE AND ADEQUATE SHORING OF ALL PARTS OF THE STRUCTURE, DURING THE COURSE OF CONSTRUCTION, SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.
17. THE DESIGN OF THE PARTS AND PORTIONS OF THE STRUCTURE IS BASED ON A COMPLETED CONDITION. ANY TEMPORARY BRACING, SHORING OR SUPPORTING OF THE STRUCTURE OR ITS PARTS WHICH IS MADE NECESSARY DUE TO CONSTRUCTION SEQUENCING (OR OTHERWISE) TO MAINTAIN STABILITY PRIOR TO COMPLETION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
18. THE CONTRACTOR SHALL INFORM THE STRUCTURAL ENGINEER, CLEARLY AND EXPLICITLY IN WRITING, OF ANY DEVIATION OR SUBSTITUTION OF REQUIREMENTS OF THE CONTRACT DOCUMENTS. CONTRACTOR IS NOT RELIEVED OF ANY REQUIREMENTS OF THE CONTRACT DOCUMENTS BY VIRTUE OF THE STRUCTURAL ENGINEER'S REVIEW OF SHOP DRAWINGS, PRODUCT DATA, ETC., UNLESS THE CONTRACTOR HAS CLEARLY AND EXPLICITLY INFORMED THE STRUCTURAL ENGINEER IN WRITING OF ANY DEVIATIONS OR SUBSTITUTIONS AT TIME OF SUBMISSION, AND THE STRUCTURAL ENGINEER HAS GIVEN WRITTEN APPROVAL FOR THE SPECIFIC DEVIATIONS OR SUBSTITUTIONS.
19. ALL THINGS WHICH, IN THE OPINION OF THE CONTRACTOR, APPEAR TO BE DEFICIENCIES, OMISSIONS, CONTRADICTIONS OR AMBIGUITIES IN THE DRAWINGS OR SPECIFICATIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER. CORRECTIONS OR WRITTEN INTERPRETATIONS SHALL BE ISSUED BEFORE AFFECTED WORK MAY PROCEED. IF THE CONTRACTOR CANNOT CONSTRUCT ANY PORTION OF THE WORK IDENTIFIED IN THE DRAWINGS IN ACCORDANCE WITH THESE DRAWINGS AND SPECIFICATIONS, THEN THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING WITH THE WORK. WORK THAT DOES NOT COMPLY WITH THE DRAWINGS MAY REQUIRE REMOVAL, TESTING, OR ENGINEERING EVALUATION AT THE CONTRACTOR'S EXPENSE. CONTRACTOR TO VERIFY ALL DIMENSIONS AND CONDITIONS AT THE PROJECT SITE PRIOR TO STARTING WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY SITE CONDITIONS THAT ARE NOT CONSISTENT WITH THE DRAWINGS.
20. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING MATERIALS OR PROCEEDING WITH NEW WORK IN AREAS AFFECTED BY EXISTING CONDITIONS. STRUCTURAL ENGINEER SHALL BE INFORMED IN WRITING OF CONFLICTS BETWEEN EXISTING AND PROPOSED NEW CONSTRUCTION.
21. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL DIMENSIONS SHOWN ON THE CONTRACT DOCUMENTS, INCONSISTENCIES ON THE STRUCTURAL DRAWINGS OR BETWEEN THE STRUCTURAL DRAWINGS AND ANY OTHER CONTRACT, SHOP, FABRICATION, OR OTHER DRAWINGS OR INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING WITH AFFECTED WORK.
22. CONTRACTOR SHALL PROVIDE IN HIS SCHEDULE FOR A SHOP DRAWING REVIEW AND RETURN TIME OF A MINIMUM OF FIFTEEN (15) WORKING DAYS IN THE STRUCTURAL ENGINEER'S OFFICE. ALL ANCHOR BOLTS SHALL BE SET WITH TEMPLATES IN ACCORDANCE WITH BUILDING MANUFACTURER'S REQUIREMENTS AND PLACEMENT DRAWINGS.
23. VERIFY ELEVATOR PIT DIMENSIONS, LOCATIONS, LOADS AND DETAILS WITH THE ELEVATOR SUPPLIER PRIOR TO THE FABRICATION AND/OR INSTALLATION OF ANY MATERIAL.
24. ALL SECTIONS AND DETAILS ARE TYPICAL AT SIMILAR LOCATIONS AND WHERE APPLICABLE. ONCE THE PROJECT IS COMPLETED, THE OWNER SHALL BE RESPONSIBLE FOR ADEQUATE STRUCTURAL MAINTENANCE. THE CONTRACTOR IS REQUIRED TO INFORM THE OWNER OF THIS IN WRITING.

2.0 SPECIAL INSPECTIONS PER CHAPTER 17 (IBC 2018)

SPECIAL INSPECTIONS AS DESCRIBED IN CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE, 2018 EDITION, ARE REQUIRED FOR THIS PROJECT. A "STATEMENT OF SPECIAL INSPECTIONS" HAS BEEN ATTACHED TO THIS SET OF CONSTRUCTION DOCUMENTS.

3.0 FILL

- 1. ALL FILL MATERIAL SHALL BE SELECT MATERIAL CAPABLE OF ATTAINING 95% MAXIMUM DRY DENSITY COMPACTION.
2. THE EXPOSED SOIL SURFACE AFTER EXCAVATION SHALL BE COMPACTED A MINIMUM OF 95% OF THEIR STANDARD PROCTOR MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698 TO A DEPTH OF 6".
3. THIS PROJECT WAS DESIGNED IN THE ABSENCE OF A SOILS REPORT. ALL DESIGN VALUES ARE BASED ON AN ASSUMED BEARING VALUE OF 2000 PSF. THE REASONABLENESS OF THIS ASSUMPTION SHOULD BE VERIFIED PRIOR TO COMMENCING ANY FOUNDATION WORK. ALL EXCAVATIONS FOR FOOTINGS SHALL BE MADE TO THE GRADES SHOWN FOR CONTINUOUS FOOTINGS. CONTRACTOR SHALL TAKE MEASURES AS TO PREVENT CAVE-IN OF THE FOOTING EXCAVATIONS AS MAY BE REQUIRED.
4. COMPACTED FILL MATERIAL SHALL BE FREE OF ORGANICS, STONES, ROCKS, BROKEN BRICKS, WOOD FRAGMENTS, OR OTHER DELETERIOUS MATERIAL THAT AFFECTS THE COMPATIBILITY OF THE MATERIAL.
5. FILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 10" AND COMPACTED TO AT LEAST 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY.
6. PRIOR TO PLACEMENT OF ANY CONCRETE, THE THIN LAYER OF DISTURBED SOIL IN THE FOOTING SUBGRADE SHALL BE COMPACTED WITH HAND OPERATED, GAS POWER TAMPERS.

4.0 FOUNDATIONS

- 1. ENGINEERED FILL.
ALL FILL MATERIAL SHALL BE SELECTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. MATERIAL SHALL BE A CLEAR, LOW PLASTICITY SOIL WITH PLASTICITY INDEX LESS THAN 30 (LESS THAN 15 IS PREFERRED), LIQUID LIMIT LESS THAN 50, UNIT WEIGHT OF 120 PCF, AND SHALL NOT CONTAIN MORE THAN 5% BY WEIGHT OF FIBROUS ORGANIC MATERIALS. ALL FILL MATERIAL SHALL BE SELECT MATERIAL CAPABLE OF ATTAINING 95% MAXIMUM DRY DENSITY COMPACTION. COMPACTED FILL MATERIAL SHALL BE FREE OF STONES, ROCKS, BROKEN BRICKS, WOOD FRAGMENTS, OR OTHER DELETERIOUS MATERIAL THAT AFFECTS THE COMPATIBILITY OF THE MATERIAL.
2. COMPACTION:
ALL FILL SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR (ASTM D-698) EXCEPT THAT THE TOP 18 INCHES UNDER FOUNDATIONS AND THE BUILDING PAD SHALL BE COMPACTED TO A MINIMUM OF 100% STANDARD PROCTOR. MOISTURE SHALL BE CONTROLLED TO WITHIN 3% ABOVE OR BELOW OPTIMUM CONTENT.
3. MODULUS OF SUBGRADE REACTION FOR SLABS ON GRADE: 200 PCI
THE EXPOSED SOIL SURFACE AFTER EXCAVATION SHALL BE COMPACTED A MINIMUM OF 95% OF THEIR STANDARD PROCTOR MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698 TO A DEPTH OF 6".
4. ALL EXCAVATIONS FOR FOOTINGS SHALL BE MADE TO THE GRADES SHOWN FOR CONTINUOUS FOOTINGS. CONTRACTOR SHALL TAKE MEASURES AS TO PREVENT CAVE-IN OF THE FOOTING EXCAVATIONS AS MAY BE REQUIRED.
5. PRIOR TO PLACEMENT OF ANY CONCRETE, THE THIN LAYER OF DISTURBED SOIL IN THE FOOTING SUBGRADE SHALL BE COMPACTED WITH HAND OPERATED, GAS POWER TAMPERS
FOUNDATION AND RETAINING WALLS SHALL HAVE A MINIMUM OF TWO FEET (2'-0") OF FREE DRAINING GRANULAR FILL AGAINST THE BACK OF THE WALL OR SHALL HAVE AN ACCEPTABLE COMMERCIAL GRADE OF DRAINAGE MAT PLACED AGAINST THE BACK OF THE WALL.
6. FOUNDATION WALLS RETAINING EARTH SHALL BE BRACED AGAINST BACKFILL PRESSURES UNTIL FLOOR SLABS AT TOP AND BOTTOM ARE IN PLACE. BACKFILL IS STRICTLY PROHIBITED UNTIL SLABS ARE IN PLACE.
7. FOUNDATION WALLS OR GRADE BEAMS HAVING EARTH PLACED ON EACH SIDE SHALL HAVE BOTH FILLED SIMULTANEOUSLY TO MAINTAIN A COMMON ELEVATION.
8. REINFORCING IN ALL CONTINUOUS STRIP FOOTINGS SHALL HAVE CORNER BARS OR DOWELS PROVIDED AT ALL CORNERS AND INTERSECTIONS.
9. IF UNDERPINNING OF EXISTING FOUNDATIONS ADJACENT TO THE NEW CONSTRUCTION WILL BE REQUIRED, THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL SUCH WORK AND FOR PROVIDING FOR THE ADEQUACY AND PERMANENT SUPPORT FOR ALL EXISTING BUILDINGS. CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER REGISTERED IN SOUTH CAROLINA TO DESIGN AND DETAIL ALL UNDERPINNING WORK BASED ON CONDITIONS UNCOVERED AND DOCUMENTED IN THE FIELD. CALCULATIONS AND DRAWINGS FOR ALL UNDERPINNING WORK, SIGNED AND SEALED BY THE CONTRACTOR'S ENGINEER, SHALL BE SUBMITTED TO THE ARCHITECT FOR RECORD ONLY.

5.0 CONCRETE

- 1. CONCRETE SHALL HAVE 28-DAY COMPRESSIVE STRENGTHS AND DENSITIES AS FOLLOWS:
ELEMENT MEMBER STRENGTH FC DENSITY YC
FOOTINGS & SLABS ON GRADE 4 KSI 145 PCF
CAST-IN-PLACE WALLS 4 KSI 145 PCF
SLABS ON STEEL DECK 3 KSI 115 PCF
STAIR PAN FILL 3 KSI 115 PCF
ALL OTHER CONCRETE U.N.O. 4 KSI 145 PCF
2. CONCRETE MIX DESIGNS:
A. SUBMITTALS: SUBMIT WRITTEN REPORTS OF EACH PROPOSED CONCRETE MIX NOT LESS THAN 15 DAYS PRIOR TO THE START OF WORK. DESIGN MIXES PREPARED MORE THAN TWELVE (12) MONTHS PRIOR TO THE DATE OF THE SUBMITTAL ARE NOT PERMITTED.
B. MIX DESIGNS, INCLUDING W/C RATIOS AND SLUMPS, SHALL BE PREPARED IN ACCORDANCE WITH THE MOST CURRENT ACI 301 CHAPTER 3, EXCEPT WHERE NOTED OTHERWISE IN THE PROJECT SPECIFICATIONS. CEMENT SHALL CONFORM TO ASTM C 150 TYPE 1 OR AT CONTRACTOR'S OPTION, ASTM C 595 TYPE 1P WHERE FLY ASH IS PERMITTED IN ACCORDANCE WITH THE SPECIFICATIONS. NORMAL WEIGHT AGGREGATE SHALL CONFORM TO ASTM C 330, NO ADMIXTURES CONTAINING CALCIUM CHLORIDE SHALL BE PERMITTED IN ANY CONCRETE.
C. AGGREGATE SIZES SHALL BE:
FORMED CONCRETE ELEMENTS, U.N.O. #67 STONE (3/4" MAX.)
GRADE SLABS AND EARTH FORMED ELEMENTS #57 STONE (1" MAX.)
LIGHTWEIGHT CONCRETE ELEMENTS 3/8" MAX. DIMENSION
COARSE MASONRY GROUT PER SECTION 04230 #6 STONE (3/8" MAX.)
FINE MASONRY GROUT PER SECTION 04230 #4 STONE (3/16" MAX.)
D. WATER REDUCING ADMIXTURE SHALL BE USED IN ALL CONCRETE.
E. AIR ENTRAINING ADMIXTURE IN ACCORDANCE WITH ACI 301-84 TABLE 3.4.1, SHALL BE USED IN ALL CONCRETE EXPOSED TO FREEZING AND THAWING DURING CONSTRUCTION OR SERVICE CONDITIONS.
F. WATER/CEMENT RATIO SHALL NOT EXCEED 0.50 FOR ANY CONCRETE SUBJECTED TO FREEZING/THAWING.
G. ALL PUMPED CONCRETE SHALL HAVE A WATER/CEMENT RATIO LESS THAN 0.50 AND SHALL CONTAIN A HIGH RANGE WATER REDUCING ADMIXTURE (SUPERPLASTICIZER).
H. IN NO CASE SHALL A WATER/CEMENT RATIOS EXCEED THE FOLLOWING:
FC 3000 PSI 0.60 MAX. W/C RATIO
FC 4000 PSI 0.50 MAX. W/C RATIO
3. CURING:
A. LIQUID MEMBRANE CURING COMPOUND WITH A MINIMUM 30% SOLIDS CONTENT SHALL BE APPLIED WITHIN TWO (2) HOURS AFTER COMPLETION OF FINISHING TO ALL CONCRETE FLATWORK AND WALLS, U.N.O., OTHER THAN FOOTINGS AND GRADE BEAMS.
B. FLOORS IN AREAS WHERE TILE AND/OR LIQUID FLOOR HARDENER SHALL BE CURED WITH SPECIFIED DISSIPATING LIQUID MEMBRANE CURING COMPOUND OR WET CURED BY USE OF MOISTURE RETAINING COVER. DISSIPATING CURING COMPOUND SHALL BE THOROUGHLY BROOMED AND WASHED OFF PRIOR TO APPLICATION OF FLOOR FINISH.
4. WHERE USE IS DESIRED, SUBMIT FOR ENGINEER'S APPROVAL A NON-CORROSIVE, NON-CHLORIDE, ACCELERATING ADMIXTURE FOR CONCRETE EXPOSED TO TEMPERATURES BELOW 40 DEGREES. UNIFORMITY HEAT WATER AND AGGREGATES TO A TEMPERATURE OF NOT LESS THAN 50 DEGREES. PLACE AND CURE CONCRETE IN ACCORDANCE WITH ACI 308 "COLD WEATHER CONCRETING".
5. WHEN HOT WEATHER CONDITIONS EXIST, PLACE AND CURE CONCRETE IN ACCORDANCE WITH ACI 305 "HOT WEATHER CONCRETING". COOL MATERIALS BEFORE MIXING TO MAINTAIN CONCRETE PLACEMENT TEMPERATURES BELOW 90 DEGREES.
6. ALL CONSTRUCTION JOINTS SHOWN ON THE DRAWINGS SHALL BE INCORPORATED INTO THE STRUCTURE UNLESS THE STRUCTURAL ENGINEER APPROVES THEIR ELIMINATION.
7. ADDITIONAL CONSTRUCTION JOINTS, REQUIRED TO FACILITATE CONSTRUCTION, ARE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER AND MAY REQUIRE ADDITIONAL REINFORCING. SUCH JOINTS SHALL BE CLEARLY DETAILED ON THE SHOP DRAWINGS AND ALL REINFORCING SHALL PASS CONTINUOUSLY THROUGH THE JOINT.
8. REINFORCING IN ALL ABUTTING CONCRETE, INCLUDING FOOTINGS, SHALL BE CONTINUOUS THROUGH OR AROUND ALL CORNERS OR INTERSECTIONS. DOWELS OR SPLICES SHALL BE EQUAL IN SIZE AND SPACING TO THE REINFORCING IN THE ABUTTING MEMBERS.
9. REFER TO ARCHITECTURAL DRAWINGS FOR DOOR AND WINDOW OPENINGS, DRIPS, REGLETS, WASHES, MASONRY ANCHORS, BRICK LEDGE ELEVATIONS, SLAB DEPRESSIONS AND MISCELLANEOUS EMBEDDED PLATES, BOLTS, ANCHORS, ANGLES, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CONCRETE FINISHES. WHERE FINISH IS NOT SPECIFIED, CONFORM TO REQUIREMENTS OF ACI 301.
10. REFER TO PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR UNDERFLOOR, PERIMETER AND OTHER DRAINS AND FOR SLEEVES, OUTLET BOXES, CONDUIT, ANCHORS, ETC. THE VARIOUS TRADES ARE RESPONSIBLE FOR THEIR ITEMS.
11. BASE PLATES, ANCHOR BOLTS, SUPPORT ANGLES AND OTHER STEEL EXPOSED TO EARTH OR GRANULAR FILL SHALL BE COVERED WITH A MINIMUM OF 3" OF CONCRETE.
12. FILL SLABS NOT SHOWN ON THE STRUCTURAL DRAWINGS, SHALL BE REINFORCED WITH A MINIMUM OF 6X6-W/1.4XW/1.4 W/UNLESS NOTED OTHERWISE ON OTHER DRAWINGS OR IN THE SPECIFICATIONS.
13. SLABS ON STEEL DECK SHALL BE PLACED SO THE FINISH SURFACE IS SCREED TO WITHIN 1/4" OF THE TOP OF SLAB (T.O.SLAB) ELEVATION SHOWN ON THE DRAWINGS. SCREED SUPPORTS SHALL BE PLACED OVER OR IMMEDIATELY ADJACENT TO BEAM OR GIRDER LINES. SCREED SUPPORTS SHALL NOT BE LOCATED ON DECK SPANNING BETWEEN BEAMS OR GIRDER. FINISHING TOLERANCE SHALL BE WITHIN CLASS B IN ACCORDANCE WITH ACI 301 AND CONSIDERATION SHALL BE GIVEN TO SEQUENCING OF CONCRETE PLACEMENT TO FACILITATE CONTROL OF FINISH ELEVATIONS.
14. GROUT:
A. GROUT BELOW STRUCTURAL STEEL BASE PLATES SHALL BE NON-SHRINK GROUT WITH A MINIMUM STRENGTH OF 6000 PSI WHEN BEARING ON 3000 PSI CONCRETE OR LESS, A STRENGTH OF 8000 PSI WHEN BEARING ON CONCRETE BETWEEN 3000 AND 4000 PSI, AND, UNLESS NOTED OTHERWISE ON THE DRAWINGS, A STRENGTH OF 8000 PSI WHEN BEARING ON CONCRETE GREATER THAN 4000 PSI.
B. NON-SHRINK GROUT SHALL BE PRE-MIXED, NON-CORROSIVE, NON-METALLIC, NON-STAINING CONTAINING SILICA SANDS, PORTLAND CEMENT, SHRINKAGE COMPENSATING AND WATER REDUCING AGENTS. PRODUCT SHALL ONLY REQUIRE THE ADDITION OF WATER. MINIMUM COMPRESSIVE STRENGTH SHALL BE 2500 PSI AFTER ONE DAY AND 6000 PSI AFTER 28 DAYS. GROUT SHALL BE FREE OF GAS PRODUCING OR AIR RELEASING AND OXIDIZING AGENTS AND CONTAIN NO CORROSIVE IRON, ALUMINUM OR GYPSUM.

- 17. PROVIDE CONCRETE GROUT - NOT MORTAR - FOR REINFORCED MASONRY LINTEL AND BOND BEAMS WHERE INDICATED ON DRAWINGS OR AS SCHEDULED.
18. TOLERANCE FOR ANCHOR BOLTS AND OTHER EMBEDDED ITEMS SHALL BE PER THE AISC CODE OF STANDARD PRACTICE SECTION 7.5.
19. UNLESS OTHERWISE SHOWN IN THE ARCHITECTURAL DRAWINGS, PROVIDE 3/4" CHAMFERS AT ALL COLUMN, WALL, SLAB OR BEAM EDGES THAT ARE EXPOSED TO VIEW IN THE FINISHED STRUCTURE.

6.0 REINFORCING STEEL

- 1. REINFORCING SHALL BE DOMESTIC NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60 OR 60S INCLUDING STIRRUPS AND TIES, EXCEPT THAT REINFORCING WHICH IS REQUIRED TO BE WELDED SHALL CONFORM TO ASTM A706.
2. FIELD BENDING OF CONCRETE REINFORCING STEEL IS NOT PERMITTED WITHOUT WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.
3. WELDED WIRE MAT SHALL CONFORM TO ASTM A194 AND FABRIC TO ASTM A195.
4. ALL REINFORCING SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH ACI SP-46 "ACI DETAILING MANUAL - 1994" AND THE "CRS MANUAL OF STANDARD PRACTICE", LATEST EDITION.
5. MINIMUM CONCRETE COVER OVER REINFORCING SHALL BE U.N.O.:
A. UNFORMED SURFACE CAST AGAINST EARTH 3 IN.
B. FORMED SURFACE EXPOSED TO EARTHWEATHER 2 IN.
C. FORMED SLABS AND WALLS NOT EXPOSED TO EARTHWEATHER USING MAX. #5 BAR 3/4 IN.
D. ALL OTHER FORMED ELEMENTS NOT EXPOSED TO EARTHWEATHER 1 1/2 IN.
6. DEVELOPMENT LENGTHS AND LAP SPLICES SHALL BE IN ACCORDANCE WITH ACI 318-05 CHAPTER 12 AS INDICATED BELOW AND AS INDICATED ON THE DRAWINGS, WHERE SPLICES ARE NOT CALLED OUT ON THE DRAWINGS, USE CLASS "B". THE BASIC DEVELOPMENT LENGTHS, SHOWN IN INCHES IN PARAGRAPH "A" BELOW, SHALL BE MULTIPLIED BY THE FACTORS IN PARAGRAPH "B" AS INDICATED FOR TENSION OR COMPRESSION AND THEN ROUNDED UP TO THE NEAREST WHOLE INCH. THE FACTORS INDICATED BELOW ARE CUMULATIVE ACROSS ALL OF THE APPLICABLE CONDITIONS.
BASIC DEVELOPMENT LENGTHS ARE NOTED AS "N" FOR NOMINAL TENSION DEVELOPMENT, "T" FOR TOP BAR TENSION DEVELOPMENT, AND "C" FOR COMPRESSION DEVELOPMENT.
A. REINFORCING TYPED AS FOLLOWS:
FC PSI LDB #3 #4 #5 #6 #7 #8 #9 #10 #11
N 17 22 28 33 48 55 62 70 78
3000 T 22 29 36 43 63 72 81 91 101
C 9 11 14 17 20 22 25 28 31
FC PSI LDB #3 #4 #5 #6 #7 #8 #9 #10 #11
N 14 19 24 29 42 48 54 61 67
4000 T 19 25 31 37 54 62 70 79 87
C 8 10 12 15 17 19 22 24 27
B. DEVELOPMENT LENGTH MULTIPLIERS: MULTIPLICATION FACTORS APPLY TO THE BASIC "LD" INDICATED ABOVE AND ARE CUMULATIVE OVER EACH OF THE REQUIREMENTS NOTED BELOW.
I. COMPRESSION ENCLOSURE WITHIN SPIRALS, TIES, OR STIRRUPS PER ACI 12.3.3.2 BUT NOT LESS THAN 8" .75
II. TENSION: CLEAR SPACING < 2 DB OUTSIDE STIRRUPS 1.5
III. TENSION: CLEAR SPACING OR COVER < 1 DB INSIDE STIRRUPS 1.5
IV. TENSION: CLASS "B" SPLICE REQUIREMENT 1.3
V. TENSION: BARS IN LIGHTWEIGHT AGGREGATE CONCRETE 1.3
7. A CLASS "B" SPLICE IS REQUIRED WHEREVER ALL REINFORCING BARS CROSSING A SECTION ARE SPLICED.
REINFORCING BARS SHALL BE WELDED ONLY WHERE SHOWN ON THE STRUCTURAL DRAWINGS AND WELDS SHALL BE IN ACCORDANCE WITH THE "STRUCTURAL WELDING CODE - REINFORCING STEEL" (AWS D1.4). NO OTHER REINFORCING MAY BE WELDED WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER. TACK WELDING OF ANY REINFORCING IS STRICTLY PROHIBITED.
9. WELDED WIRE MAT/FABRIC SHALL BE LAPPED 1'-0" AT ALL SPLICES.
10. ALL REINFORCING TERMINATING AT THE TOPS OF COLUMNS AND PILASTERS SHALL BE HOOKED, U.N.O.
11. SUBMIT SHOP DRAWINGS FOR FABRICATION, BENDING, AND PLACEMENT OF CONCRETE REINFORCEMENT. COMPLY WITH ACI DETAILING MANUAL (SP-46) SHOWING BAR SCHEDULES, STIRRUP SPACING, DIAGRAMS OF BENT BARS, ARRANGEMENT OF CONCRETE REINFORCEMENT. INCLUDE SPECIAL REINFORCEMENT REQUIRED AT OPENINGS THROUGH CONCRETE STRUCTURES. INCLUDE ALL ACCESSORIES REQUIRED TO SUPPORT REINFORCING.
12. SHOP DRAWINGS SHALL BE REVIEWED BY THE CONTRACTOR PRIOR TO SUBMISSION AND SHALL BEAR THE CONTRACTOR'S APPROVAL STAMP ACCEPTING RESPONSIBILITY FOR DIMENSIONS, QUANTITIES AND COORDINATION WITH THE OTHER TRADES.
13. SUBMIT TWO (2) PRINTS OF EACH SHOP DRAWING FOR REVIEW. SEE PROJECT SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
14. CONTRACTOR SHALL PROVIDE IN HIS SCHEDULE FOR A SHOP DRAWING REVIEW AND RETURN TIME OF A MINIMUM OF FIFTEEN (15) WORKING DAYS IN THE STRUCTURAL ENGINEER'S OFFICE. CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER A MINIMUM OF 48 HOURS PRIOR TO ALL CONCRETE POURS IN ORDER TO PERMIT REINFORCING STEEL REVIEW IF REQUIRED BY THE STRUCTURAL ENGINEER.

7.0 TIMBER NOTES

- 1. ALL TIMBER FRAMING MEMBERS SHALL BE SYP, KD, NO. 2.
2. EXTERIOR WALL SHEATHING SHALL BE JOINTED OVER STUDS A MINIMUM OF 12" ABOVE SOLE PLATE AND 12" BELOW TOP PLATE.
3. ALL EXTERIOR WALL SHEATHING MUST EXTEND FROM BOTTOM EDGE OF SOLE PLATE OR SILL PLATE TO TOP EDGE OF TOP PLATE.
4. PLYWOOD SHEATHING SHALL HAVE 1/8" SPACE BETWEEN SHEETS, ALL EDGES, AND BE 1/2" SPACED PLYWOOD.
5. ALL EXTERIOR WALLS GREATER THAN OR EQUAL TO 10 FEET IN HEIGHT MUST BE 2X6 STUDS. FASTEN PLYWOOD WITH DOUBLE ROW OF NAILS (JACKS AND ADJACENT WALL STUDS) AT ALL WINDOWS AND DOOR OPENINGS WITH NAIL SPACING PREVIOUSLY INDICATED.
6. ALL PLYWOOD SUB-FLOOR SHEATHING TO BE 23/32 TONGUE AND GROOVE EXTERIOR GRADE STURD-FLOOR. FLOORING SHALL BE GLUED AND NAILED WITH 8D NAILS @ 6" O.C. AT ALL SUPPORTED EDGES AND 6" O.C. AT INTERMEDIATE FRAMING MEMBERS.
7. EXTERIOR STUDS, NOT JACK STUDS, SHALL BE INSTALLED AT OPENING JAMBS TO REPLACE THE TYPICAL SPACED STUDS INTERRUPTED BY OPENINGS.
8. ALL EXTERIOR & INTERIOR SHEAR WALL WOOD SOLE PLATES IN CONTACT WITH CONCRETE OR MASONRY SHALL BE PRESSURE TREATED AND ANCHORED TO THE FOUNDATION WALL W/ 5/8" Ø ANCHOR BOLTS X 7" EMBEDMENT AT 32" O.C. A MINIMUM OF ONE ANCHOR BOLT SHALL BE PROVIDED WITHIN 6 TO 12 INCHES OF EACH END OF EACH PLATE AND WITHIN 12 INCHES OF CORNERS.
9. ALL OTHER SOLE PLATES TO BE FASTENED W/ 5/8" Ø A.B. X 7" EMBED. MIN @ 32" O.C.
10. LAMINATED VENEER LUMBER SHALL BE EQUAL TO "MICROLAM" WITH 2600 PSI BENDING STRESS, 2,000,000 PSI MODULUS OF ELASTICITY.
11. ROOF SHEATHING FASTENING:
THE FIRST FOUR FOOT WIDE PLYWOOD SHEATHING ALONG ROOF EDGES (INCLUDES GABLE ENDWALL AND EACH SIDE OF RIDGE), SHALL HAVE ALL EDGES NAILED @ 4" O.C. WITH INTERMEDIATE MEMBERS FASTENED AT 4' O.C. PROVIDE BLOCKING, AS REQUIRED, TO INSURE ALL EDGES ARE NAILED. THE REMAINING ROOF SHEATHING SHALL BE FASTENED @ 4" O.C. ALONG EDGES AND 6" O.C. ALONG INTERMEDIATE MEMBERS. SHEATHING SHALL BE FASTENED TO ROOF FRAMING WITH 10d NAILS.
GABLE END BLOCKING: PROVIDE BLOCKING @ 48" O.C. MAXIMUM, IN FIRST TWO FRAMING SPACES AT EACH END.
12. SIMPSON STRONG-TIE CONNECTORS ARE SPECIFICALLY REQUIRED TO MEET THE STRUCTURAL CALCULATIONS OF PLAN. BEFORE SUBSTITUTING ANOTHER BRAND, CONFIRM LOAD CAPACITY BASED ON RELIABLE PUBLISHED TESTING DATA OR CALCULATIONS. THE ENGINEER/DESIGNER OF RECORD SHOULD EVALUATE AND GIVE WRITTEN APPROVAL FOR SUBSTITUTION PRIOR TO INSTALLATION.

8.0 STRUCTURAL MASONRY

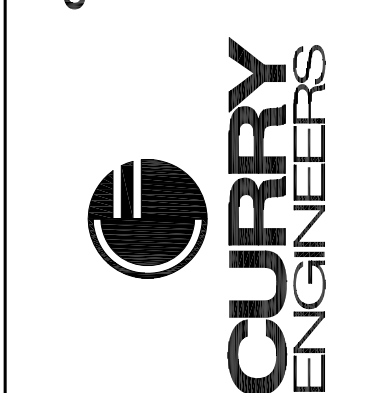
- 1. ALL STRUCTURAL MASONRY SHALL CONFORM TO ACI 530-11 STANDARDS AS APPROPRIATE TO THE MATERIAL.
2. MASONRY STRENGTH AND GRADE:
A. CONCRETE MASONRY UNITS (CMU):
UNITS SHALL BE LIGHTWEIGHT CELLULAR UNITS CONFORMING TO ASTM C 90. GRADE N-2. CONCRETE MASONRY NET AREA UNIT STRENGTH SHALL BE NO LESS THAN 1900 PSI IN ACCORDANCE WITH ASTM C 140, WITH A UNIT WEIGHT NOT EXCEEDING 95 PCF. SEE SPECIFICATIONS.
DESIGN COMPRESSIVE STRENGTH OF CMU (FM) = 1500 PSI.
3. SUBMITTALS: CONTRACTOR SHALL SUBMIT FOR APPROVAL TEST REPORTS ON MASONRY UNITS SHOWING UNIT WEIGHT, COMPRESSIVE STRENGTH, ABSORPTION, VOLUME CHANGE AND SHRINK PERCENT AND TEST NO. LATER THAN 15 WORKING DAYS PRIOR TO THE COMMENCEMENT OF MASONRY CONSTRUCTION.
4. MORTAR SHALL CONFORM TO ASTM C 270. MORTAR SHALL BE TYPE "S" AND SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 1800 PSI.
5. MASONRY GROUT FILL SHALL CONFORM TO ASTM C 476. GROUT, EITHER FINE OR COARSE AGGREGATE PER SPECIFICATIONS, SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI. MASONRY CONCRETE FILL SHALL CONFORM TO THE REQUIREMENTS NOTED UNDER "CONCRETE" IN THE GENERAL NOTES.
6. GROUTING:
A. ALL BOND BEAMS SHALL BE FILLED WITH GROUT AND REINFORCED AS INDICATED ON THE DRAWINGS (DETAILS OR SCHEDULES). MORTAR FILL IS NOT PERMITTED.
B. ALL MASONRY WALL CELLS OR CAVITIES INDICATED AS REINFORCED SHALL BE GROUTED FOR THE FULL HEIGHT OF THE WALL, UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. UNREINFORCED WALLS INDICATED AS GROUTED SHALL BE GROUTED FULL HEIGHT, UNLESS SPECIFICALLY NOTED OTHERWISE. MORTAR FILL IS NOT PERMITTED.
C. ALL MASONRY CELLS OR CAVITIES BELOW GRADE SHALL BE GROUTED SOLID UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. MORTAR FILL IS NOT PERMITTED.
D. VERTICAL GROUTING SHALL BE LOW LIFT OR HIGH LIFT AS FOLLOWS:
LOW LIFT GROUTING SHALL BE USED FOR ALL CAVITY WALLS AND MAY BE USED FOR ALL WALLS AT THE OPTION OF THE CONTRACTOR. LIFTS SHALL NOT EXCEED 4'-0" IN HEIGHT.
HIGH LIFT GROUTING IS PERMISSIBLE ONLY FOR FILLING OF CELLULAR MASONRY UNITS AND SHALL NOT EXCEED ONE STORY IN HEIGHT. CLEAN OUT HOLES SHALL BE PROVIDED AT THE BASE OF EACH GROUTED CELL.
E. GROUTING SHALL BE STOPPED 1 1/2" BELOW THE TOP OF A COURSE TO FORM A KEY AT THE JOINT.
F. GROUTING OF MASONRY BEAMS OR LINTELS SHALL BE DONE IN ONE CONTINUOUS OPERATION.
7. REINFORCING:
A. ALL BARS MARKED "CONTINUOUS" SHALL BE LAPPED A MINIMUM OF 40 BAR DIAMETERS AT ALL SPLICES. UNLESS NOTED OTHERWISE, ALL WALL/FOOTING DOWELS SHALL BE LAPPED 30 BAR DIAMETERS OR 24" IN THE LONGER, GREATEST.
B. FOUNDATION DOWELS MAY HAVE A MAXIMUM OF 18" TO ALIGN WITH WALL CAVITIES OR VERTICAL CMU CORES. GREATER SLOPES WILL REQUIRE REPLACEMENT OF THE FOUNDATION DOWELS.
C. SPLICED REINFORCING SHALL BE LAPPED UNDER "REINFORCING" ABOVE OR AS SHOWN ON DRAWINGS, WHICHEVER IS GREATEST. ALL SPLICES SHALL BE WIRED TOGETHER.
D. VERTICAL REINFORCING BARS SHALL HAVE A MINIMUM CLEARANCE OF 3/4" FROM MASONRY AND SHALL BE HELD TO TOP AND BOTTOM AND AT INTERVALS NOT EXCEEDING 4'-0". ACCESSORIES FOR SUCH SUPPORT SHALL BE USED. PROVIDE "AA WIRE PRODUCTS COMPANY" (OR APPROVED EQUAL) REBAR POSITIONER AA225 OR AA239 FOR VERTICAL BARS AND AA238 FOR HORIZONTAL BARS OR APPROVED EQUAL PRODUCTS FROM OTHER SUPPLIERS.
E. HORIZONTAL JOINT REINFORCING SHALL BE LAPPED NO LESS THAN 6" ALL SPLICES. INCLUDING CORNERS AND TEE'S WHERE APPLICABLE.
F. ALL HORIZONTAL JOINT REINFORCING SHALL STOP AT CONTROL JOINTS.
G. HORIZONTAL REINFORCING IN BOND BEAMS SHALL BE CONTINUOUS THROUGH CONTROL JOINTS.
8. MASONRY SHOWN ON THE STRUCTURAL DRAWINGS DEFINES THE STRUCTURAL EXTENTS AND REQUIREMENTS FOR MASONRY FOR SUPPORTING MEMBERS, FLOORS, ROOFS OR WALLS AND SHALL BE BUILT IN CONFORMANCE WITH THE REQUIREMENTS OF THESE DRAWINGS AND NOTE 1 ABOVE. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE TOTAL SCOPE OF THE MASONRY AND FOR LOCATIONS AND DETAILS OF OPENINGS, SPECIAL COURSING OR OTHER MASONRY DETAILS.
9. MASONRY CONTRACTOR SHALL PROVIDE FOR AND COORDINATE WITH OTHER TRADES FOR PLACEMENT OF ALL ITEMS TO BE EMBEDDED OR BUILT INTO THE MASONRY.

9.0 TIMBER TRUSS NOTES

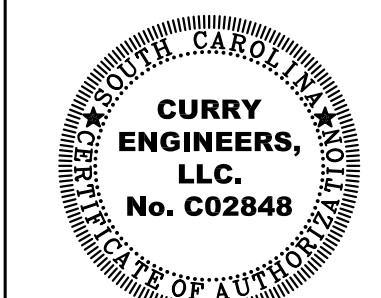
- 1. PREFAB ROOF TRUSSES SHALL BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER IN ACCORDANCE WITH THE LATEST EDITION OF THE "NATIONAL DESIGN SPECIFICATION FOR STRESS-GRADE LUMBER AND ITS FASTENINGS" AS RECOMMENDED BY THE NATIONAL FOREST PRODUCTS ASSOCIATION AND THE TRUSS PLATE INSTITUTE. TRUSSES SHALL BE DESIGNED FOR ALL APPLICABLE LIVE AND DEAD LOADS IN ACCORDANCE WITH IBC REQUIREMENTS, LATEST EDITION.
2. FLOOR TRUSS DEFLECTION SHALL BE LIMITED 1/4" FOR TOTAL LOAD.
3. ALL PLYWOOD SUB-FLOOR SHEATHING TO BE 23/32 TONGUE AND GROOVE EXTERIOR GRADE STURD-FLOOR. FLOORING SHALL BE GLUED AND NAILED WITH 8D NAILS @ 6" O.C. AT ALL SUPPORTED EDGES AND 6" O.C. AT INTERMEDIATE FRAMING MEMBERS.
4. PRE-MANUFACTURED WOOD TRUSS SUPPLIER TO PROVIDE ALL NECESSARY TEMPORARY AND PERMANENT BRACING FOR LATERAL STABILITY OF TRUSS SYSTEM. PRE-MANUFACTURED TRUSS SHOP DRAWINGS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FABRICATION.
5. WOOD COMPONENT MANUFACTURE TO COORDINATE ALL DIMENSIONS WITH THE CONTRACTOR. TRUSS MANUFACTURE TO DETERMINE AND LOCATE ALL POINT AND LINE LOADS ON TRUSSES AND GIRDETS.
6. NO OPENINGS, NOTCHES OR MODIFICATIONS IN WOOD COMPONENTS SHALL BE FIELD CUT WITHOUT WRITTEN PERMISSION BY THE WOOD COMPONENT DESIGNER.
7. ROOF TRUSS DESIGN CRITERIA:
-145 MPH (WITH APPLICABLE SHAPE FACTORS)
-TOP CHORD DL= ACTUAL LOADS
RLL= 20 PSF
-BOTTOM CHORD DL= ACTUAL LOADS
LL= 30 PSF ATTIC AREAS
8. CONTRACTOR TO FURNISH WOOD TRUSS DESIGNER/SUPPLIER WITH ACTUAL LOADS AND THEIR LOCATIONS, OF ELECTRICAL, PLUMBING AND MECHANICAL SYSTEMS. THESE LOADS ARE REQUIRED FOR FINAL COMPONENT DESIGN.
9. WOOD FRAMING - #2 COMMON SYP WITH 19% MOISTURE CONTENT.
10. ROOF SHEATHING FASTENING:
THE FIRST FOUR FOOT WIDE PLYWOOD SHEATHING ACTION ALONG ROOF EDGES (INCLUDES GABLE END WALL AND EACH SIDE OF RIDGE), SHALL HAVE ALL EDGES NAILED @ 4" O.C. WITH INTERMEDIATE MEMBERS FASTENED AT 4' O.C. PROVIDE BLOCKING, AS REQUIRED, TO INSURE ALL EDGES ARE NAILED. THE REMAINING ROOF SHEATHING SHALL BE FASTENED @ 4" O.C. ALONG EDGES AND 6" O.C. ALONG INTERMEDIATE MEMBERS. SHEATHING SHALL BE FASTENED TO ROOF FRAMING WITH 10d NAILS.
GABLE END BLOCKING: PROVIDE BLOCKING @ 48" O.C. MAXIMUM, IN FIRST TWO FRAMING SPACES AT EACH END.
11. SIMPSON STRONG-TIE CONNECTORS ARE SPECIFICALLY REQUIRED TO MEET THE STRUCTURAL CALCULATIONS OF PLAN. BEFORE SUBSTITUTING ANOTHER BRAND, CONFIRM LOAD CAPACITY BASED ON RELIABLE PUBLISHED TESTING DATA OR CALCULATIONS. THE ENGINEER/DESIGNER OF RECORD SHOULD EVALUATE AND GIVE WRITTEN APPROVAL FOR SUBSTITUTION PRIOR TO INSTALLATION.

Table with columns: DATE (03.11.21), PAC, REVISIONS (A through F), and BID DATE.

CURRY ENGINEERS, LLC
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TMS# 259-00-00-189
HANAHAN, SC



LEGAL NOTICE
DRAWINGS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE THE PROPERTY OF THE ENGINEER. WHETHER THE WORK FOR WHICH THEY ARE MADE BE EXECUTED OR NOT, AND ARE NOT TO BE USED ON OTHER WORK EXCEPT BY AGREEMENT WITH THE ENGINEER.

GENERAL NOTES

DRAWN BY: J. BOYD
DESIGNED BY: P. CURRY
CHECKED BY: P. CURRY
DATE: 10.14.20
SCALE: AS NOTED
JOB NO.: 220-064
SHEET: S100

BID SET

1.0 CODES AND STANDARDS

- INTERNATIONAL BUILDING CODE 2018 EDITION INCLUDING ALL SUBSEQUENT SUPPLEMENTS AND AMENDMENTS THERETO.
- "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES", AMERICAN SOCIETY OF CIVIL ENGINEERS, ASCE 7-16.
- "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS", ALLOWABLE STRENGTH DESIGN (13th EDITION - ASD), AMERICAN INSTITUTE OF STEEL CONSTRUCTION
- "SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS", AMERICAN INSTITUTE OF STEEL CONSTRUCTION
- "STRUCTURAL WELDING CODE - STEEL (AWS D1.1)" AND "STRUCTURAL WELDING CODE REINFORCING STEEL (AWS D1.4)", AMERICAN WELDING SOCIETY.
- "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-14)", AMERICAN CONCRETE INSTITUTE (LATEST EDITION)
- "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES" (ACI 530-14) AND "SPECIFICATIONS FOR MASONRY STRUCTURES" (ACI 530.1-14), AMERICAN CONCRETE INSTITUTE (LATEST EDITION)
- "MANUAL OF STANDARD PRACTICE", CONCRETE REINFORCING STEEL INSTITUTE, LATEST EDITION.
- "DESIGN MANUAL FOR FLOOR DECKS AND ROOF DECKS", STEEL DECK INSTITUTE.
- A. ANSIS/DI C-2011, STANDARD FOR COMPOSITE STEEL FLOOR DECK-SLABS  
B. ANSIS/DI NC-2010, STANDARD FOR NONCOMPOSITE STEEL FLOOR DECK  
C. ANSIS/DI RD-2010, STANDARD FOR STEEL ROOF DECK
- "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS", AMERICAN IRON AND STEEL INSTITUTE (AISI), LATEST EDITION.

2.0 GRAVITY LOAD DESIGN CRITERIA RECREATION CENTER

- 2.1 DEAD LOAD CRITERIA
- I) ROOF 20 PSF
  - II) TRUSS BOTTOM CHORD 5 PSF
- 2.2 LIVE LOAD CRITERIA
- I) GROUND / FIRST FLOOR 100 PSF
  - II) MECH PLATFORM 40 PSF
  - III) ROOF 20 PSF

- 2.3 SNOW CRITERIA
- I) SNOW LOADS 5 PSF
  - II) IMPORTANCE FACTOR I

3.0 LATERAL LOADS DESIGN CRITERIA

- 3.1 WIND CRITERIA
- I) WIND LOAD USED 145 MPH
  - II) ENCLOSURE CRITERIA ENCLOSED
  - III) WIND EXPOSURE CATEGORY B
  - IV) IMPORTANCE FACTOR 1.0
  - V) NS WIND BASE SHEAR 43 KIPS
  - VI) EW WIND BASE SHEAR 29 KIPS

- 3.1.1 WALL WIND LOADS
- I) MWFRS 20 PSF
  - II) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - III) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.1.2 ROOF WIND LOADS
- I) MWFRS (END ZONE) -15 PSF
  - II) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - III) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.2 SEISMIC CRITERIA
- HAZARD EXPOSURE GROUP: I
  - DESIGN CATEGORY: D
  - IMPORTANCE FACTOR: 1.0
  - $S_s = 1.759g$
  - $S_1 = .516g$
  - RESPONSE MODIFICATION: 5
  - SRS: SPECIAL REINFORCED MASONRY SHEARWALLS
  - SITE CLASSIFICATION: SITE CLASS D
  - ANALYSIS METHOD: EQUIVALENT LATERAL FORCE
  - BASE SHEAR: 20 KIPS

4.0 OTHER DESIGN CRITERIA

SOIL BEARING PRESSURE: 2000 PSF (ASSUMED)  
THIS PROJECT WAS DESIGNED IN THE ABSENCE OF A SOILS REPORT.  
ALL DESIGN VALUES ARE BASED ON AN ASSUMED BEARING VALUE OF 2000 PSF.  
THE REASONABLENESS OF THIS ASSUMPTION SHOULD BE VERIFIED PRIOR TO COMMENCING ANY FOUNDATION WORK.

**IBC 2018:**  
1803.2 - INVESTIGATIONS REQUIRED. GEOTECHNICAL INVESTIGATIONS SHALL BE CONDUCTED IN ACCORDANCE WITH SECTIONS 1803.3 THROUGH 1803.5.

**EXCEPTION:** THE BUILDING OFFICIAL SHALL BE PERMITTED TO WAIVE THE REQUIREMENT FOR A GEOTECHNICAL INVESTIGATION WHERE SATISFACTORY DATA FROM ADJACENT AREAS IS AVAILABLE THAT DEMONSTRATES AN INVESTIGATION IS NOT NECESSARY FOR ANY OF THE CONDITIONS IN SECTIONS 1803.5.1 THROUGH 1803.5.6 AND SECTION 1803.5.10 AND 1803.5.11.

FOR SINGLE STORY BUILDINGS NOT MORE THAN 5,000 SQ. FT. AND NOT MORE THAN 30 FT. IN HEIGHT, A SITE SPECIFICATION INVESTIGATION REPORT IS NOT REQUIRED IF THE SEISMIC DESIGN IS DETERMINED BY THE DESIGN PROFESSIONAL IN ACCORDANCE WITH CHAPTER 20 OF ASCE 7.

2.0 GRAVITY LOAD DESIGN CRITERIA PAVILION

- 2.1 DEAD LOAD CRITERIA
- I) ROOF 20 PSF
  - II) TRUSS BOTTOM CHORD 5 PSF
- 2.2 LIVE LOAD CRITERIA
- I) GROUND / FIRST FLOOR 100 PSF
  - II) ROOF 20 PSF

- 2.3 SNOW CRITERIA
- I) SNOW LOADS 5 PSF
  - II) IMPORTANCE FACTOR I

3.0 LATERAL LOADS DESIGN CRITERIA

- 3.1 WIND CRITERIA
- I) WIND LOAD USED 145 MPH
  - II) ENCLOSURE CRITERIA OPEN
  - III) WIND EXPOSURE CATEGORY B
  - IV) IMPORTANCE FACTOR 1.0
  - V) NS WIND BASE SHEAR 38 KIPS
  - VI) EW WIND BASE SHEAR 8 KIPS

- 3.1.1 WALL WIND LOADS
- I) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - II) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.1.2 ROOF WIND LOADS
- I) MWFRS (END ZONE) +1-30 PSF
  - II) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - III) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.2 SEISMIC CRITERIA
- HAZARD EXPOSURE GROUP: I
  - DESIGN CATEGORY: D
  - IMPORTANCE FACTOR: 1.0
  - $S_s = 1.759g$
  - $S_1 = .516g$
  - RESPONSE MODIFICATION: 1.5
  - SRS: CANTILEVER COLUMNS
  - SITE CLASSIFICATION: SITE CLASS D
  - ANALYSIS METHOD: EQUIVALENT LATERAL FORCE
  - BASE SHEAR: 6 KIPS

4.0 OTHER DESIGN CRITERIA

SOIL BEARING PRESSURE: 2000 PSF (ASSUMED)  
THIS PROJECT WAS DESIGNED IN THE ABSENCE OF A SOILS REPORT.  
ALL DESIGN VALUES ARE BASED ON AN ASSUMED BEARING VALUE OF 2000 PSF.  
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**IBC 2018:**  
1803.2 - INVESTIGATIONS REQUIRED. GEOTECHNICAL INVESTIGATIONS SHALL BE CONDUCTED IN ACCORDANCE WITH SECTIONS 1803.3 THROUGH 1803.5.

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2.0 GRAVITY LOAD DESIGN CRITERIA BATH HOUSE

- 2.1 DEAD LOAD CRITERIA
- I) ROOF 20 PSF
  - II) TRUSS BOTTOM CHORD 5 PSF
- 2.2 LIVE LOAD CRITERIA
- I) GROUND / FIRST FLOOR 100 PSF
  - II) ROOF 20 PSF

- 2.3 SNOW CRITERIA
- I) SNOW LOADS 5 PSF
  - II) IMPORTANCE FACTOR I

3.0 LATERAL LOADS DESIGN CRITERIA

- 3.1 WIND CRITERIA
- I) WIND LOAD USED 145 MPH
  - II) ENCLOSURE CRITERIA ENCLOSED
  - III) WIND EXPOSURE CATEGORY B
  - IV) IMPORTANCE FACTOR 1.0
  - V) NS WIND BASE SHEAR 13 KIPS
  - VI) EW WIND BASE SHEAR 7 KIPS

- 3.1.1 WALL WIND LOADS
- I) MWFRS 18 PSF
  - II) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - III) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.1.2 ROOF WIND LOADS
- I) MWFRS (END ZONE) -14 PSF
  - II) COMPONENTS & CLADDING (END ZONE) SEE CHART
  - III) COMPONENTS & CLADDING (INTERIOR) SEE CHART

- 3.2 SEISMIC CRITERIA
- HAZARD EXPOSURE GROUP: I
  - DESIGN CATEGORY: D
  - IMPORTANCE FACTOR: 1.0
  - $S_s = 1.759g$
  - $S_1 = .516g$
  - RESPONSE MODIFICATION: 5
  - SRS: SPECIAL REINFORCED MASONRY SHEARWALLS
  - SITE CLASSIFICATION: SITE CLASS D
  - ANALYSIS METHOD: EQUIVALENT LATERAL FORCE
  - BASE SHEAR: 15 KIPS

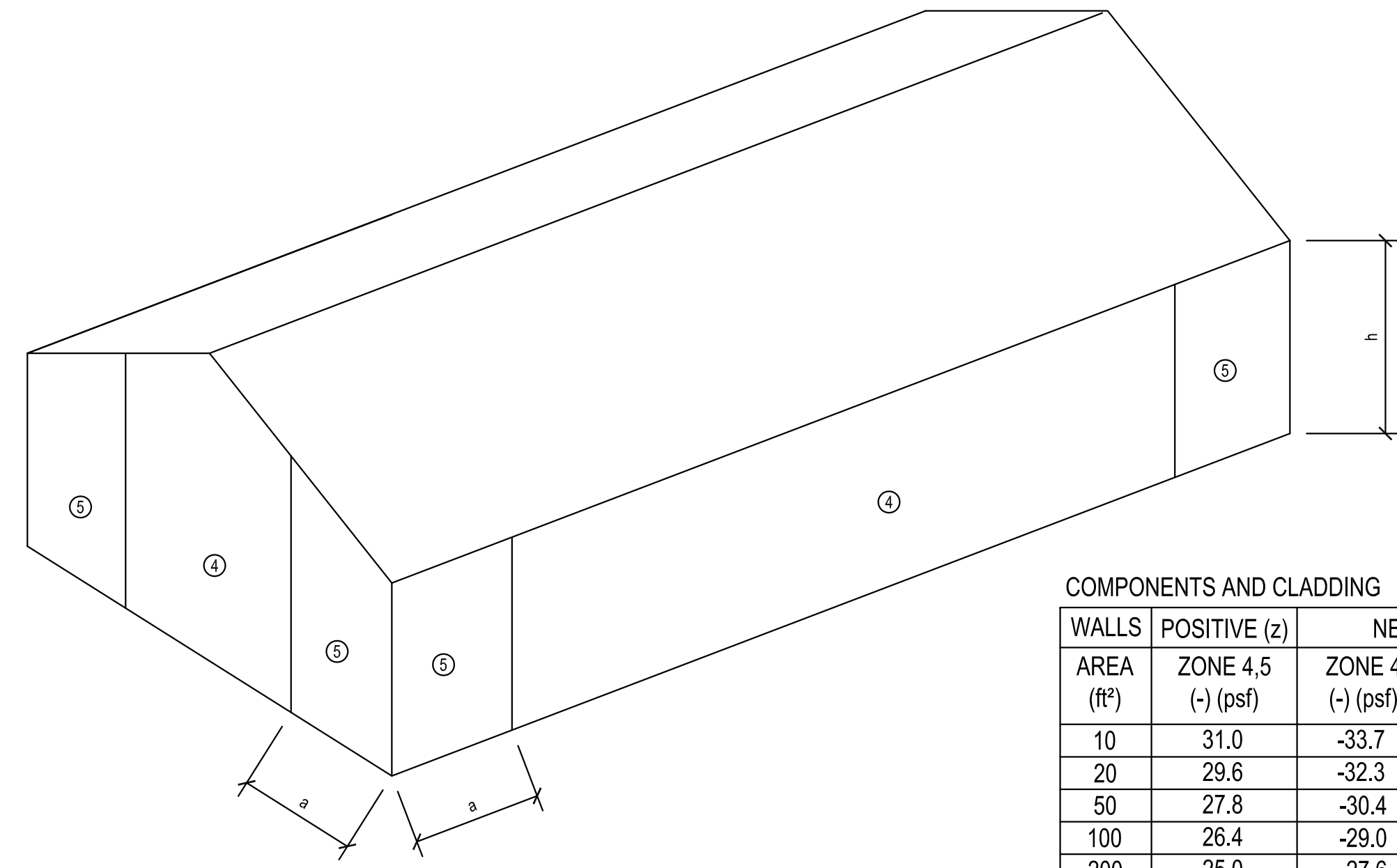
4.0 OTHER DESIGN CRITERIA

SOIL BEARING PRESSURE: 2000 PSF (ASSUMED)  
THIS PROJECT WAS DESIGNED IN THE ABSENCE OF A SOILS REPORT.  
ALL DESIGN VALUES ARE BASED ON AN ASSUMED BEARING VALUE OF 2000 PSF.  
THE REASONABLENESS OF THIS ASSUMPTION SHOULD BE VERIFIED PRIOR TO COMMENCING ANY FOUNDATION WORK.

**IBC 2018:**  
1803.2 - INVESTIGATIONS REQUIRED. GEOTECHNICAL INVESTIGATIONS SHALL BE CONDUCTED IN ACCORDANCE WITH SECTIONS 1803.3 THROUGH 1803.5.

**EXCEPTION:** THE BUILDING OFFICIAL SHALL BE PERMITTED TO WAIVE THE REQUIREMENT FOR A GEOTECHNICAL INVESTIGATION WHERE SATISFACTORY DATA FROM ADJACENT AREAS IS AVAILABLE THAT DEMONSTRATES AN INVESTIGATION IS NOT NECESSARY FOR ANY OF THE CONDITIONS IN SECTIONS 1803.5.1 THROUGH 1803.5.6 AND SECTION 1803.5.10 AND 1803.5.11.

FOR SINGLE STORY BUILDINGS NOT MORE THAN 5,000 SQ. FT. AND NOT MORE THAN 30 FT. IN HEIGHT, A SITE SPECIFICATION INVESTIGATION REPORT IS NOT REQUIRED IF THE SEISMIC DESIGN IS DETERMINED BY THE DESIGN PROFESSIONAL IN ACCORDANCE WITH CHAPTER 20 OF ASCE 7.



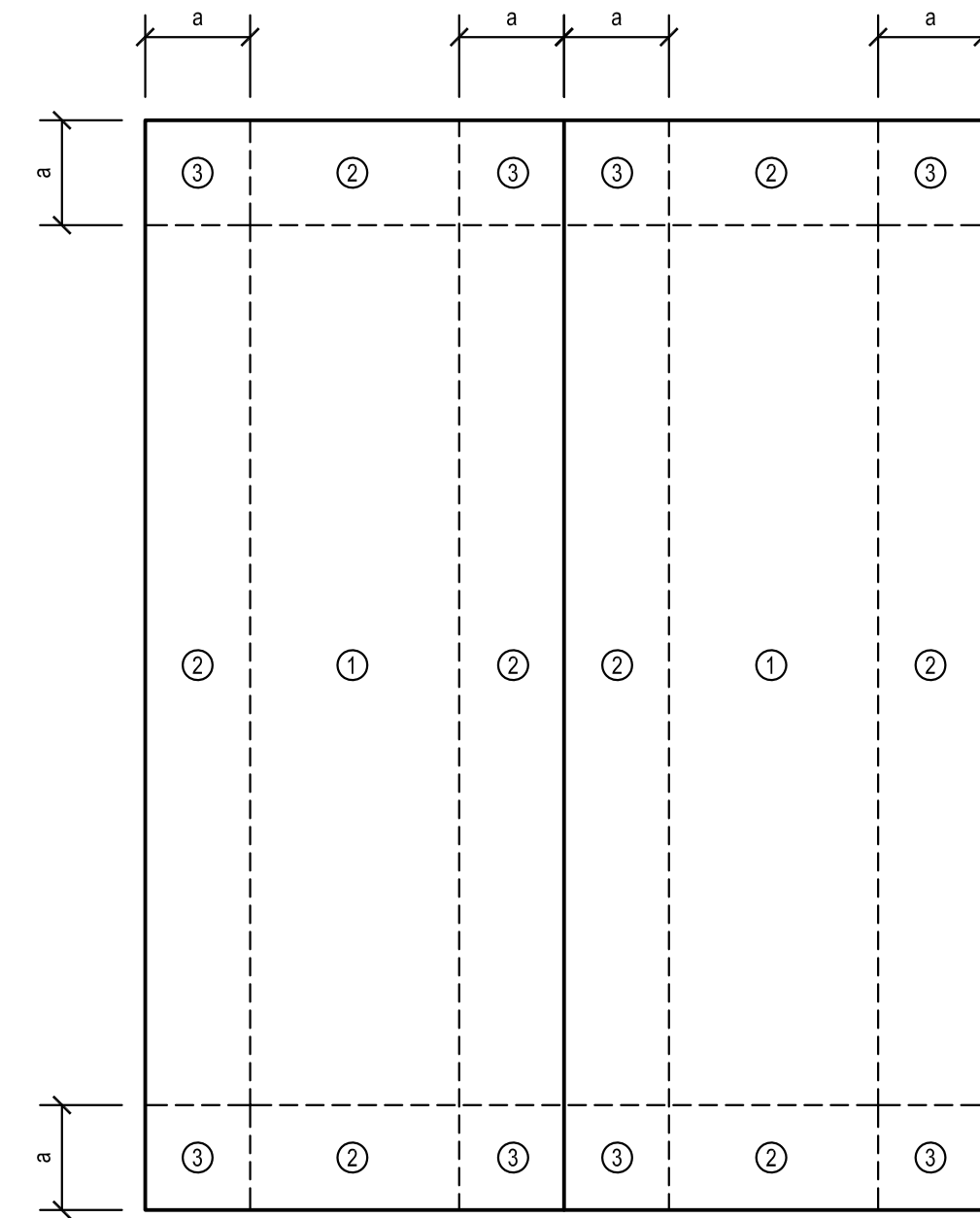
**C&C WALLS (TOILETS)**

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

COMPONENTS AND CLADDING

| WALLS AREA (ft²) | NEGATIVE           |                  |                  |
|------------------|--------------------|------------------|------------------|
|                  | ZONE 4,5 (-) (psf) | ZONE 4 (-) (psf) | ZONE 5 (-) (psf) |
| 10               | 31.0               | -33.7            | -41.6            |
| 20               | 29.6               | -32.3            | -38.8            |
| 50               | 27.8               | -30.4            | -35.1            |
| 100              | 26.4               | -29.0            | -32.3            |
| 200              | 25.0               | -27.6            | -29.5            |
| 500              | 23.1               | -25.8            | -25.8            |
| 1000             | 23.1               | -25.8            | -25.8            |

$a = 3.0'$



**C&C GABLE ROOF (TOILETS)**

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

$a = 3.0'$

| GABLE ROOF AREA (ft²) | POSITIVE             |                  |                  | NEGATIVE         |                  |                  | OVERHANG         |                  |
|-----------------------|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                       | ZONE 1,2,3 (+) (psf) | ZONE 1 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3 (-) (psf) |
| 10                    | 17.9                 | -28.4            | -49.4            | -73.1            | -62.6            | -102.0           |                  |                  |
| 20                    | 16.3                 | -27.6            | -45.5            | -68.4            | -62.6            | -92.5            |                  |                  |
| 50                    | 14.2                 | -26.6            | -40.3            | -62.1            | -62.6            | -80.0            |                  |                  |
| 100                   | 12.6                 | -25.8            | -36.3            | -57.3            | -62.6            | -70.5            |                  |                  |
| 200                   | 12.6                 | -25.8            | -36.3            | -57.3            | -62.6            | -70.5            |                  |                  |
| 500                   | 12.6                 | -25.8            | -36.3            | -57.3            | -62.6            | -70.5            |                  |                  |
| 1000                  | 12.6                 | -25.8            | -36.3            | -57.3            | -62.6            | -70.5            |                  |                  |

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
|------------|----------|----------|--------------|
| 1          |          | 03.11.21 | PAC          |
| 2          |          |          |              |
| 3          |          |          |              |
| 4          |          |          |              |
| 5          |          |          |              |
| 6          |          |          |              |
| 7          |          |          |              |
| 8          |          |          |              |
| 9          |          |          |              |
| 10         |          |          |              |

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**CURRY ENGINEERS**

**HANAHAN REC CENTER**  
TMS# 259-00-00-189  
**HANAHAN, SC**

CAROLINA PROFESSIONAL ENGINEERS ASSOCIATION  
**CURRY ENGINEERS, LLC**  
No. C02848

CAROLINA PROFESSIONAL ENGINEERS ASSOCIATION  
**MAURA CURRY**  
No. 21964

10/14/20

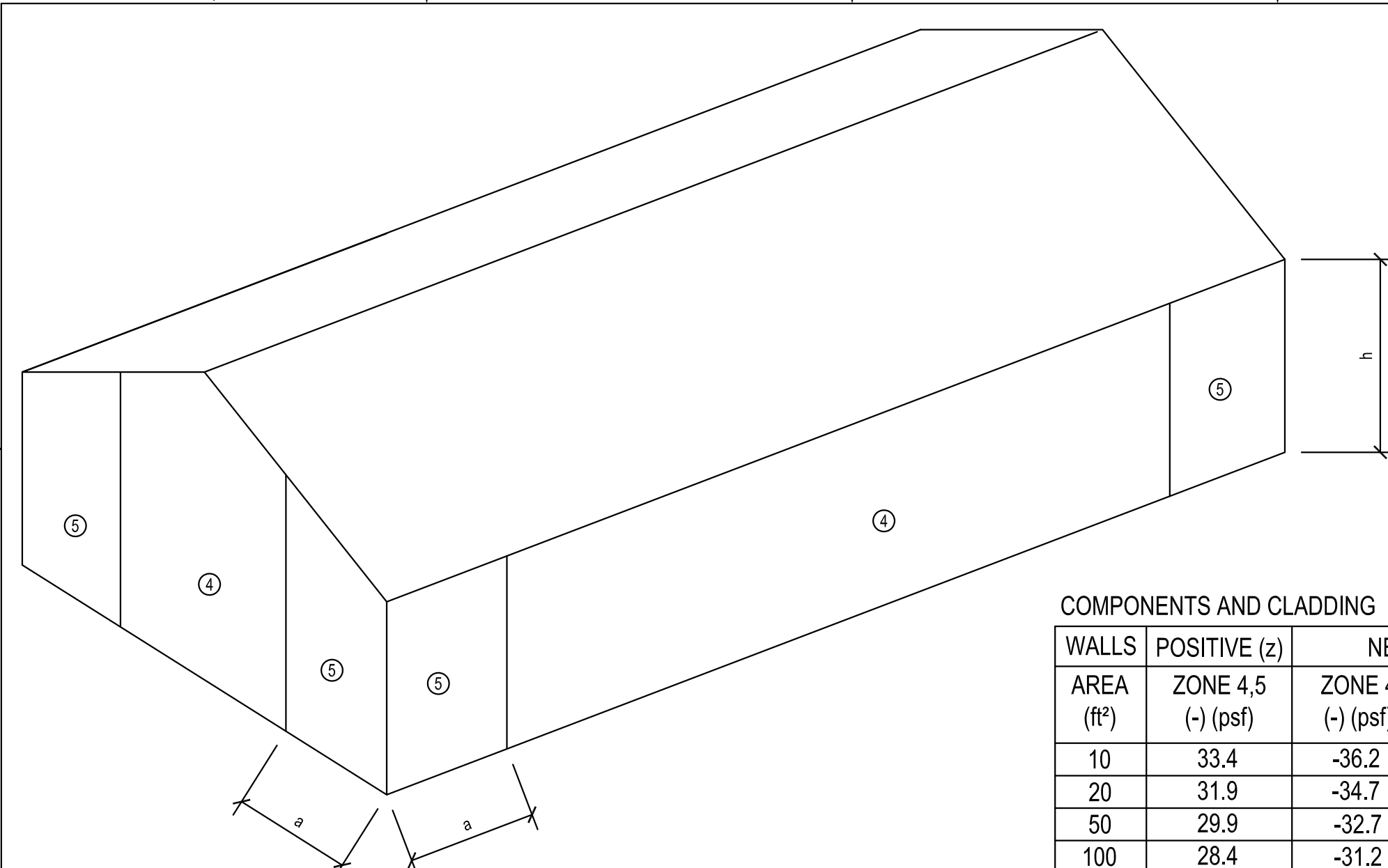
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**BASIS OF DESIGN**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

S101

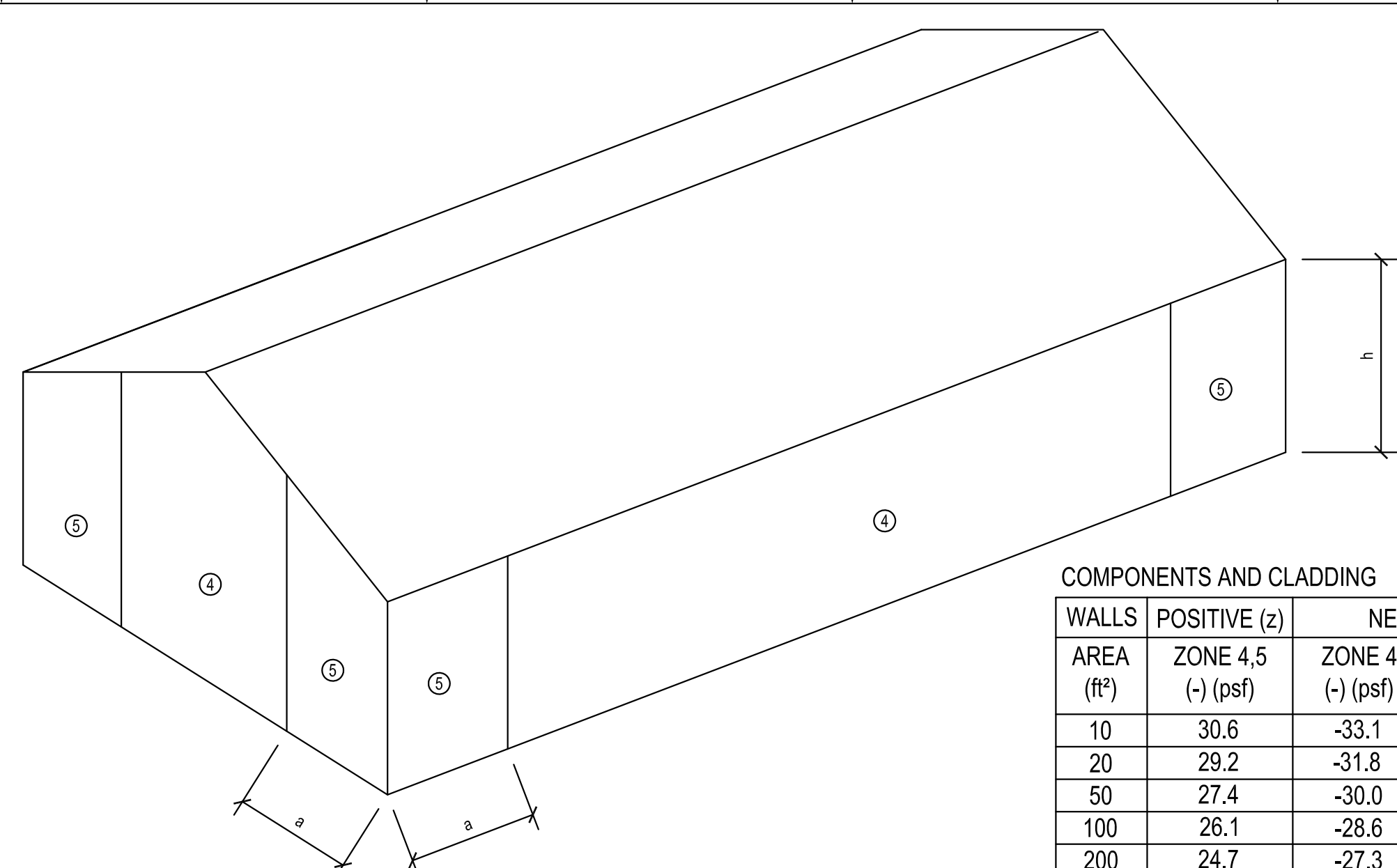
BID SET



**C&C WALLS @ GABLE ROOF (REC CENTER)**  
SCALE: 1/8" = 1'-0"

| WALLS | POSITIVE (z)            |                    | NEGATIVE         |                  |
|-------|-------------------------|--------------------|------------------|------------------|
|       | AREA (ft <sup>2</sup> ) | ZONE 4,5 (-) (psf) | ZONE 4 (-) (psf) | ZONE 5 (-) (psf) |
| 10    | 33.4                    | -36.2              | -44.7            |                  |
| 20    | 31.9                    | -34.7              | -41.7            |                  |
| 50    | 29.9                    | -32.7              | -37.7            |                  |
| 100   | 28.4                    | -31.2              | -34.7            |                  |
| 200   | 26.9                    | -29.7              | -31.7            |                  |
| 500   | 24.9                    | -27.7              | -27.7            |                  |
| 1000  | 24.9                    | -27.7              | -27.7            |                  |

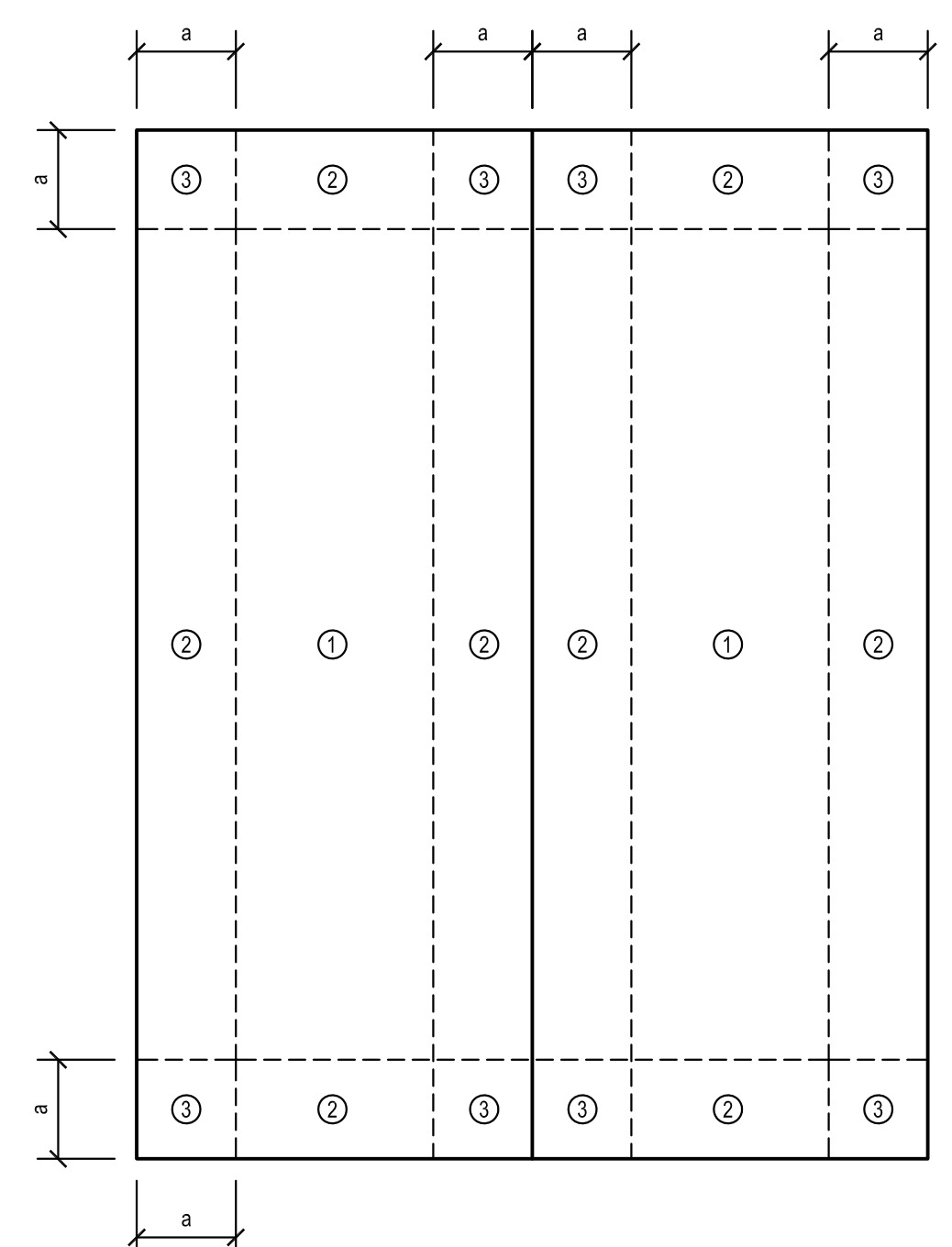
a = 5.3'



**C&C WALLS @ MONOSLOPE ROOF (REC CENTER)**  
SCALE: 1/8" = 1'-0"

| WALLS | POSITIVE (z)            |                    | NEGATIVE         |                  |
|-------|-------------------------|--------------------|------------------|------------------|
|       | AREA (ft <sup>2</sup> ) | ZONE 4,5 (-) (psf) | ZONE 4 (-) (psf) | ZONE 5 (-) (psf) |
| 10    | 30.6                    | -33.1              | -40.8            |                  |
| 20    | 29.2                    | -31.8              | -38.0            |                  |
| 50    | 27.4                    | -30.0              | -34.5            |                  |
| 100   | 26.1                    | -28.6              | -31.8            |                  |
| 200   | 24.7                    | -27.3              | -29.0            |                  |
| 500   | 22.9                    | -25.5              | -25.5            |                  |
| 1000  | 22.9                    | -25.5              | -25.5            |                  |

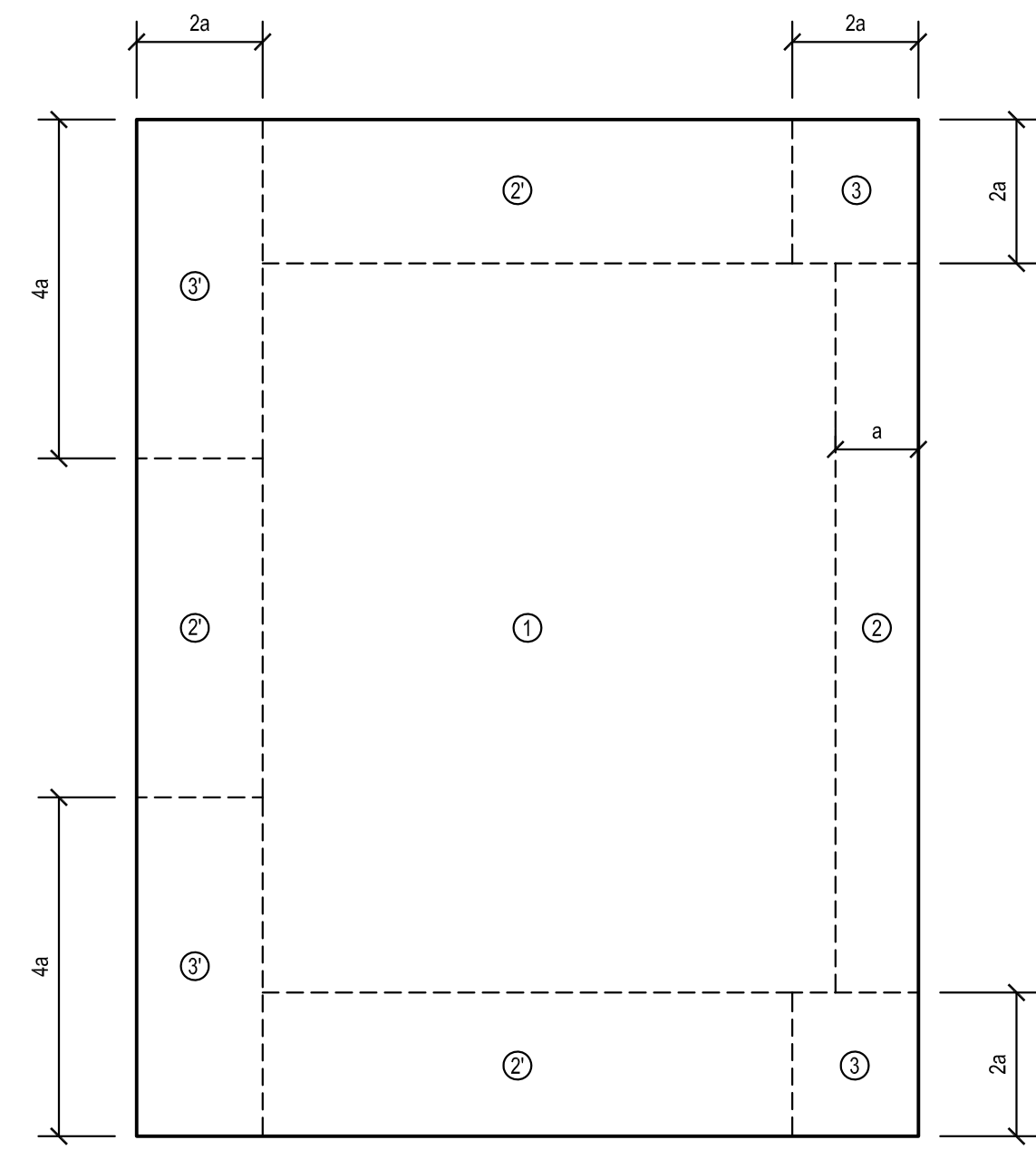
a = 5.3'



**C&C GABLE ROOF (REC CENTER)**  
SCALE: 1/8" = 1'-0"

a = 5.3'

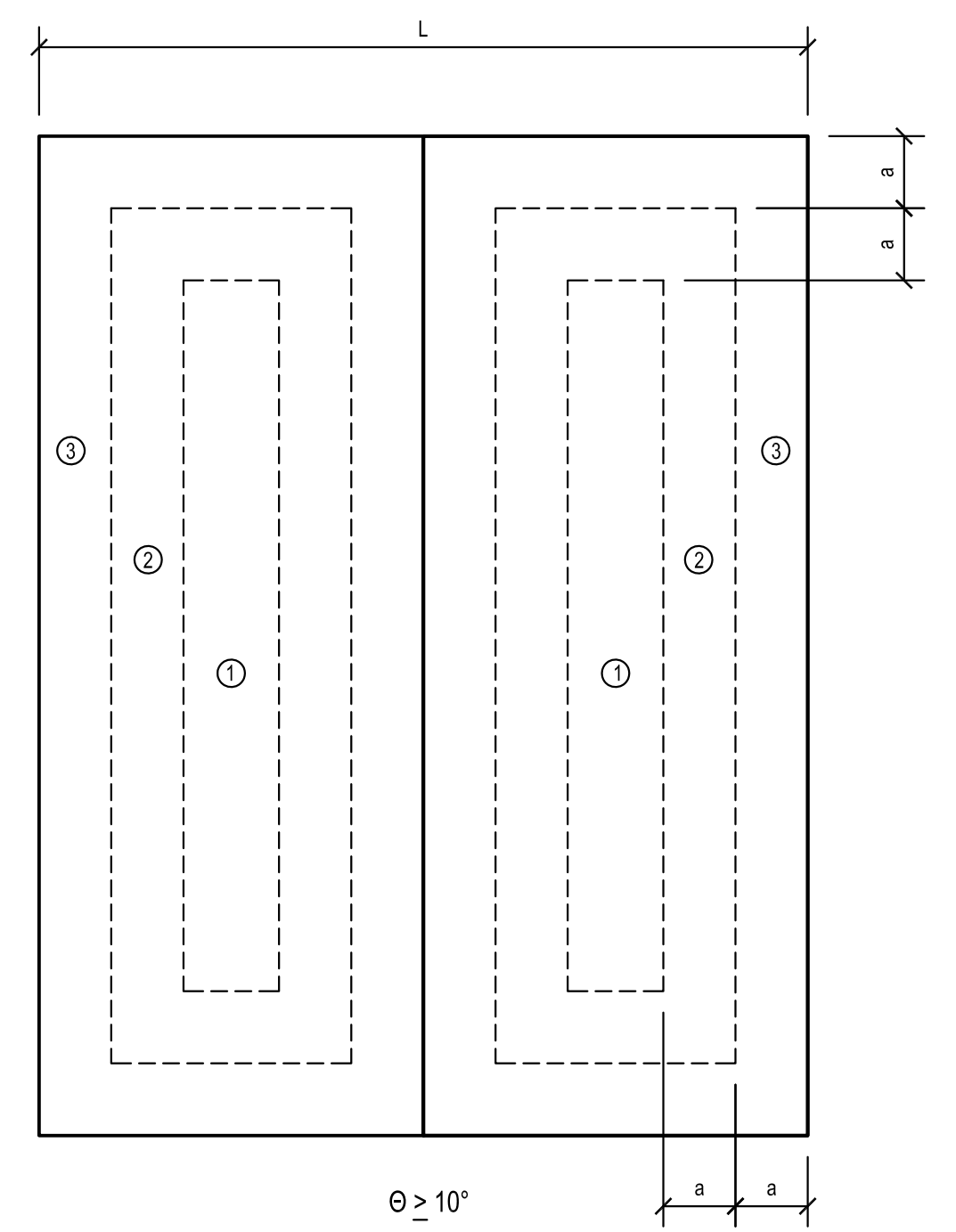
| GABLE ROOF AREA (ft <sup>2</sup> ) | POSITIVE             | NEGATIVE         |                  |                  | OVERHANG         |                  |
|------------------------------------|----------------------|------------------|------------------|------------------|------------------|------------------|
|                                    | ZONE 1,2,3 (+) (psf) | ZONE 1 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3 (-) (psf) |
| 10                                 | 19.2                 | -30.6            | -53.2            | -78.7            | -67.4            | -109.8           |
| 20                                 | 17.5                 | -29.7            | -48.9            | -73.6            | -67.4            | -99.6            |
| 50                                 | 15.3                 | -28.6            | -43.3            | -66.8            | -67.4            | -86.1            |
| 100                                | 13.6                 | -27.7            | -39.1            | -61.7            | -67.4            | -75.8            |
| 200                                | 13.6                 | -27.7            | -39.1            | -61.7            | -67.4            | -75.8            |
| 500                                | 13.6                 | -27.7            | -39.1            | -61.7            | -67.4            | -75.8            |
| 1000                               | 13.6                 | -27.7            | -39.1            | -61.7            | -67.4            | -75.8            |



**C&C MONOSLOPE ROOF (REC CENTER)**  
SCALE: 1/8" = 1'-0"

a = 5.3'

| AREA (ft <sup>2</sup> ) | POSITIVE            |                  |                  | NEGATIVE          |                  |                   |
|-------------------------|---------------------|------------------|------------------|-------------------|------------------|-------------------|
|                         | ALL ZONES (+) (psf) | ZONE 1 (-) (psf) | ZONE 2 (-) (psf) | ZONE 2' (-) (psf) | ZONE 3 (-) (psf) | ZONE 3' (-) (psf) |
| 10                      | 13.6                | -36.2            | -41.9            | -50.4             | -56.0            | -78.7             |
| 20                      | 12.7                | -36.2            | -41.0            | -49.5             | -50.9            | -70.2             |
| 50                      | 11.6                | -36.2            | -39.9            | -48.4             | -44.2            | -58.9             |
| 100                     | 10.8                | -36.2            | -39.1            | -47.5             | -39.1            | -50.4             |
| 200                     | 10.8                | -36.2            | -39.1            | -47.5             | -39.1            | -50.4             |
| 500                     | 10.8                | -36.2            | -39.1            | -47.5             | -39.1            | -50.4             |
| 1000                    | 10.8                | -36.2            | -39.1            | -47.5             | -39.1            | -50.4             |



**C&C PITCHED FREE ROOF (PAVILION)**  
SCALE: 1/8" = 1'-0"

| AREA (ft <sup>2</sup> ) | POSITIVE         |                  |                  | NEGATIVE         |                  |                   |
|-------------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
|                         | ZONE 1 (+) (psf) | ZONE 2 (+) (psf) | ZONE 3 (+) (psf) | ZONE 1 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3A (-) (psf) |
| < 9                     | 28               | 43               | 56               | -21              | -33              | -42               |
| < 9, < 36               | 28               | 43               | 43               | -21              | -33              | -33               |
| > 36                    | 28               | 28               | 28               | -21              | -21              | -21               |

| AREA (ft <sup>2</sup> ) | POSITIVE         |                  |                  | NEGATIVE         |                  |                   |
|-------------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
|                         | ZONE 1 (+) (psf) | ZONE 2 (+) (psf) | ZONE 3 (+) (psf) | ZONE 1 (-) (psf) | ZONE 2 (-) (psf) | ZONE 3A (-) (psf) |
| < 9                     | 11               | 18               | 22               | -29              | -43              | -57               |
| < 9, < 36               | 11               | 18               | 18               | -29              | -43              | -43               |
| > 36                    | 11               | 11               | 11               | -29              | -29              | -29               |

a = 3.0'

| REV      | DATE | APPROVED BY | DESCRIPTION |
|----------|------|-------------|-------------|
| 03.11.21 | PAC  |             |             |

CURRY ENGINEERS, LLC  
STRUCTURAL ENGINEERING  
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WWW.CURRYENGINEERS.COM

**HANAHAN REC CENTER**  
TMS# 259-00-00-189  
**HANAHAN, SC**

J. BOYD  
CURRY ENGINEERS, LLC  
No. C02848

10/14/20  
LEGAL NOTICE  
DRAWINGS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE THE PROPERTY OF THE ENGINEER WHETHER THE WORK FOR WHICH THEY ARE MADE BE EXECUTED OR NOT, AND ARE NOT TO BE USED ON OTHER WORK EXCEPT BY AGREEMENT WITH THE ENGINEER.

**BASIS OF DESIGN**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

BID SET

| SOILS & FOUNDATIONS           |       |          |                                  |  |
|-------------------------------|-------|----------|----------------------------------|--|
| ITEM                          | CONT. | PERIODIC | REFERENCE STANDARD IBC REFERENCE | VERIFICATION AND INSPECTION  |
| 1. SHALLOW FOUNDATIONS        |       | X        | 1705.6                           | INSPECT SOILS BELOW FOOTINGS FOR ADEQUATE BEARING CAPACITY & CONSISTENCY w/ GEOTECHNICAL REPORT. INSPECT REMOVAL OF UNSUITABLE MATERIAL & PREPARATION OF SUB-GRADE PRIOR TO PLACEMENT OF CONTROLLED FILL. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.  |
| 2. CONTROLLED STRUCTURAL FILL |       | X        | 1705.6                           | PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.  |
|                               | X     |          |                                  | VERIFY USE OF PROPER MATERIALS, DENSITY AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.  |
|                               | X     |          |                                  | PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.  |
|                               |       | X        |                                  | VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.<br><br>EXCEPTION: WHERE SECTION 1803 DOES NOT REQUIRE REPORTING OF MATERIALS AND PROCEDURES FOR FILL PLACEMENT, THE SPECIAL INSPECTOR SHALL VERIFY THAT THE IN-PLACE DRY DENSITY OF THE COMPACTED FILL IS NOT LESS THAN 90 PERCENT OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT DETERMINED IN ACCORDANCE WITH ASTM D 1557.   |
| 3. DEEP FOUNDATIONS           | X     |          | 1705.7, 1705.8                   | OBSERVE DRIVING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT.  |
|                               | X     |          |                                  | VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM TYPE AND SIZE OF HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENETRATION, DETERMINE REQUIRED PENETRATIONS TO ACHIEVE DESIGN CAPACITY, RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY DAMAGE TO FOUNDATION ELEMENTS.  |
|                               | X     |          |                                  | VERIFY ELEMENTS MATERIALS, SIZES AND LENGTHS COMPLY WITH THE REQUIREMENTS.   |
|                               | X     |          |                                  | FOR STEEL ELEMENTS, PERFORM ADDITIONAL INSPECTIONS IN ACCORDANCE W/ SECTION 1705.2.  |
|                               | X     |          |                                  | FOR CONCRETE ELEMENTS AND CONCRETE FILLED ELEMENTS, PERFORM ADDITIONAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.  |
|                               | X     |          |                                  | FOR SPECIALTY ELEMENTS, PERFORM ADDITIONAL INSPECTIONS AS DETERMINED BY REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE.  |
|                               | X     |          |                                  | SPECIAL INSPECTIONS SHALL BE PERFORMED CONTINUOUSLY DURING INSTALLATION OF HELICAL PILE FOUNDATIONS. THE INFORMATION RECORDED SHALL INCLUDE INSTALLATION EQUIPMENT USED, PILE DIMENSIONS, TIP ELEVATION, FINAL DEPTH, FINAL INSTALLATION TORQUE AND OTHER PERTINENT INSTALLATION DATA AS REQUIRED BY CONTRACT DOCUMENTS. THE APPROVED GEOTECHNICAL REPORT AND THE CONSTRUCTION DOCUMENTS PREPARED BY THE REGISTERED DESIGN PROFESSIONAL SHALL BE USED TO DETERMINE COMPLIANCE. |
|                               | X     |          |                                  | SPECIAL INSPECTIONS SHALL BE PERFORMED DURING INSTALLATION AND TESTING OF CAST IN PLACE DEEP FOUNDATION ELEMENTS AS REQUIRED BY TABLE 1705.8. THE APPROVED GEOTECHNICAL REPORT AND THE CONSTRUCTION DOCUMENTS PREPARED BY THE REGISTERED DESIGN PROFESSIONAL SHALL BE USED TO DETERMINE COMPLIANCE.  |
| 4. LOAD TESTING               | X     |          | 1705.7                           | DETERMINE CAPACITIES OF TEST ELEMENTS AND CONDUCT ADDITIONAL LOAD TEST, AS REQUIRED BY CONTRACT DOCUMENTS.   |

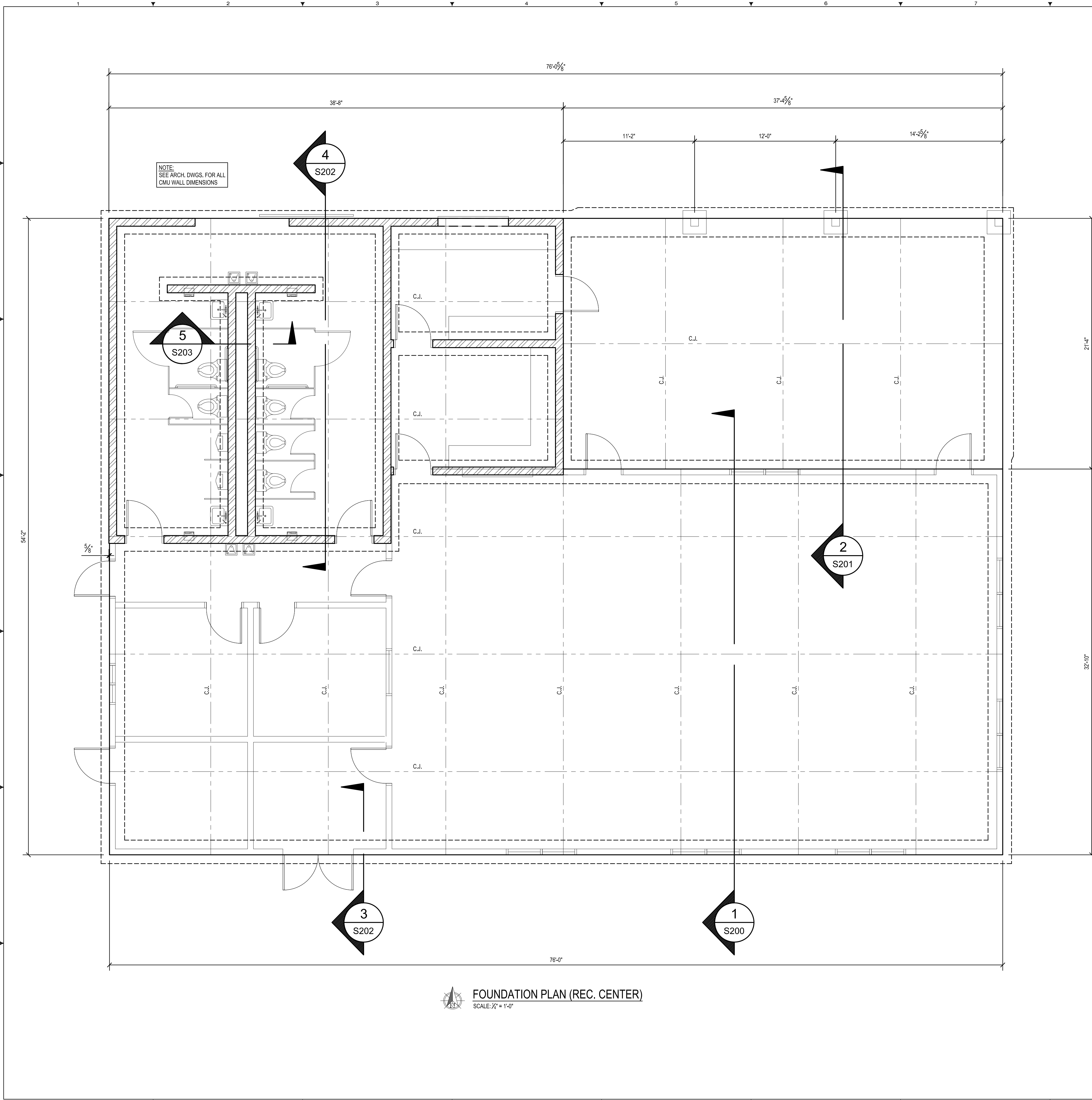
| CAST-IN-PLACE CONCRETE              |       |          |   |   |
|-------------------------------------|-------|----------|---|---|
| ITEM                                | CONT. | PERIODIC | REFERENCE STANDARD IBC REFERENCE                                | VERIFICATION AND INSPECTION   |
| 1. MIX DESIGN                       |       | X        | ACI 318: CH4, 5.2-5.4<br>1910.4.2, 1910.2, 1901.3               | VERIFY USE OF REQUIRED DESIGN MIX   |
| 2. MATERIAL CERTIFICATION           |       |          | ACI 318:3<br>1705.3.1   | IN THE ABSENCE OF SUFFICIENT DATA OR DOCUMENTATION PROVIDING EVIDENCE OF CONFORMANCE TO QUALITY STANDARDS FOR MATERIAL IN CHAPTER 2 OF ACI 318, THE BUILDING OFFICIAL SHALL REQUIRE TESTING OF MATERIALS IN ACCORDANCE WITH THE APPROPRIATE STANDARDS AND CRITERIA FOR THE MATERIAL IN CHAPTER 3 OF ACI 318.  |
| 3. REINFORCEMENT INSTALLATION       |       | X        | ACI 318:3.5, 7.1-7.7  | INSPECT SIZE, SPACING, COVER, POSITIONING & GRADE OF REINFORCING STEEL. VERIFY THAT REINFORCING BARS ARE FREE OF FORM OIL OR OTHER DELETERIOUS MATERIALS. INSPECT BAR LAPS & MECHANICAL SPLICES. VERIFY THAT BARS ARE ADEQUATELY TIED & SUPPORTED ON CHAIRS OR BOLSTERS.  |
| 4. POST-TENSIONING OPERATIONS       |       | X        | ACI 318: CH 16  | INSPECT PLACEMENT, STRESSING, GROUTING AND PROTECTION OF POST-TENSIONING TENDONS. VERIFY THAT TENDONS ARE CORRECTLY POSITIONED, SUPPORTED, TIED AND WRAPPED. RECORD TENDON ELONGATIONS. VERIFICATION OF IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSION CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.   |
| 5. WELDING OF REINFORCING           |       |          | AWS D1.4 ACI 318: 3.5.2   | VISUALLY INSPECT ALL REINFORCING STEEL WELDS. VERIFY WELDABILITY OF REINFORCING STEEL. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1705.2.2. ITEM 2b   |
| 6. ANCHOR RODS                      |       | X        | ACI 318: 8.1.3, 21.2.8  | INSPECT SIZE, POSITIONING AND EMBEDMENT OF ANCHOR RODS. INSPECT CONCRETE PLACEMENT AND CONSOLIDATION AROUND ANCHORS. INSPECTION OF ANCHORS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.   |
| 7. CONCRETE PLACEMENT               | X     |          | ACI 318: 5.9, 5.10<br>ACI 318: 6.1.1,<br>1910.6, 1910.7, 1910.8 | INSPECT PLACEMENT OF CONCRETE. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBERS BEING FORMED.   |
| 8. SAMPLING AND TESTING OF CONCRETE | X     |          | ASTM C 172, ASTM C 31<br>ACI 318: 5.6, 5.8<br>1910.10           | AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATED SPECIMENS FOR STRENGTH TEST, PERFORM SLUMP AND AIR CONTENT TEST, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.   |
| 9. CURING AND PROTECTION            |       | X        | ACI 318: 5.11-5.13<br>1910.9                                    | INSPECT CURING, COLD WEATHER PROTECTION AND HOT WEATHER PROTECTION PROCEDURES. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURES AND TECHNIQUES.  |
| 10. POST INSTALLED ANCHORS          |       | X        | ACI 318: 3.8.6, 8.1.3, 21.2.8<br>1904.2, 1910.2, 1910.3         | INSPECT POST INSTALLED ANCHORS IN HARDENED CONCRETE MEMBERS.  |
| 11. INSPECTION OF PRESTRESSED CONC. | X     |          | ACI 318: 18.20, 18.18.4   | APPLICATION OF PRESTRESSED FORCES, GROUTING BONDING PRESTRESSED TENDONS IN THE SEISMIC FORCE RESISTING SYSTEM   |
| 12. PRECAST CONCRETE MEMBERS        |       | X        | ACI 318: CH 16  | INSPECT ERECTION OF PRECAST CONCRETE MEMBERS  |
| 10. OTHER:                          |       |          | 1705.3  | SPECIAL INSPECTIONS NOT REQUIRED FOR:<br>1) ISOLATED SPREAD CONCRETE FOOTINGS OF BUILDINGS THREE STORIES OR LESS ABOVE GRADE PLANE THAT ARE FULLY SUPPORTED ON EARTH OR ROCK.<br>2) CONTINUOUS CONCRETE FOOTINGS SUPPORTING WALLS OF BUILDINGS THREE STORIES OR LESS ABOVE GRADE HEIGHT THAT ARE FULLY SUPPORTED ON EARTH OR ROCK WHERE THE FOOTINGS SUPPORT WALLS OF LIGHT FRAME CONSTRUCTION, ARE DESIGNED IN ACCORDANCE WITH TABLE 1809.7 OR THE STRUCTURAL DESIGN IS BASED ON A COMPRESSIVE STRENGTH $f_c$ NO GREATER THAN 2,500 POUNDS PER SQUARE INCH, REGARDLESS OF THE COMPRESSIVE STRENGTH SPECIFIED IN THE CONSTRUCTION DOCUMENTS OR USED IN THE FOOTING CONSTRUCTION.<br>3) NONSTRUCTURAL CONCRETE SLABS SUPPORTED DIRECTLY ON THE GROUND, INCLUDING PRESTRESSED SLABS ON GRADE, WHERE THE EFFECTIVE PRESTRESS IN THE CONCRETE IS LESS THAN 150 PSI.<br>4) CONCRETE FOUNDATION WALLS CONSTRUCTED IN ACCORDANCE W/ TABLE 1807.1.6.2.<br>5) CONCRETE PATIOS, DRIVEWAYS AND SIDEWALKS, ON GRADE |

| WOOD CONSTRUCTION  |       |          |                                  |   |
|--|-------|----------|----------------------------------|---|
| ITEM   | CONT. | PERIODIC | REFERENCE STANDARD IBC REFERENCE | VERIFICATION AND INSPECTION   |
| 1. FABRICATOR CERTIFICATION / QUALITY CONTROL PROCEDURES<br><input type="checkbox"/> FABRICATOR EXEMPT |       |          | 1704.2.5.1                       | FABRICATION AND IMPLEMENTATION PROCEDURES.<br>THE SPECIAL INSPECTOR SHALL VERIFY THAT THE FABRICATOR MAINTAINS DETAILED FABRICATION AND QUALITY CONTROL PROCEDURES THAT PROVIDE A BASIS FOR INSPECTION CONTROL OF THE WORKMANSHIP AND THE FABRICATOR'S ABILITY TO CONFORM TO APPROVED CONSTRUCTION DOCUMENTS AND REFERENCED STANDARDS. THE SPECIAL INSPECTOR SHALL REVIEW THE PROCEDURES FOR COMPLETENESS AND ADEQUACY RELATIVE TO THE CODE REQUIREMENTS FOR THE FABRICATOR'S SCOPE OF WORK.<br><br>EXCEPTION: SPECIAL INSPECTIONS AS REQUIRED BY SECTION 1704.2.5 SHALL NOT BE REQUIRED WHERE THE FABRICATOR IS APPROVED IN ACCORDANCE WITH SECTION 1704.2.5.2.<br>1704.2.5.2 FABRICATOR APPROVAL. SPECIAL INSPECTIONS REQUIRED BY SECTION 1705 ARE NOT REQUIRED WHERE THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION. APPROVAL SHALL BE BASED UPON REVIEW OF THE FABRICATOR'S WRITTEN PROCEDURAL AND QUALITY CONTROL MANUALS AND PERIODIC AUDITING OF FABRICATION PRACTICES BY AN APPROVED SPECIAL INSPECTION AGENCY. AT COMPLETION OF FABRICATION, THE APPROVED FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE TO THE BUILDING OFFICIAL STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS. |
| 2. DIAPHRAGMS AND SHEARWALLS   | X     |          | 1705.5.1                         | HIGH-LOAD DIAPHRAGMS DESIGNED IN ACCORDANCE WITH SECTION 2306.2 SHALL BE INSTALLED WITH SPECIAL INSPECTIONS AS INDICATED IN SECTION 1704.2. THE SPECIAL INSPECTOR SHALL INSPECT THE WOOD STRUCTURAL PANEL SHEATHING TO ASCERTAIN WHETHER IT IS OF THE GRADE AND THICKNESS SHOWN ON THE APPROVED BUILDING PLANS. ADDITIONALLY, THE SPECIAL INSPECTOR MUST VERIFY THE NOMINAL SIZE OF FRAMING MEMBERS AT ADJOINING PANEL EDGES, THE NAIL OR STAPLE DIAMETER AND LENGTH, THE NUMBER OF FASTENER LINES AND THAT THE SPACING BETWEEN FASTENERS IN EACH LINE AND AT EDGE MARGINS AGREES WITH THE APPROVED BUILDING PLANS.   |
|  |       | X        | 1705.10.1                        | CONTINUOUS SPECIAL INSPECTION IS REQUIRED DURING FIELD GLUING OPERATIONS OF ELEMENTS OF THE MAIN WINDFORCE-RESISTING SYSTEM. PERIODIC SPECIAL INSPECTION IS REQUIRED FOR NAILING, BOLTING, ANCHORING AND OTHER FASTENING OF COMPONENTS WITHIN THE MAIN WINDFORCE-RESISTING SYSTEM, INCLUDING WOOD SHEAR WALLS, WOOD DIAPHRAGMS, DRAG STRUTS, BRACES AND HOLD-DOWNS.<br><br>EXCEPTION: SPECIAL INSPECTION IS NOT REQUIRED FOR WOOD SHEAR WALLS, SHEAR PANELS AND DIAPHRAGMS, INCLUDING NAILING, BOLTING, ANCHORING AND OTHER FASTENING TO OTHER COMPONENTS OF THE MAIN WINDFORCE-RESISTING SYSTEM, WHERE THE FASTENER SPACING OF THE SHEATHING IS MORE THAN 4 INCHES (102 MM) ON CENTER.   |
| 3. METAL PLATE WOOD TRUSSES  |       |          | 1705.5.2                         | INSPECT THE FABRICATION OF WOOD TRUSSES.<br><br>WHERE A TRUSS CLEAR SPAN IS 60 FEET OR GREATER, THE SPECIAL INSPECTOR SHALL VERIFY THAT THE TEMPORARY INSTALLATION RESTRAINT/BRACING AND THE PERMANENT INDIVIDUAL TRUSS MEMBER RESTRAINT/BRACING ARE INSTALLED IN ACCORDANCE WITH THE APPROVED TRUSS SUBMITTAL PACKAGE.   |

| MASONRY                           |                     |  | REQUIRED INSPECTION LEVEL: <input type="checkbox"/> 1 <input type="checkbox"/> 2 |
|-----------------------------------|---------------------|--|--|
| ITEM                              | AGENCY # (QUALIF.)  | SCOPE  |  |
| 1. MATERIAL CERTIFICATION         |                     |  |  |
| 2. MIXING OF MORTAR & GROUT       | ICC-SMSI            | INSPECT PROPORTIONING, MIXING & RETEMPERING OF MORTAR AND GROUT.   |  |
| 3. INSTALLATION OF MASONRY        | ICC-SMSI            | INSPECT SIZE, LAYOUT, BONDING AND PLACEMENT OF MASONRY UNITS.  |  |
| 4. MORTAR JOINTS                  | ICC-SMSI            | INSPECT CONSTRUCTION OF MORTAR JOINTS INCLUDING TOOLING AND FILLING OF HEAD JOINTS   |  |
| 5. REINFORCEMENT INSTALLATION     | ICC-SMSI<br>AWS-CWI | INSPECT PLACEMENT, POSITIONING AND LAPPING OF REINFORCING STEEL.<br><br>INSPECT WELDING OF REINFORCING STEEL.  |  |
| 6. PRESTRESSED MASONRY            | ICC-SMSI            | INSPECT PLACEMENT, ANCHORAGE AND STRESSING OF PRESTRESSING BARS.   |  |
| 7. GROUTING OPERATIONS            | ICC-SMSI            | INSPECT PLACEMENT AND CONSOLIDATION OF GROUT. INSPECT MASONRY CLEAN-OUTS FOR HIGH-LIFT GROUTING.   |  |
| 8. WEATHER PROTECTION             | ICC-SMSI            | INSPECT COLD WEATHER PROTECTION AND HOT WEATHER PROTECTION PROCEDURES. VERIFY THAT WALL CAVITIES ARE PROTECTED AGAINST PRECIPITATION.  |  |
| 9. EVALUATION OF MASONRY STRENGTH | ICC-SMSI            | TEST COMPRESSIVE STRENGTH OF MORTAR AND GROUT CUBE SAMPLES (ASTM C780).<br><br>TEST COMPRESSIVE STRENGTH OF MASONRY PRISMS (ASTM C1314).   |  |
| 10. ANCHORS AND TIES              | ICC-SMSI            | INSPECT SIZE, LOCATION, SPACING AND EMBEDMENT OF DOWELS, ANCHORS AND TIES.   |  |
| 11. OTHER:                        |                     | SPECIAL INSPECTIONS NOT REQUIRED FOR:<br>1. EMPIRICALLY DESIGNED MASONRY, GLASS UNIT MASONRY, OR MASONRY VENEER DESIGNED IN ACCORDANCE W/ TABLE 1604.5 & 1617.6<br>2. MASONRY FOUNDATION WALLS CONSTRUCTED IN ACCORDANCE W/ TABLES 1805.5.1-1805.5.4 |  |

|  |          |  |  |  |  |  |  |  |  |  |  |
|--|----------|--|--|--|--|--|--|--|--|--|--|
| DATE:  | 03.11.21 |  |  |  |  |  |  |  |  |  |  |
| REVISIONS:   |          |  |  |  |  |  |  |  |  |  |  |
| BID DATE:  |          |  |  |  |  |  |  |  |  |  |  |
| <b>CURRY ENGINEERS, LLC</b><br>STRUCTURAL ENGINEERING<br>843 - 849 - 9755<br>508 AMERICAN BLVD.<br>MOUNTAIN VIEW, NC 28149<br>WWW.CURRYENGINEERS.COM<br>      |          |  |  |  |  |  |  |  |  |  |  |
| <b>HANAHAN REC CENTER</b><br><b>TMS# 259-00-00-189</b><br><b>HANAHAN, SC</b>   |          |  |  |  |  |  |  |  |  |  |  |
| <br><br>10/14/20   |          |  |  |  |  |  |  |  |  |  |  |
| LEGAL NOTICE<br>DRAWINGS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE THE PROPERTY OF THE ENGINEER. WHETHER THE WORK FOR WHICH THEY ARE MADE BE EXECUTED OR NOT, AND ARE NOT TO BE USED ON OTHER WORK EXCEPT BY AGREEMENT WITH THE ENGINEER. |          |  |  |  |  |  |  |  |  |  |  |
| <b>SPECIAL INSPECTION NOTES</b>  |          |  |  |  |  |  |  |  |  |  |  |
| DRAWN BY: J. BOYD<br>DESIGNED BY: P. CURRY<br>CHECKED BY: P. CURRY<br>DATE: 10.14.20<br>SCALE: AS NOTED<br>JOB NO.: 220-064<br>SHEET:  |          |  |  |  |  |  |  |  |  |  |  |
| <b>S103</b>  |          |  |  |  |  |  |  |  |  |  |  |

BID SET



- FOUNDATION PLAN NOTES:**
- THESE STRUCTURAL PLANS HAVE BEEN PRODUCED OVER THE ARCHITECTURAL BACKGROUND (HALF TONE). THE BACKGROUND INFORMATION FOR ARCHITECTURAL ITEMS IS FOR REFERENCE ONLY. ARCHITECT SHOULD BE CONSULTED FOR COORDINATION REGARDING BACKGROUND INFORMATION.
  - T.S.L. ELEVATION IS +0'-0" USED FOR DATUM ELEVATION. ELEVATIONS FOR FOOTINGS, SLABS, STEEL, WALLS, FLOORS, ELEVATOR PITS, ETC. ARE REFERENCED + OR - FROM DATUM ELEVATION.
  - T.F.T.G. ELEVATIONS ARE SHOWN ON PLAN FOR STRIP AND SPREAD FOOTINGS. FOOTING STEPS ARE SHOWN IN RELATIVE LOCATIONS UNLESS NOTED OTHERWISE ON PLAN. SEE SHT. S205 "TYPICAL DETAILS" FOR FOOTING STEP AND SPACING REQUIREMENTS. TOP OF STRIP FOOTING ELEVATION MATCHES ADJACENT TOP OF SPREAD FOOTING ELEVATION, U.N.O. (I.E. FOOTING STEPS).
  - TYPICAL SLAB ON GRADE (S.O.G.) IS 4" NORMAL WEIGHT CONCRETE REINFORCED WITH #6-W1.4XW1.4 WYM (FLAT SHEETS) ON COMPACTED FILL. ROLLED MESH IS NOT PERMITTED. SUPPORT W/M AT 1" FROM TOP OF S.O.G. WITH SAND PLATES (CHAIRS WITH SHEET METAL PLATE BASES) OR OTHER ACCEPTABLE DEVICES. BRICKS ARE NOT PERMITTED. SEE ARCH. DWGS. SPECIFICATION FOR MOISTURE BARRIER RETARDER.
  - PROVIDE THICKENED S.O.G. UNDER ALL MASONRY WALLS WHERE NO FOOTINGS ARE SHOWN ON PLAN. REFER TO SHT. S205 "TYPICAL DETAILS".
  - CONTROL JOINTS - SAW CUT OR STRIPPABLE - ARE SHOWN ON PLAN - REFER TO "CONTROL JOINT" DETAILS ON SHT. S205 FOR DETAILS AT THESE JOINTS. WHERE CONTRACTOR DESIRES TO BREAK SLAB POURS ALONG THESE JOINTS, THE "CONSTRUCTION JOINT" DETAILS SHOWN ON SHT. S205 SHALL BE USED.
  - NO UNDERCUTTING AND BACKFILLING IS PERMITTED UNDER ANY FOOTINGS DUE TO HIGH ALLOWABLE BEARING PRESSURES USED IN FOOTING DESIGN. LEAN CONCRETE ( $f_c = 2000$  PSI) OR FOOTING CONCRETE SHALL BE USED TO "BACKFILL" ANY OVEREXCAVATION.
  - CONTRACTOR SHALL SHORE ALL WALLS RECEIVING BACKFILL ON ONLY ONE SIDE OR WALLS WITH UNEQUAL LEVELS OF BACKFILL ON OPPOSITE SIDES, UNLESS NOTED OTHERWISE IN THE DETAILS. ANY WALLS FOR WHICH SHORING IS INDICATED AS REQUIRED IN THE PLANS OR DETAILS SHALL BE SHORED REGARDLESS OF BACKFILL CONDITIONS.
  - MASONRY SHOWN ON STRUCTURAL DRAWINGS DEFINES ONLY THE EXTENT AND REQUIREMENTS OF MASONRY UTILIZED FOR STRUCTURAL PURPOSES (I.E. BEARING WALLS, SHEAR WALLS, RETAINING WALLS, FOUNDATION WALLS, COLUMNS, ETC.).
  - REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND DRAWINGS OF OTHER DISCIPLINES FOR LOCATIONS AND DIMENSIONS OF OPENINGS, DEPRESSIONS, NON-STRUCTURAL MASONRY, AND PRECAST PANEL CLADDING SYSTEMS.
  - SEE SHT. S200 - S204 FOR SECTIONS.
  - ALL DIMENSIONS TO BE VERIFIED BY ARCHITECT / CONTRACTOR PRIOR TO CONSTRUCTION.
  - SEE SHT. S100 FOR "GENERAL NOTES". TYPICAL DETAILS ARE GENERALLY NOT CUT ON PLANS BUT RATHER ARE INTENDED TO DEFINE TYPICAL CONSTRUCTION CONDITIONS. WHERE TYPICAL DETAILS ARE CUT ON PLAN, THE INTENT IS TO ILLUSTRATE THE TYPE OF CONDITION AT WHICH THAT DETAIL IS INTENDED TO APPLY RATHER THAN EVERY OCCURRENCE OF THAT DETAIL.

**LEGEND:**  
 C.J. CONTROL JOINT  
 F.O.S. FACE OF SLAB / STUD  
 8" CMU WALL

| APPROVED BY: | DATE:    | DATE: | DATE: | DATE: | DATE: | DATE: | DATE: | DATE: | DATE: |
|--------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| PAC          | 03.11.21 |       |       |       |       |       |       |       |       |

**CURRY ENGINEERS, LLC**  
 STRUCTURAL ENGINEERING

943 - 849 - 9755  
 5075 AMERICAN PARKWAY  
 MURRY, NC 27556  
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**TMS# 259-00-00-189**  
**HANAHAN, SC**

10/14/20

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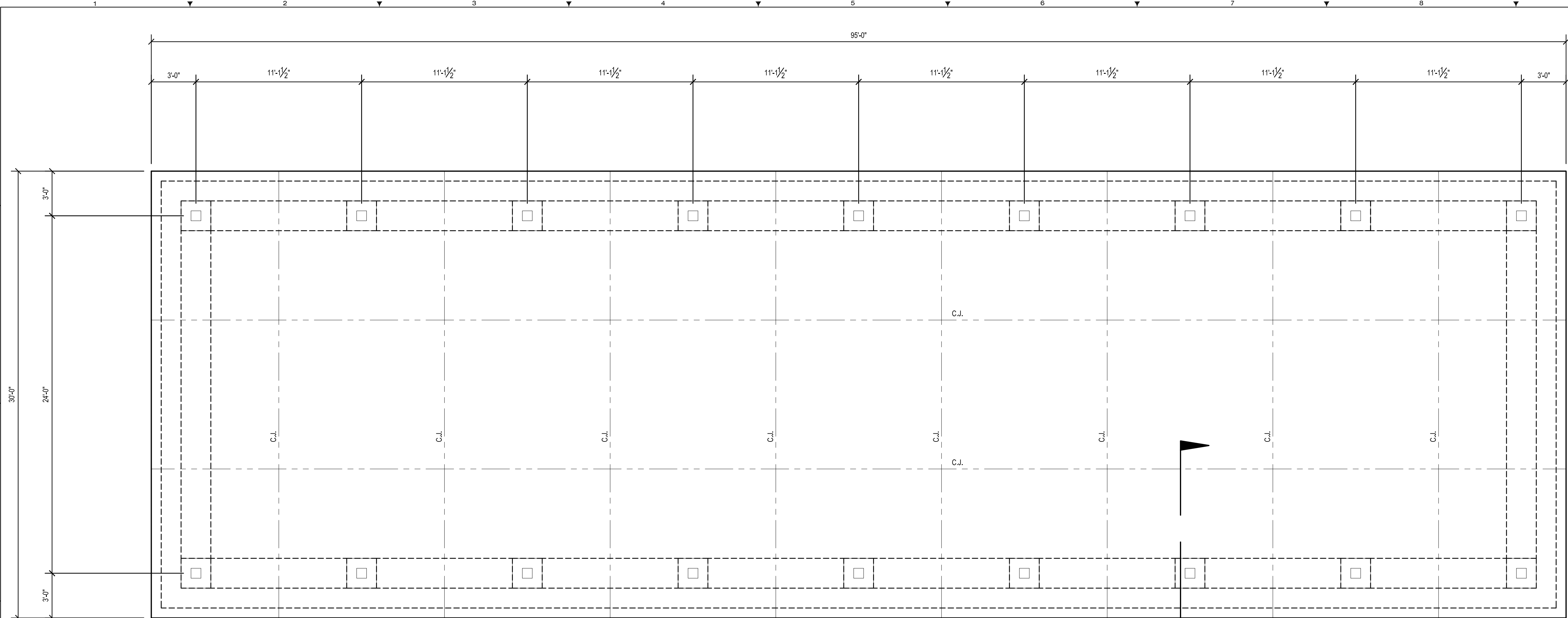
**FOUNDATION LAYOUT PLAN**

DRAWN BY: J. BOYD  
 DESIGNED BY: P. CURRY  
 CHECKED BY: P. CURRY  
 DATE: 10.14.20  
 SCALE: AS NOTED  
 JOB NO.: 220-064  
 SHEET:

**S110**

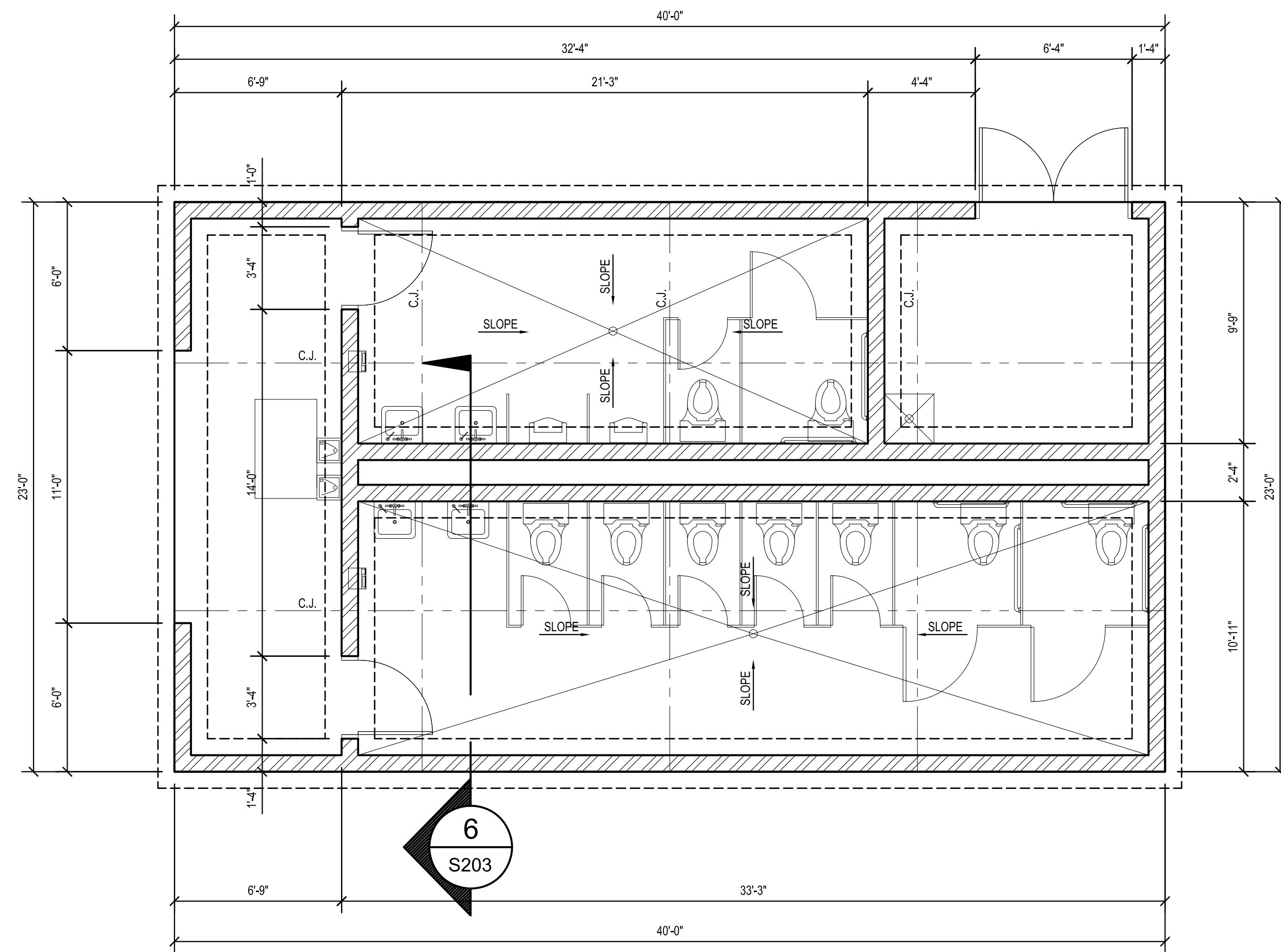
**FOUNDATION PLAN (REC. CENTER)**  
 SCALE: 1/2" = 1'-0"

BID SET



**FOUNDATION PLAN (PAVILION)**  
SCALE: 1/2" = 1'-0"

**7**  
S204



**FOUNDATION PLAN (TOILETS)**  
SCALE: 1/2" = 1'-0"

**6**  
S203

**FOUNDATION PLAN NOTES:**

- THESE STRUCTURAL PLANS HAVE BEEN PRODUCED OVER THE ARCHITECTURAL BACKGROUND (HALF TONE). THE BACKGROUND INFORMATION FOR ARCHITECTURAL ITEMS IS FOR REFERENCE ONLY. ARCHITECT SHOULD BE CONSULTED FOR COORDINATION REGARDING BACKGROUND INFORMATION.
- T/S/L ELEVATION IS +0'-0" USED FOR DATUM ELEVATION. ELEVATIONS FOR FOOTINGS, SLABS, STEEL, WALLS, FLOORS, ELEVATOR PITS, ETC. ARE REFERENCED + OR - FROM DATUM ELEVATION.
- T/FG ELEVATIONS ARE SHOWN ON PLAN FOR STRIP AND SPREAD FOOTINGS. FOOTING STEPS ARE SHOWN IN RELATIVE LOCATIONS UNLESS NOTED OTHERWISE ON PLAN. SEE SHT. S205 "TYPICAL DETAILS" FOR FOOTING STEP AND SPACING REQUIREMENTS. TOP OF STRIP FOOTING ELEVATION MATCHES ADJACENT TOP OF SPREAD FOOTING ELEVATION, U.N.O. (I.E. FOOTING STEPS).
- TYPICAL SLAB ON GRADE (S.O.G.) IS 4" NORMAL WEIGHT CONCRETE REINFORCED WITH 6#6-W14-W14 WWM (FLAT SHEETS) ON COMPACTED FILL. ROLLED MESH IS NOT PERMITTED. SUPPORT WWM AT 1" FROM TOP OF S.O.G. WITH SAND PLATES (CHAIRS WITH SHEET METAL PLATE BASES) OR OTHER ACCEPTABLE DEVICES. BRICKS ARE NOT PERMITTED. SEE ARCH. DWGS. SPECIFICATION FOR MOISTURE BARRIER RETARDER.
- PROVIDE THICKENED S.O.G. UNDER ALL MASONRY WALLS WHERE NO FOOTINGS ARE SHOWN ON PLAN. REFER TO SHT. S205 "TYPICAL DETAILS".
- CONTROL JOINTS - SAW CUT OR STRIPPABLE - ARE SHOWN ON PLAN - REFER TO "CONTROL JOINT" DETAILS ON SHT. S205 FOR DETAILS AT THESE JOINTS. WHERE CONTRACTOR DESIRES TO BREAK SLAB POURS ALONG THESE JOINTS, THE "CONSTRUCTION JOINT" DETAILS SHOWN ON SHT. S205 SHALL BE USED.
- NO UNDERCUTTING AND BACKFILLING IS PERMITTED UNDER ANY FOOTINGS DUE TO HIGH ALLOWABLE BEARING PRESSURES USED IN FOOTING DESIGN. LEAN CONCRETE (f<sub>c</sub> = 2000 PSI) OR FOOTING CONCRETE SHALL BE USED TO "BACKFILL" ANY OVEREXCAVATION.
- CONTRACTOR SHALL SHORE ALL WALLS RECEIVING BACKFILL ON ONLY ONE SIDE OR WALLS WITH UNEQUAL LEVELS OF BACKFILL ON OPPOSITE SIDES. UNLESS NOTED OTHERWISE IN THE DETAILS, ANY WALLS FOR WHICH SHORING IS INDICATED AS REQUIRED IN THE PLANS OR DETAILS SHALL BE SHORED REGARDLESS OF BACKFILL CONDITIONS.
- MASONRY SHOWN ON STRUCTURAL DRAWINGS DEFINES ONLY THE EXTENT AND REQUIREMENTS OF MASONRY UTILIZED FOR STRUCTURAL PURPOSES (I.E. BEARING WALLS, SHEAR WALLS, RETAINING WALLS, FOUNDATION WALLS, COLUMNS, ETC.).
- REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND DRAWINGS OF OTHER DISCIPLINES FOR LOCATIONS AND DIMENSIONS OF OPENINGS, DEPRESSIONS, NON-STRUCTURAL MASONRY, AND PRECAST PANEL CLADDING SYSTEMS.
- SEE SHT. S200 - S204 FOR SECTIONS.
- ALL DIMENSIONS TO BE VERIFIED BY ARCHITECT / CONTRACTOR PRIOR TO CONSTRUCTION.
- SEE SHT. S100 FOR "GENERAL NOTES". TYPICAL DETAILS ARE GENERALLY NOT CUT ON PLANS BUT RATHER ARE INTENDED TO DEFINE TYPICAL CONSTRUCTION CONDITIONS. WHERE TYPICAL DETAILS ARE CUT ON PLAN, THE INTENT IS TO ILLUSTRATE THE TYPE OF CONDITION AT WHICH THAT DETAIL IS INTENDED TO APPLY RATHER THAN EVERY OCCURRENCE OF THAT DETAIL.

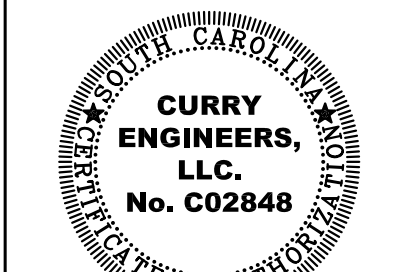
**LEGEND:**  
C.J. CONTROL JOINT  
F.O.S. FACE OF SLAB / STUD  
8" CMU WALL

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
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**FOUNDATION LAYOUT PLANS**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

S111

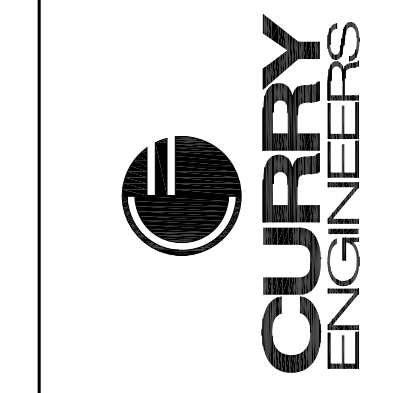
BID SET



- ROOF FRAMING PLAN NOTES:**
1. THESE STRUCTURAL PLANS HAVE BEEN PRODUCED OVER THE ARCHITECTURAL BACKGROUND (HALF TONE). THE BACKGROUND INFORMATION FOR ARCHITECTURAL ITEMS IS FOR REFERENCE ONLY. ARCHITECT SHOULD BE CONSULTED FOR COORDINATION REGARDING BACKGROUND INFORMATION.
  2. ALL SAWN LUMBER TO BE S.P.F., KD, NO.2.
  3. TRUSSES ARE EQUALLY SPACED @ 24" O.C. / RAFTERS ARE EQUALLY SPACED @ 16" O.C. ALONG SUPPORTING MEMBERS UNLESS INDICATED OTHERWISE ON PLAN OR IN DETAILS.
  4. REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING & DRAWINGS OF OTHER DISCIPLINES FOR LOCATIONS AND DIMENSIONS OF OPENINGS, DEPRESSIONS, AND NON-STRUCTURAL COMPONENTS.
  5. ROOF TO BE SHEATHED w/ 1/2" PLYWOOD SHEATHING.
  6. SEE SHEET S100 FOR "GENERAL NOTES". TYPICAL DETAILS ARE GENERALLY NOT CUT ON PLANS BUT RATHER ARE INTENDED TO DEFINE TYPICAL CONSTRUCTION CONDITIONS. WHERE TYPICAL DETAILS ARE CUT ON PLAN, THE INTENT IS TO ILLUSTRATE THE TYPE OF CONDITION AT WHICH THAT DETAIL IS INTENDED TO APPLY RATHER THAN EVERY OCCURENCE OF THAT DETAIL.

| DATE     | APPROVED BY | REVISIONS |
|----------|-------------|-----------|
| 03.11.21 | PAC         |           |
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MOUNTAIN VIEW, SC 29581  
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TMS# 259-00-00-189  
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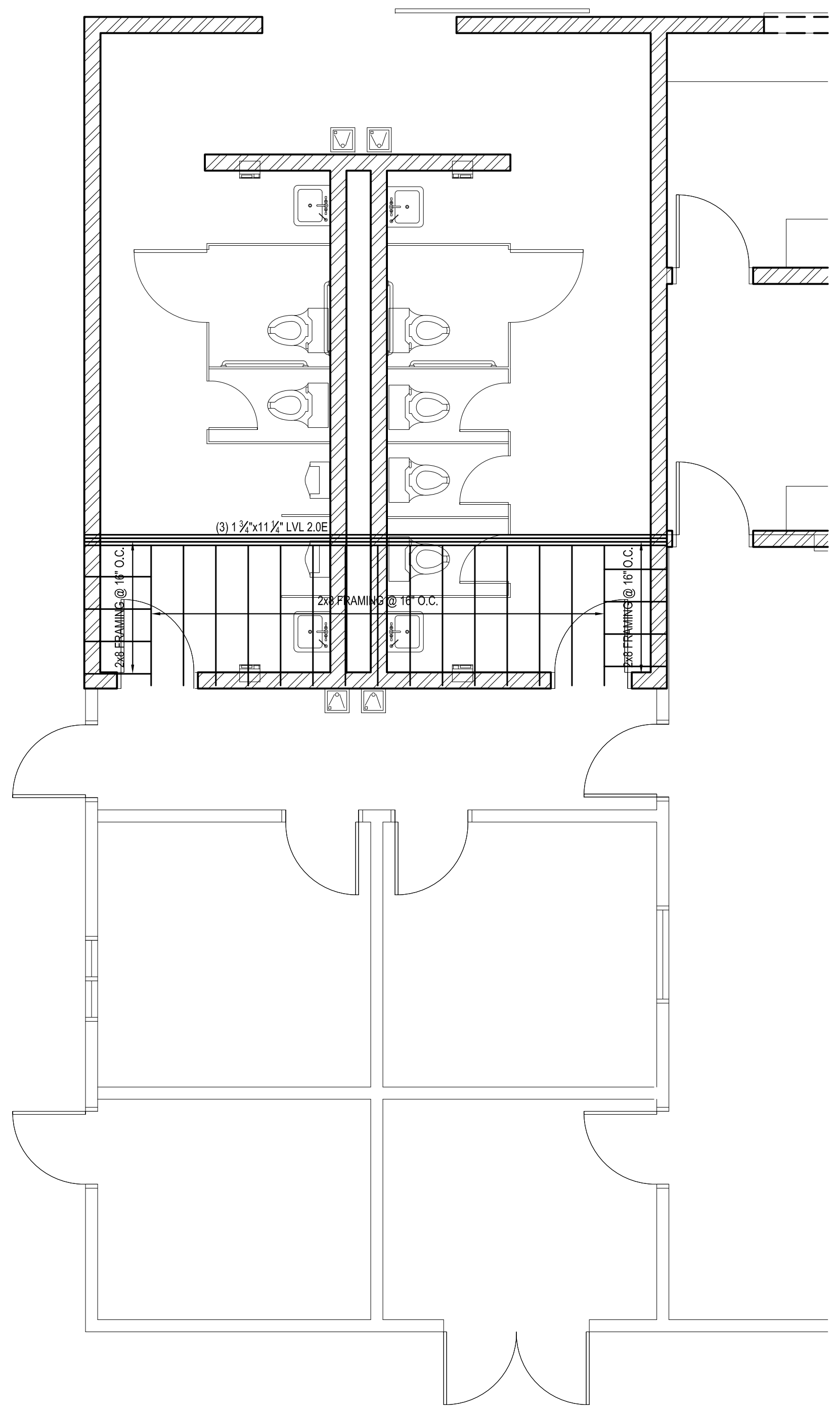
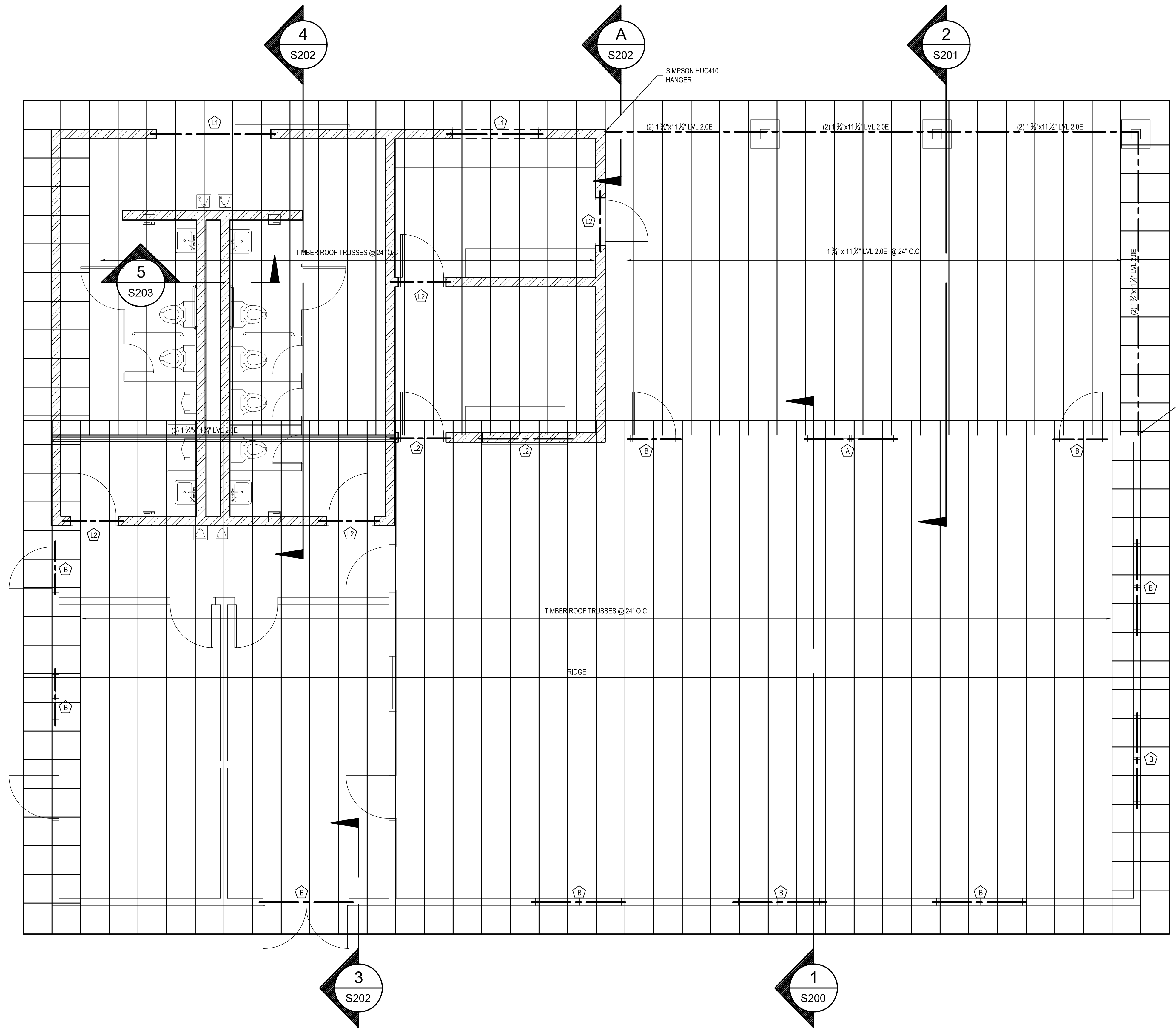


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**ROOF FRAMING LAYOUT PLAN**

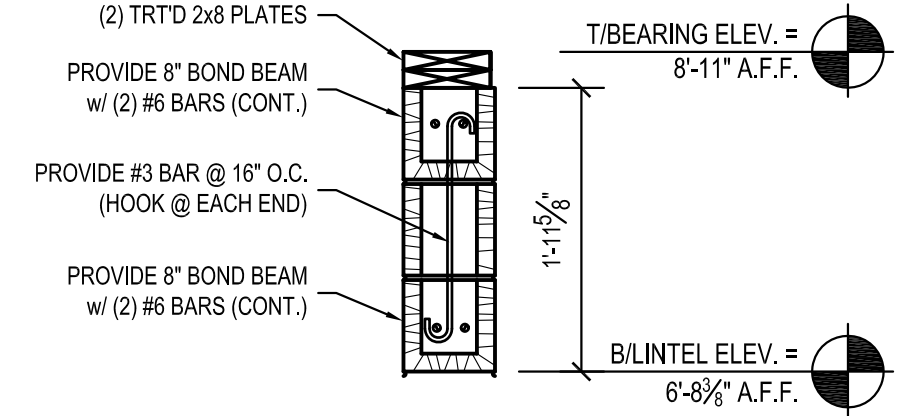
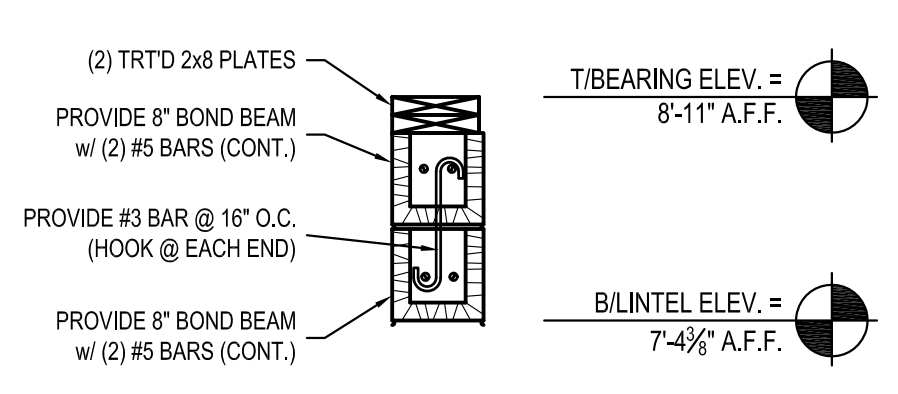
DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

**S120**



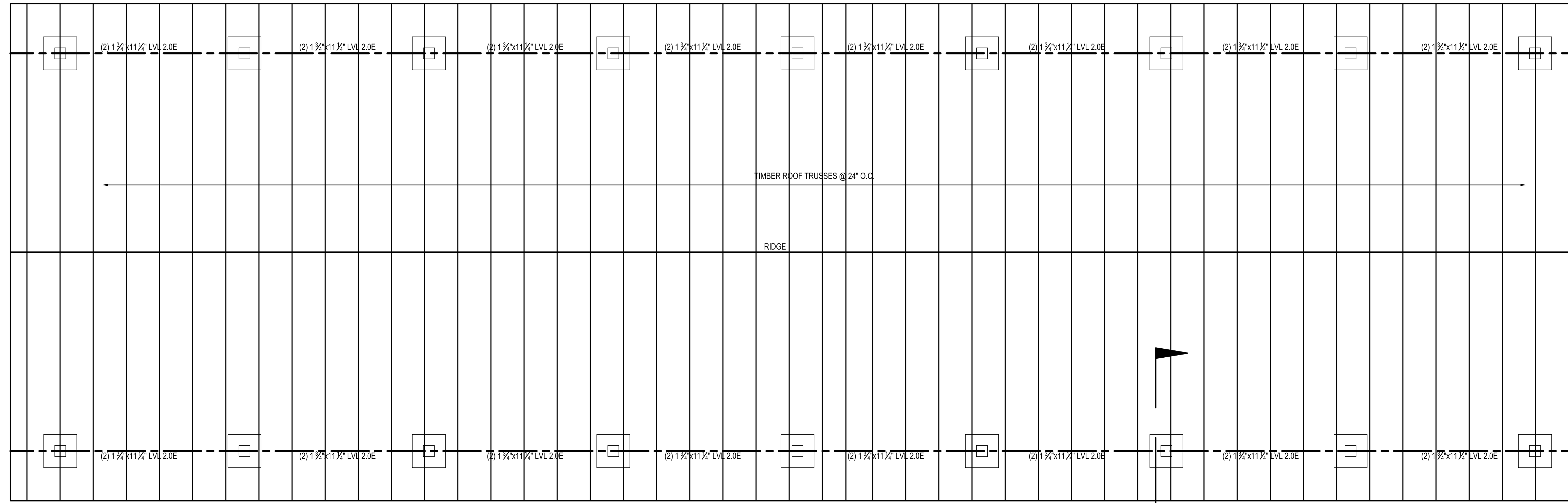
**LOWER / UPPER ROOF FRAMING PLAN (REC. CENTER)**  
SCALE: 1/2" = 1'-0"

| HEADER SCHEDULE |             |                                    |                                   |           |            |                 |
|-----------------|-------------|------------------------------------|-----------------------------------|-----------|------------|-----------------|
| TYPE            | HEADER TYPE | HEADER CONSTRUCTION                | SILL CONSTRUCTION (IF APPLICABLE) | KING STUD | JACK STUDS | HEADER HOLDOWNS |
| (H)             | BUILT-UP    | (3) 1 1/2" x 9 1/2" LVL 2.0E       | (2) 2x6                           | (3) 2x6   | (2) 2x6    | SIMPSON H6      |
| (B)             | BUILT-UP    | (3) 2x8 w/ (2) 1/2" PLYWOOD PLATES | (2) 2x6                           | (3) 2x6   | (1) 2x6    | SIMPSON H8      |



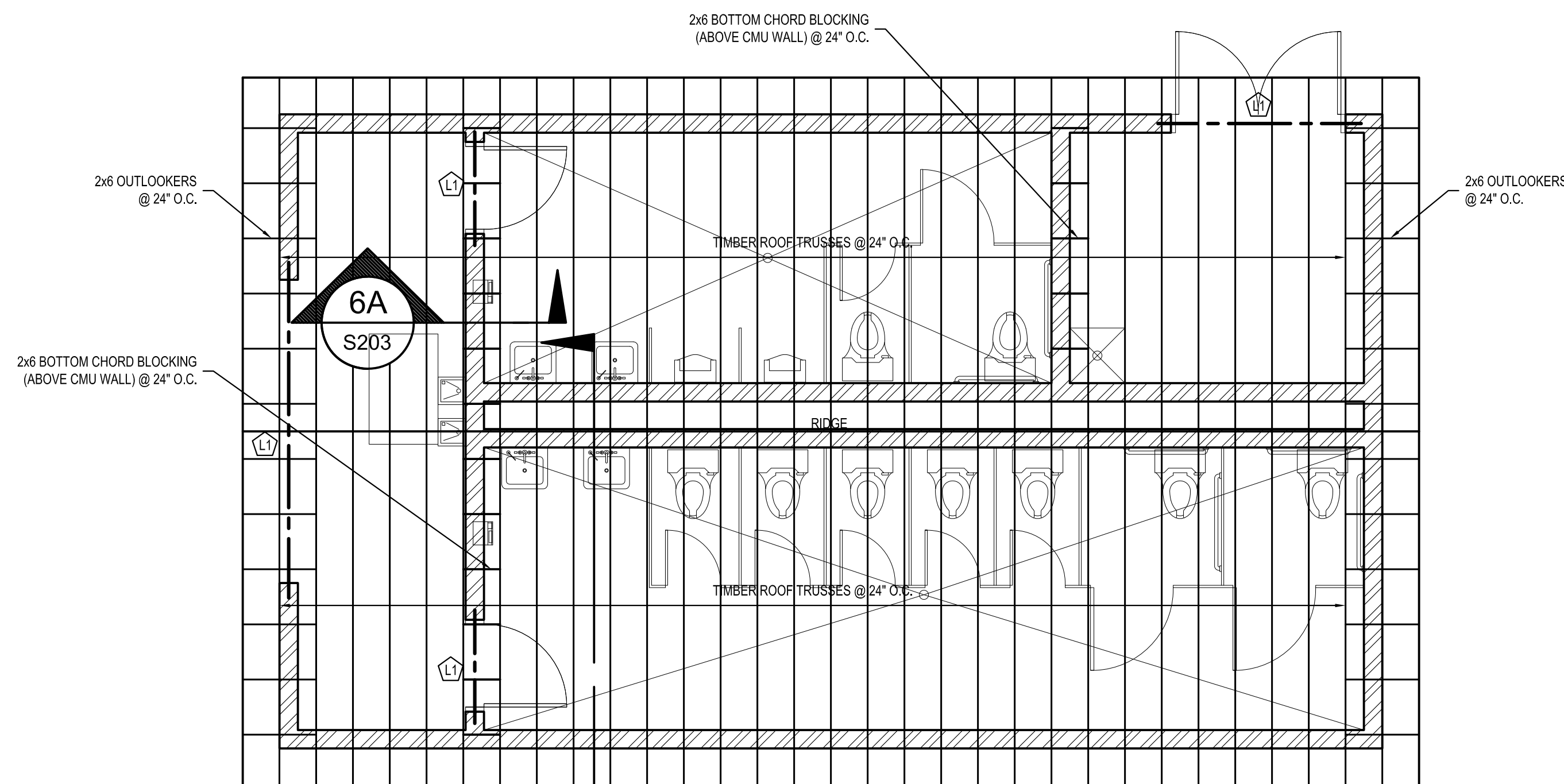
**HVAC PLATFORM FRAMING PLAN (REC. CENTER)**  
SCALE: 1/2" = 1'-0"

BID SET



ROOF FRAMING PLAN (PAVILION)  
SCALE: 1/2" = 1'-0"

7  
S204



ROOF FRAMING PLAN (TOILETS)  
SCALE: 1/2" = 1'-0"

6  
S203

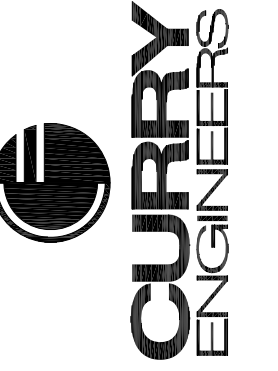
6A  
S203

**ROOF FRAMING PLAN NOTES:**

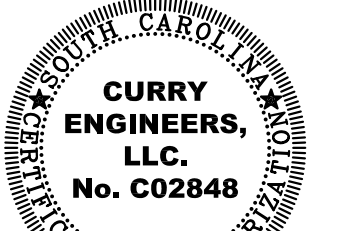
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5. ROOF TO BE SHEATHED w/ 1/2" PLYWOOD SHEATHING.
6. SEE SHEET S100 FOR "GENERAL NOTES". TYPICAL DETAILS ARE GENERALLY NOT CUT ON PLANS BUT RATHER ARE INTENDED TO DEFINE TYPICAL CONSTRUCTION CONDITIONS. WHERE TYPICAL DETAILS ARE CUT ON PLAN, THE INTENT IS TO ILLUSTRATE THE TYPE OF CONDITION AT WHICH THAT DETAIL IS INTENDED TO APPLY RATHER THAN EVERY OCCURRENCE OF THAT DETAIL.

| REVISED | BID DATE | DATE     | APPROVED BY |
|---------|----------|----------|-------------|
| Δ       | Δ        | 03.11.21 | PAC         |
| Δ       | Δ        |          |             |
| Δ       | Δ        |          |             |
| Δ       | Δ        |          |             |
| Δ       | Δ        |          |             |
| Δ       | Δ        |          |             |

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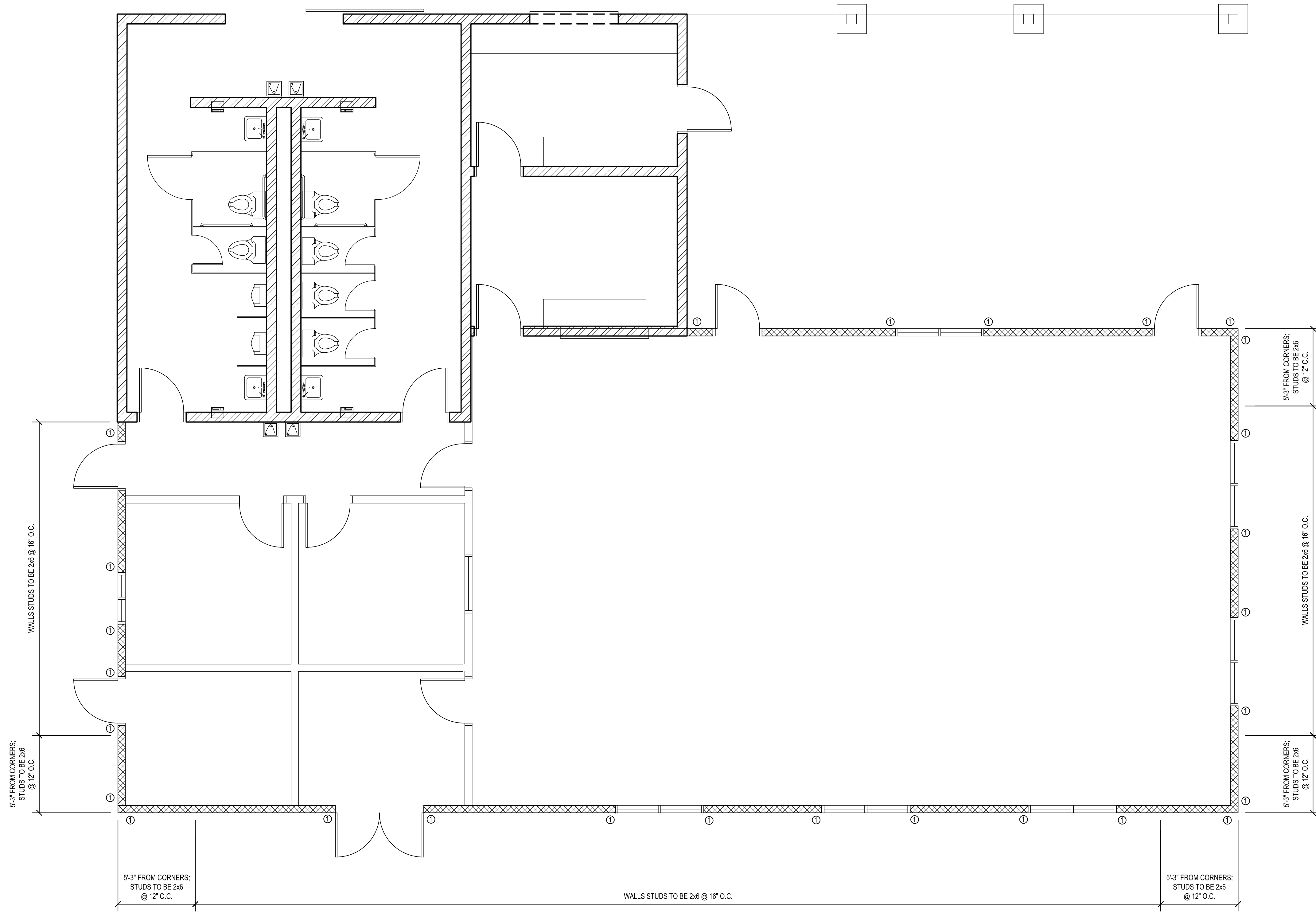
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**ROOF FRAMING LAYOUT PLANS**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

S121

BID SET

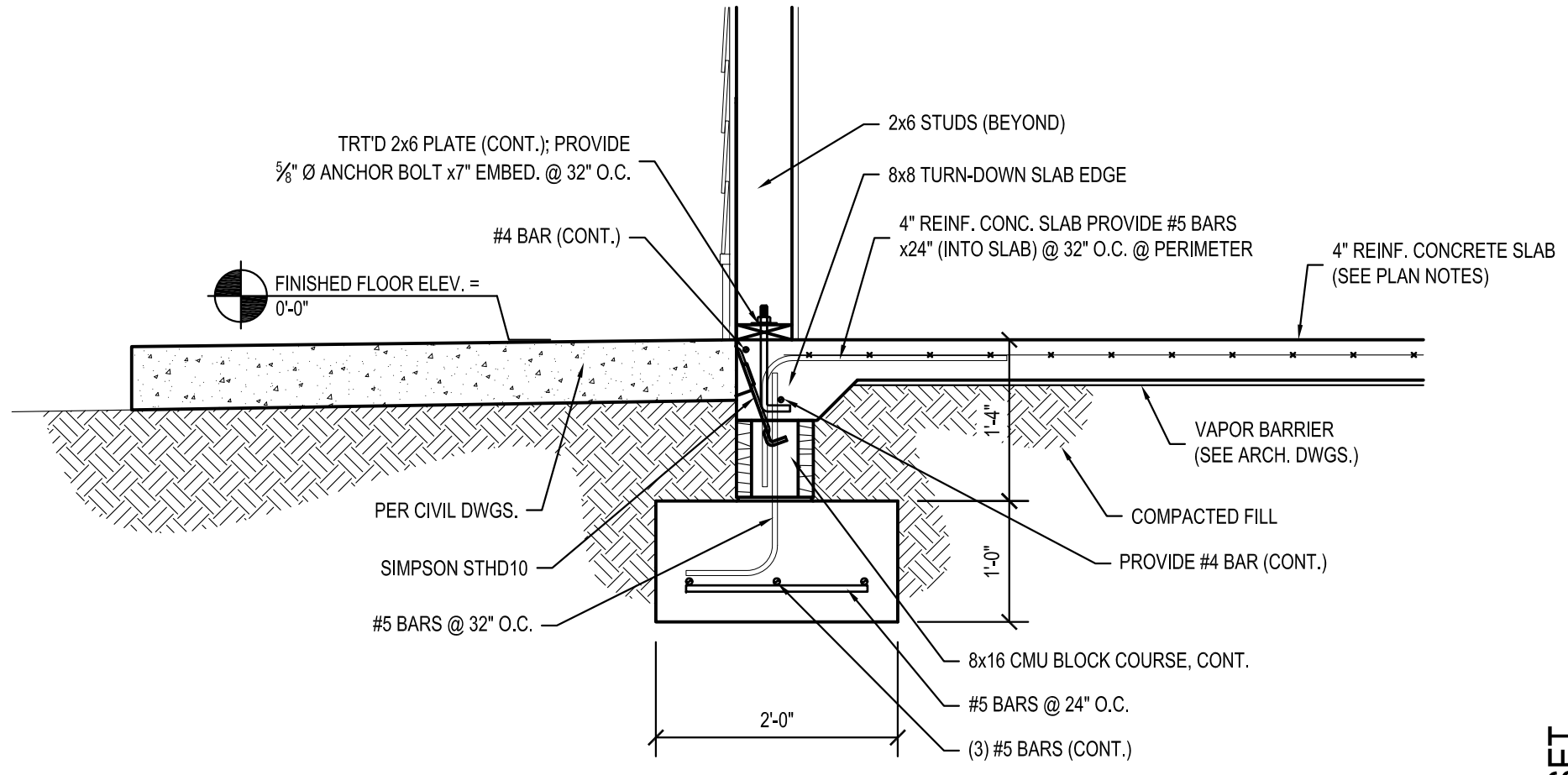


**SHEARWALL PLAN (REC. CENTER)**  
SCALE: 1/2" = 1'-0"

| HOLDOWN SCHEDULE |  |
|------------------|--|
| DESIGNATION      | HOLDOWN / INSTALLATION                                     |
| ①                | SIMPSON STHD10, PROVIDE (2) 2x STUDS @ EACH STRAP LOCATION |

| SHEARWALL SCHEDULE                |       |   |             |
|-----------------------------------|-------|---|-------------|
| SHEATHING                         | SIDES | CONNECTION  | DESIGNATION |
| 1/2" APA-RATED PLYWOOD @ 1/4" OSB | 1     | 8d NAILS @ 4" O.C. (ALL EDGES) & 6" O.C. (IN FIELD) |             |

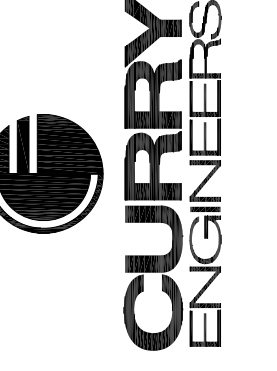
NOTE: PROVIDE 2x FLATWISE BLOCKING @ ALL PANEL EDGES, TYP.



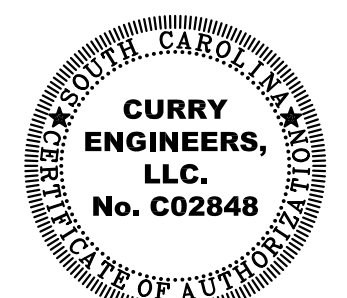
**A TYP. SECTION @ SIMPSON STHD10 HOLDOWN**  
SCALE: 3/4" = 1'-0"

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
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**HANAHAN, SC**



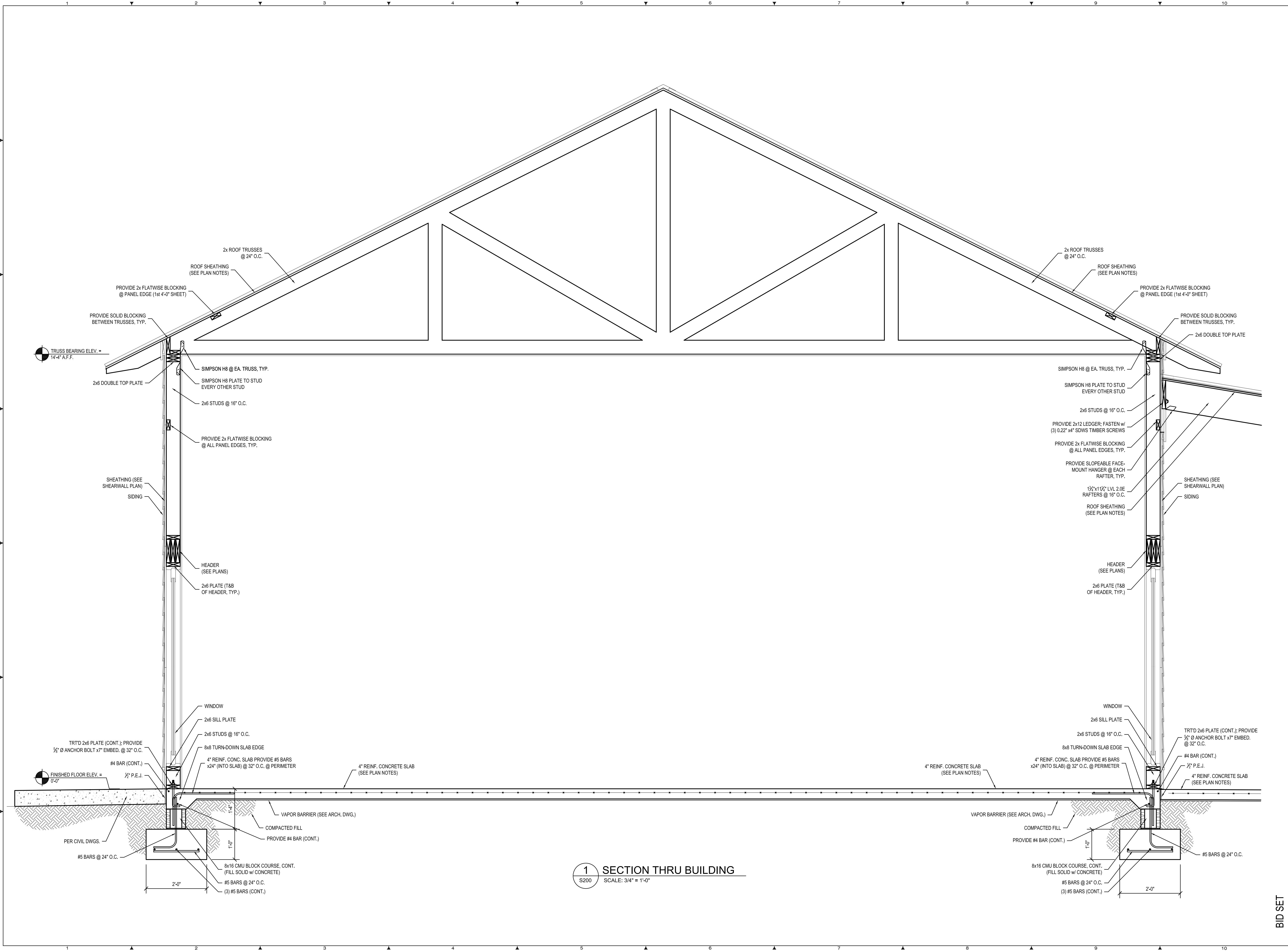
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**SHEARWALL PLAN**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

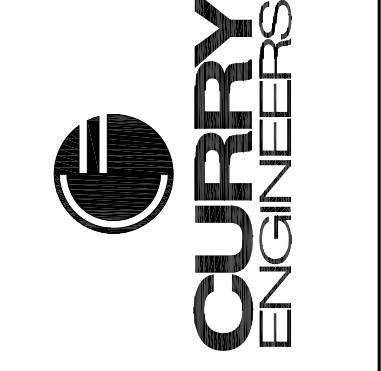
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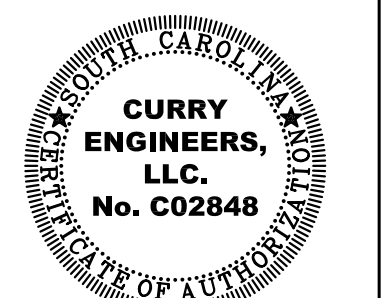
**1 SECTION THRU BUILDING**  
 S200 SCALE: 3/4" = 1'-0"

| REVISONS: | BID DATE | DATE     | APPROVED BY: |
|-----------|----------|----------|--------------|
| △         |          | 03.11.21 | PAC          |
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**HANAHAN REC CENTER**  
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**HANAHAN, SC**



10/14/20

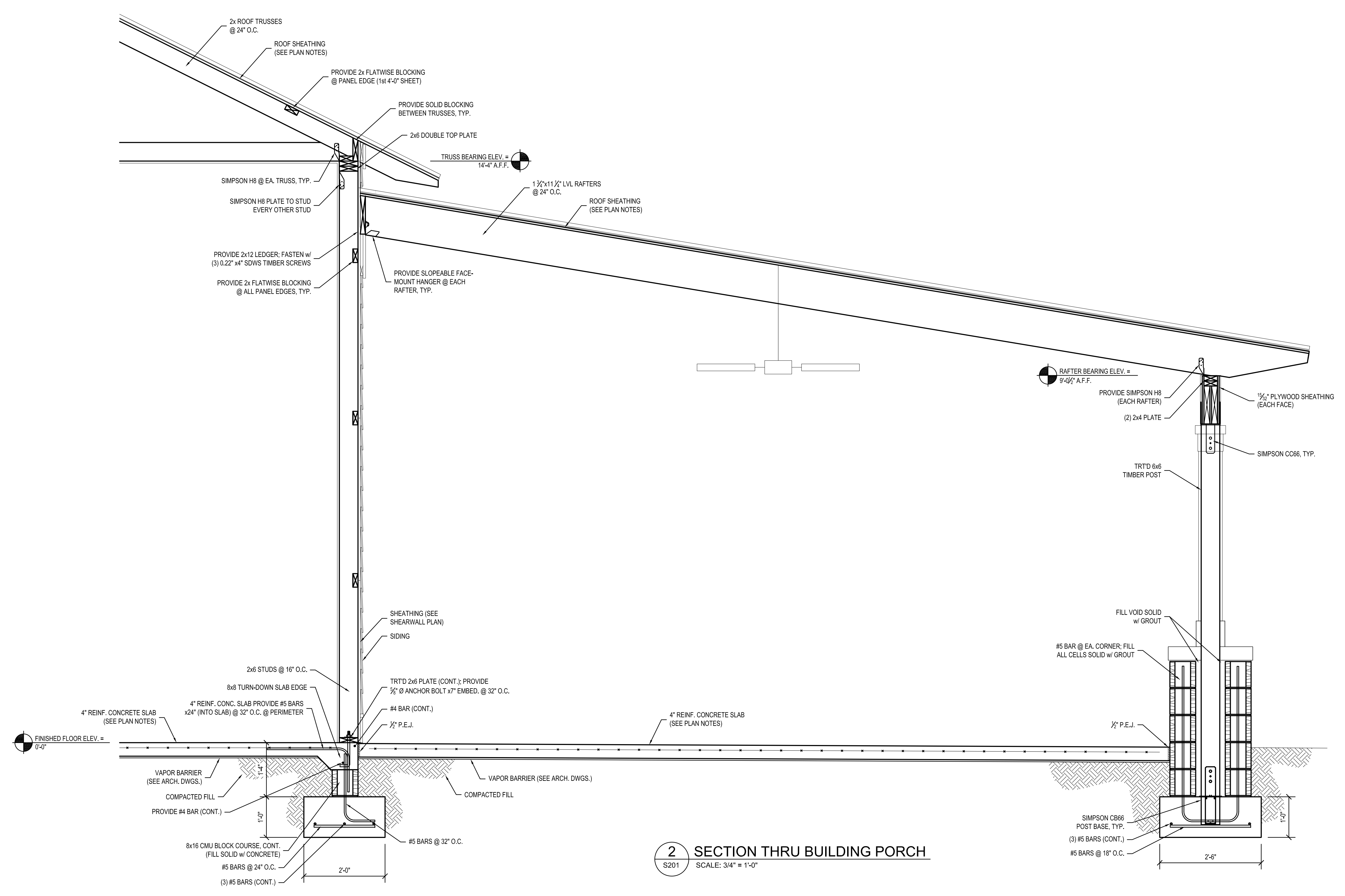
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**SECTIONS**

DRAWN BY: J. BOYD  
 DESIGNED BY: P. CURRY  
 CHECKED BY: P. CURRY  
 DATE: 10.14.20  
 SCALE: AS NOTED  
 JOB NO.: 220-064  
 SHEET:

**S200**

BID SET



|              |          |
|--------------|----------|
| APPROVED BY: | PAC      |
| DATE:        | 03.11.21 |
| BID DATE:    |          |
| REVISIONS:   |          |

CURRY ENGINEERS, LLC  
STRUCTURAL ENGINEERING  
843 - 849 - 9755  
5076 ARDEN ROAD  
MOUNTAIN VIEW, NC 28054  
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**CURRY ENGINEERS**

HANAHAN REC CENTER  
TMS# 259-00-00-189  
HANAHAN, SC

CURRY ENGINEERS, LLC  
No. C02848

CURRY ENGINEERS, LLC  
No. 21964

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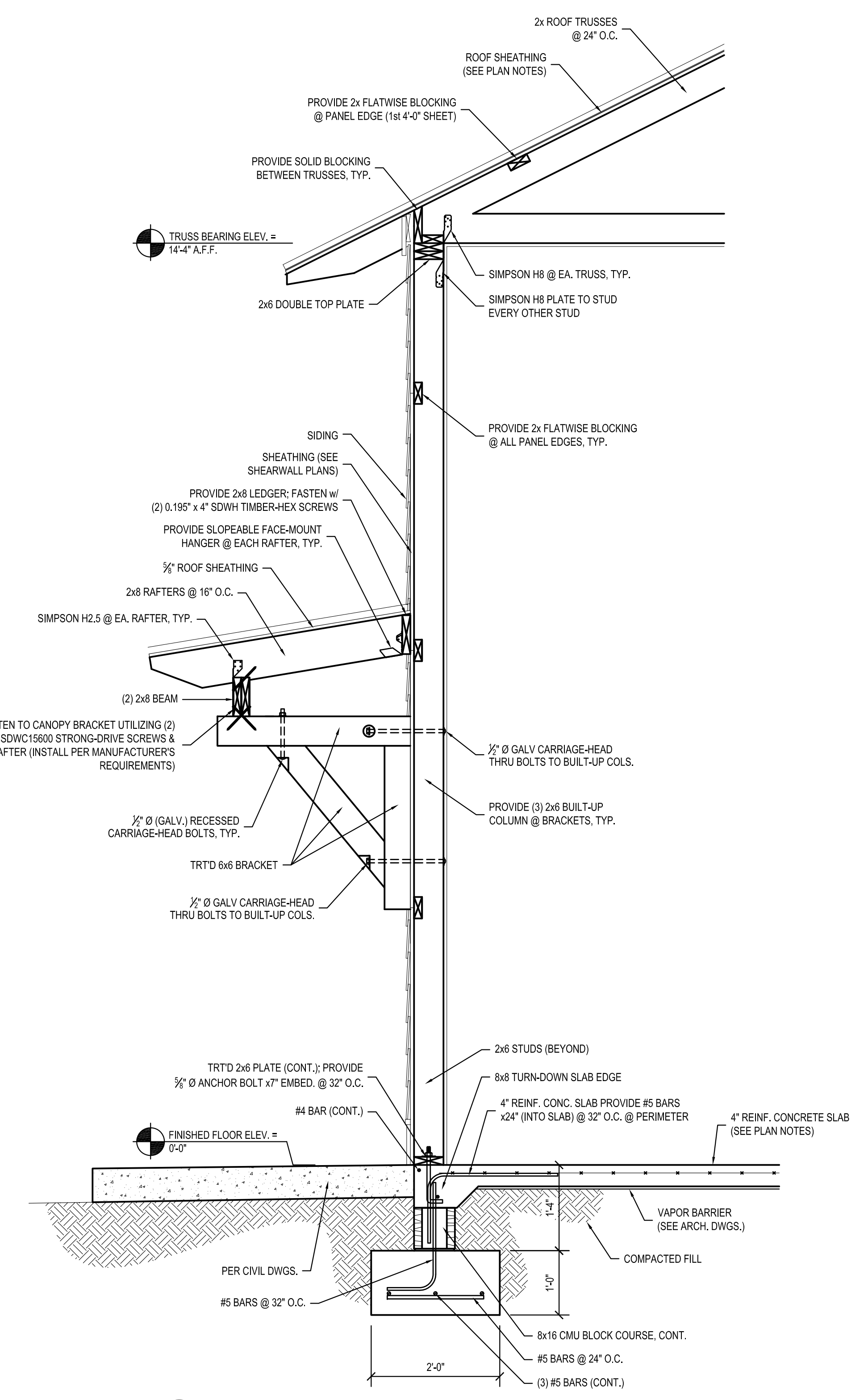
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SECTIONS

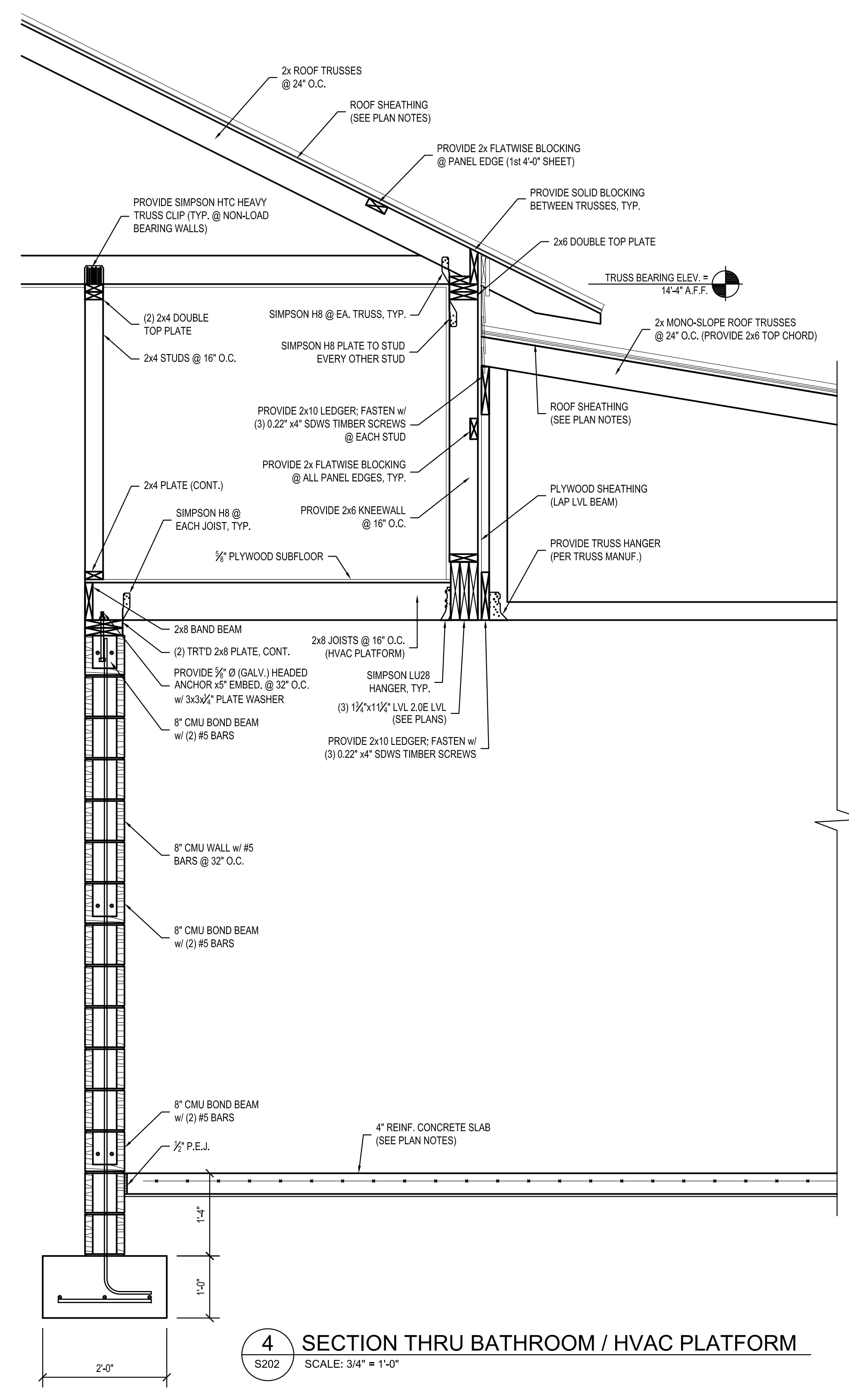
DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
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SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

S201

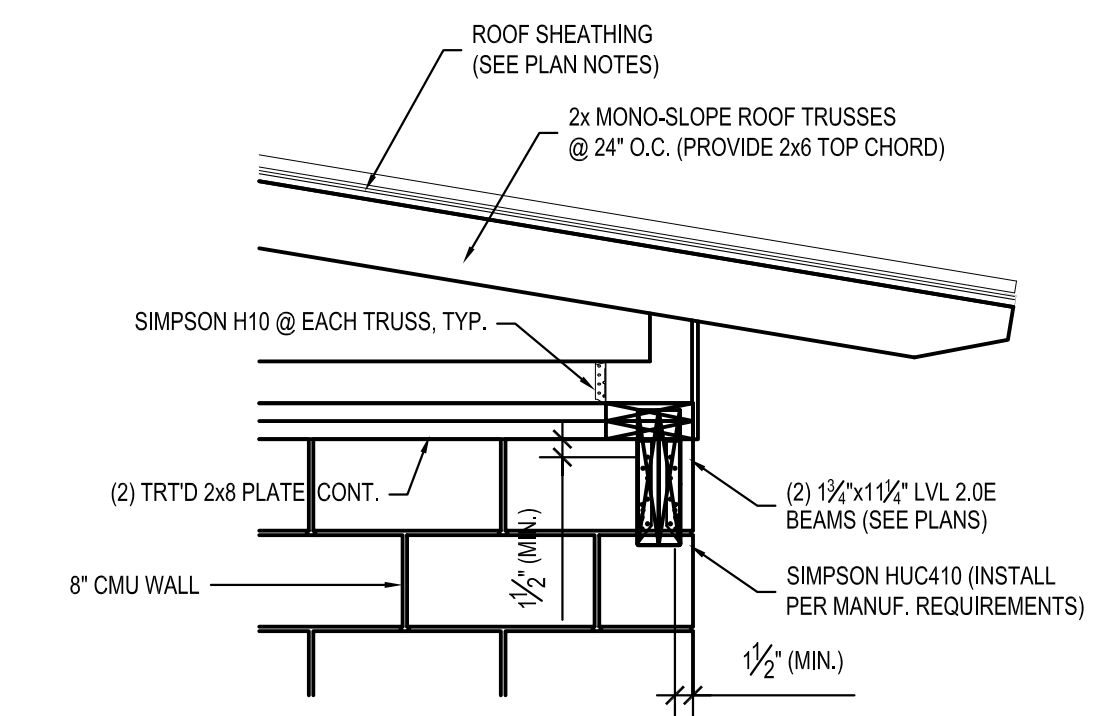
BID SET



**3 SECTION @ DOOR OVERHANG BRACKET**  
S202 SCALE: 3/4" = 1'-0"



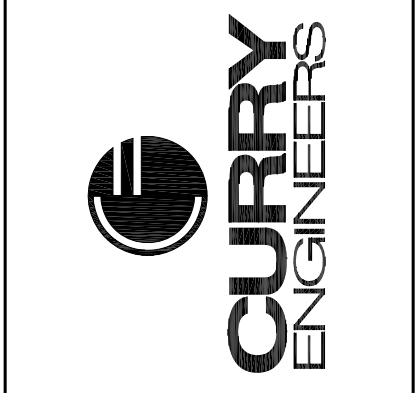
**4 SECTION THRU BATHROOM / HVAC PLATFORM**  
S202 SCALE: 3/4" = 1'-0"



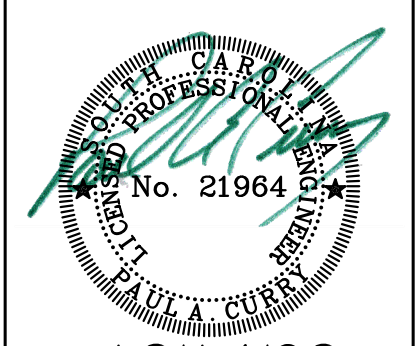
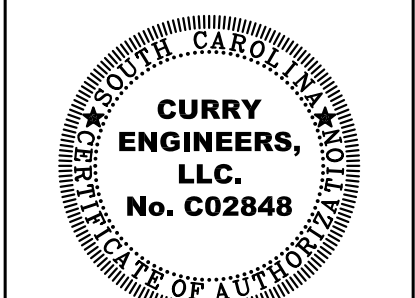
**A DETAIL @ SIMPSON HUC410 ON CMU BLOCK WALL**  
S202 SCALE: 3/4" = 1'-0"

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
|------------|----------|----------|--------------|
|            |          | 03.11.21 | PAC          |

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MOUNTAIN VIEW, SC 29570  
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10/14/20

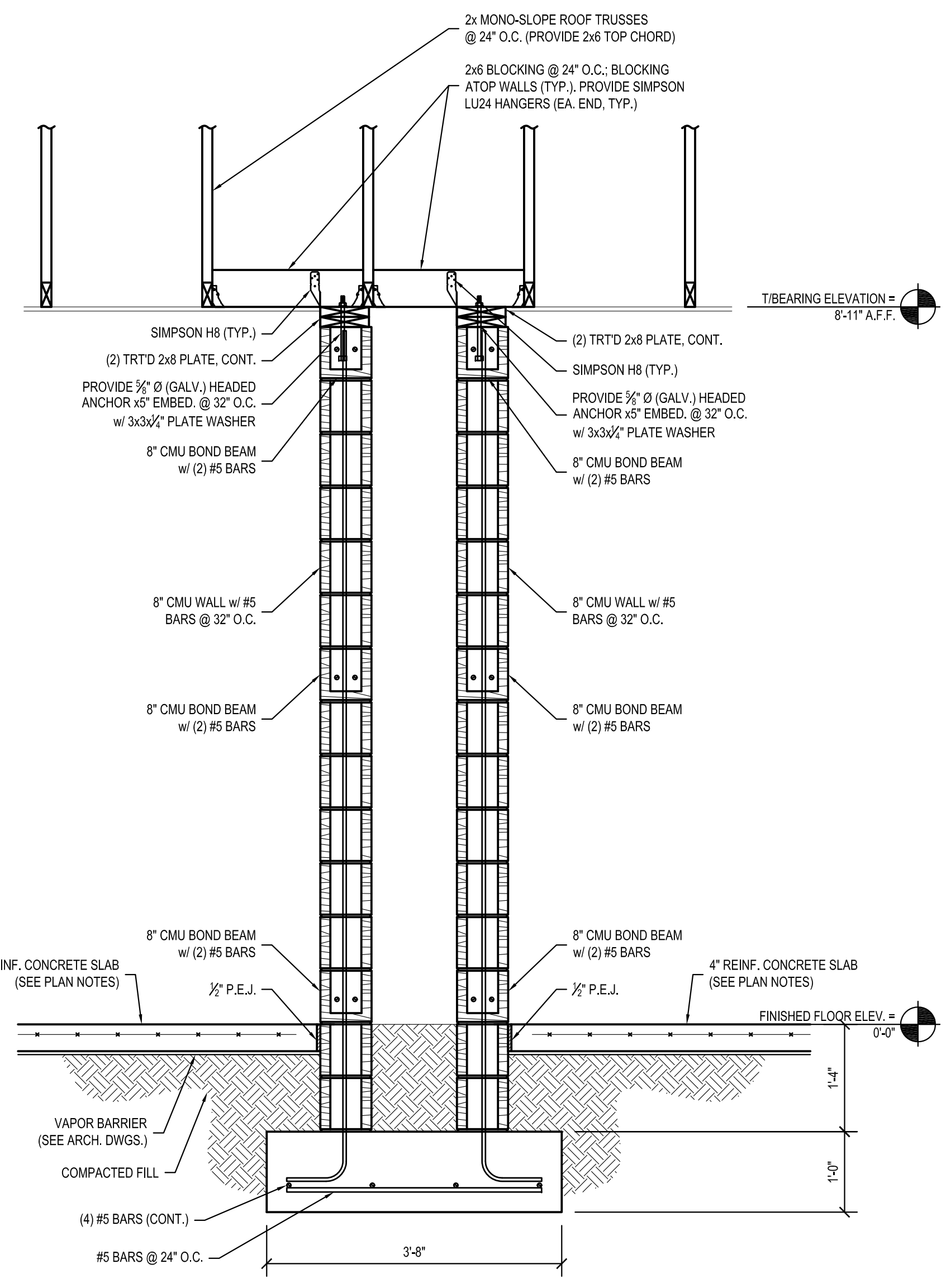
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**SECTIONS**

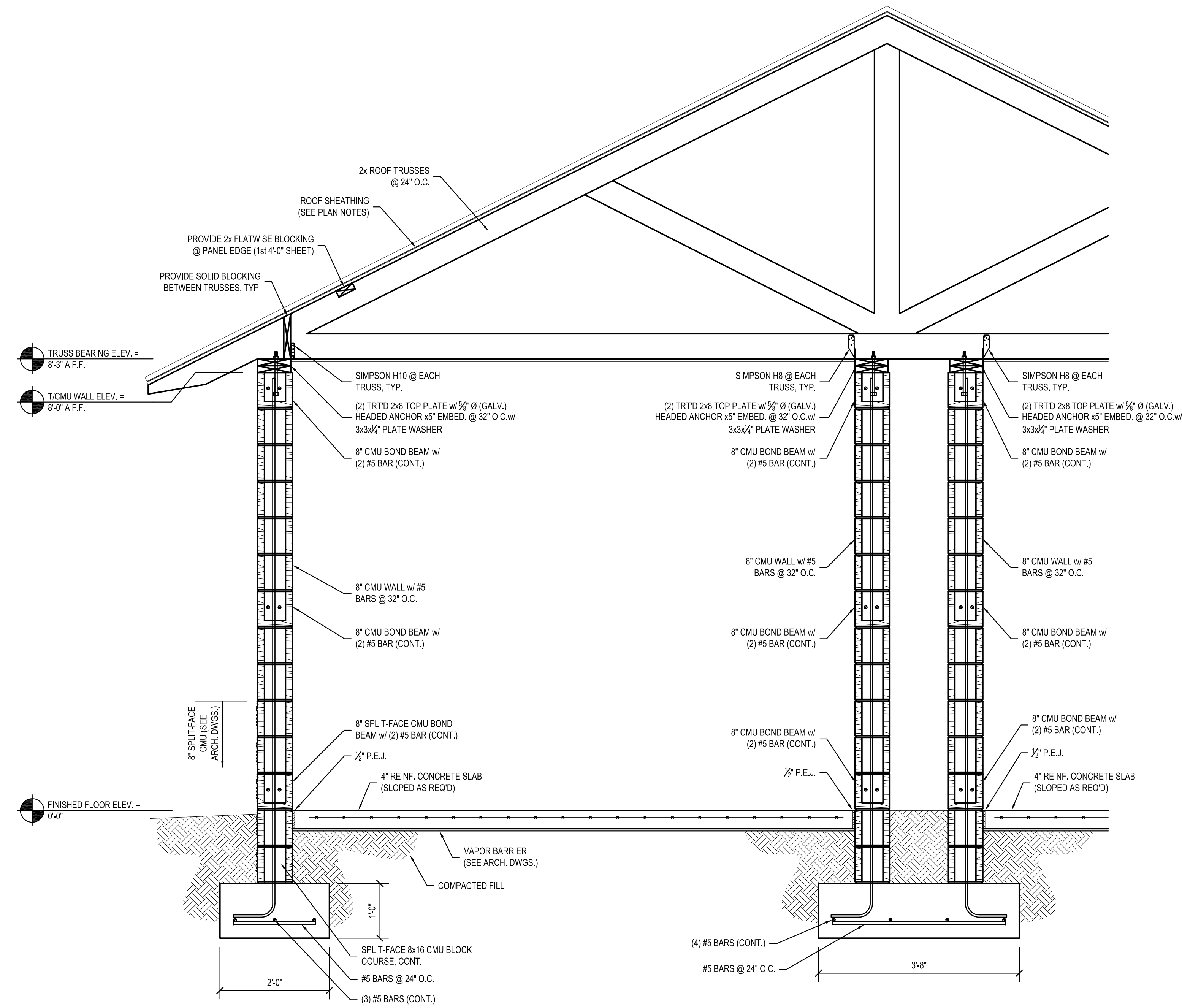
DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

**S202**

BID SET

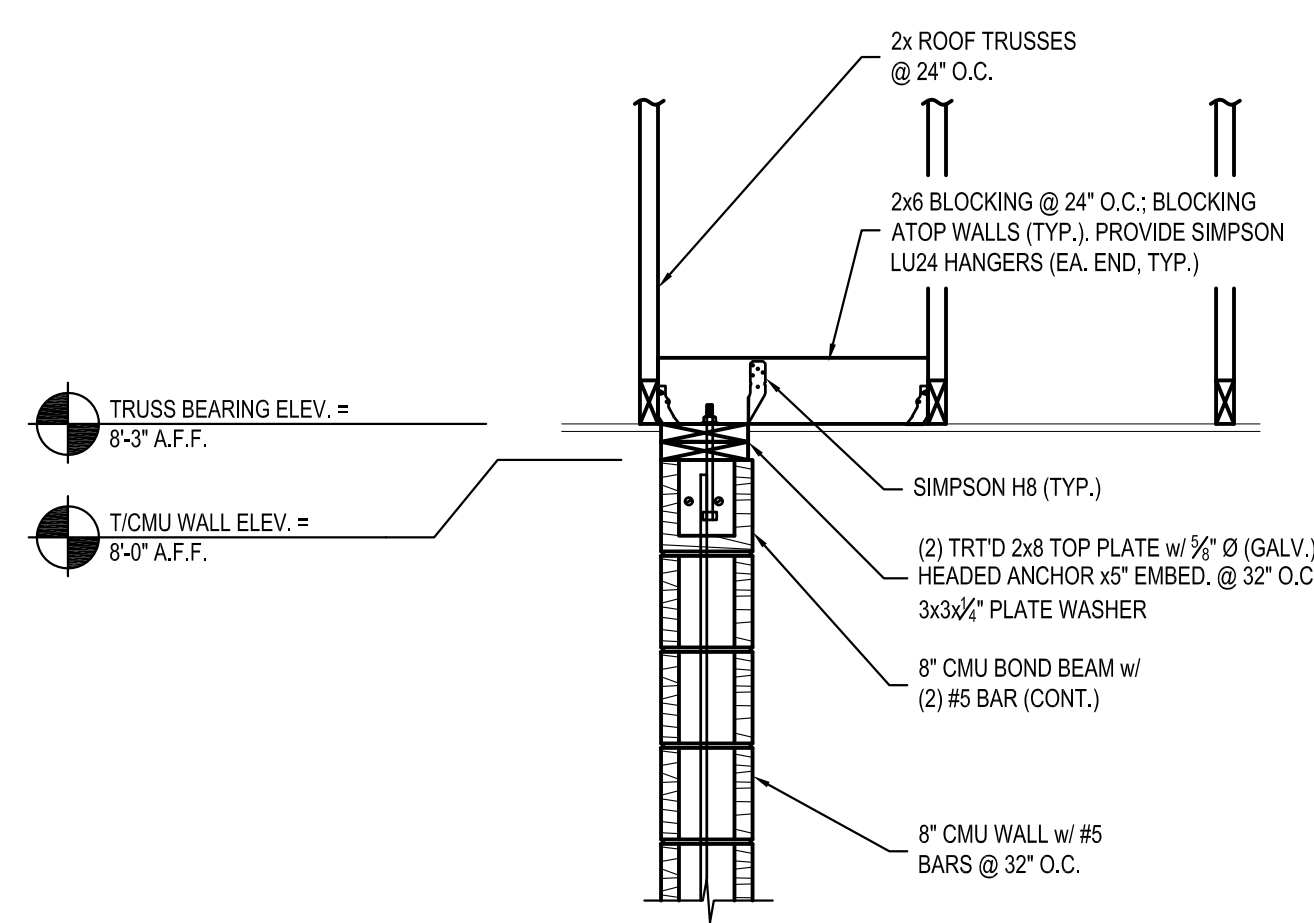


**5 SECTION @ BATHROOM**  
S203 SCALE: 3/4" = 1'-0"



**6 SECTION @ RESTROOMS**  
S203 SCALE: 3/4" = 1'-0"

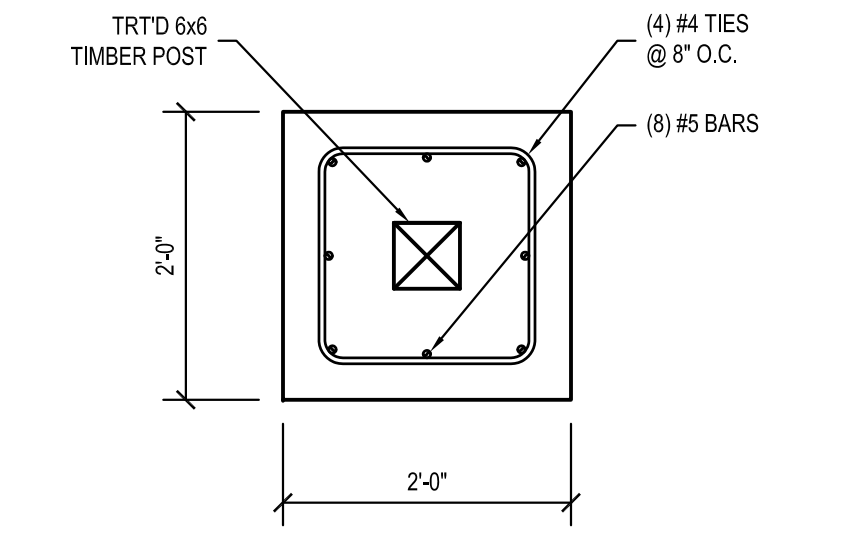
**6A SECTION @ BLOCKING OVER CMU WALL**  
S203 SCALE: 3/4" = 1'-0"



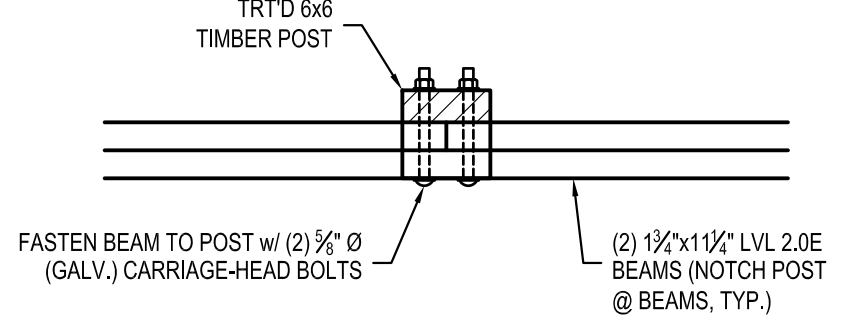
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| APPROVED BY:  | PAC      |  |  |  |  |
| DATE:   | 03.11.21 |  |  |  |  |
| REVISIONS:  | BID DATE |  |  |  |  |
| <p><b>CURRY ENGINEERS, LLC</b><br/>STRUCTURAL ENGINEERING</p> <p>843 - 849 - 9755<br/>5078 Ashcroft Way<br/>Murrellsville, NC 27559<br/>WWW.CURRYENGINEERS.COM</p>  |          |  |  |  |  |
| <p><b>HANAHAN REC CENTER</b><br/>TMS# 259-00-00-189<br/><b>HANAHAN, SC</b></p>  |          |  |  |  |  |
| <p><b>CURRY ENGINEERS, LLC</b><br/>No. C02848</p> <p><b>MADELA CURRY</b><br/>No. 21964</p> <p>10/14/20</p>  |          |  |  |  |  |
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| <b>SECTIONS</b>   |          |  |  |  |  |
| DRAWN BY: J. BOYD   |          |  |  |  |  |
| DESIGNED BY: P. CURRY   |          |  |  |  |  |
| CHECKED BY: P. CURRY  |          |  |  |  |  |
| DATE: 10.14.20  |          |  |  |  |  |
| SCALE: AS NOTED   |          |  |  |  |  |
| JOB NO.: 220-064  |          |  |  |  |  |
| SHEET:  |          |  |  |  |  |

BID SET

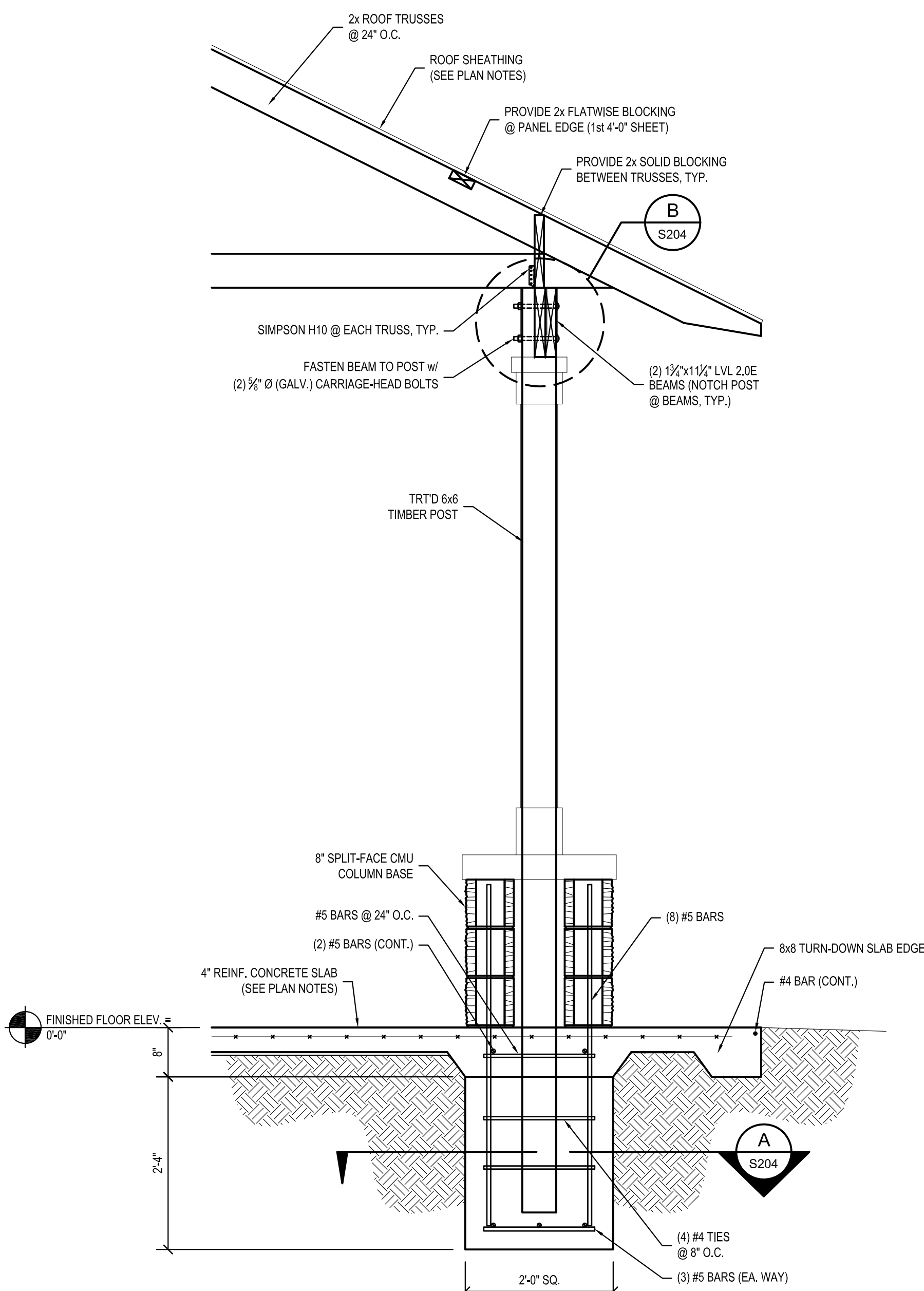
S203



**A DETAIL THRU FOUNDATION**  
S204 SCALE: 3/4" = 1'-0"



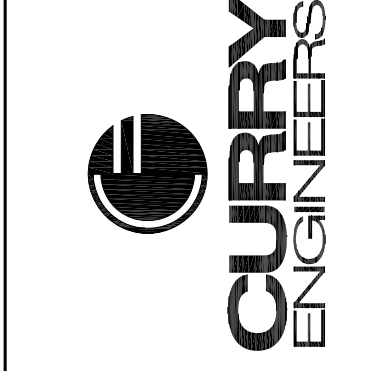
**B SPIICE DETAIL @ LVL BEAMS**  
S204 SCALE: 1" = 1'-0"



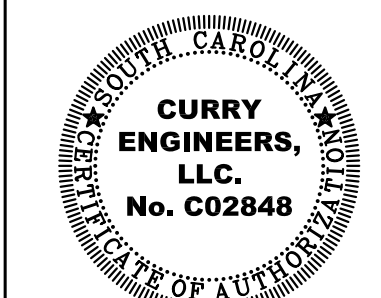
**7 SECTION @ PAVILION**  
S204 SCALE: 3/4" = 1'-0"

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
|------------|----------|----------|--------------|
| Δ          |          | 03.11.21 | PAC          |
| Δ          |          |          |              |
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| Δ          |          |          |              |
| Δ          |          |          |              |

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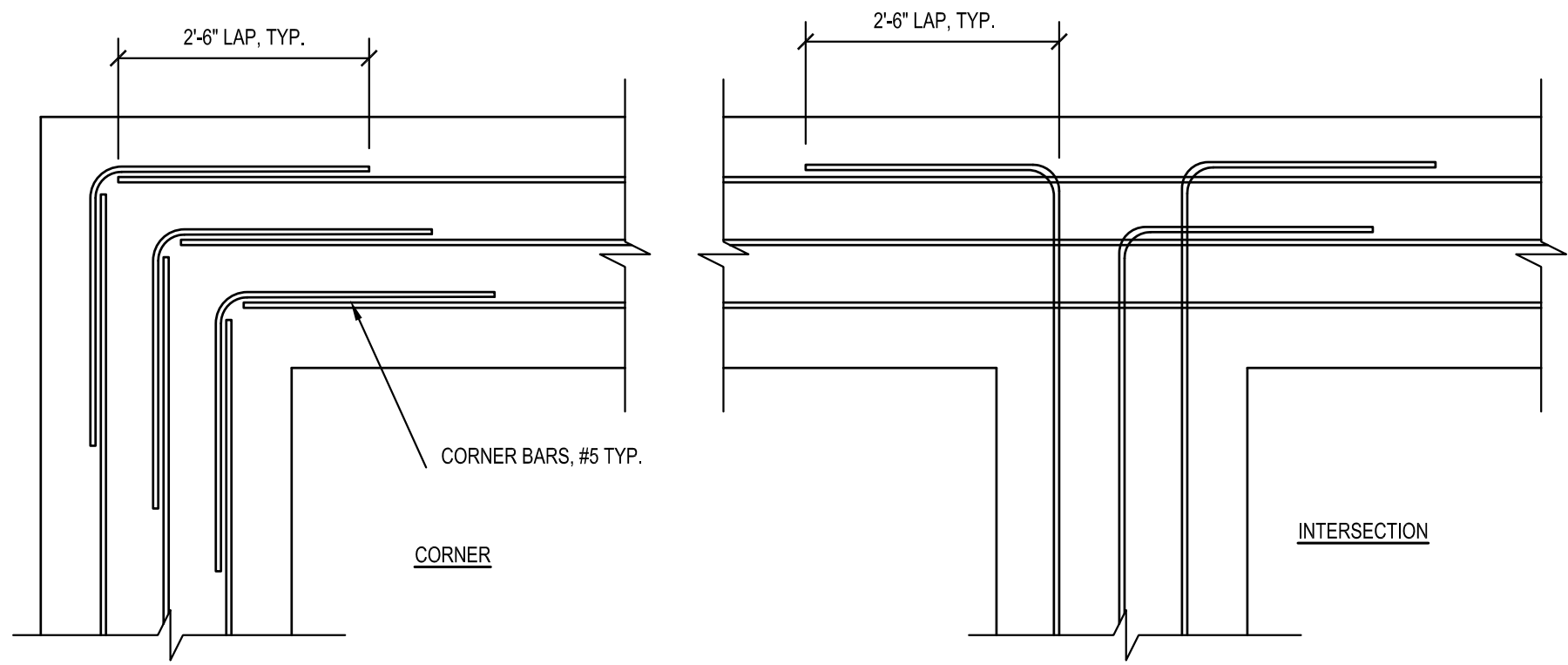
**SECTIONS**

DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

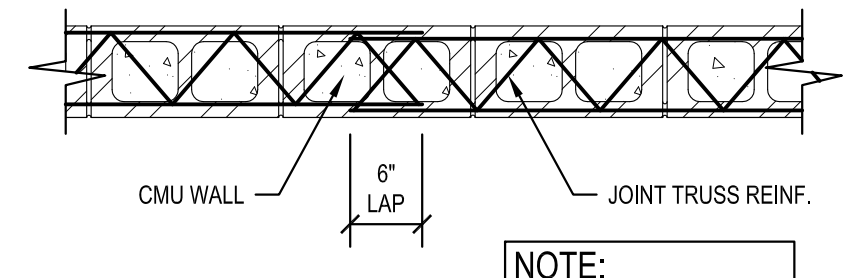
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BID SET

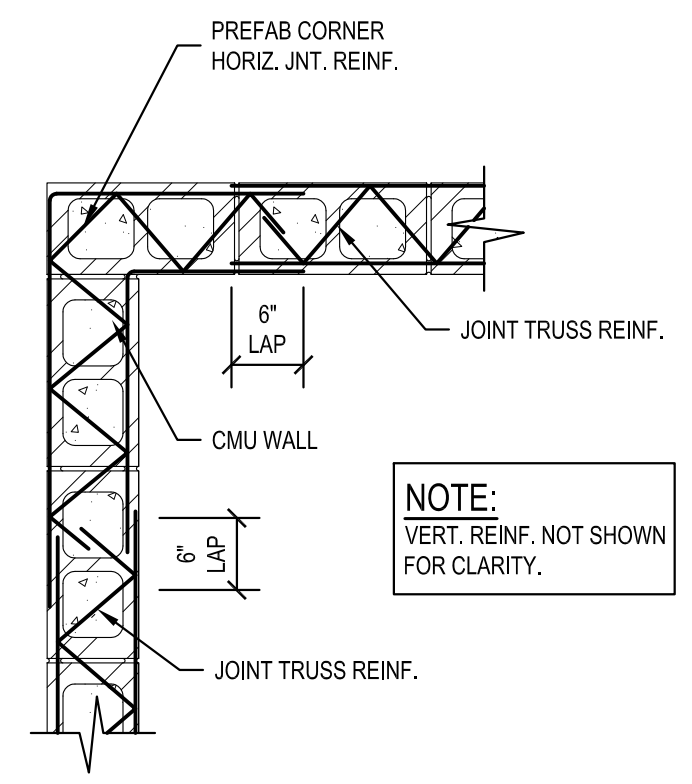




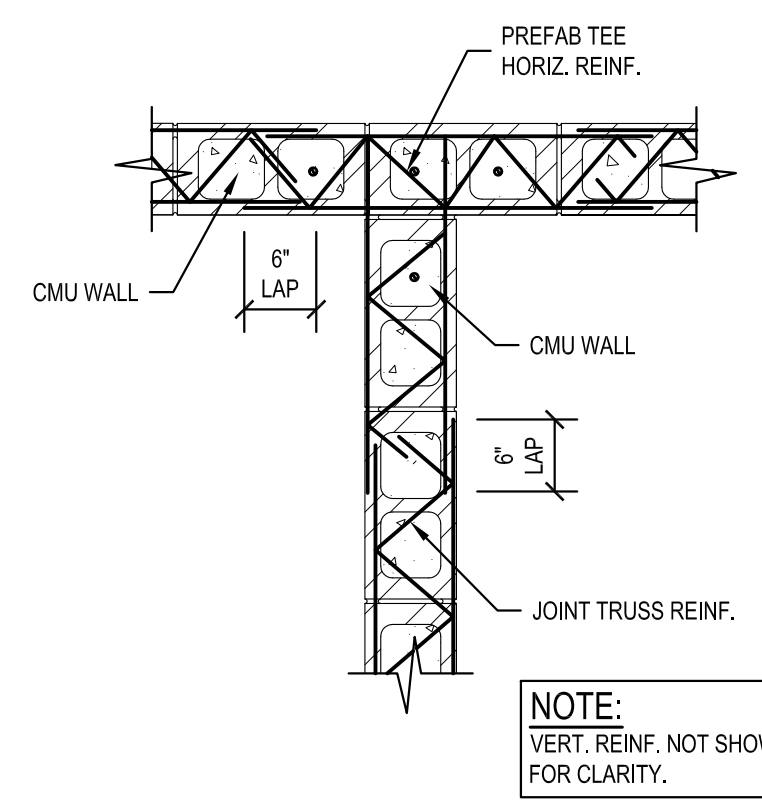
**A TYP. FOOTING DETAIL**  
SCALE: N.T.S.



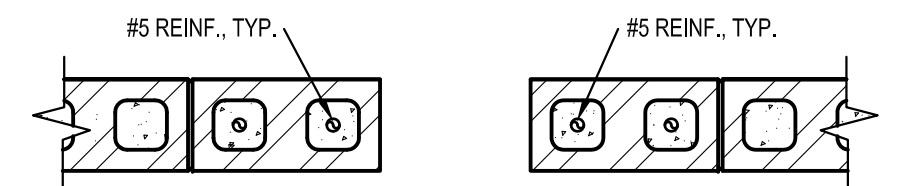
**B TYP. LAP SPLICES @ JNT. REINF.**  
SCALE: 3/4" = 1'-0"



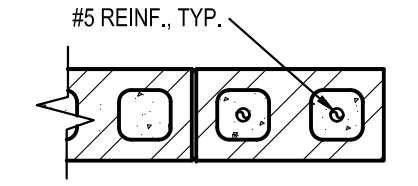
**C TYP. JNT. REINF. LAP SPLICES @ CORNER**  
SCALE: 3/4" = 1'-0"



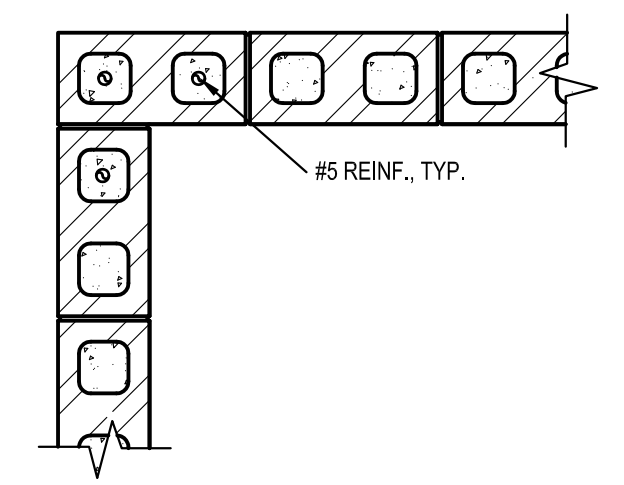
**D TYP. JNT. REINF. LAP SPLICES @ INTERSECTION**  
SCALE: 3/4" = 1'-0"



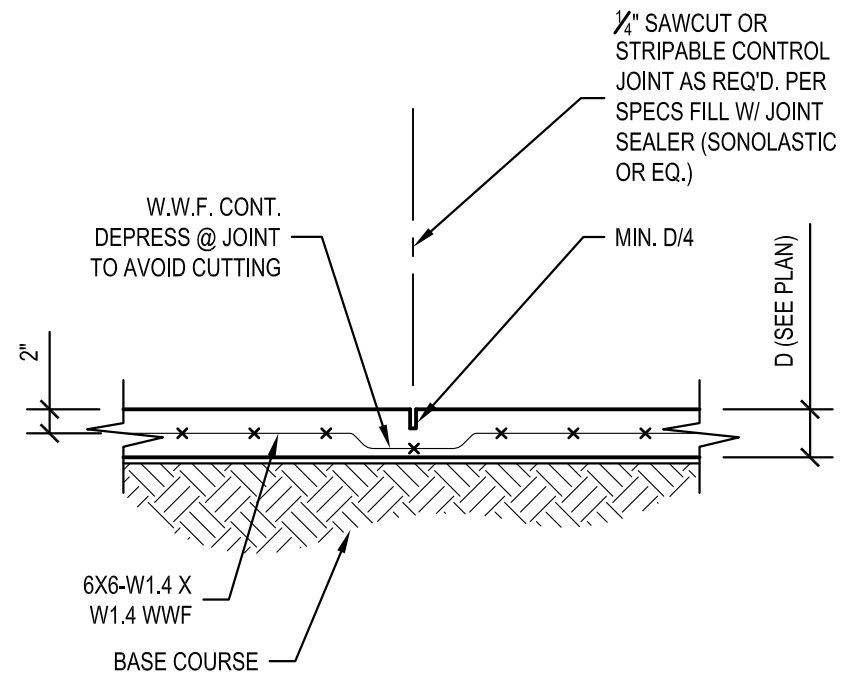
**E TYP. CMU WALL REINF. @ OPENING**  
SCALE: 3/4" = 1'-0"



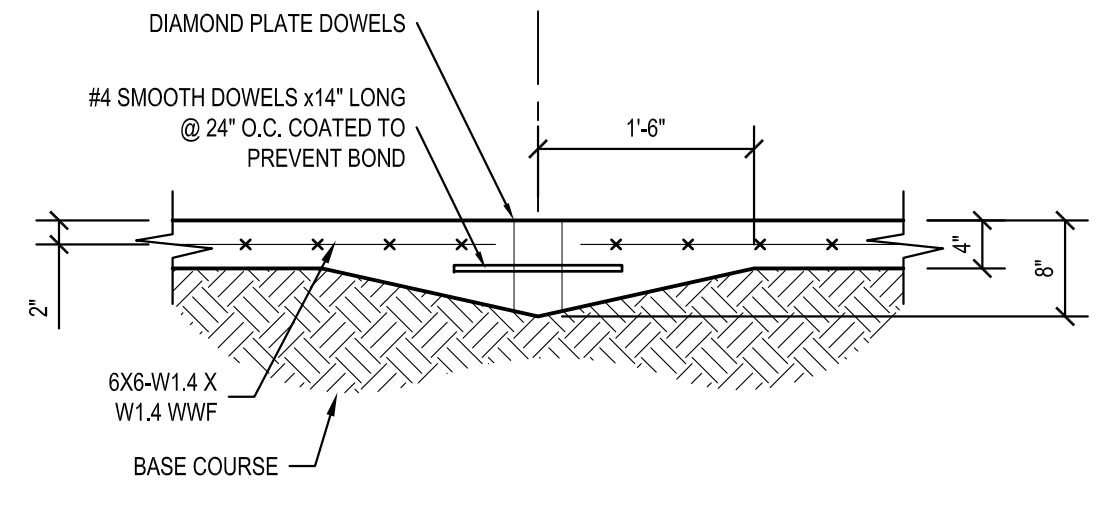
**F TYP. CMU WALL REINF. @ END WALL**  
SCALE: 3/4" = 1'-0"



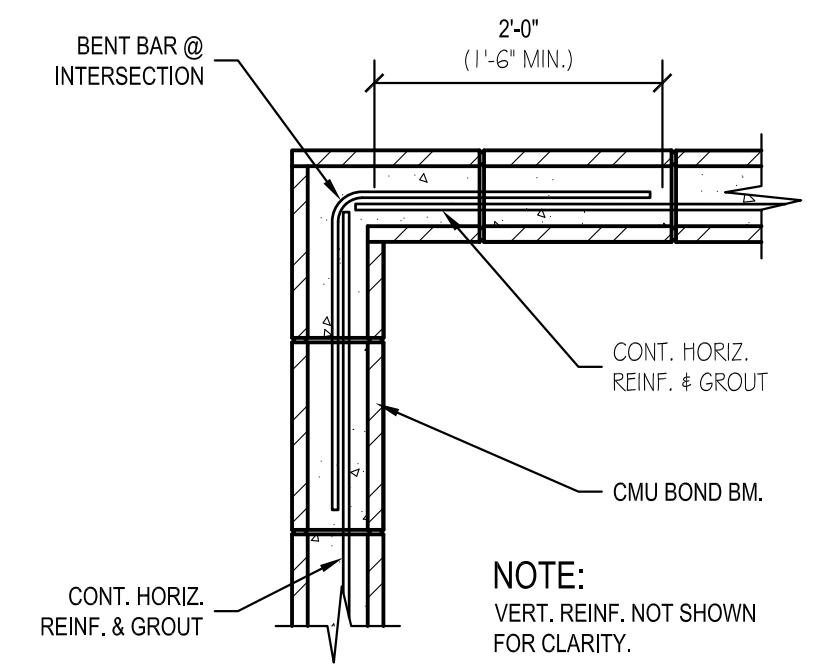
**G TYP. CMU WALL REINF. @ CORNER**  
SCALE: 3/4" = 1'-0"



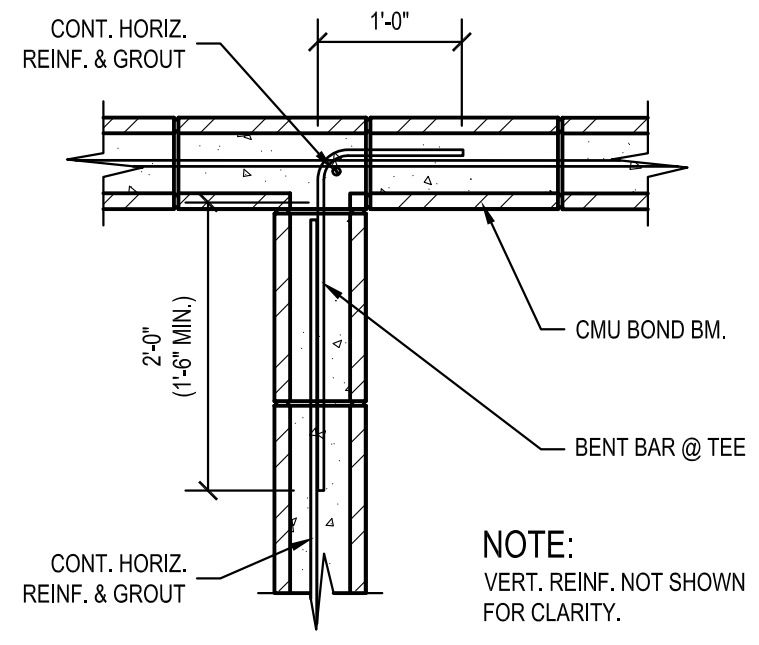
**H TYP. CNTRL JNT. @ SLAB ON GRADE**  
SCALE: 3/4" = 1'-0"



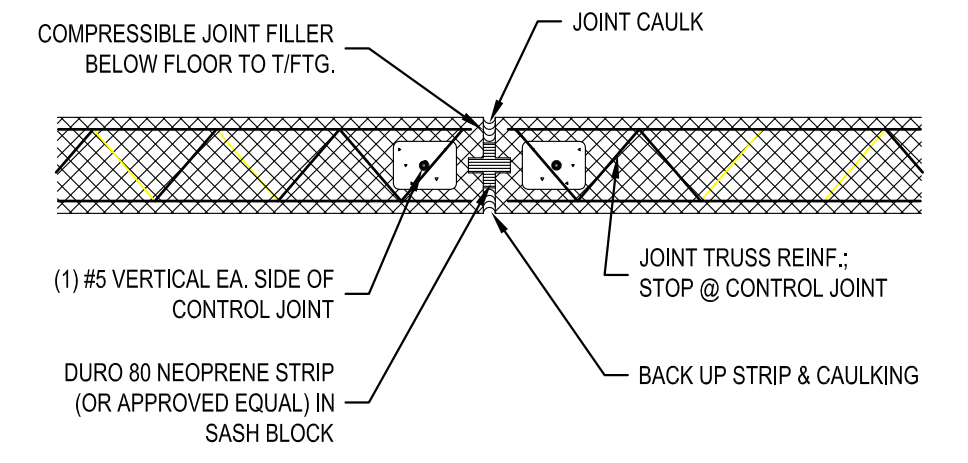
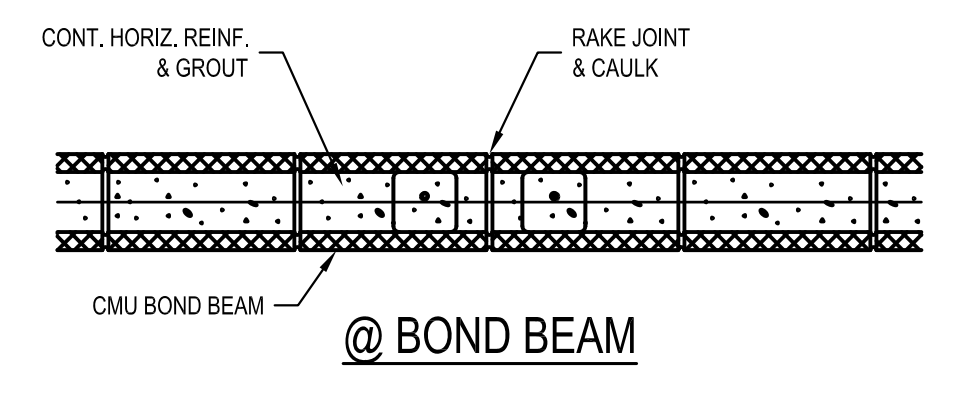
**J TYP. CONSTRUCTION JNT. DETAIL @ SLAB ON GRADE**  
SCALE: 3/4" = 1'-0"



**K TYP. BOND BEAM CORNER REINF. DETAIL**  
SCALE: 3/4" = 1'-0"



**L TYP. BOND BEAM CORNER REINF. @ INTERSECTION**  
SCALE: 3/4" = 1'-0"



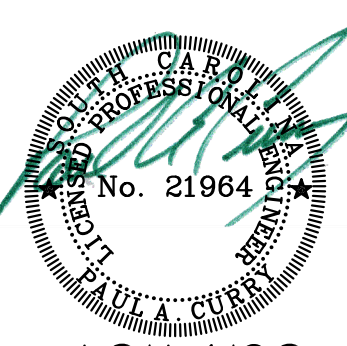
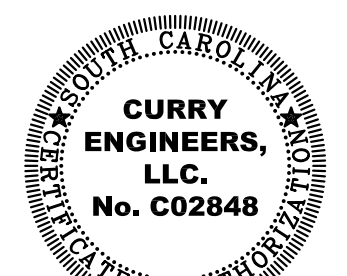
**M TYP. CONTROL JOINT @ CMU WALL**  
SCALE: 3/4" = 1'-0"

| REVISIONS: | BID DATE | DATE     | APPROVED BY: |
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|            |          | 03.11.21 | PAC          |

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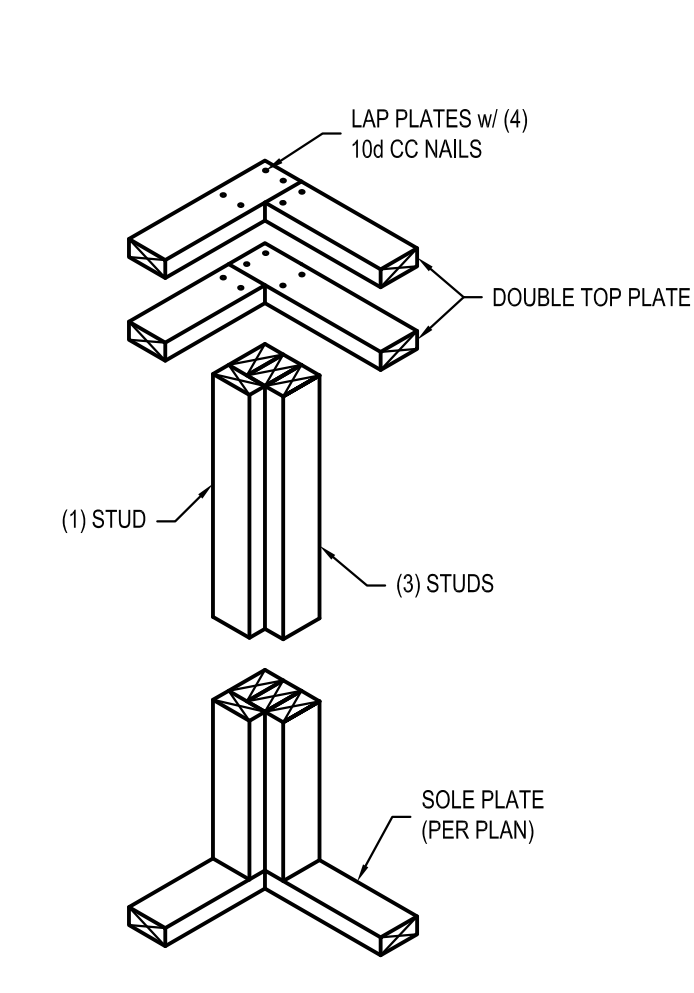
10/14/20  
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**FOUNDATION DETAILS**

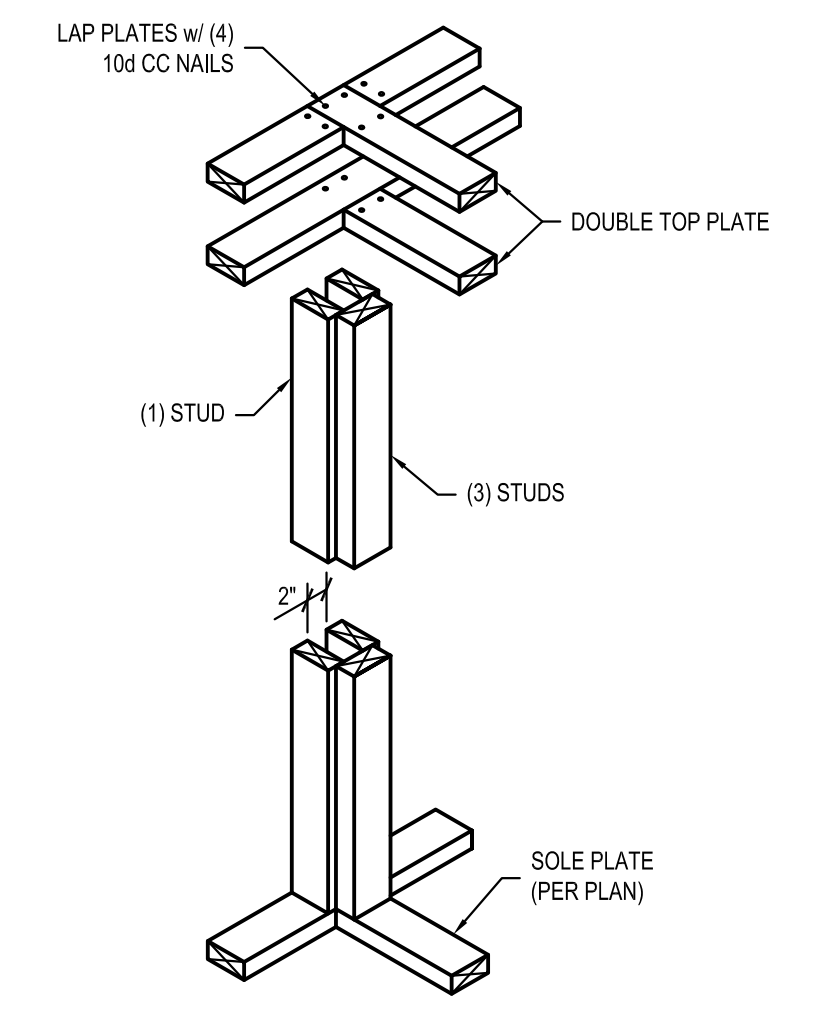
DRAWN BY: J. BOYD  
DESIGNED BY: P. CURRY  
CHECKED BY: P. CURRY  
DATE: 10.14.20  
SCALE: AS NOTED  
JOB NO.: 220-064  
SHEET:

**S205**

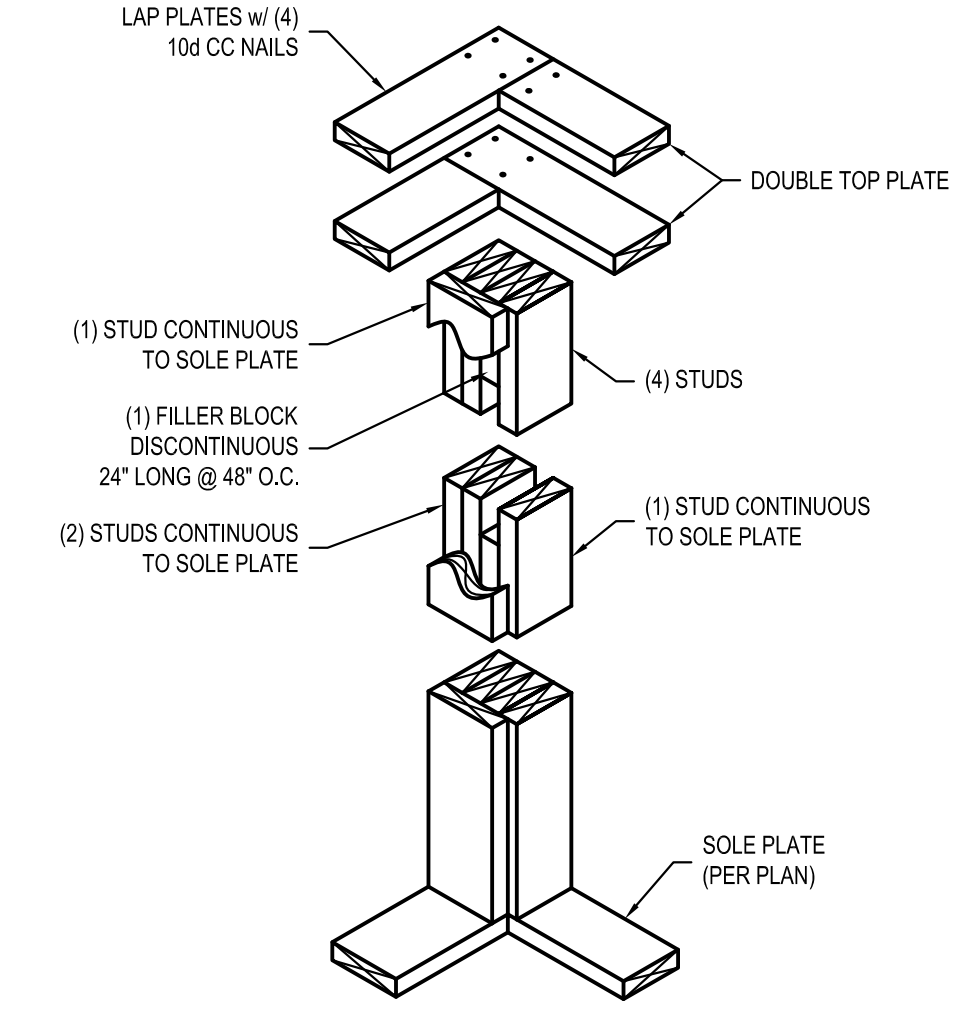
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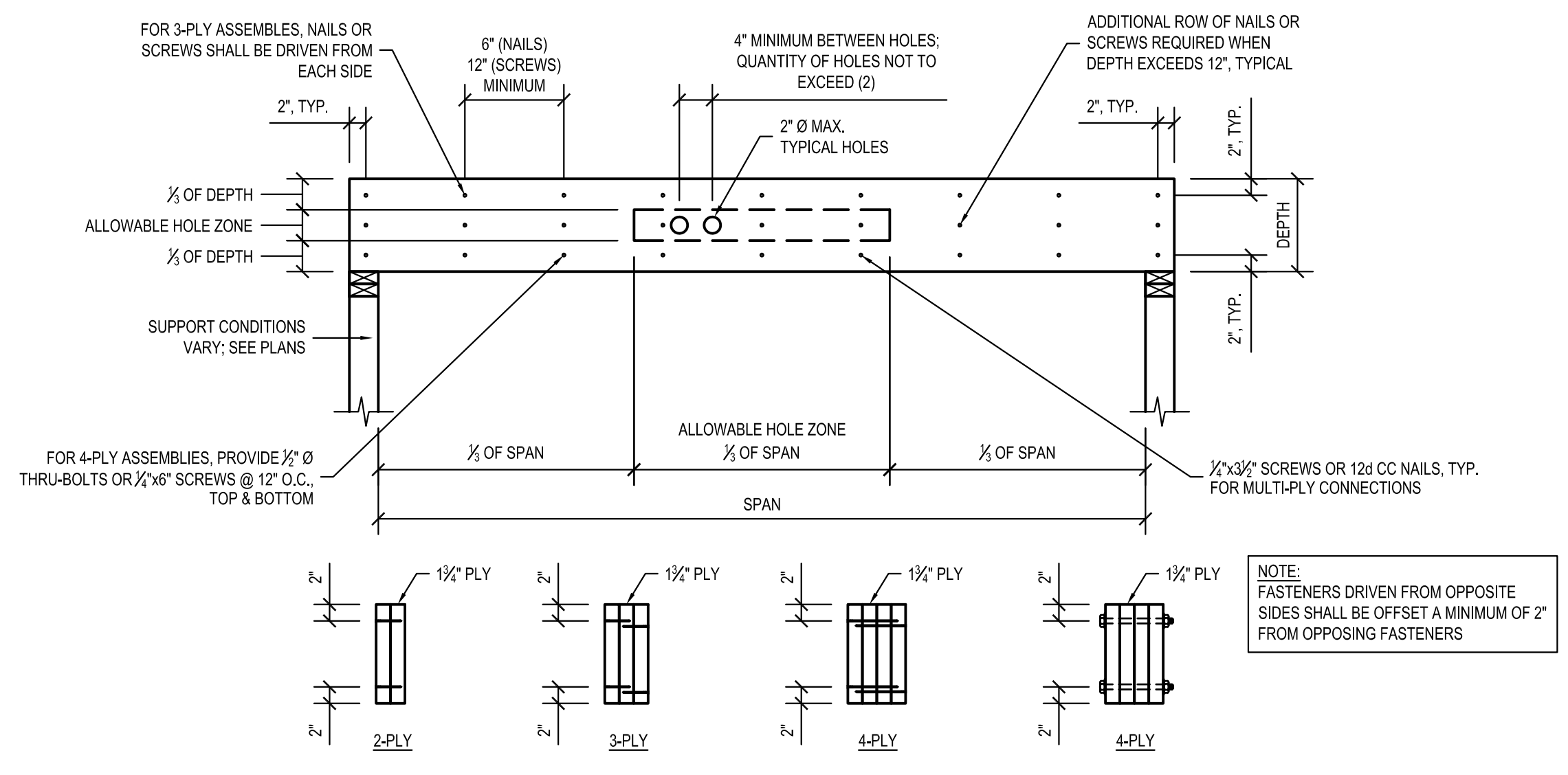
**A TYP. FRAMING @ 2x4 CORNER**  
SCALE: 3/4" = 1'-0"



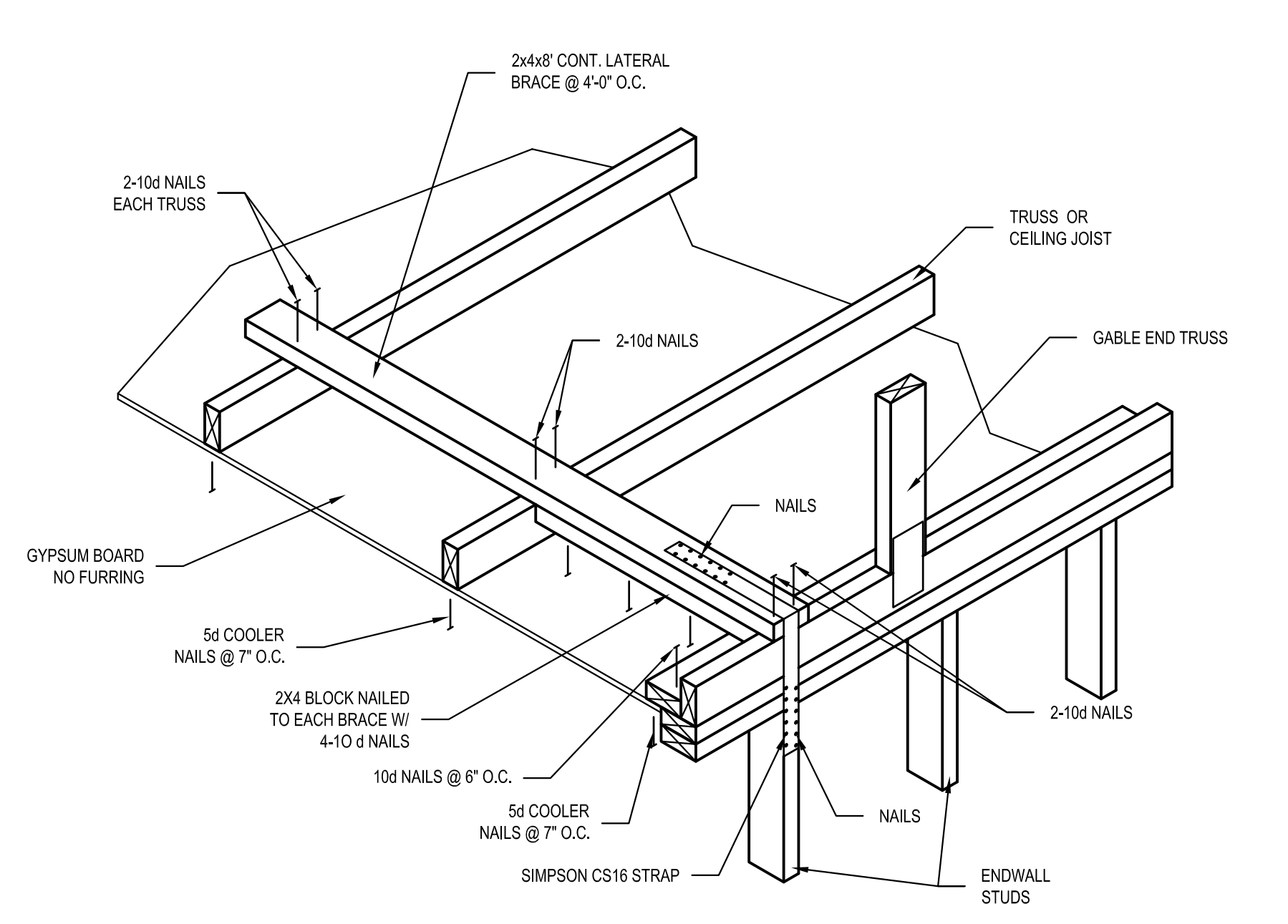
**B TYP. FRAMING @ 2x PARTITION**  
SCALE: 3/4" = 1'-0"



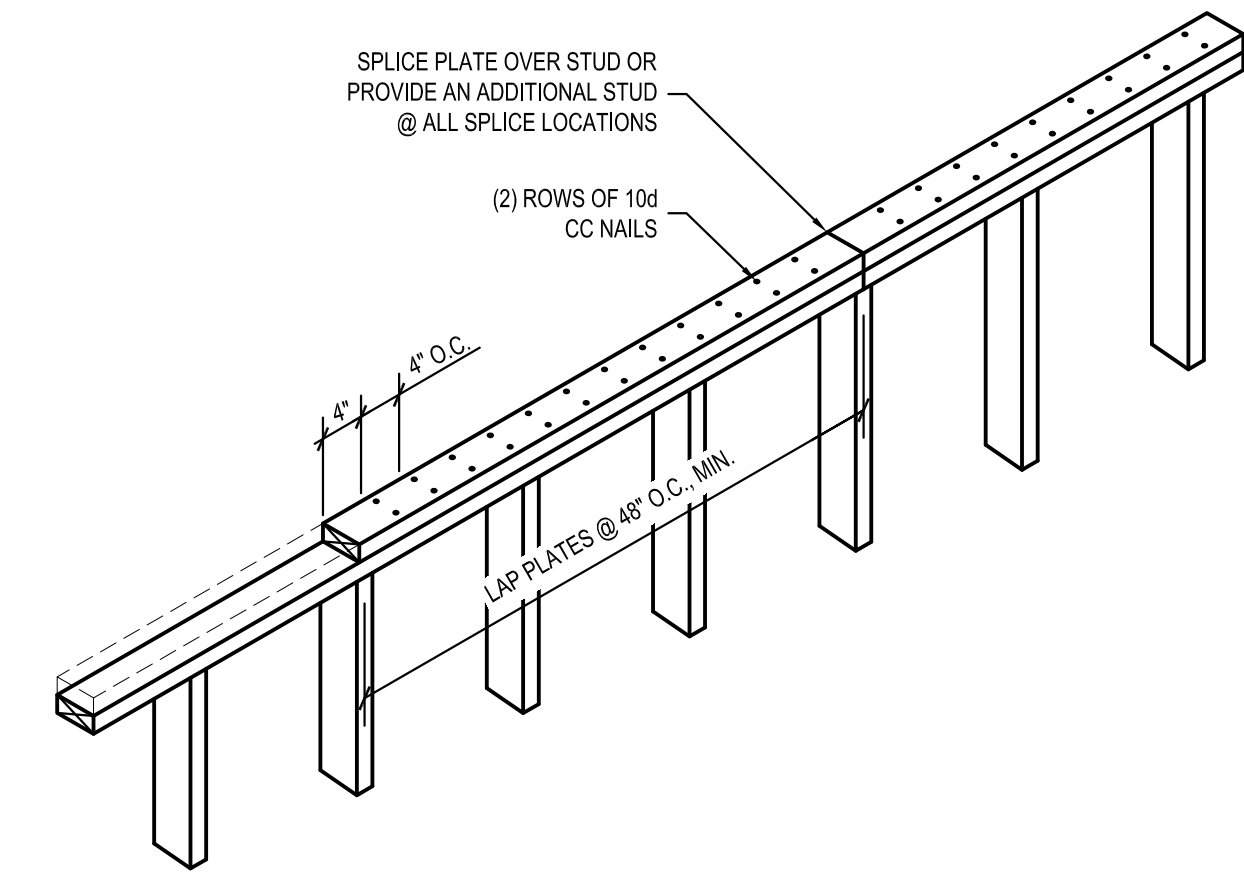
**C TYP. FRAMING @ 2x6 CORNER**  
SCALE: 3/4" = 1'-0"



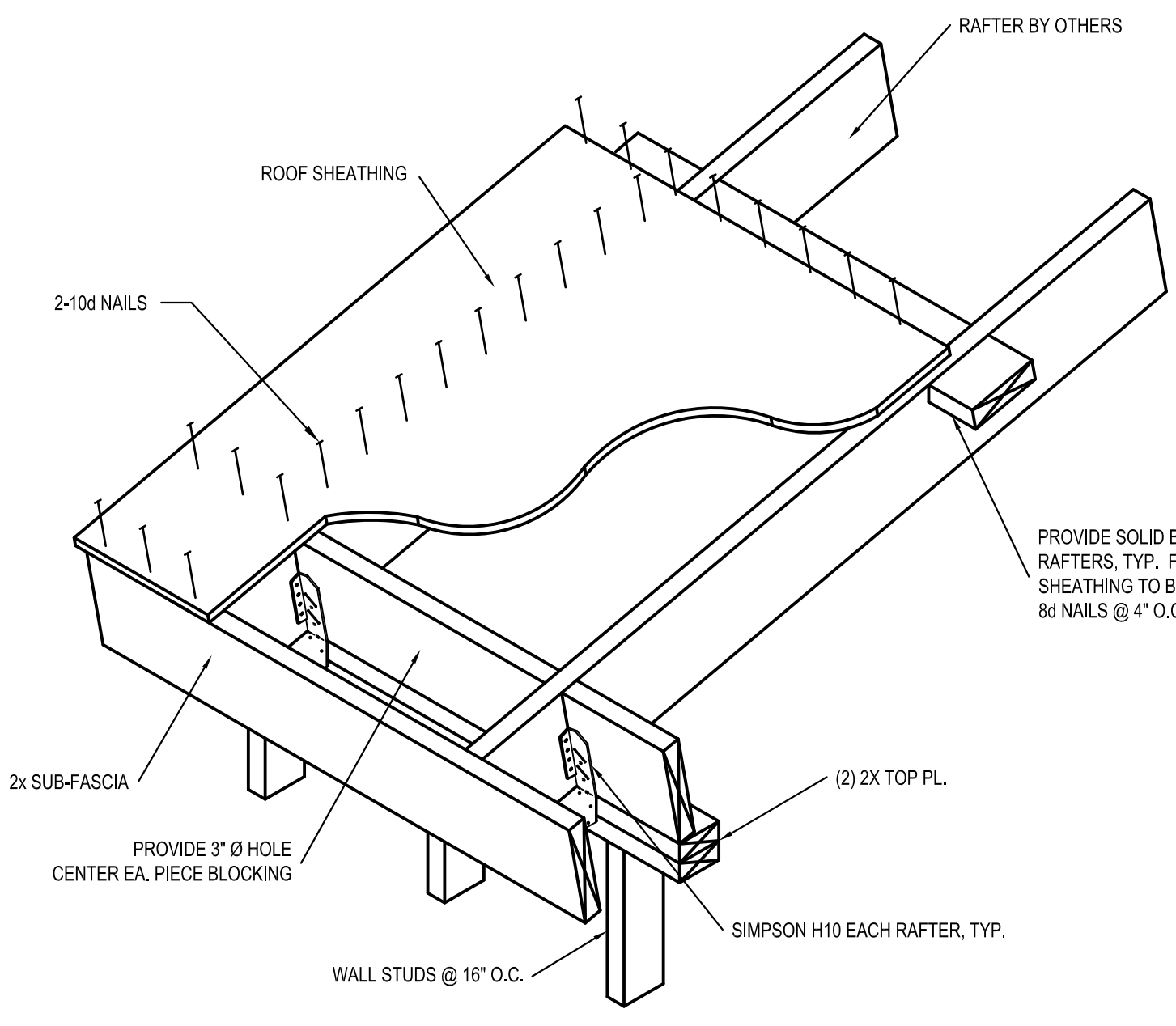
**D TYP. LVL DETAILS**  
SCALE: 3/4" = 1'-0"



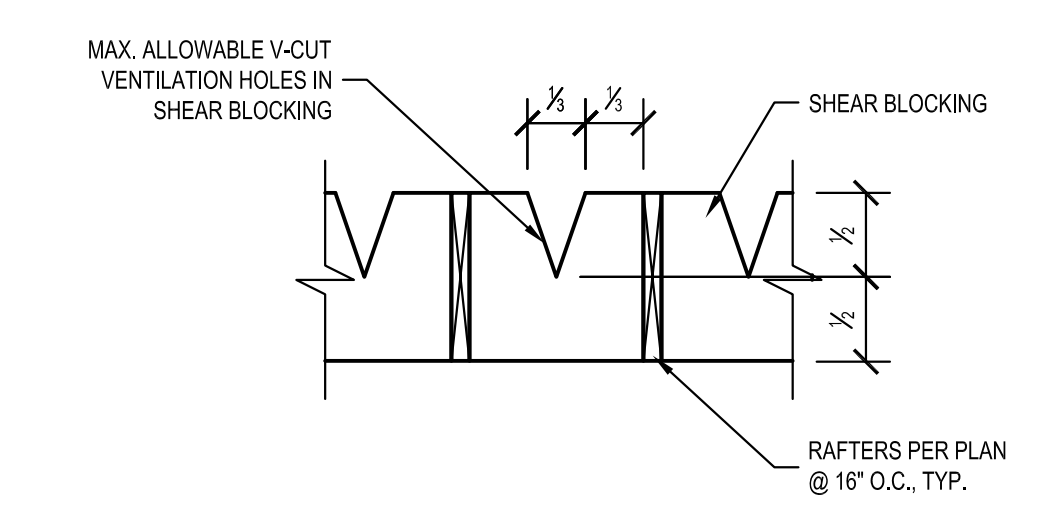
**H TYP. CEILING CONNECTION @ GABLE ENDWALL**  
SCALE: N.T.S.



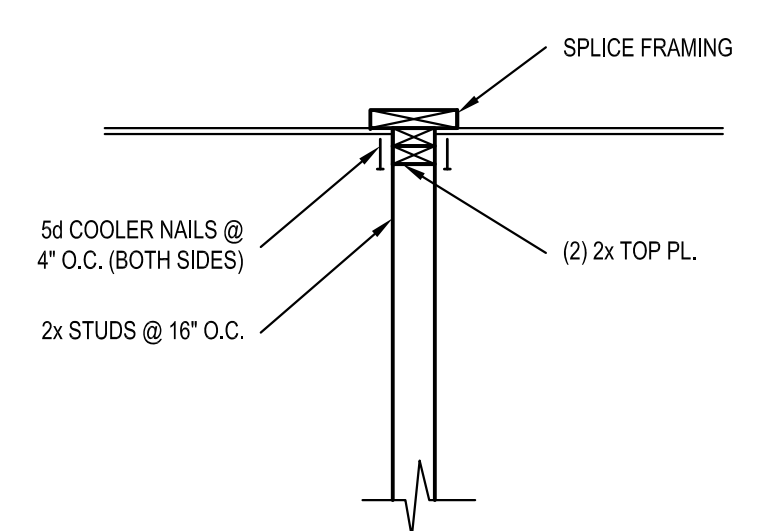
**J TYP. TOP PLATE SPLICE @ EXTERIOR WALLS**  
SCALE: 3/4" = 1'-0"



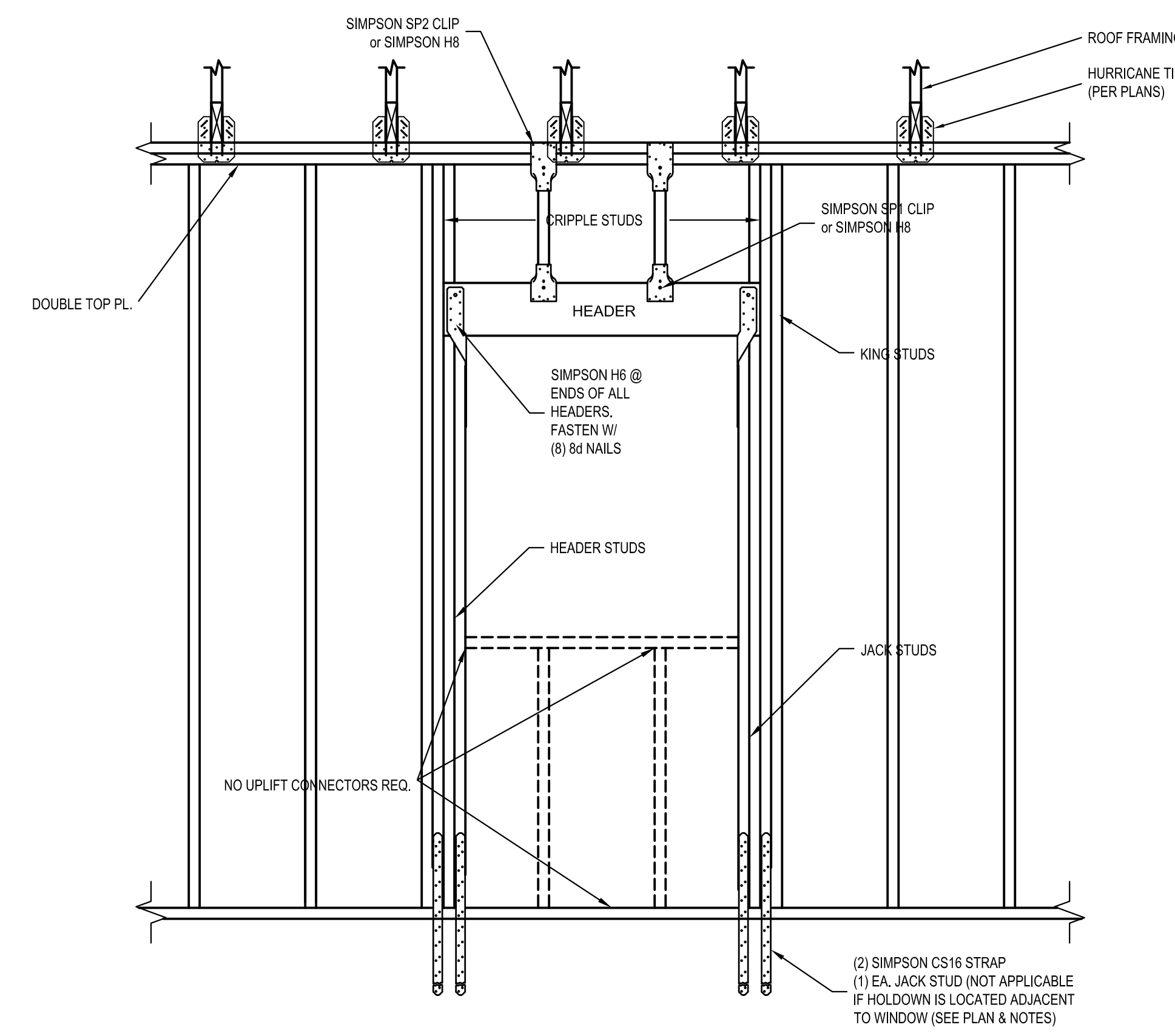
**E TYP. SHEAR BLOCKING DETAIL**  
SCALE: N.T.S.



**F SHEAR BLOCKING DETAIL**  
SCALE: 3/4" = 1'-0"



**G DIAPHRAGM SPLICE OVER PARTITION WALL**  
SCALE: 3/4" = 1'-0"



**K TYP. UPLIFT CONNECTIONS @ WINDOW & DOOR OPENINGS @ 2nd FLOOR**  
SCALE: 3/4" = 1'-0"

|              |          |     |
|--------------|----------|-----|
| DATE         | 03.11.21 | PAC |
| APPROVED BY: |          |     |
| REVISIONS:   |          |     |

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**HANAHAN REC CENTER**  
**TMS# 259-00-00-189**  
**HANAHAN, SC**

REGISTERED PROFESSIONAL ENGINEER  
**CURRY ENGINEERS, LLC**  
No. C02848

REGISTERED PROFESSIONAL ENGINEER  
**MAURA CURRY**  
No. 21964

10/14/20  
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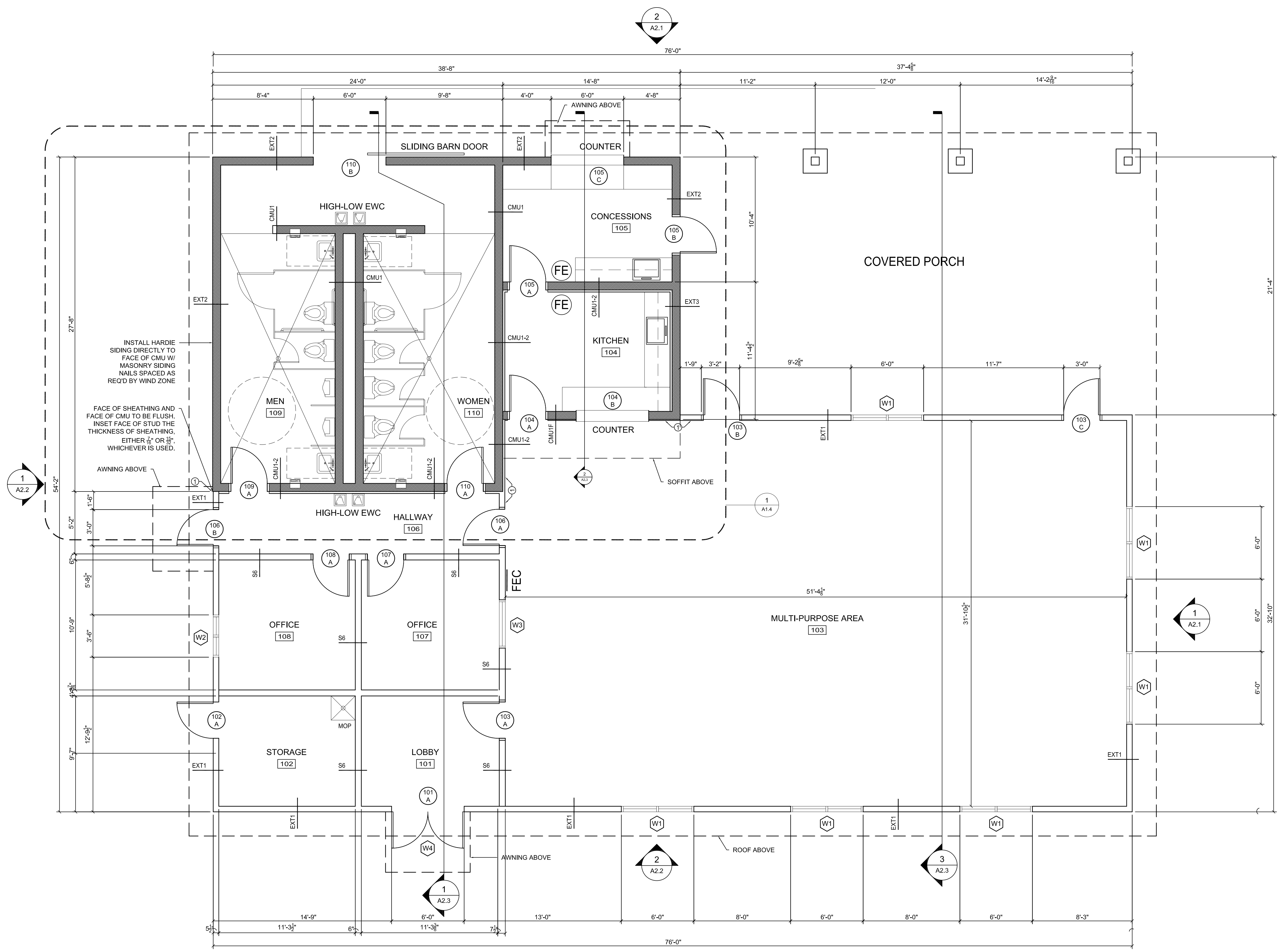
**FRAMING DETAILS**

|              |          |
|--------------|----------|
| DRAWN BY:    | J. BOYD  |
| DESIGNED BY: | P. CURRY |
| CHECKED BY:  | P. CURRY |
| DATE:        | 10.14.20 |
| SCALE:       | AS NOTED |
| JOB NO.:     | 220-064  |
| SHEET:       |          |

**S300**

BID SET

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**GENERAL NOTES**

1. EXTEND ALL WALLS TO UNDERSIDE OF ROOF STRUCTURE, UNO
2. USE MOISTURE-RESISTANT GWB IN TOILETS AND MAINTENANCE ROOMS, TYP.
3. ALL CONCEALED GWB ABOVE CEILING TO BE STANDARD 5/8" GWB, UNO
4. ALL DIMENSIONS ARE TO FACE OF STUD OR MASONRY, UNO. DIMENSIONS TO HOLLOW METAL DOOR FRAMED OPENINGS ARE TO THE ROUGH OPENING
5. ALL INTERIOR WALLS TO BE 2X6 WOOD STUDS AT 16" O.C. W/ ONE LAYER 5/8" GWB EA. SIDE UNO. SEE WALL TYPES SHEET G0.0
6. SEE ENLARGED FLOOR PLANS FOR DIMENSIONS NOT INDICATED
7. ALL NOTES THIS SHEET ARE TYPICAL FOR ALL FLOOR PLANS AND FLOOR PLAN NOTES.

**CONSTRUCTION NOTES**

1. FACE OF SHEETROCK TO BE FLUSH THOUGH SUBSTRATE VERRIES. OFFSET STUD WALL ACCORDINGLY AS INDICATED

**FLOOR PLAN LEGEND**

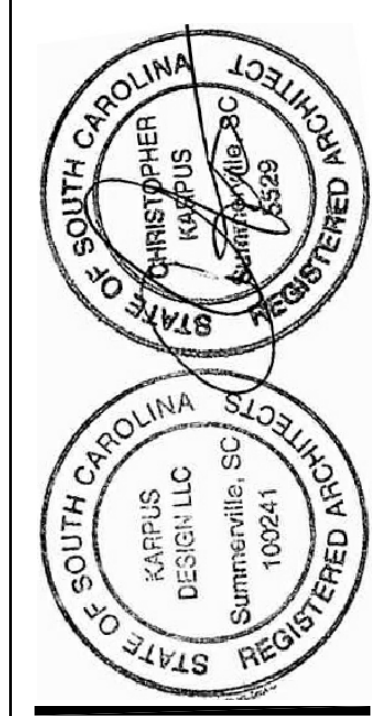
- INTERIOR WALL - WOOD STUD
- NEW EXTERIOR WALL
- GWB SOFFIT ABOVE. SEE RCP A3 SERIES
- ROOM 100** ROOM NAME & NUMBER  
SEE FINISH SCHEDULE SHT. A8.1
- DOOR TAG, SEE DOOR SCHEDULE SHT. A8.1
- WINDOW TAG, SEE WINDOW SCHEDULE SHT. A8.1
- FEC** FIRE EXTINGUISHER, TYPE ABC DRY CHEMICAL RECESSED CABINET. SEE G0.1 FOR INFORMATION
- EXT 1** WALL TYPE. SEE NOTES SHEET D1.1
- INTERIOR ELEVATIONS. SEE SHEET A7.2

**1 REC. CENTER FLOOR PLAN**  
SCALE: 1/4"=1'-0"

KARPUS DESIGN, LLC  
 P.O. Box 986  
 Summerville, South Carolina, 29484  
 ph: 843.425.4124 | fax: 843.832.7331  
 karpusdesign.com



MOUNT PLEASANT, SC 29464.1667  
 GREENVILLE, SC 864.298.0534  
 SUMMERVILLE, SC 843.972.0710  
 SPARTANBURG, SC 864.298.0534  
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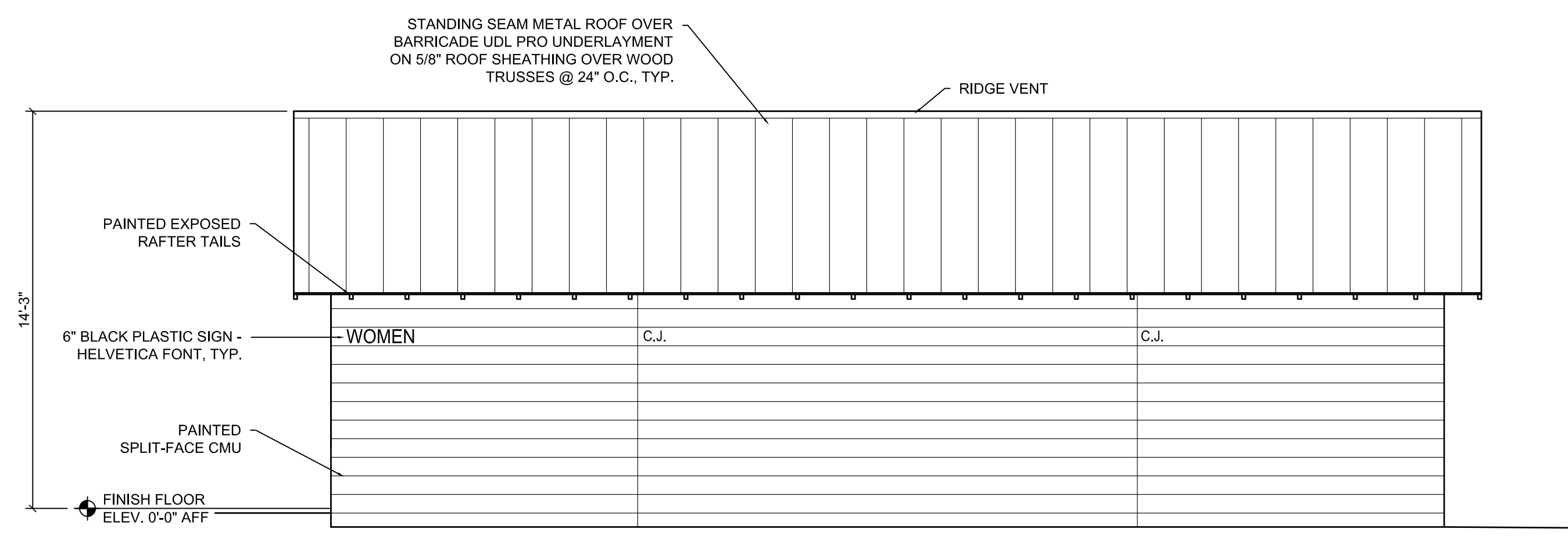
**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 3/11/21  
 DRAWN BY: CMK  
 CHECKED BY: JRP

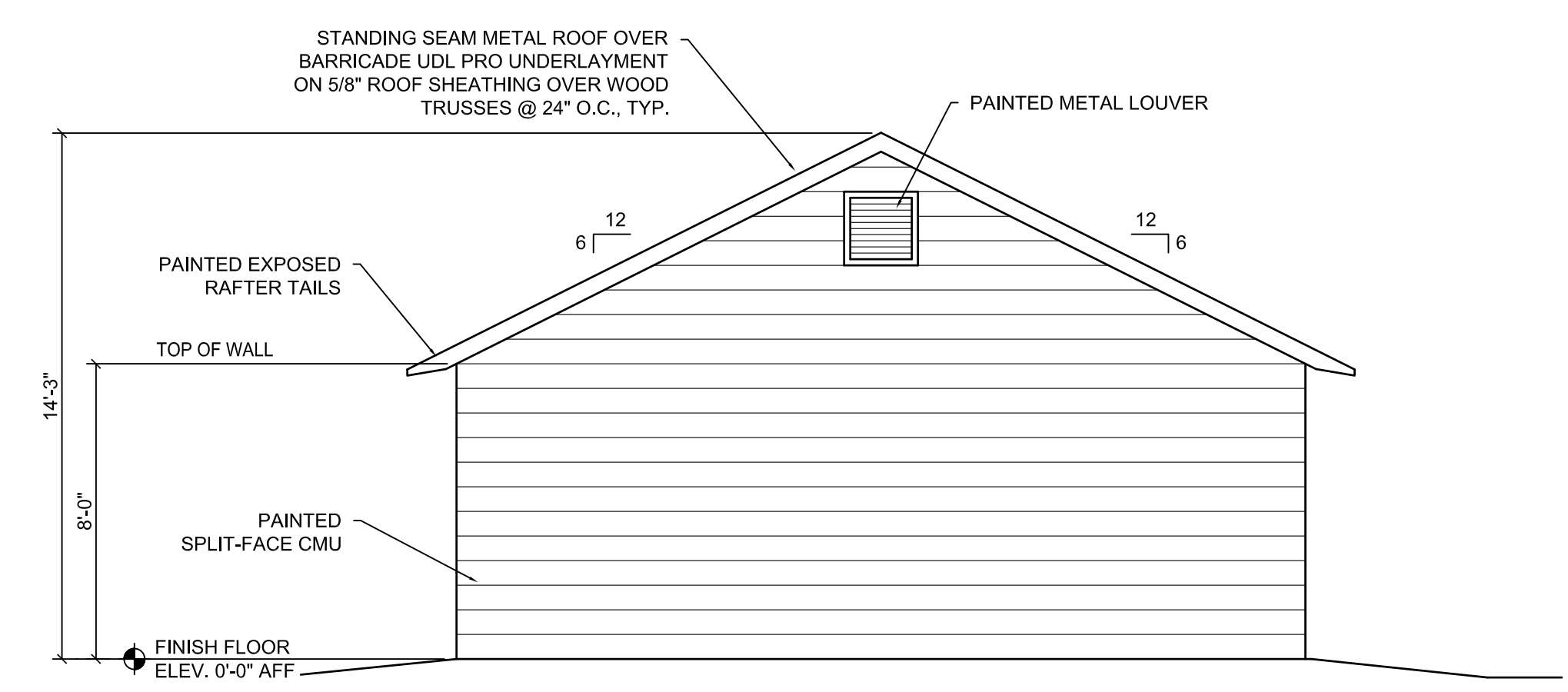
**REVISION HISTORY**

|   |         |         |
|---|---------|---------|
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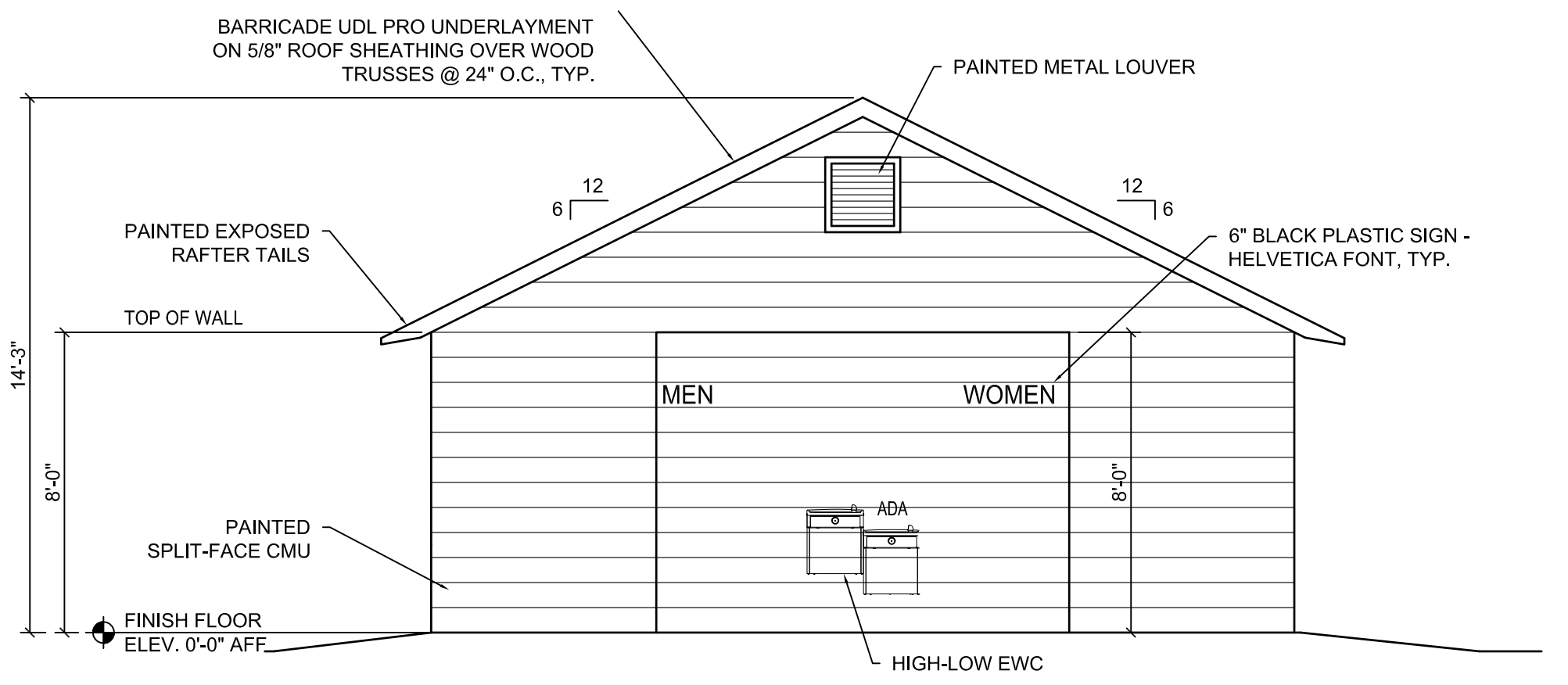
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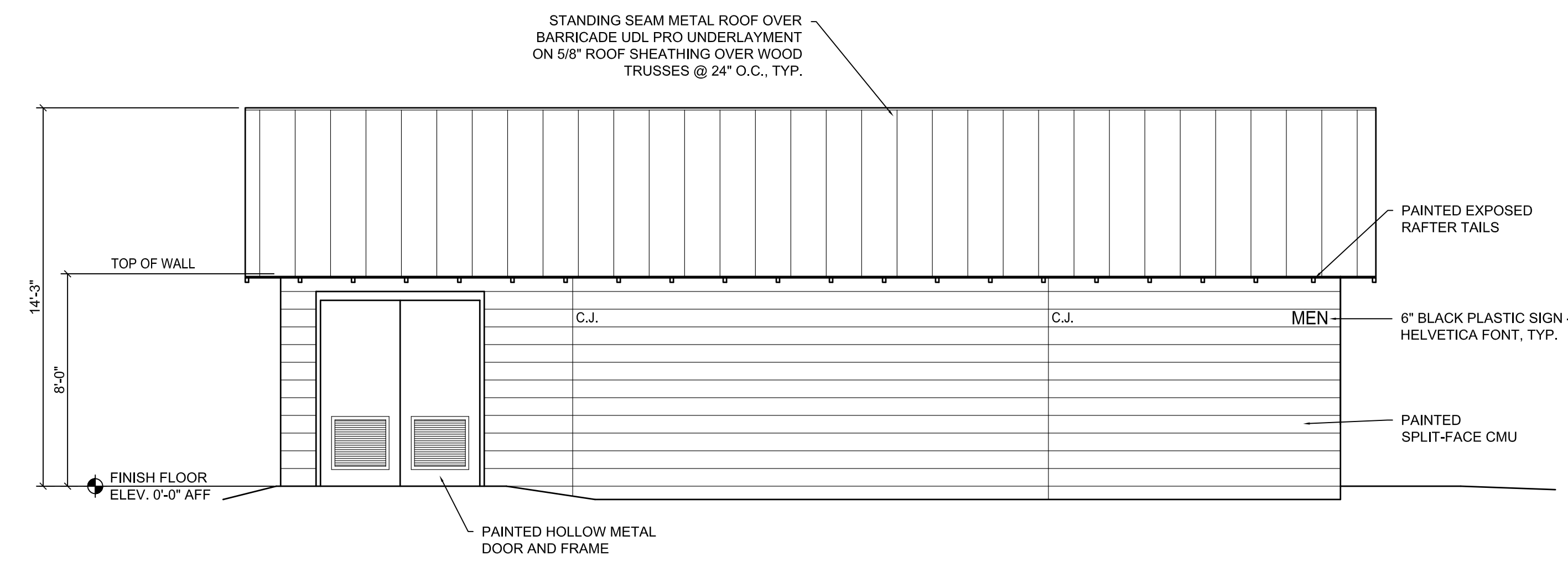
3 RESTROOM BUILDING EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



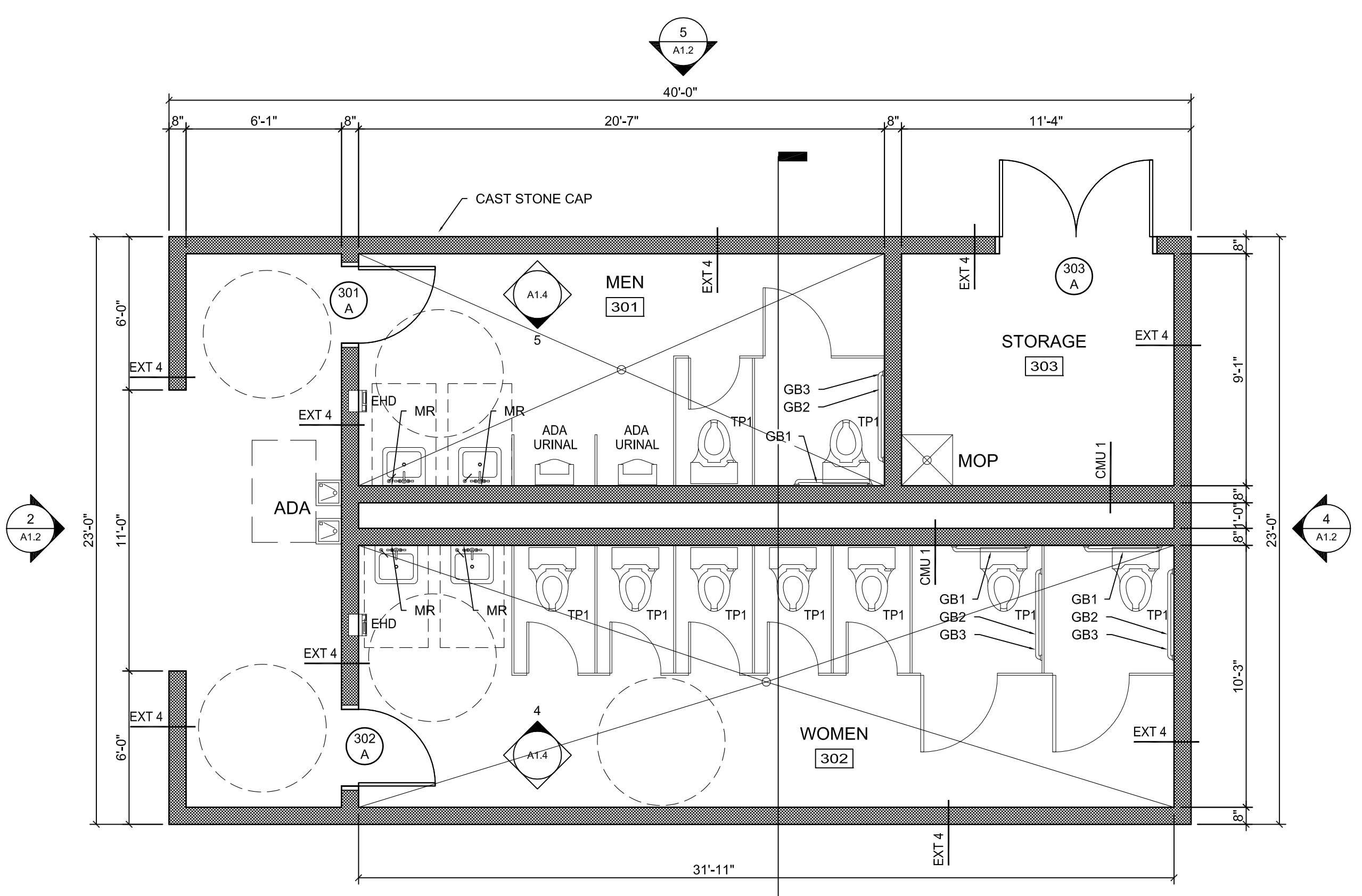
4 RESTROOM BUILDING EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



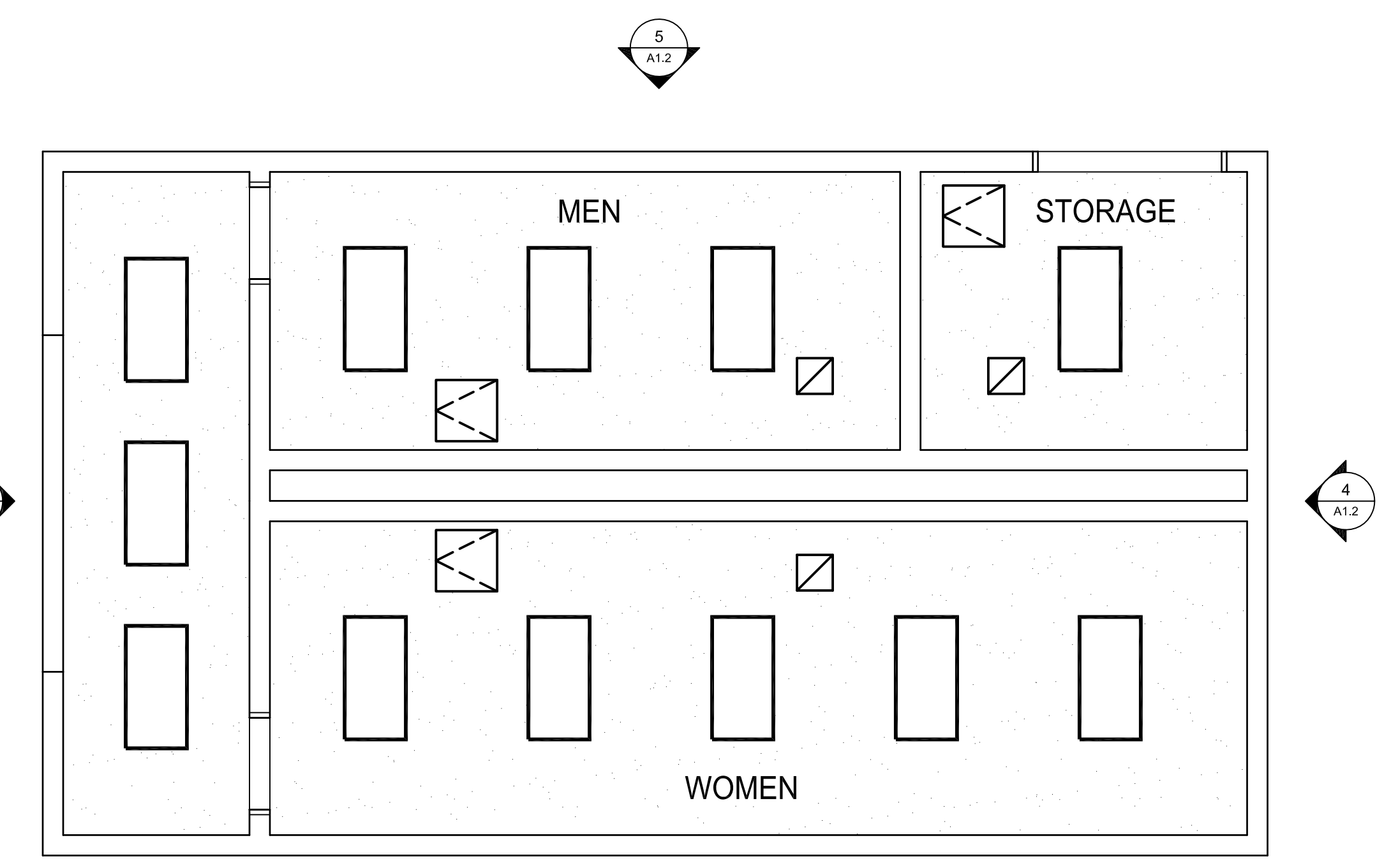
2 RESTROOM BUILDING EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



5 RESTROOM BUILDING EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



1 RESTROOM BUILDING FLOOR PLAN  
SCALE: 1/4"=1'-0"

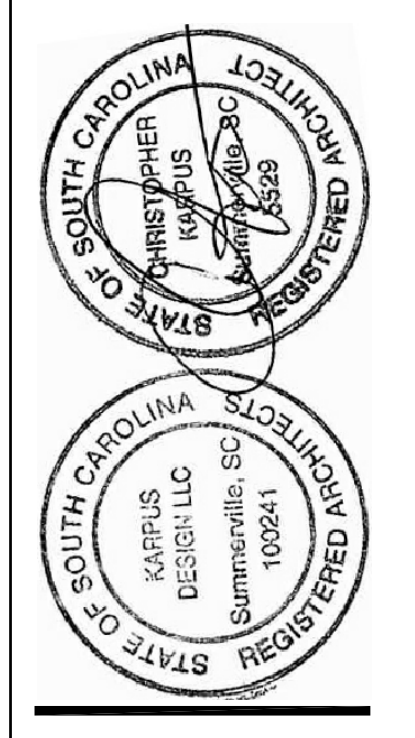


6 RESTROOM BUILDING RCP  
SCALE: 1/4"=1'-0"

NOTE: SEE SHEET A3.1 FOR TYPICAL CEILING NOTES AND LEGEND

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P.O. Box 986  
Summerville, South Carolina, 29484  
ph: 843.425.4124 | fax: 843.832.7331  
karpusdesign.com

**SW**  
SEAMONWHITESIDE  
MOUNT PLEASANT, SC 29464  
GREENVILLE, SC 29601  
SUMMERVILLE, SC 29484  
SPARTANBURG, SC 29176  
CHARLOTTE, NC 28202  
WWW.SEAMONWHITESIDE.COM

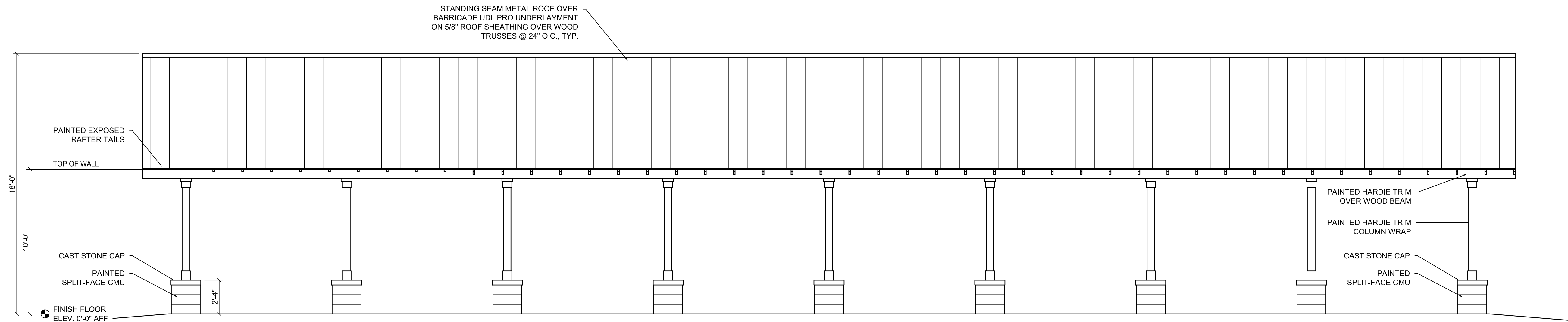


**HANAHAN RECREATION  
COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

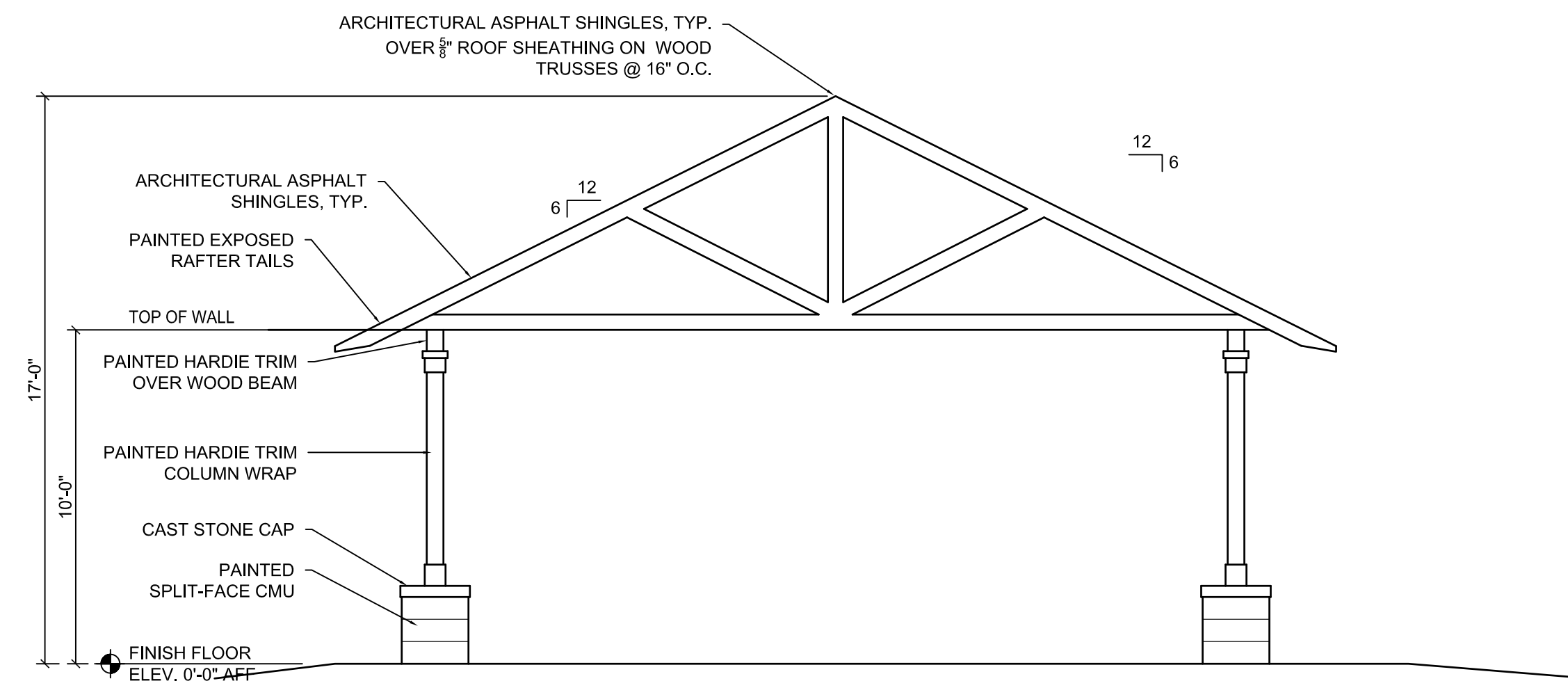
SW+ PROJECT: 7867  
DATE: 3/11/21  
DRAWN BY: CMK  
CHECKED BY: CMK

| REVISION HISTORY |                 |
|------------------|-----------------|
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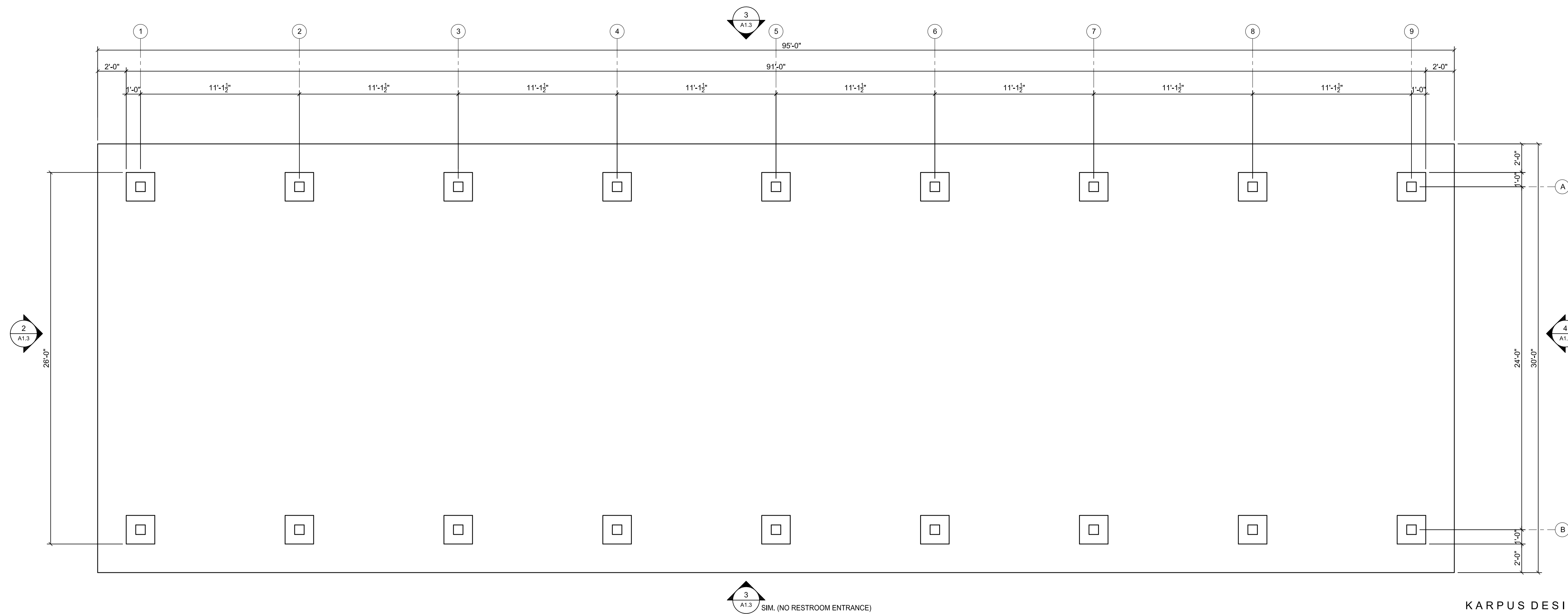
**A1.2**  
RESTROOM BUILDING



**3 PAVILION ELEVATION**  
SCALE: 1/4"=1'-0"

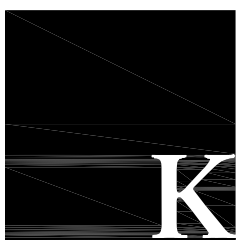


**4 PAVILION ELEVATION**  
SCALE: 1/4"=1'-0"



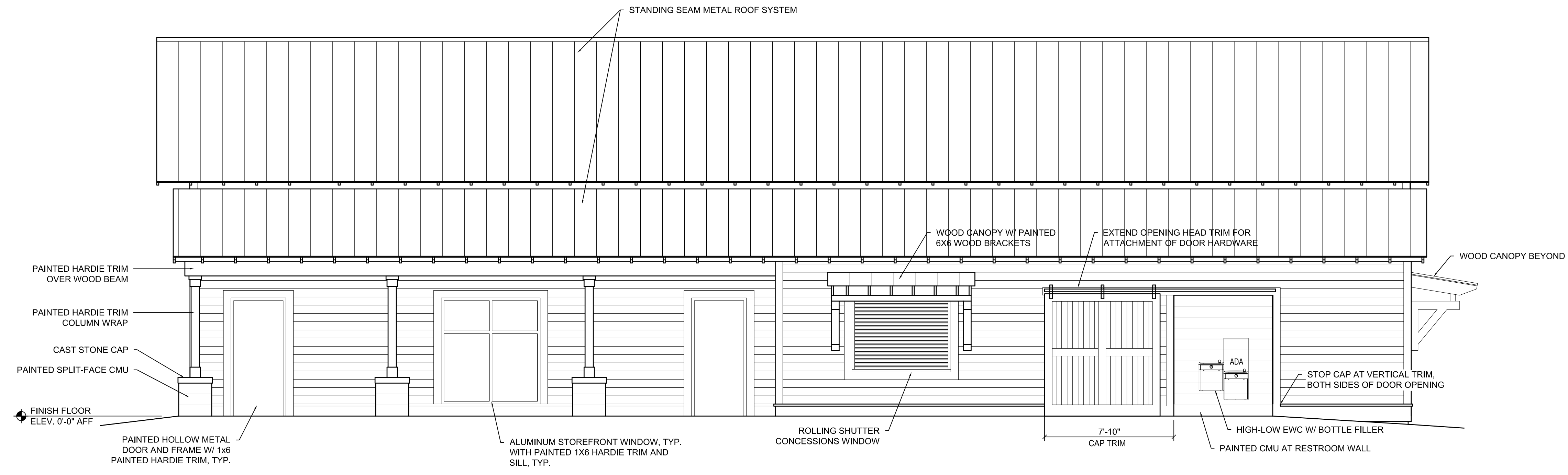
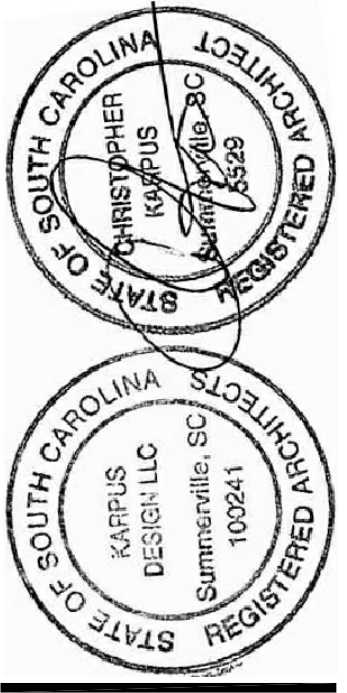
**1 PAVILION FLOOR PLAN**  
SCALE: 1/4"=1'-0"

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ph: 843.425.4124 | fax: 843.832.7331  
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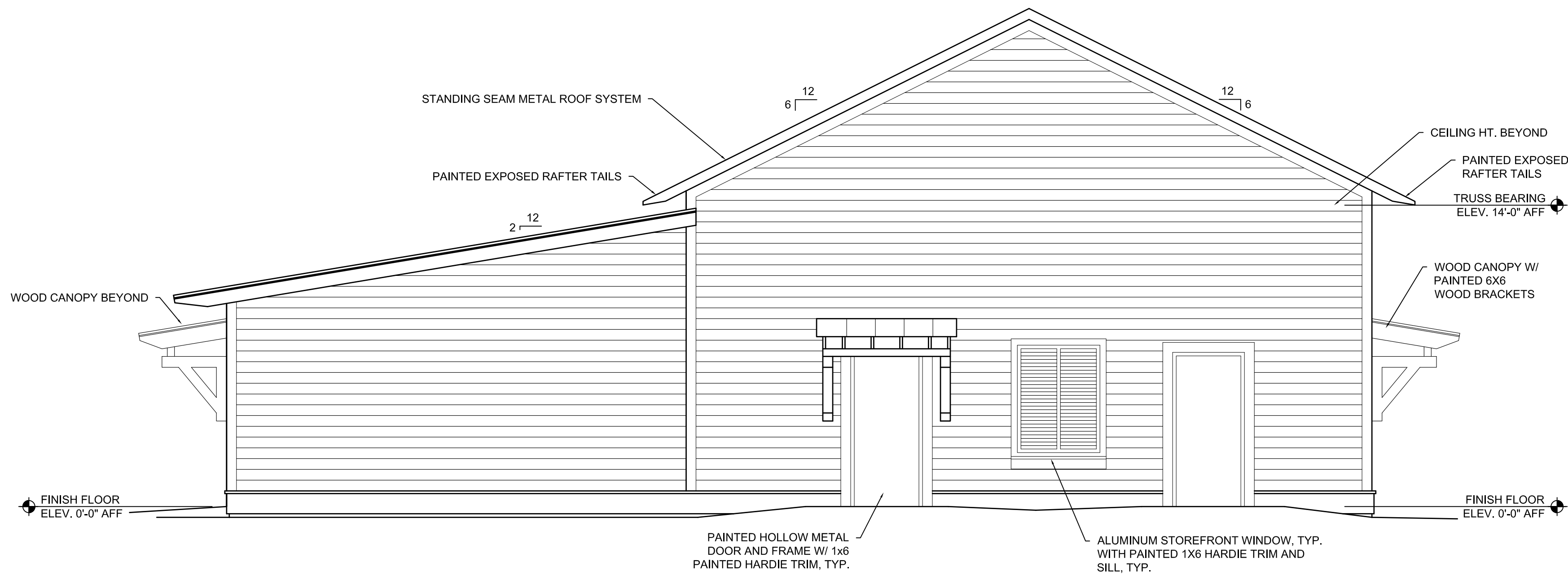


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**2** EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



**1** EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"

**HANAHAN RECREATION  
COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 3/11/21  
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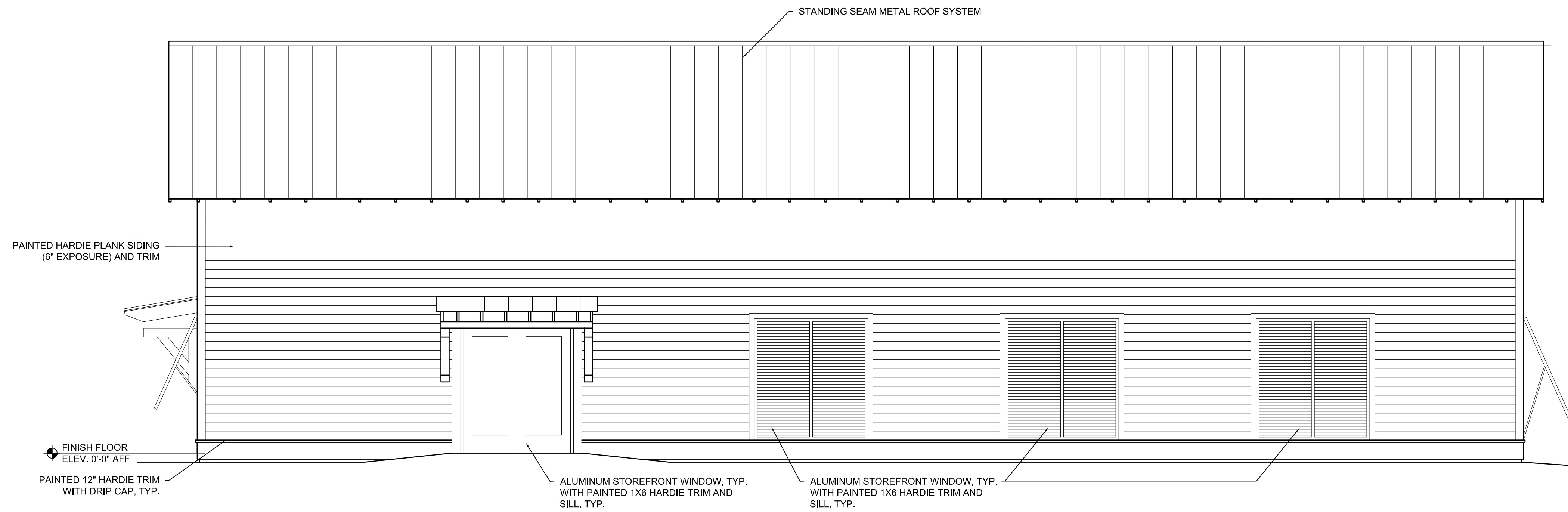
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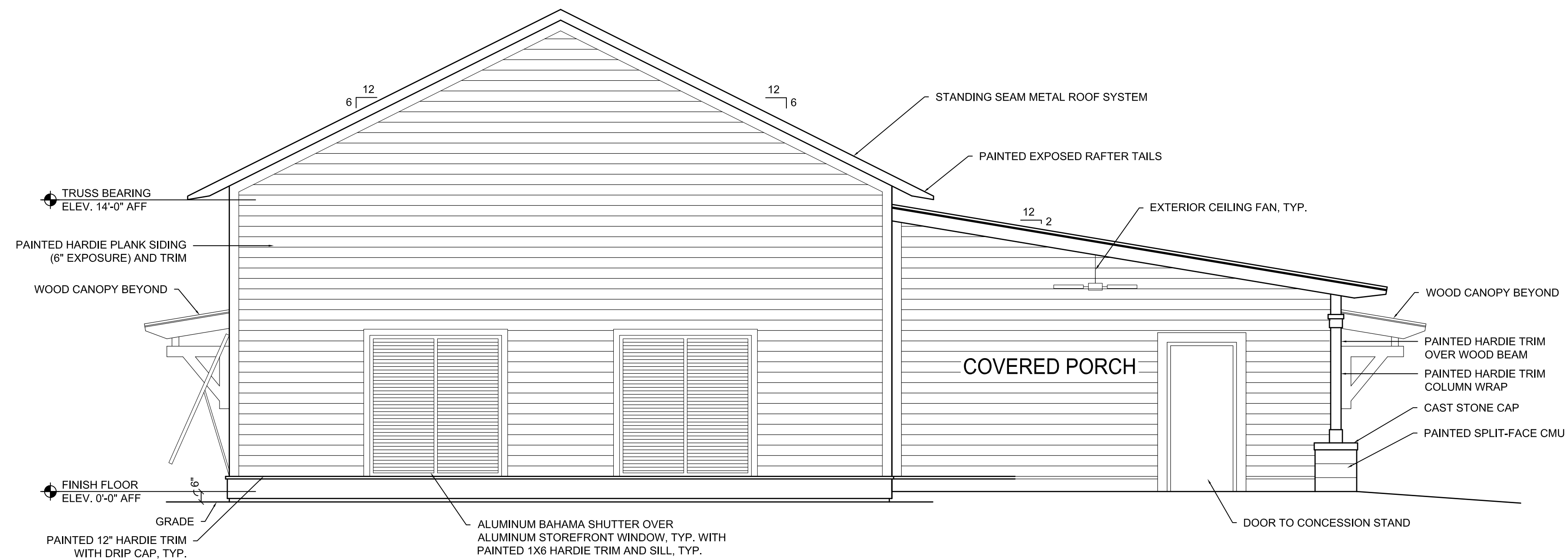
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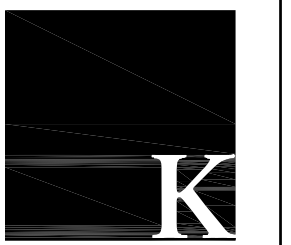


**2** EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"



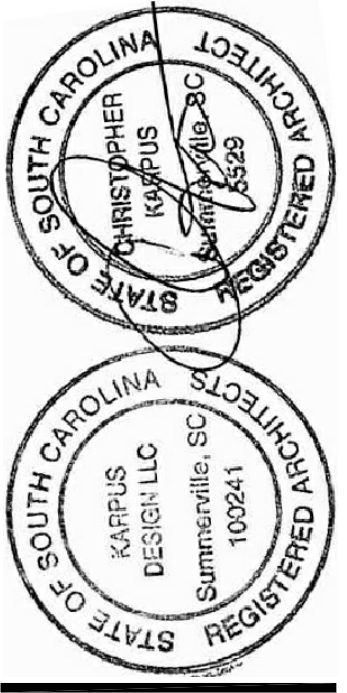
**1** EXTERIOR ELEVATION  
SCALE: 1/4"=1'-0"

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 GREENVILLE, SC 29601  
 864.298.0534  
 SUMMERVILLE, SC 29484  
 843.972.0710  
 SPARTANBURG, SC 29176  
 864.298.0534  
 CHARLOTTE, NC 28204  
 980.312.5450  
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 COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
 DATE: 3/11/21  
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**REVISION HISTORY**

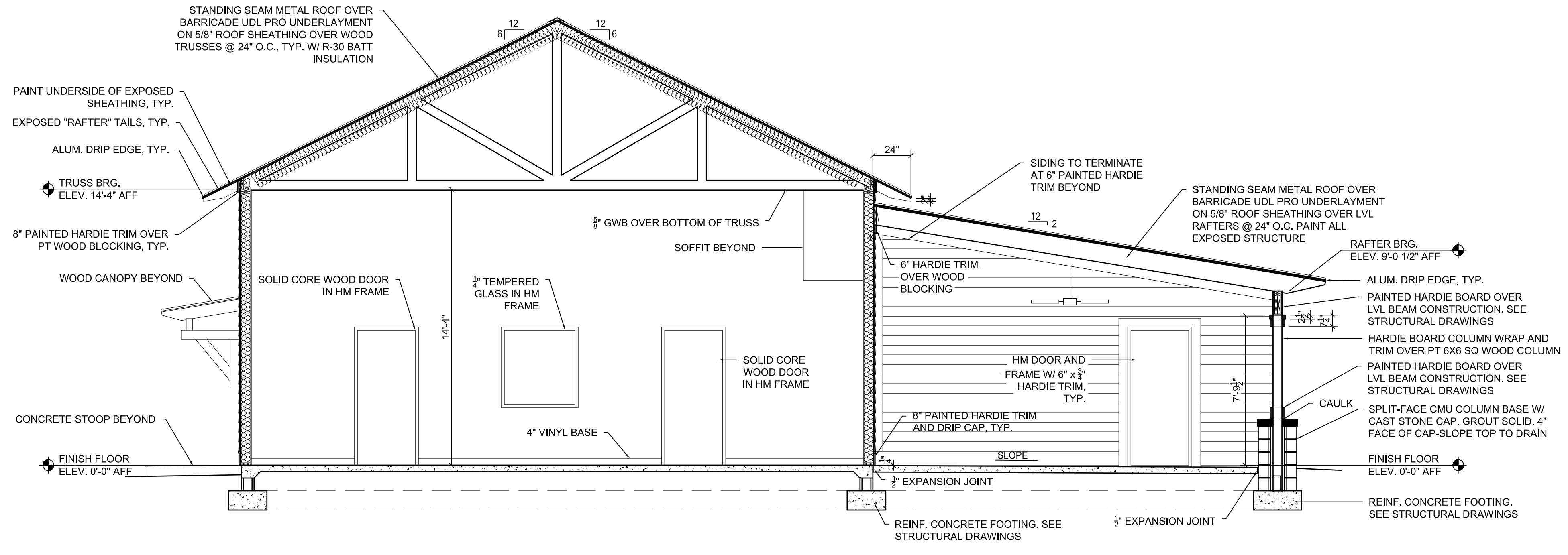
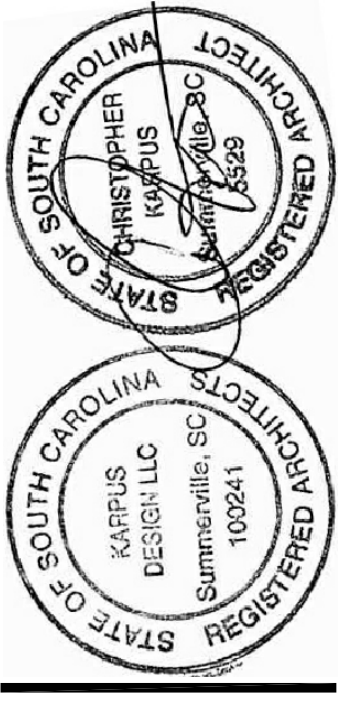
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**A2.2**

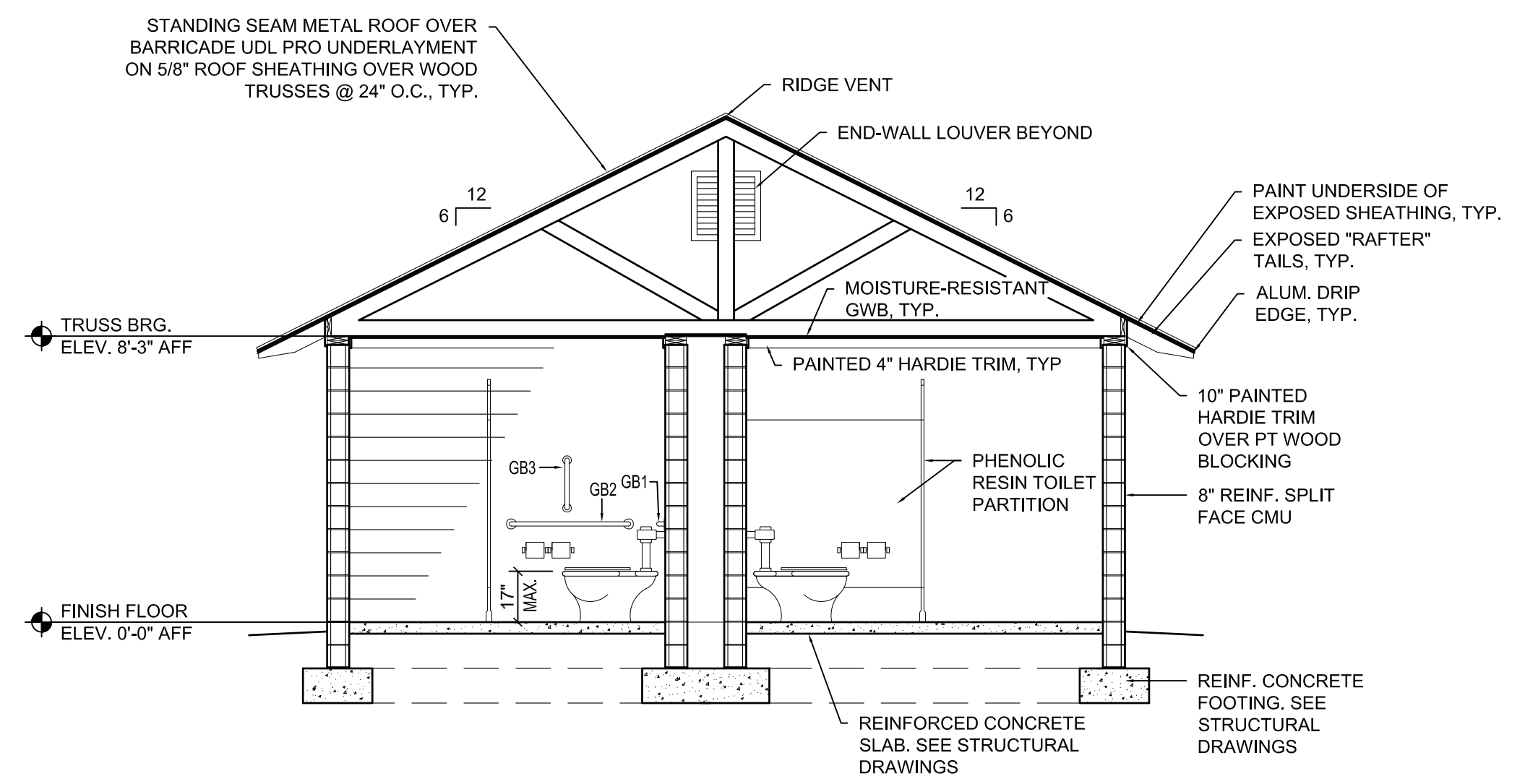
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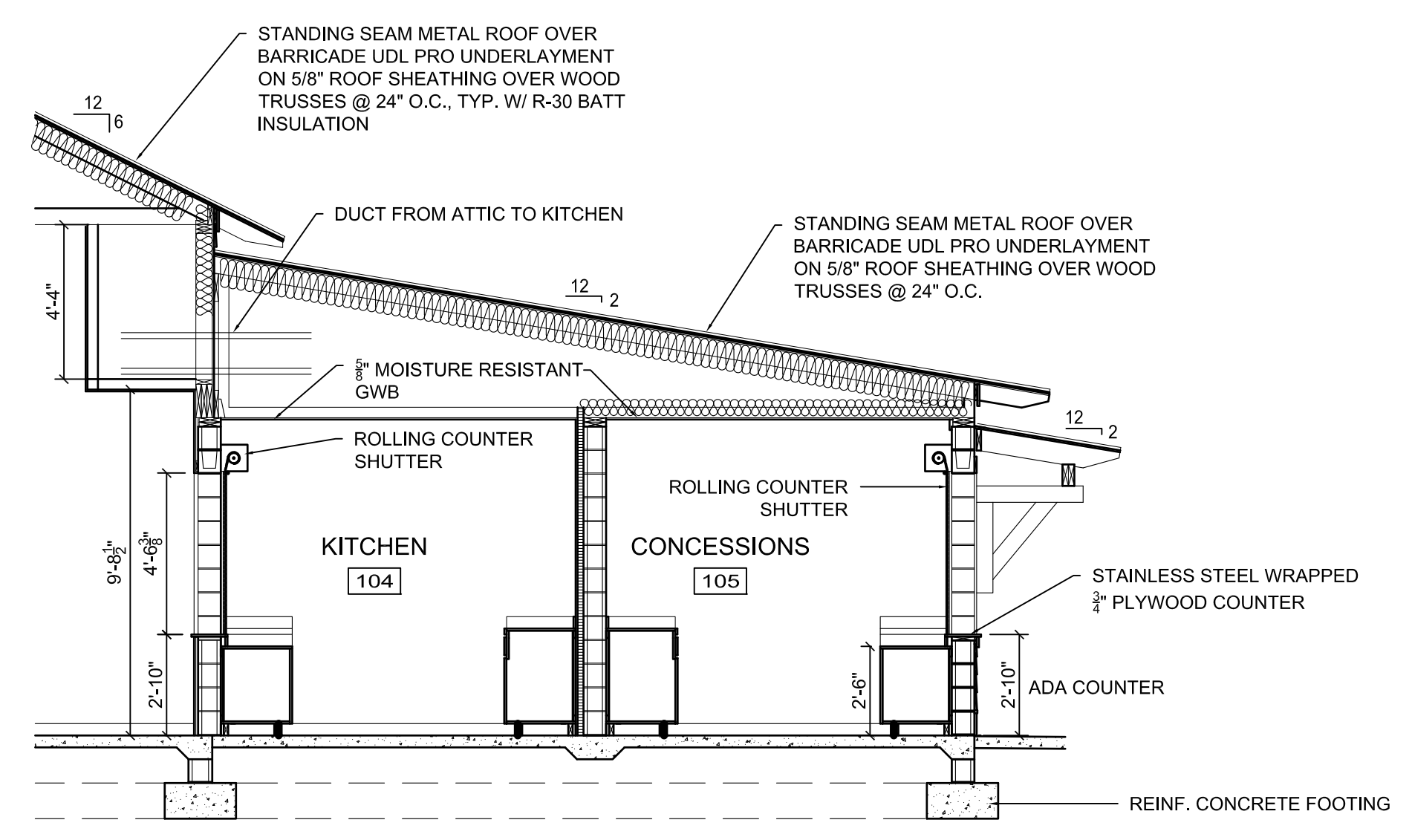
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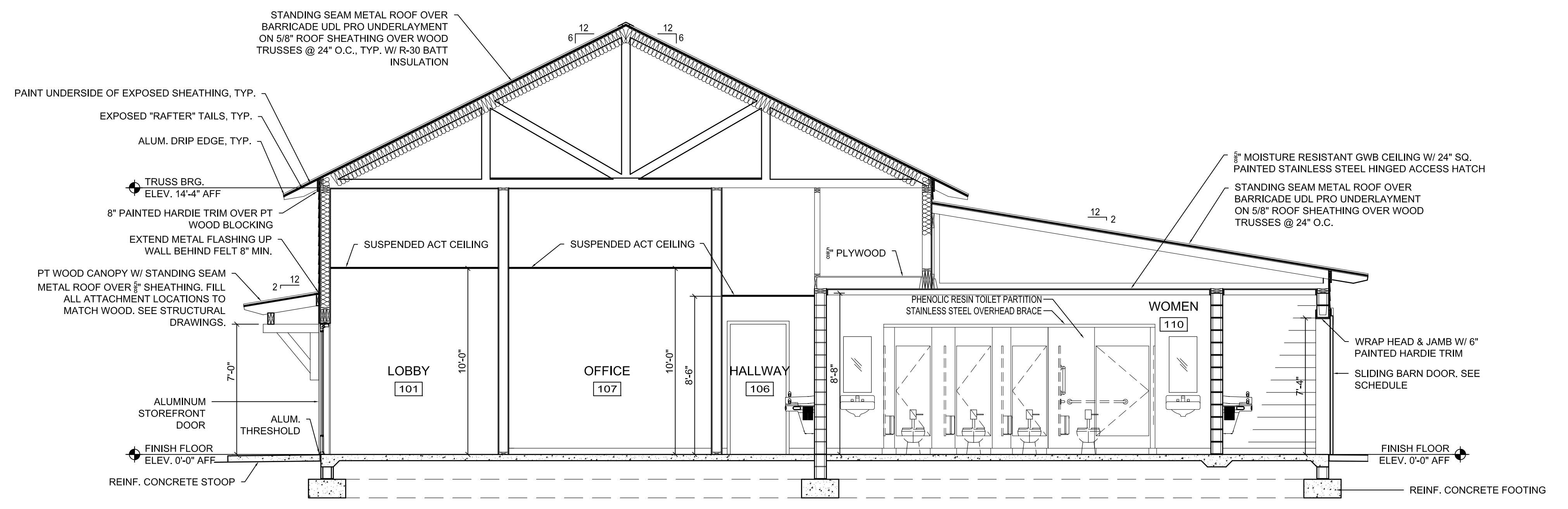
**3 BUILDING SECTION**  
SCALE: 1/4"=1'-0"



**4 BUILDING SECTION**  
SCALE: 1/4"=1'-0"



**2 PARTIAL BUILDING SECTION**  
SCALE: 1/4"=1'-0"



**1 BUILDING SECTION**  
SCALE: 1/4"=1'-0"

**HANAHAN RECREATION  
COMPLEX**  
CITY OF HANAHAN  
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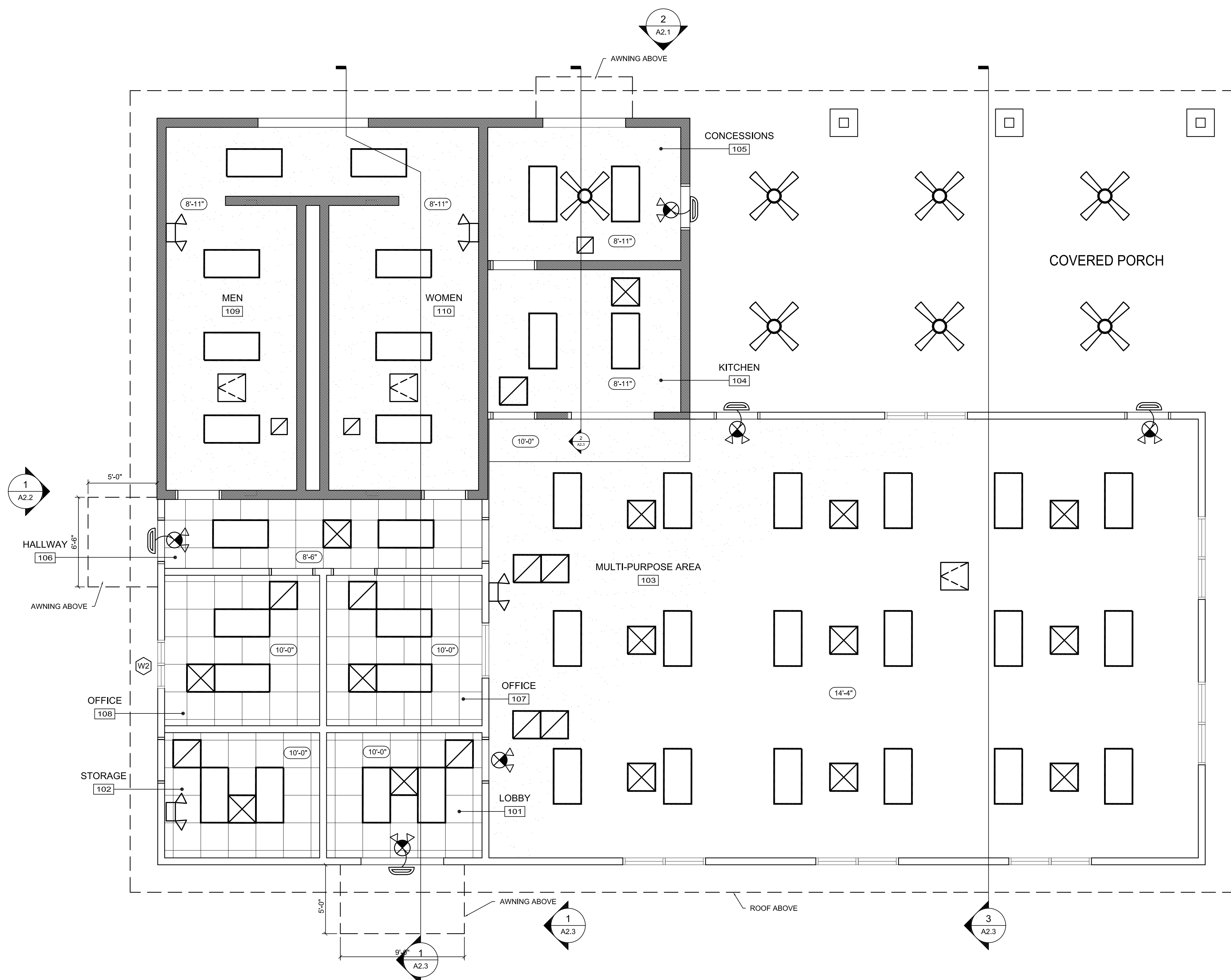
**REVISION HISTORY**

| NO. | DESCRIPTION | DATE    |
|-----|-------------|---------|
| 0   | BID SET     | 2/25/21 |

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**A1 REC. CENTER FLOOR PLAN**  
SCALE: 1/4"=1'-0"



**GENERAL NOTES**

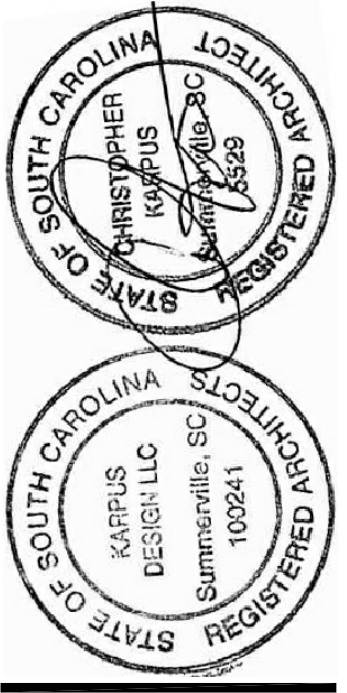
- COORDINATE AND LOCATE ALL CEILING ELECTRICAL AND MECHANICAL EQUIPMENT WITHIN THE CEILING AS SHOWN ON THE REFLECTED CEILING PLAN. ELECTRICAL AND MECHANICAL DRAWINGS LOCATE CEILING EQUIPMENT SCHEMATICALLY. SEE ELECTRICAL DRAWINGS FOR LIGHTING FIXTURE MODELS AND MANUFACTURERS. SEE MECHANICAL DRAWINGS FOR ALL HVAC TYPES.
- INSTALLATION AND DESIGN OF ALL CEILINGS SHALL CONFORM TO IBC 2018. SEE SHEET A3.2 FOR SEISMIC RESTRAINT WIRE GUIDELINES.
- DOUBLE GRIDS AT PARTITIONS ARE NOT ACCEPTABLE
- USE MOISTURE RESISTANT GWB FOR ALL CEILINGS IN ALL TOILET AND MAINT. ROOMS, TYP.
- EXTEND ALL WALLS TO STRUCTURE ABOVE
- SEE PLAN AND FINISH SCHEDULE FOR CEILING HEIGHTS
- ALL SUSPENDED CEILING TILE TO BE USG 414 FROST™ CLIMAPLUS™ CEILING PANELS, MINERAL FIBER, WHITE, 24" X 24" - NON REGULAR

**LEGEND**

- 2' x 4' RECESSED LED
- 2' x 2' RECESSED LED
- EXTERIOR GRADE FAN
- 24" SQ. ACCESS HATCH  
HALLMAN SALES, LLC  
MODEL PA-3000
- MECHANICAL RETURN.  
SEE MPE DRAWINGS
- MECHANICAL SUPPLY.  
SEE MPE DRAWINGS
- COMBO EMERGENCY  
LIGHT / EXIT LIGHT
- ILLUMINATED EXIT  
SIGN
- EMERGENCY  
LIGHT
- EXHAUST  
FAN
- EXTERIOR  
EMERGENCY  
EGRESS LIGHT
- INDICATES CEILING  
HEIGHT
- 2' x 2' ACOUSTIC  
TILE
- OPEN TO  
STRUCTURE ABOVE



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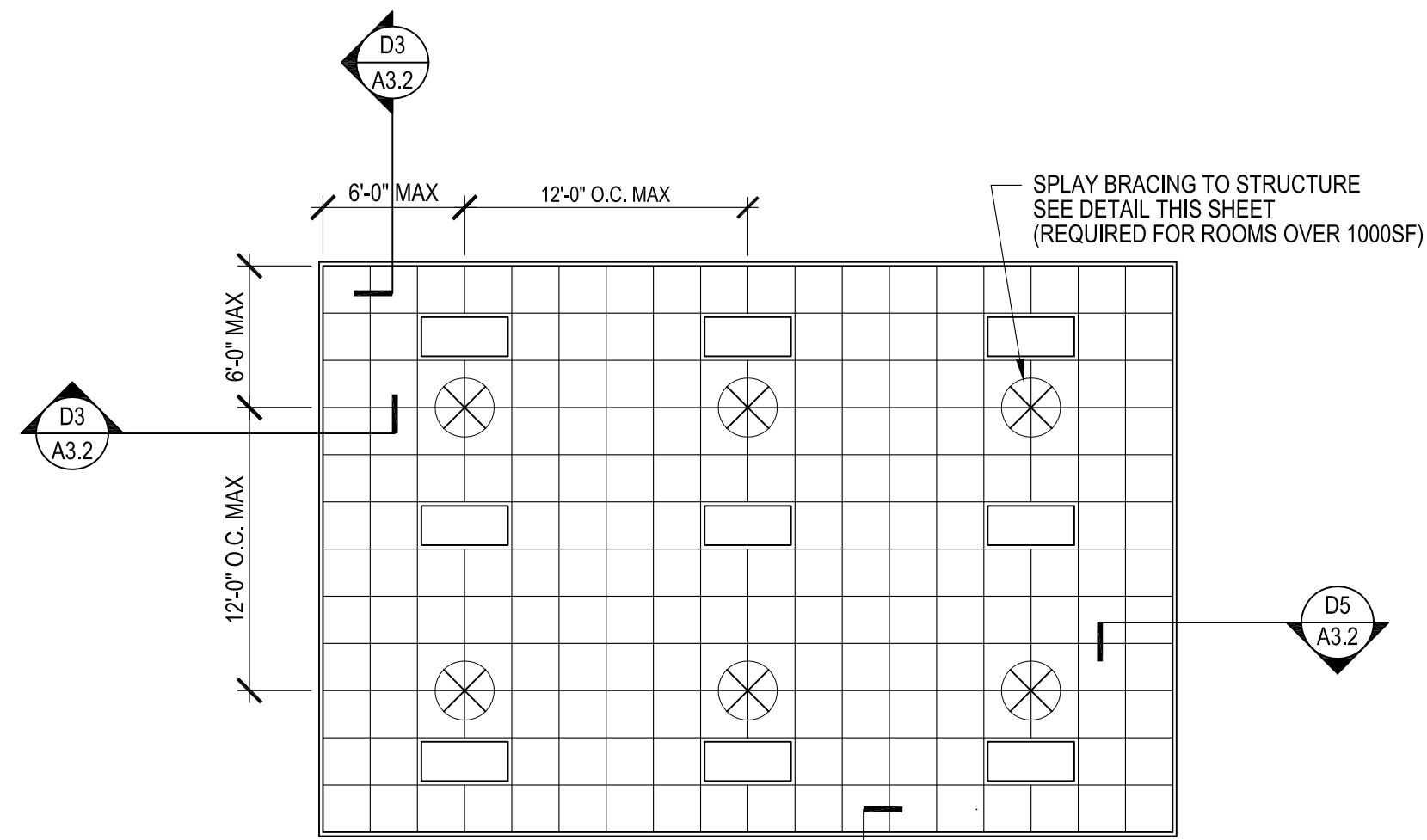
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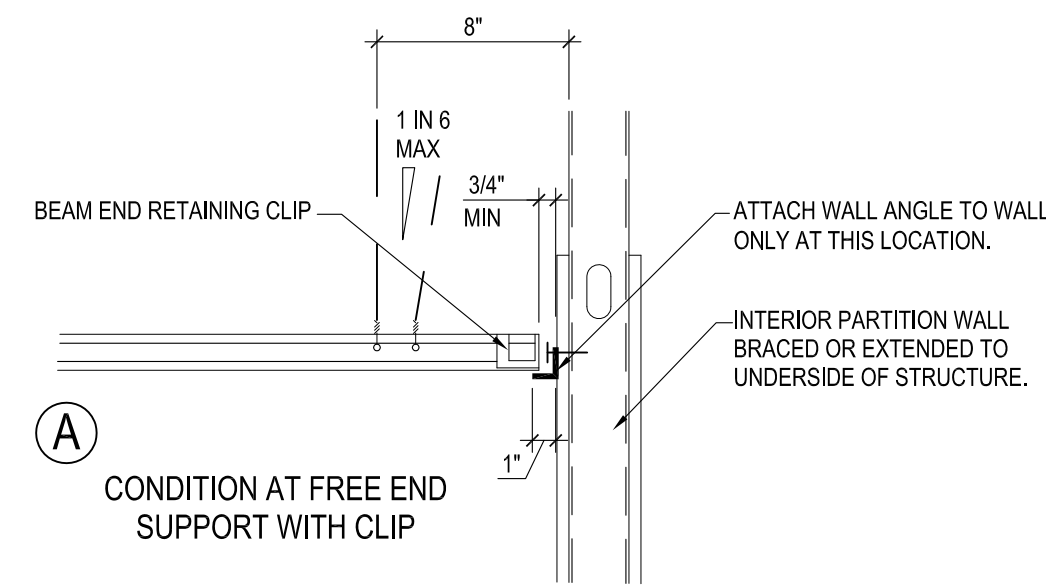
**A3.1**

REC. CENTER RCP

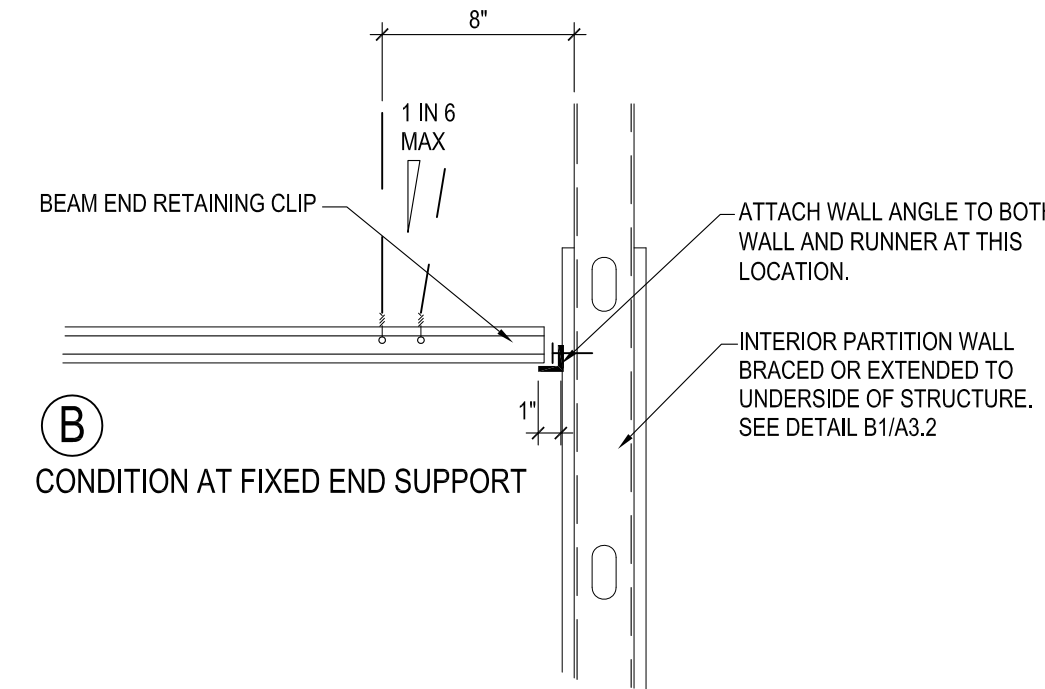
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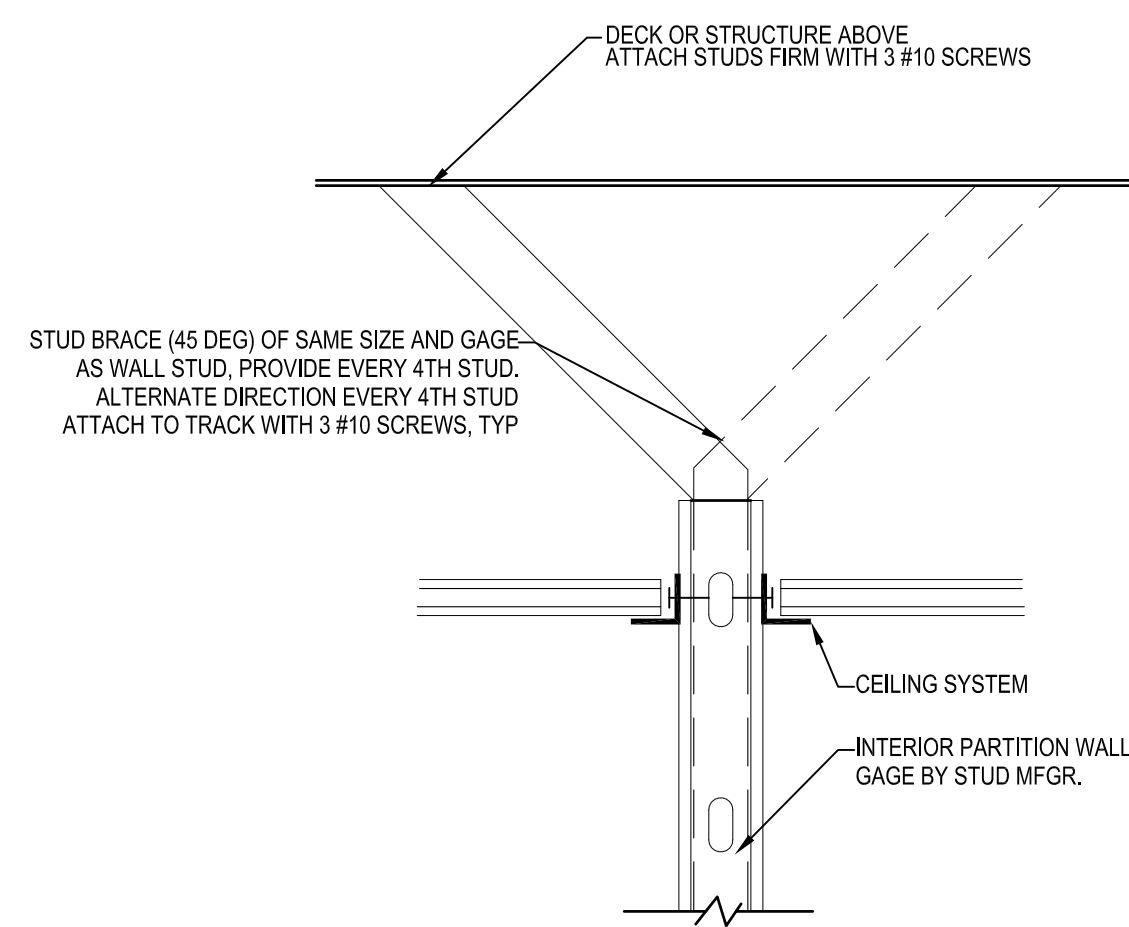
**D3** SEISMIC SPLAY BRACING DIAGRAM  
SCALE: 1/4"=1'-0"



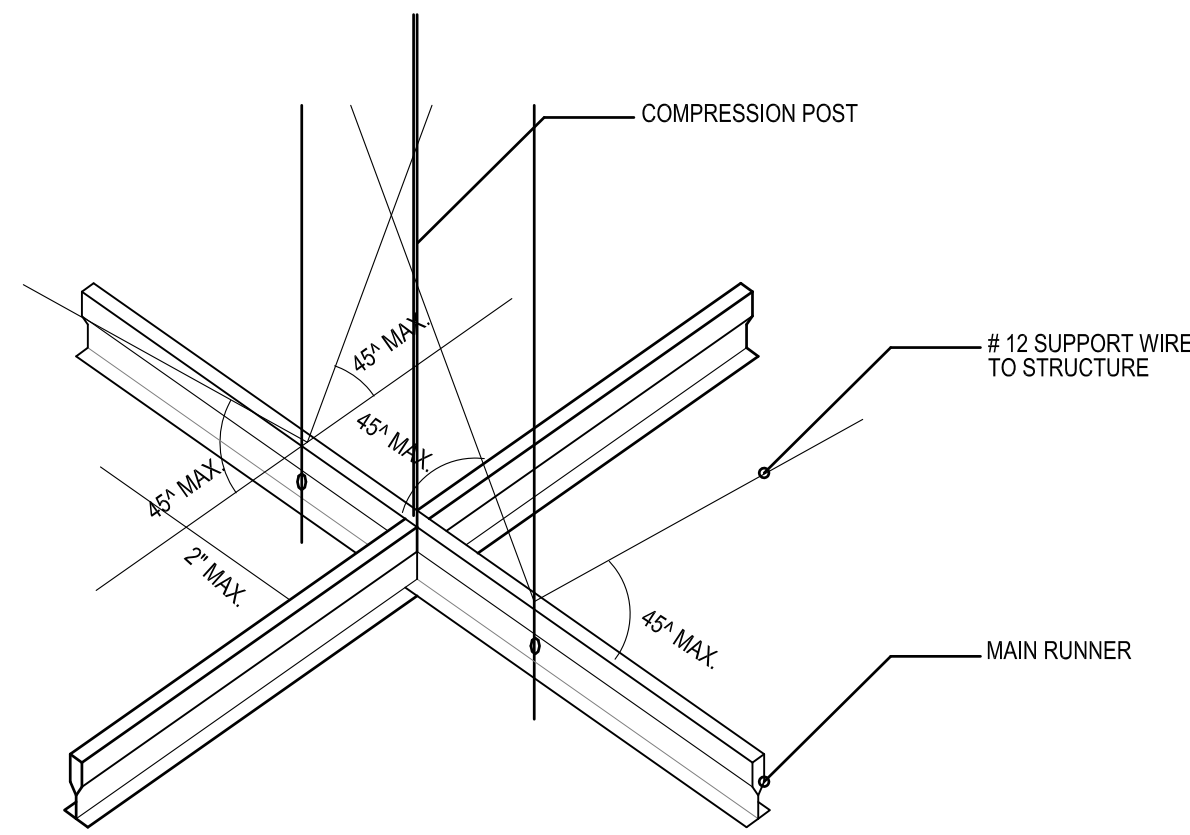
**D3** SEISMIC SPLAY BRACING PERIMETER DETAIL  
SCALE: 1/4"=1'-0"



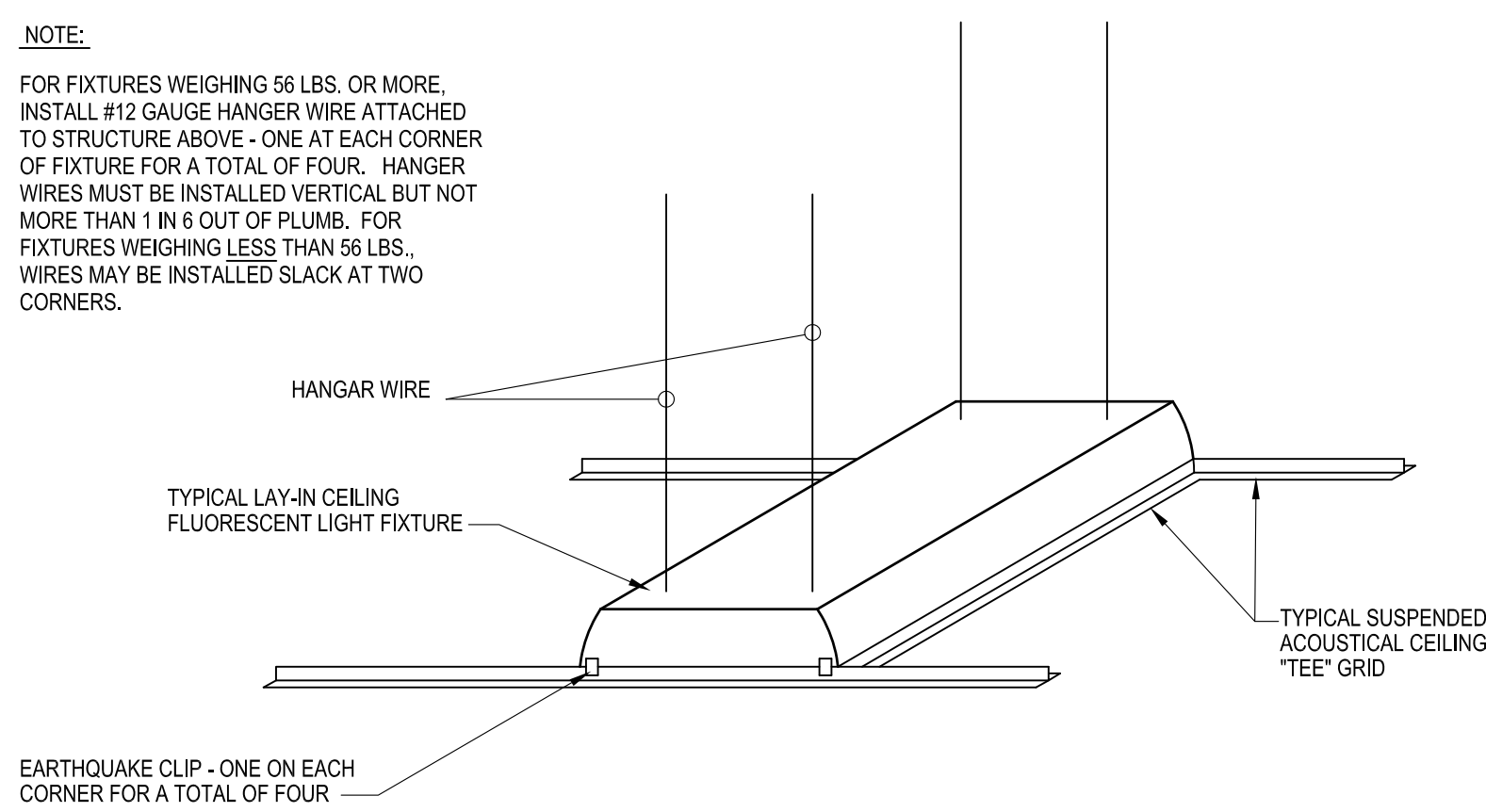
**D5** SEISMIC SPLAY BRACING PERIMETER DETAIL  
SCALE: 1/4"=1'-0"



**B1** PARTITION SEISMIC BRACING  
SCALE: 1/4"=1'-0"



**B1** SPLAY BRACING DETAIL  
NTS (REQUIRED @ ROOMS OVER 1000 SF)



NOTE: SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION

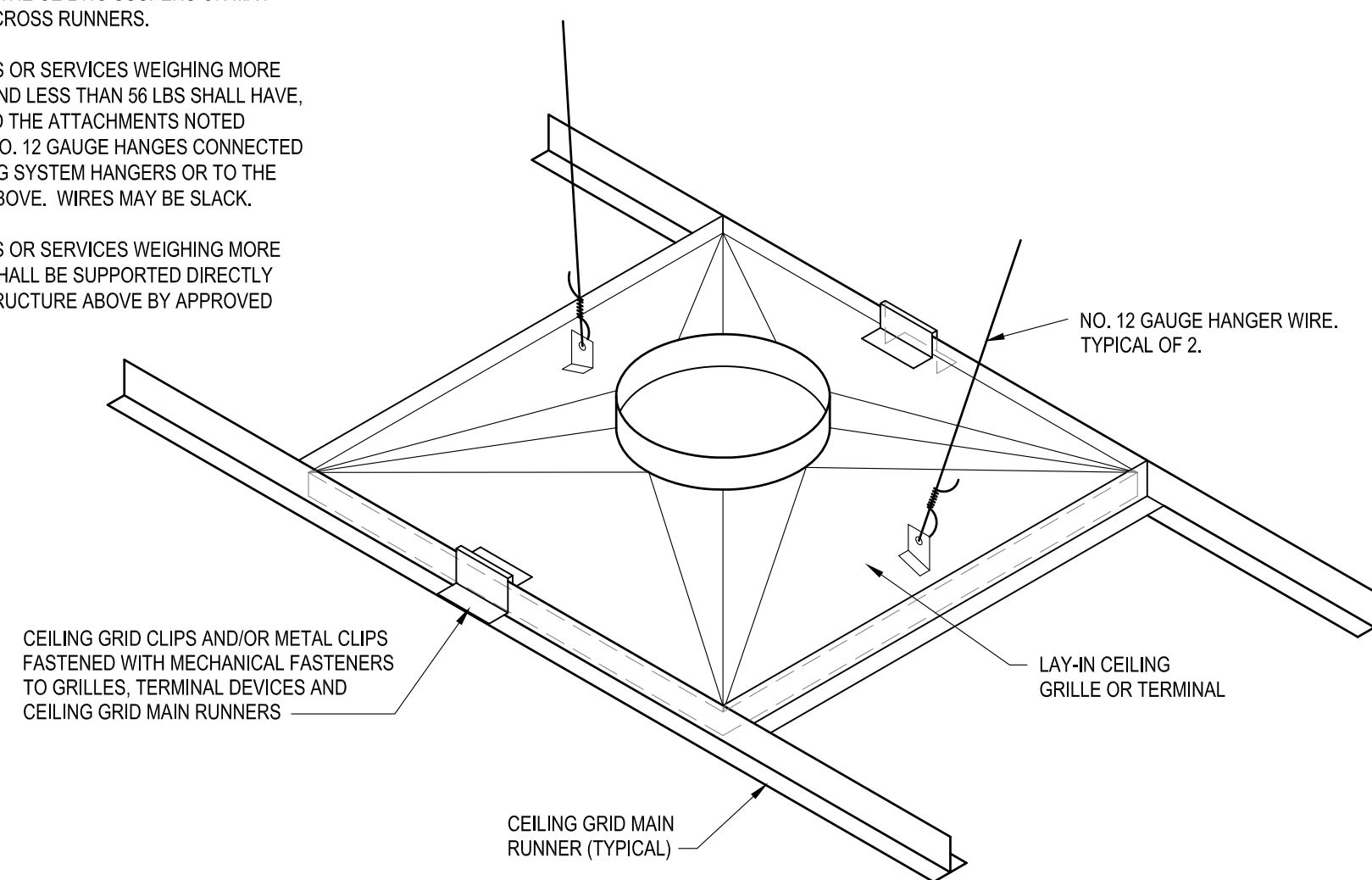
**A1** LIGHT FIXTURE SEISMIC RESTRAINT  
NTS

**ATTACHMENT NOTES:**

CEILING MOUNTED AIR TERMINALS OR SERVICES WEIGHING 20 LBS. OR LESS SHALL BE POSITIVELY ATTACHED TO THE CEILING SUSPENSION MAIN RUNNERS OR CROSS RUNNERS.

AIR TERMINALS OR SERVICES WEIGHING MORE THAN 20 LBS AND LESS THAN 56 LBS SHALL HAVE, IN ADDITION TO THE ATTACHMENTS NOTED ABOVE, TWO NO. 12 GAUGE HANGES CONNECTED TO THE CEILING SYSTEM HANGERS OR TO THE STRUCTURE ABOVE. WIRES MAY BE SLACK.

AIR TERMINALS OR SERVICES WEIGHING MORE THAN 56 LBS SHALL BE SUPPORTED DIRECTLY FROM THE STRUCTURE ABOVE BY APPROVED HANGERS.



NOTE: SEE MECHANICAL PLANS FOR ADDITIONAL INFORMATION

**A3** AIR TERMINAL SEISMIC RESTRAINT  
NTS

| SEISMIC REQUIREMENTS TABLE: IBC 2018 |   |
|--------------------------------------|---|
| CATEGORY D, E, & F                   | REQUIREMENTS                              |
| CONNECTIONS / HANGERS                | NOTE: USE HEAVY DUTY GRID                 |
| INTERSECTION STRENGTH                | 180 LBS                                   |
| HANGERS                              | #12 @ 4'-0" O.C. / 10# @ 5'-0" O.C.       |
| PLUMB                                | NOT MORE THAN 1 IN 6 OR 10" FROM VERTICAL |
| CONNECTION DEVICES                   | MIN. 100 LBS                              |
| PERIMETER WIRES                      | MAXIMUM 8" FROM ALL WALLS                 |
| SPLAY BRACING                        | NOTE: USE HEAVY DUTY GRID                 |
| 4 WIRE CLUSTERS                      | REQUIRED OVER 1000 SF. CEILING AREA       |
| FIRST POINT                          | MAX. 6'-0" FROM PERIMETER WALLS           |
| SPACING                              | 12'-0" O.C.                               |
| CONNECTION STRENGTH                  | MIN. 200 LBS                              |
| COMPRESSION POSTS                    | REQUIRED (CONDUIT OR STEEL STUD)          |
| MOLDING / PARTITIONS                 | NOTE: USE HEAVY DUTY GRID                 |
| MOLDING (WALL ANGLE)                 | MIN. 2"                                   |
| ATTACHMENT (NO MOVEMENT)             | REQUIRED @ 2 ADJACENT WALLS               |
| CLEARANCE (FREE TO MOVE)             | 3/4" @ 2 ADJACENT WALLS                   |
| SPACER BARS                          | REQUIRED                                  |
| PARTITION ATTACHMENT TO GRID         | ALLOWED WITH BRACING, UNDER 2,500 SF.     |
| LIGHTING / FIXTURES                  | NOTE: USE HEAVY DUTY GRID                 |
| LIGHTS < 56 LBS                      | 2 CONNECTORS / 2 SLACK WIRES              |
| LIGHTS > 56 LBS                      | SUSPEND FROM STRUCTURE, NOT GRID          |
| MECHANICAL < 20 LBS                  | ATTACHED TO GRID                          |
| MECHANICAL > 20 LBS, < 56 LBS        | 2 SLACK WIRES                             |
| MECHANICAL > 56 LBS                  | SUSPEND FROM STRUCTURE, NOT GRID          |

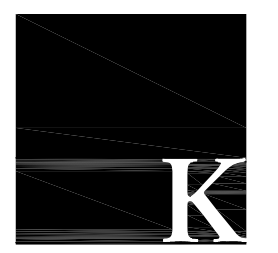
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**HANAHAN RECREATION COMPLEX**  
 CITY OF HANAHAN  
 HANAHAN, SOUTH CAROLINA

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| REVISION HISTORY |                 |
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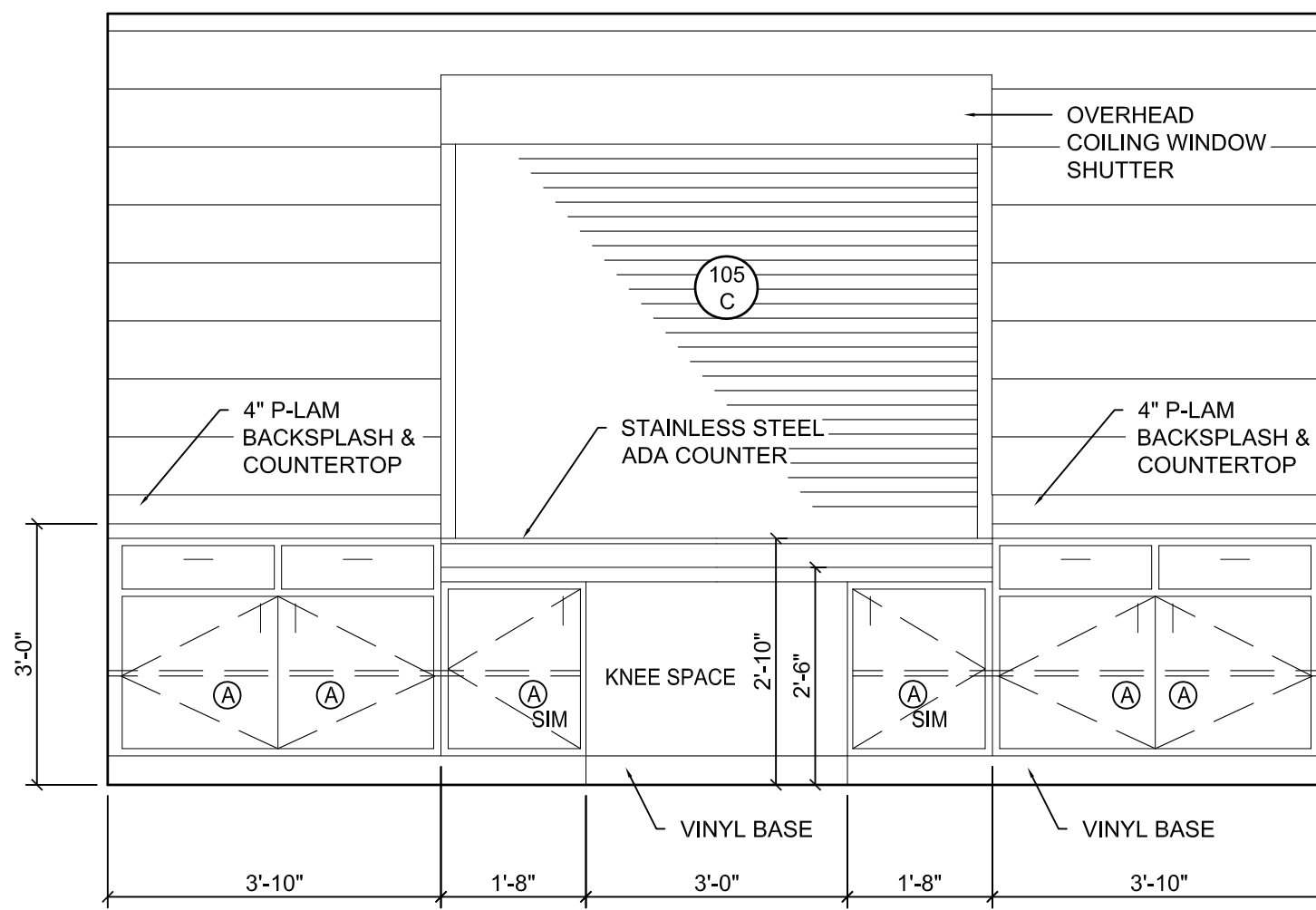
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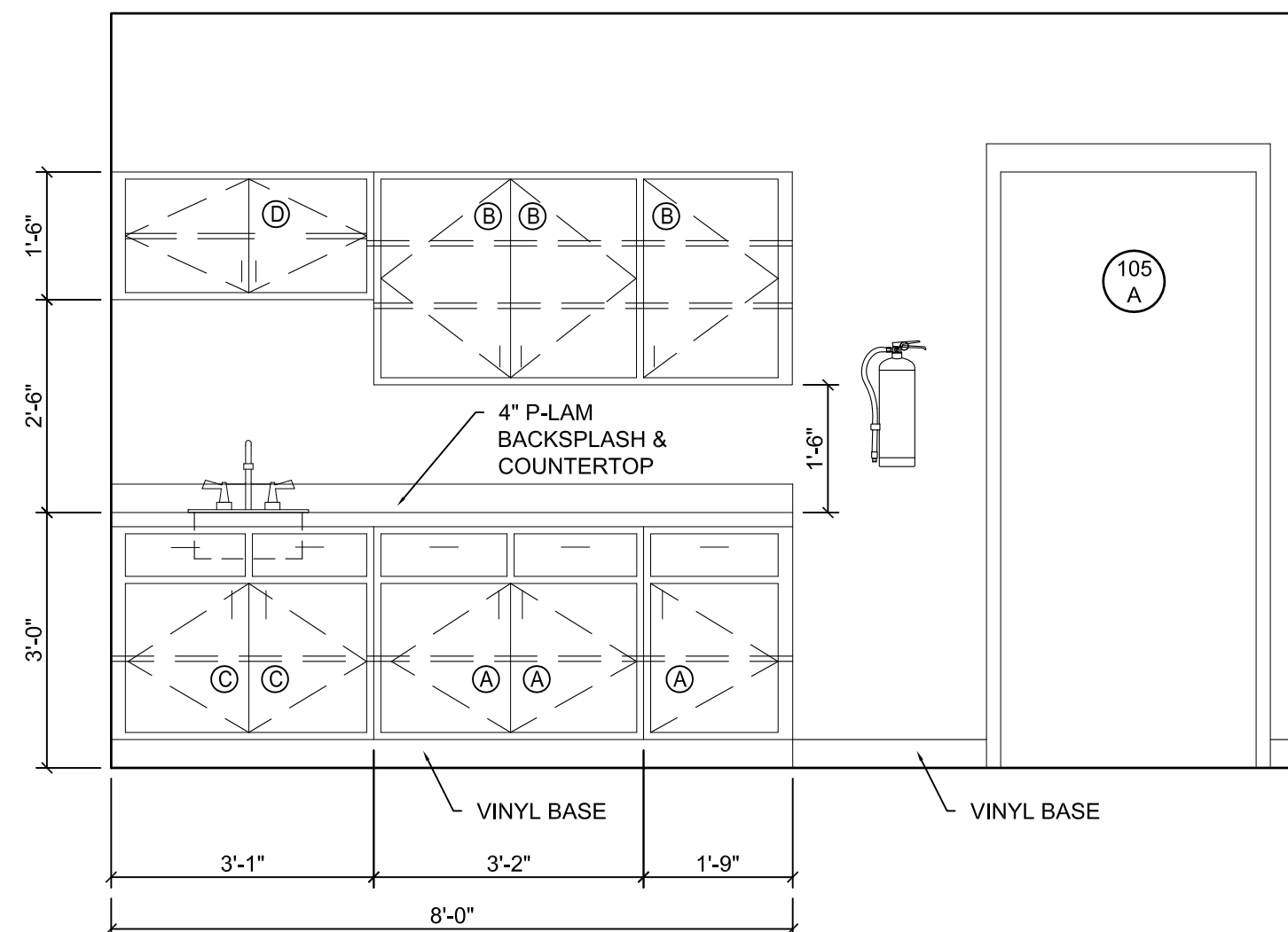
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SEISMIC CEILING DETAILS

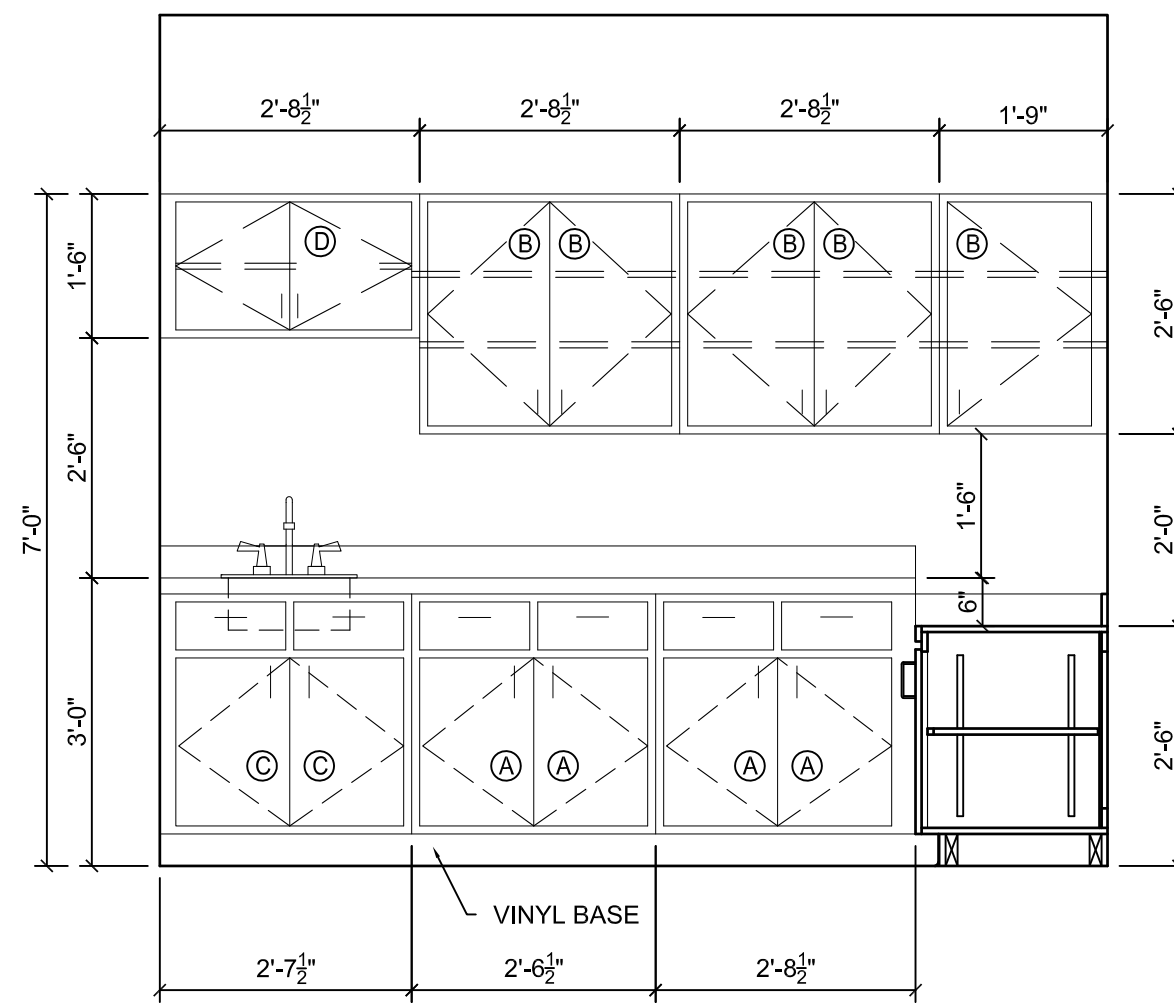
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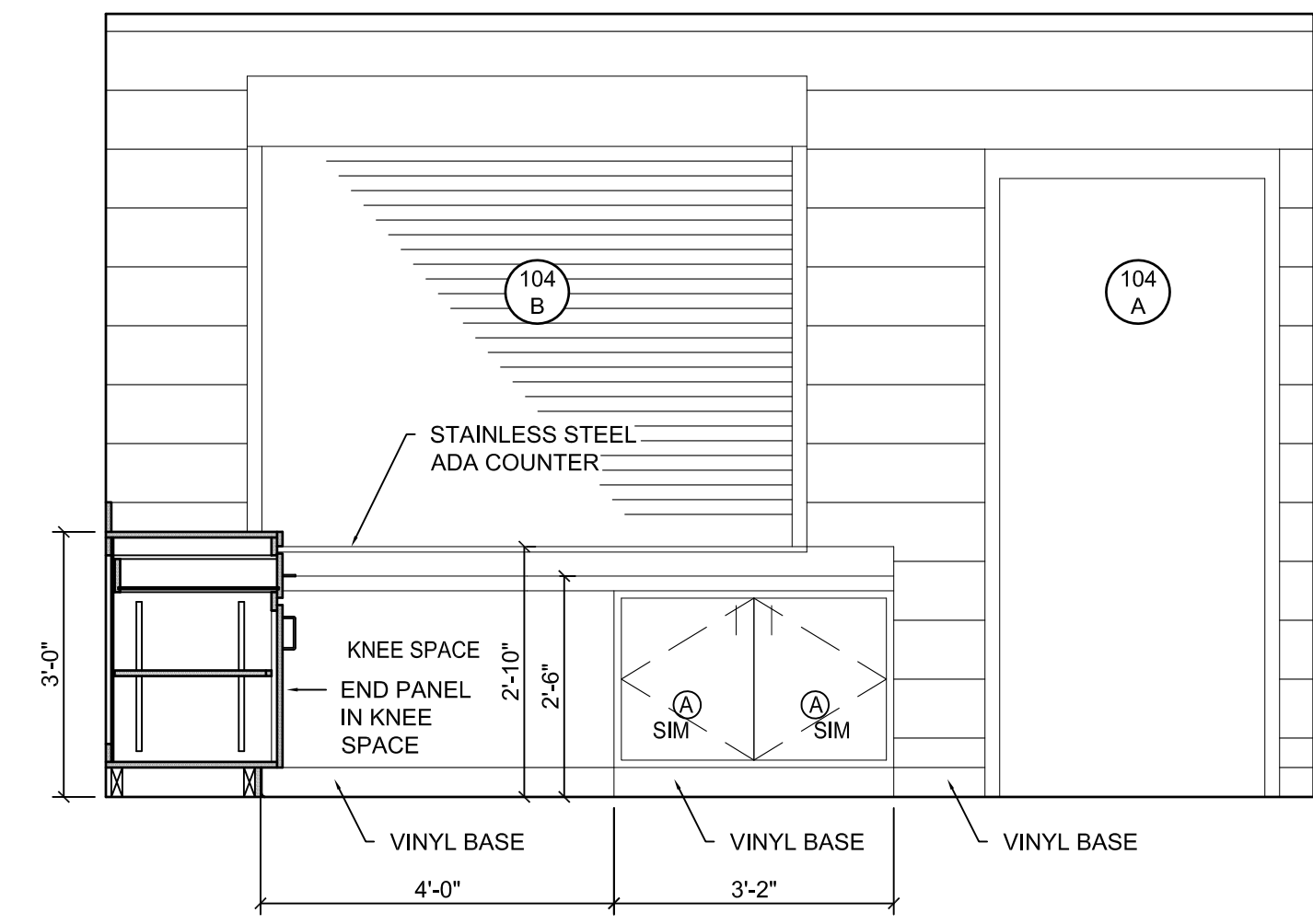
**2 CASEWORK ELEVATION**  
SCALE: 1/2"=1'-0"



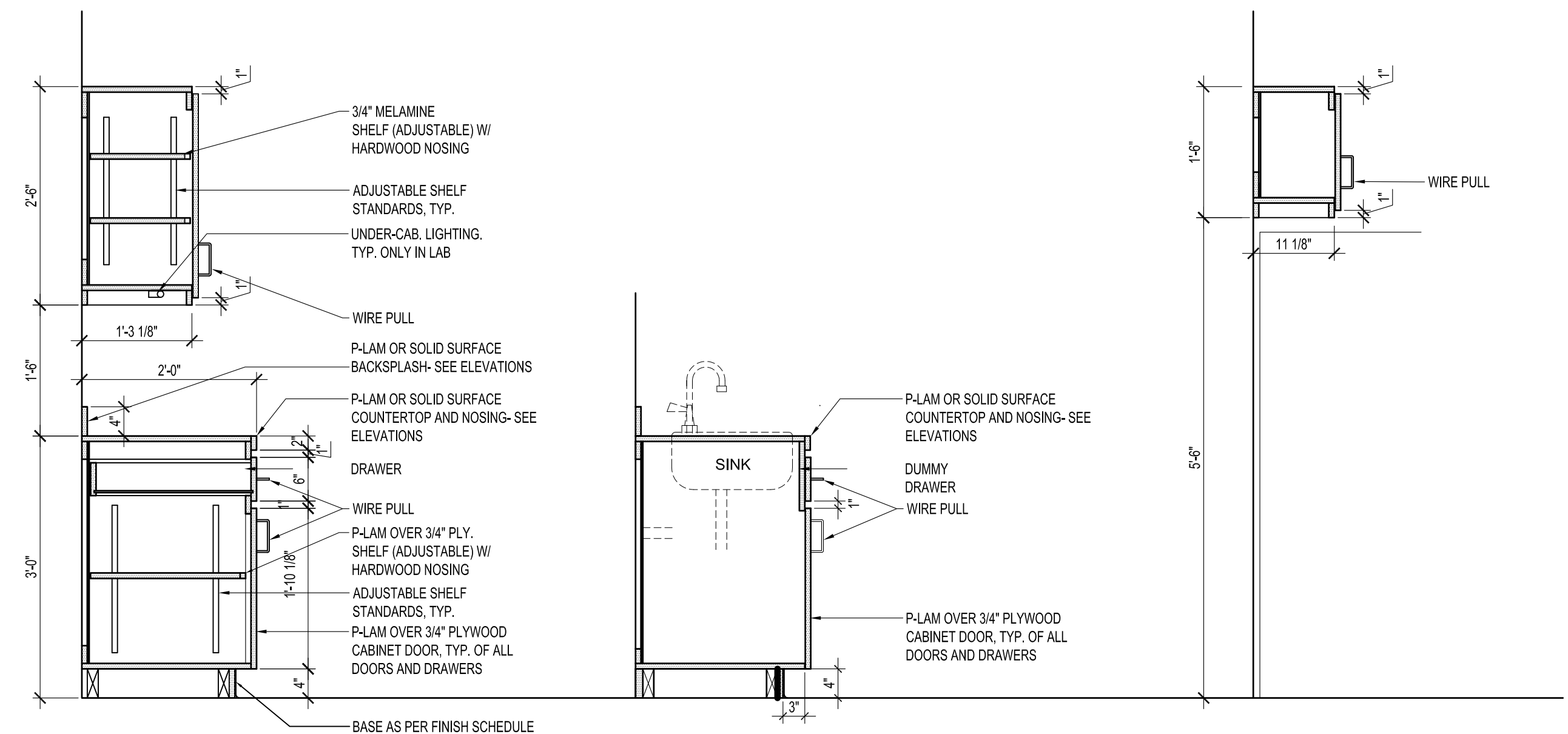
**2 CASEWORK ELEVATION**  
SCALE: 1/2"=1'-0"



**3 CASEWORK ELEVATION**  
SCALE: 1/2"=1'-0"



**4 CASEWORK ELEVATION**  
SCALE: 1/2"=1'-0"



BASE CABINET **A**  
WALL CABINET **B**

ALL CASEWORK TO BE PLASTIC LAMINATE OVER 3/4" PLYWOOD OR TYPE 3 MDF, TYP. OF ALL EXTERIOR EXPOSED SURFACES  
 ALL INTERIOR SURFACES TO BE WHITE MELAMINE  
 ALL HINGES TO BE 120 DEG. SELF-CLOSING CONCEALED HINGES AND BASE PLATES W/ NICKEL-PLATED FINISH  
 ALL PULLS TO BE 4" WIRE PULLS - FINISH TO BE SELECTED BY ARCHITECT  
 ALL EDGES TO BE BANDED

**1 CASEWORK SECTIONS**  
SCALE: 3/4"=1'-0"



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**A7.1**  
 CASEWORK ELEVATIONS

| ROOM FINISH SCHEDULE |                    |       |            |           |           |           |           |         |        |       |
|----------------------|--------------------|-------|------------|-----------|-----------|-----------|-----------|---------|--------|-------|
| ROOM                 | ROOM NAME          | FLOOR | Base Mat'l | WALLS     |           |           |           | CEILING |        | NOTES |
|                      |                    |       |            | N         | S         | E         | W         | MATL    | HEIGHT |       |
| 101                  | LOBBY              | SC    | VB1        | PT ON GWB | PT ON GWB | PT ON GWB | PT ON GWB | ACT     | 10'-0" |       |
| 102                  | STORAGE            | SC    | VB1        | PT ON GWB | PT ON GWB | PT ON GWB | PT ON GWB | ACT     | 10'-0" |       |
| 103                  | MULTI-PURPOSE AREA | VCT   | VB1        | PT ON GWB | PT ON GWB | PT ON GWB | PT ON GWB | GWB     | 14'-4" |       |
| 104                  | KITCHEN            | VCT   | VB1        | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-11" |       |
| 105                  | CONCESSIONS        | SC    | VB1        | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-11" |       |
| 106                  | HALLWAY            | VCT   | VB1        | PT ON CMU | PT ON GWB | PT ON GWB | PT ON GWB | ACT     | 10'-0" |       |
| 107                  | OFFICE             | VCT   | VB1        | PT ON GWB | PT ON GWB | PT ON GWB | PT ON GWB | ACT     | 10'-0" |       |
| 108                  | OFFICE             | VCT   | VB1        | PT ON GWB | PT ON GWB | PT ON GWB | PT ON GWB | ACT     | 10'-0" |       |
| 109                  | MEN                | SC    | VB1        | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-11" |       |
| 110                  | WOMEN              | SC    | VB1        | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-11" |       |
| 301                  | MEN                | SC    | -          | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-3"  |       |
| 302                  | WOMEN              | SC    | -          | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-3"  |       |
| 303                  | STORAGE            | SC    | -          | PT ON CMU | PT ON CMU | PT ON CMU | PT ON CMU | GWB2    | 8'-3"  |       |

FINISH SCHEDULE KEY:  
ACT: 2"x2" ACOUSTIC TILE CEILING  
GWB: GYPSUM WALL BOARD  
GWB2: WATER RESISTANT GYPSUM WALL BOARD  
PT: PAINT (FLAT-PRIMER + 2 COATS ON GWB) PAINT (ON BLOCK: FLAT-PRIMER + 2 COATS EPOXY)  
SC: SEALED CONCRETE  
VB: 4" VINYL BASE  
VCT: VINYL COMPOSITION TILE

## 2 FINISH SCHEDULE

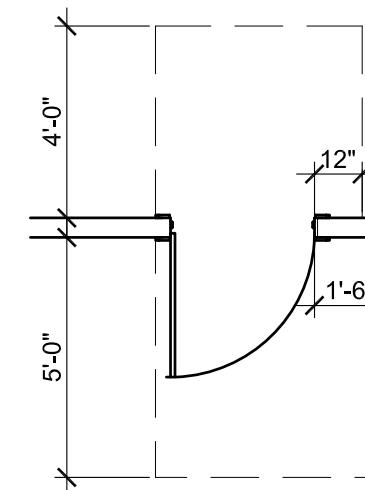
SCALE: NTS

| DOOR AND FRAME SCHEDULE                   |                    |                    |        |      |         |             |       |        |      |                |         |                                 |
|---|--------------------|--------------------|--------|------|---------|-------------|-------|--------|------|----------------|---------|---------------------------------|
| Door No.                                  | Room Name          | DOOR               |        |      |         |             | FRAME |        |      | Hrdwr. Set No. | Remarks |                                 |
|   |                    | Door Size (w x ht) | Thk.   | Type | Glazing | Fire Rating | Type  | Detail | Head |                |         | Jamb                            |
| 101A                                      | LOBBY 101          | PAIR 3'-0" x 7'-0" | 1 3/4" | FG1  | IMPACT  | -           | HM4   |        |      |                |         |                                 |
| 102A                                      | STORAGE            | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM1   |        |      |                |         |                                 |
| 103A                                      | MULTI-PURPOSE AREA | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM1   |        |      |                |         |                                 |
| 103B                                      | MULTI-PURPOSE AREA | 3'-0" x 7'-0"      | 1 3/4" | F3   | -       | -           | HM1   |        |      |                |         |                                 |
| 103C                                      | MULTI-PURPOSE AREA | 3'-0" x 7'-0"      | 1 3/4" | F3   | -       | -           | HM1   |        |      |                |         |                                 |
| 104A                                      | KITCHEN            | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM2   |        |      |                |         |                                 |
| 104B                                      | KITCHEN            | 6'-0" x 4'-8"      | RS     | -    | -       | -           | -     |        |      |                |         | ROLLING SHUTTER COUNTER WINDOW  |
| 105A                                      | CONCESSIONS        | 3'-0" x 7'-0"      | 1 3/4" | F2   | -       | -           | HM2   |        |      |                |         |                                 |
| 105B                                      | CONCESSIONS        | 3'-0" x 7'-0"      | 1 3/4" | F3   | -       | -           | HM2   |        |      |                |         |                                 |
| 105C                                      | CONCESSIONS        | 6'-0" x 4'-8"      | RS     | -    | -       | -           | -     |        |      |                |         | ROLLING SHUTTER COUNTER WINDOW  |
| 106A                                      | HALLWAY            | 3'-0" x 7'-0"      | 1 3/4" | F2   | -       | -           | HM1   |        |      |                |         |                                 |
| 106B                                      | HALLWAY            | 3'-0" x 7'-0"      | 1 3/4" | F3   | -       | -           | HM1   |        |      |                |         |                                 |
| 107A                                      | OFFICE             | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM1   |        |      |                |         |                                 |
| 108A                                      | OFFICE             | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM1   |        |      |                |         |                                 |
| 109A                                      | MEN                | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM2   |        |      |                |         |                                 |
| 110A                                      | WOMEN              | 3'-0" x 7'-0"      | 1 3/4" | F1   | -       | -           | HM2   |        |      |                |         |                                 |
| 110B                                      | RESTROOMS          | 6'-8" x 7'-8"      | 3"     | BD   | -       | -           | -     |        |      |                |         | PT WOOD BARN DOOR - 2 LAYERS 2x |
| BUILDING 2 - PAVILION: NO DOORS OR FRAMES |                    |                    |        |      |         |             |       |        |      |                |         |                                 |
| 301A                                      | MEN                | 3'-0" x 7'-0"      | 1 3/4" | F4   | -       | -           | HM2   |        |      |                |         |                                 |
| 302A                                      | WOMEN              | 3'-0" x 7'-0"      | 1 3/4" | F4   | -       | -           | HM2   |        |      |                |         |                                 |
| 303A                                      | STORAGE            | PAIR 3'-0" x 7'-0" | 1 3/4" | F4   | -       | -           | HM2   |        |      |                |         |                                 |

NOTE: \$400 PER DOOR HARDWARE ALLOWANCE TO BE INCLUDED IN ON GC BIDS

## 3 DOOR SCHEDULE

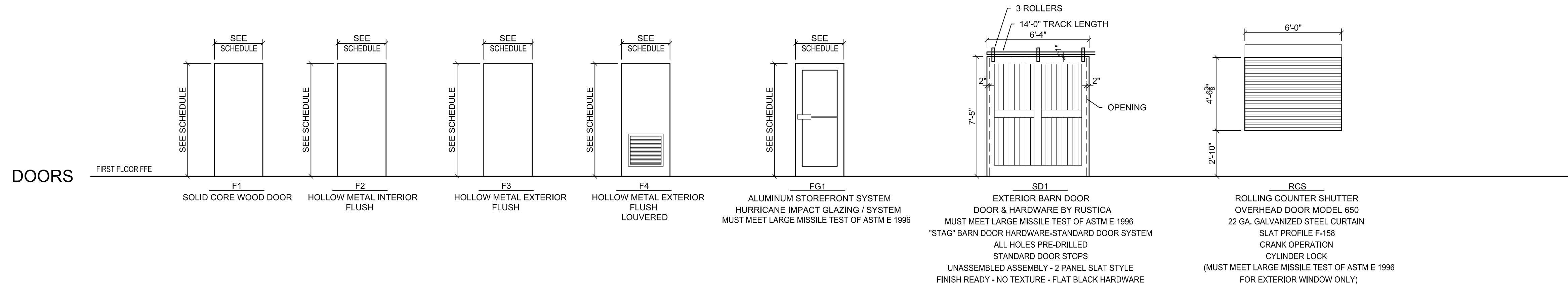
SCALE: NTS



MINIMUM REQUIRED ADA CLEARANCES AT ALL DOORS. NOTIFY ARCHITECT PRIOR TO INSTALLING FRAME IF THESE CLEARANCES CANNOT BE MAINTAINED.

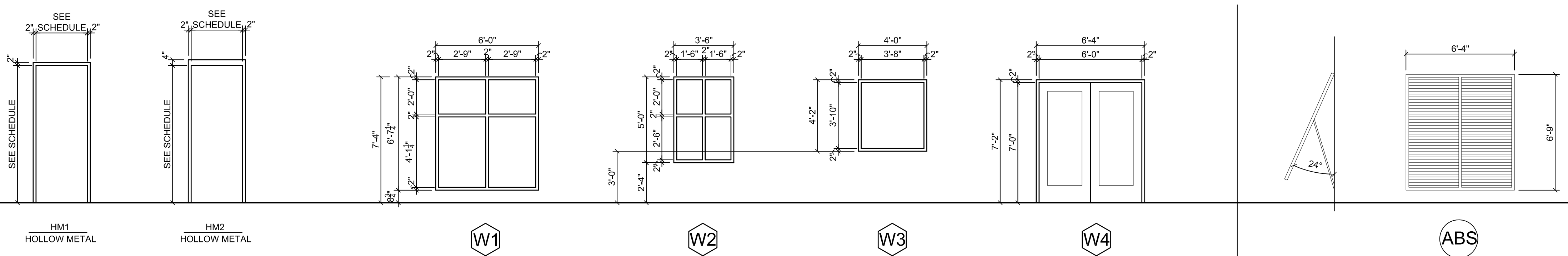
## 4 ADA DOOR CLEARANCES

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



### DOORS

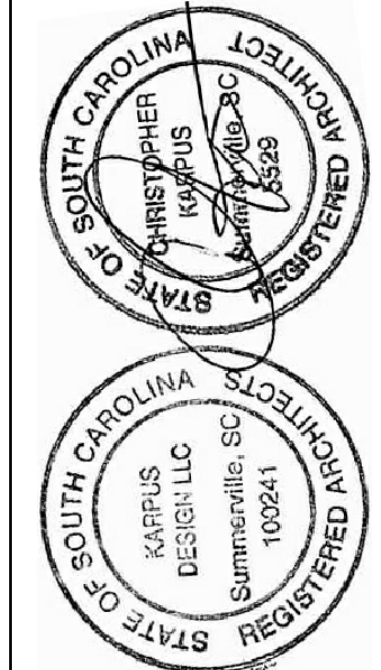
### FRAMES



## 1 DOOR AND FRAME ELEVATIONS

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

**SWH** SEAMON WHITESIDE  
MOUNT PLEASANT, SC 29464-1667  
GREENVILLE, SC 29615-0534  
SUMMERVILLE, SC 29484-9710  
SPARTANBURG, SC 29426-0534  
CHARLOTTE, NC 28202-5450  
WWW.SEAMONWHITESIDE.COM



**HANAHAN RECREATION COMPLEX**  
CITY OF HANAHAN  
HANAHAN, SOUTH CAROLINA

SW+ PROJECT: 7867  
DATE: 3/11/21  
DRAWN BY: CMK  
CHECKED BY: CMK

| REVISION HISTORY |                 |
|------------------|-----------------|
| 0                | BID SET 2/25/21 |

|  |  |
|--|--|
|  |  |
|  |  |
|  |  |

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**A8.1**

SCHEDULES

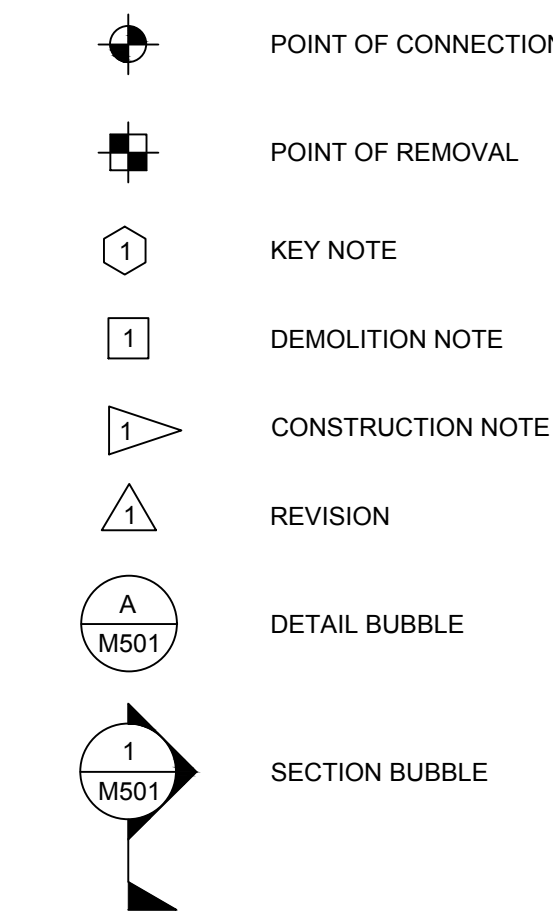
**GENERAL NOTES:**

- PROVIDE ALL MATERIALS AND LABOR NECESSARY FOR COMPLETE AND PROPERLY FUNCTIONING PLUMBING SYSTEMS.
- WORK SHALL CONFORM TO OR MEET THE REQUIREMENTS OF THE MOST CURRENT EDITION OF:
  - INTERNATIONAL PLUMBING CODE
  - ALL FEDERAL, STATE AND LOCAL CODES AND ORDINANCES WHICH APPLY TO THIS WORK.
- DRAWING IS DIAGRAMMATIC IN NATURE AND IS NOT INTENDED TO BE SCALED FOR DIMENSIONS.
- ALL MATERIALS SHALL MEET THE REQUIREMENTS OF UL WHERE UL STANDARDS ARE ESTABLISHED FOR THOSE ITEMS. ALL ITEMS SHALL BE CLASSIFIED BY UL AS SUITABLE FOR THE PURPOSE USED.
- ALL ITEMS SHALL BE NEW AND ALL MATERIALS/EQUIPMENT/DEVICES SHALL BE CURRENT PRODUCTS BY MANUFACTURERS REGULARLY ENGAGED IN THE PRODUCTION OF SUCH PRODUCTS.
- COORDINATE LOCATION OF PLUMBING WORK WITH OTHER TRADES TO AVOID CONFLICTS AND INTERFERENCES.
- INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS.
- COORDINATE AND OBTAIN PERMITS AND INSPECTIONS FROM AUTHORITY HAVING JURISDICTION.
- PROVIDE OWNER WITH CERTIFICATE OF FINAL INSPECTION AND ACCEPTANCE FROM AUTHORITY HAVING JURISDICTION.
- WHERE PIPES PENETRATE FIRE RATED WALLS, FLOORS OR CEILING, SEAL OPENING AROUND PIPES WITH U.L. LISTED FIRE STOPPING MATERIAL TO MAINTAIN THE FIRE RATING OF THE WALL, FLOOR OR CEILING IN ACCORDANCE WITH U.L. LISTED DESIGN FOR 1 HOUR PENETRATIONS. SUBMIT U.L. DESIGN FOR FIRE RATED PENETRATIONS SEALS TO ARCHITECT/ENGINEER FOR APPROVAL PRIOR TO START OF WORK.
- CLEANOUTS, LINE SIZE, UNLESS NOTED OTHERWISE.
- FLOOR DRAINS, LINE SIZE, UNLESS NOTED OTHERWISE. THE FLOOR DRAINS SHALL BE FLUSH MOUNTED WITH FINISHED FLOOR AND THE FLOOR SHALL SLOPE TO THE DRAINS AT A MINIMUM OF  $\frac{1}{16}$ " PER FOOT. COORDINATE WITH ARCHITECTURAL AND STRUCTURAL.
- VALVES SHALL BE LINE SIZE UNLESS NOTED OTHERWISE.
- ABOVE GROUND WATER PIPING SHALL BE TYPE L COPPER. UNDERGROUND WATER PIPING SHALL BE TYPE K COPPER.
- WASTE, DRAIN, AND VENT PIPING SHALL BE STANDARD WEIGHT, TYPE 1, PVC. INSTALLED IN ACCORDANCE WITH ASTM D2321.
- COLD WATER PIPING SHALL BE INSULATED WITH 1" THICK GLASS FIBER ('K' OF 0.24 AT 75°F) WITH VAPOR BARRIER. HOT WATER PIPING SHALL BE INSULATED WITH 1" THICK GLASS FIBER ('K' OF 0.24 AT 75°F) WITHOUT VAPOR BARRIER.
- VERIFY ALL EXISTING PIPE SIZES. NOTIFY ENGINEER IF EXISTING AS BUILT PIPE SIZES VARY.
- ALL ROOF PENETRATIONS SHALL BE COORDINATED WITH ROOFING CONTRACTOR TO ENSURE ROOF BOND WILL BE MAINTAINED.
- PROVIDE ALL OPERATION AND MAINTENANCE MANUALS FOR PLUMBING EQUIPMENT TO BUILDING OWNER.

**PLUMBING LEGENDS & ABBREVIATIONS**

**NOTE: ALL SYMBOL DESCRIPTIONS ARE SUBJECT TO MODIFICATION ON THE DRAWINGS.  
ALL SYMBOLS NOT NECESSARILY USED ON THIS PROJECT.**

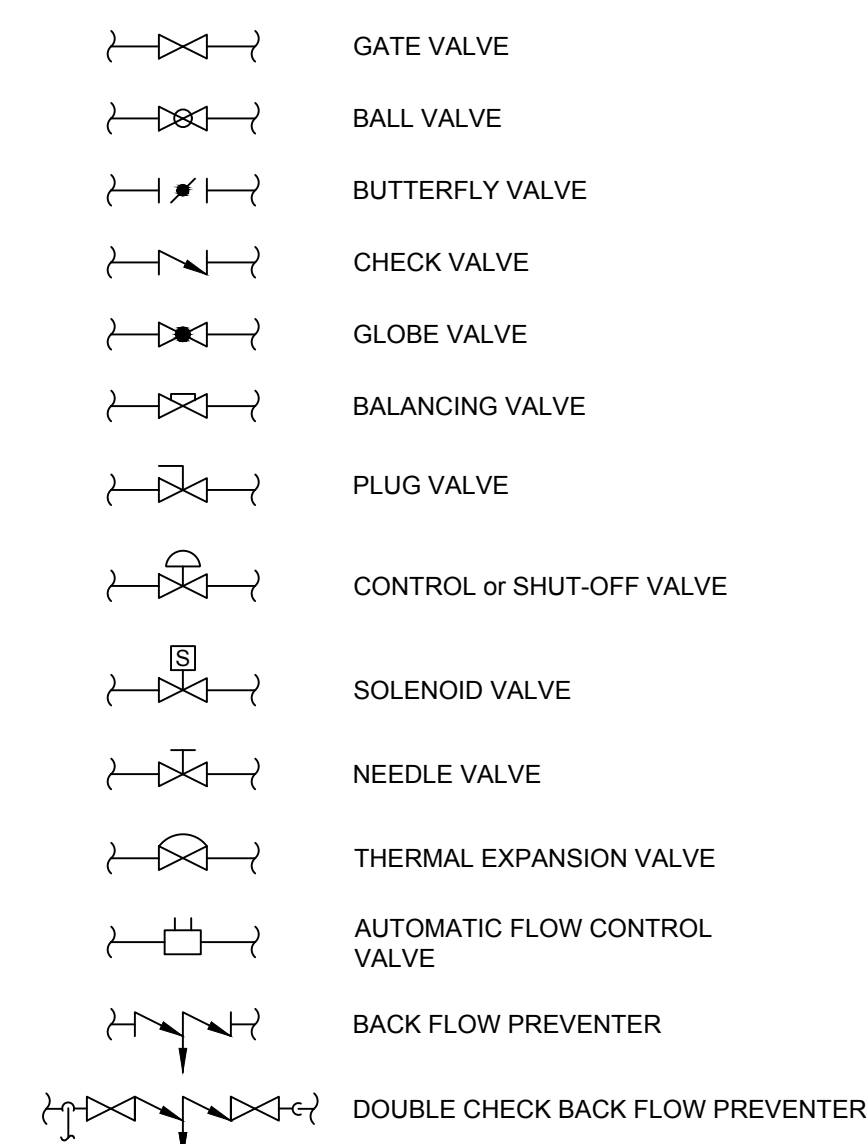
**GENERAL SYMBOLS:**



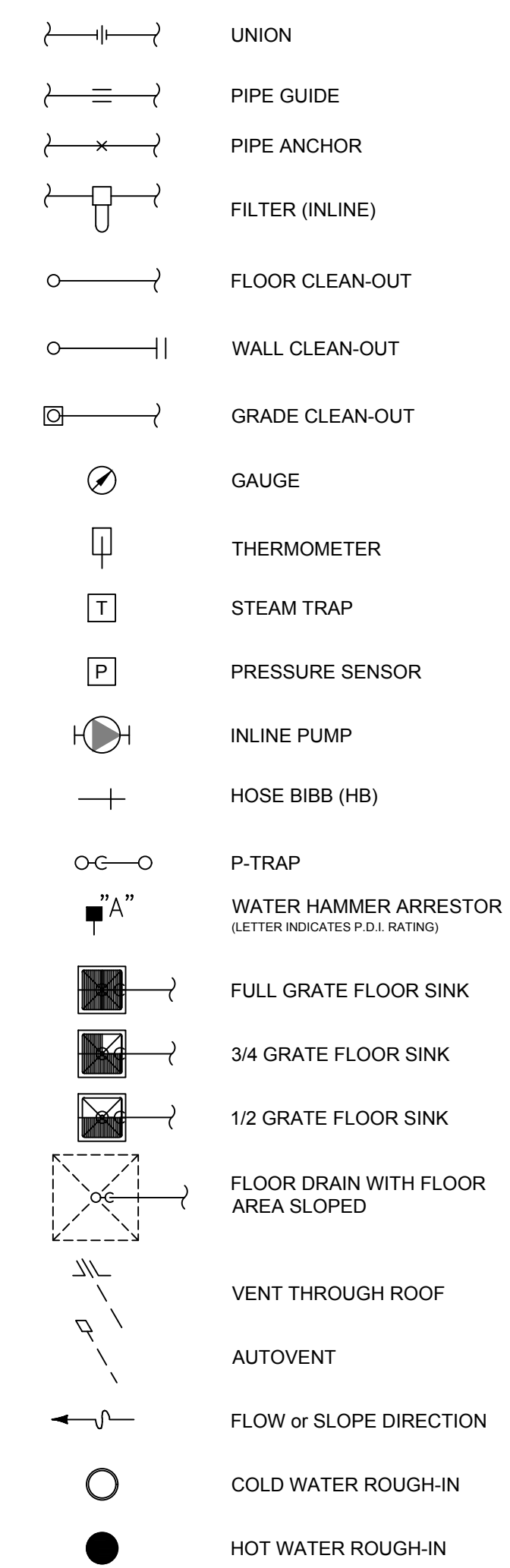
**PLUMBING ABBREVIATIONS:**

|          |                                     |
|----------|-------------------------------------|
| AFF      | ABOVE FINISHED FLOOR                |
| AFG      | ABOVE FINISHED GRADE                |
| AD       | ACCESS DOOR                         |
| BLDG     | BUILDING                            |
| CA       | COMPRESSED AIR                      |
| CD       | CONDENSATE DRAIN                    |
| CO       | CLEANOUT                            |
| CW       | DOMESTIC COLD WATER                 |
| DCV      | DOUBLE CHECK VALVE                  |
| Ø or DIA | DIAMETER                            |
| DN       | DOWN                                |
| (E)      | EXISTING                            |
| EES      | EMERGENCY EYE AND SHOWER WASH       |
| EEW      | EMERGENCY EYE WASH                  |
| EF       | EXHAUST FAN                         |
| EL       | ELEVATION                           |
| FCO      | FLOOR CLEAN OUT                     |
| FCV      | FLOOR CLEAN OUT                     |
| FD       | FLOOR DRAIN                         |
| FDC      | FIRE DEPARTMENT CONNECTION          |
| FS       | FLOOR SINK                          |
| GCO      | GRADE CLEAN OUT                     |
| GT       | GREASE TRAP                         |
| HB       | HOSE BIBB                           |
| HD       | HUB DRAIN                           |
| HW       | DOMESTIC HOT WATER                  |
| HWR      | DOMESTIC HOT WATER RETURN           |
| HWRP     | HOT WATER RECIRCULATION PUMP        |
| (N)      | NEW                                 |
| NC       | NORMALLY CLOSED                     |
| NO       | NORMALLY OPEN                       |
| P-1      | PLUMBING FIXTURE                    |
| PIV      | POST INDICATING VALVE               |
| PRV      | PRESSURE RELIEF VALVE               |
| PSIA     | POUNDS PER SQUARE INCH ABSOLUTE     |
| PSIG     | POUNDS PER SQUARE INCH GAUGE        |
| PT       | PLASTER TRAP                        |
| (R)      | REMOVE / RELOCATE                   |
| R.I.     | ROUGH-IN                            |
| RPBP     | REDUCED PRESSURE BACKFLOW PREVENTER |
| SAN      | SANITARY                            |
| SP       | SUMP/GRINDER PUMP                   |
| SS       | SOLIDS SEPARATOR                    |
| STM      | STEAM                               |
| TD       | TRENCH DRAIN                        |
| TMV      | THERMOSTATIC MIXING VALVE           |
| TP       | TRAP PRIMER                         |
| V        | SANITARY VENT                       |
| VTR      | VENT THROUGH ROOF                   |
| WCO      | WALL CLEAN OUT                      |
| WH-1     | WATER HEATER                        |

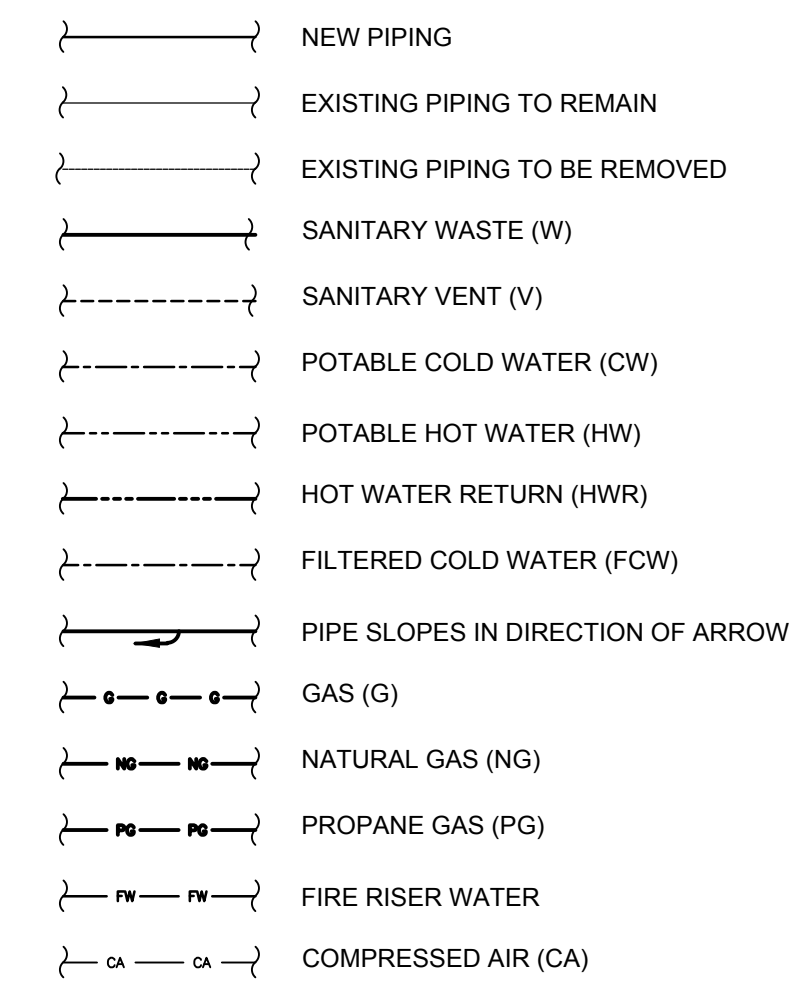
**VALVES & FITTINGS:**



**VALVES & FITTINGS (continued):**



**PIPING DESIGNATIONS:**

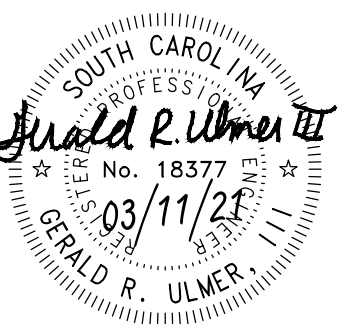
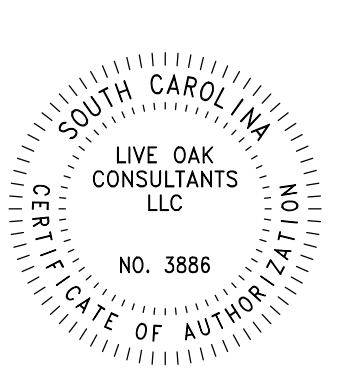


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 Raleigh, NC 27616  
 www.LiveOakConsultants.com  
 Project # 2020015E

New Recreation Building for:  
**HANAHAN CITY PARK**  
 City of Hanahan  
 Hanahan, South Carolina



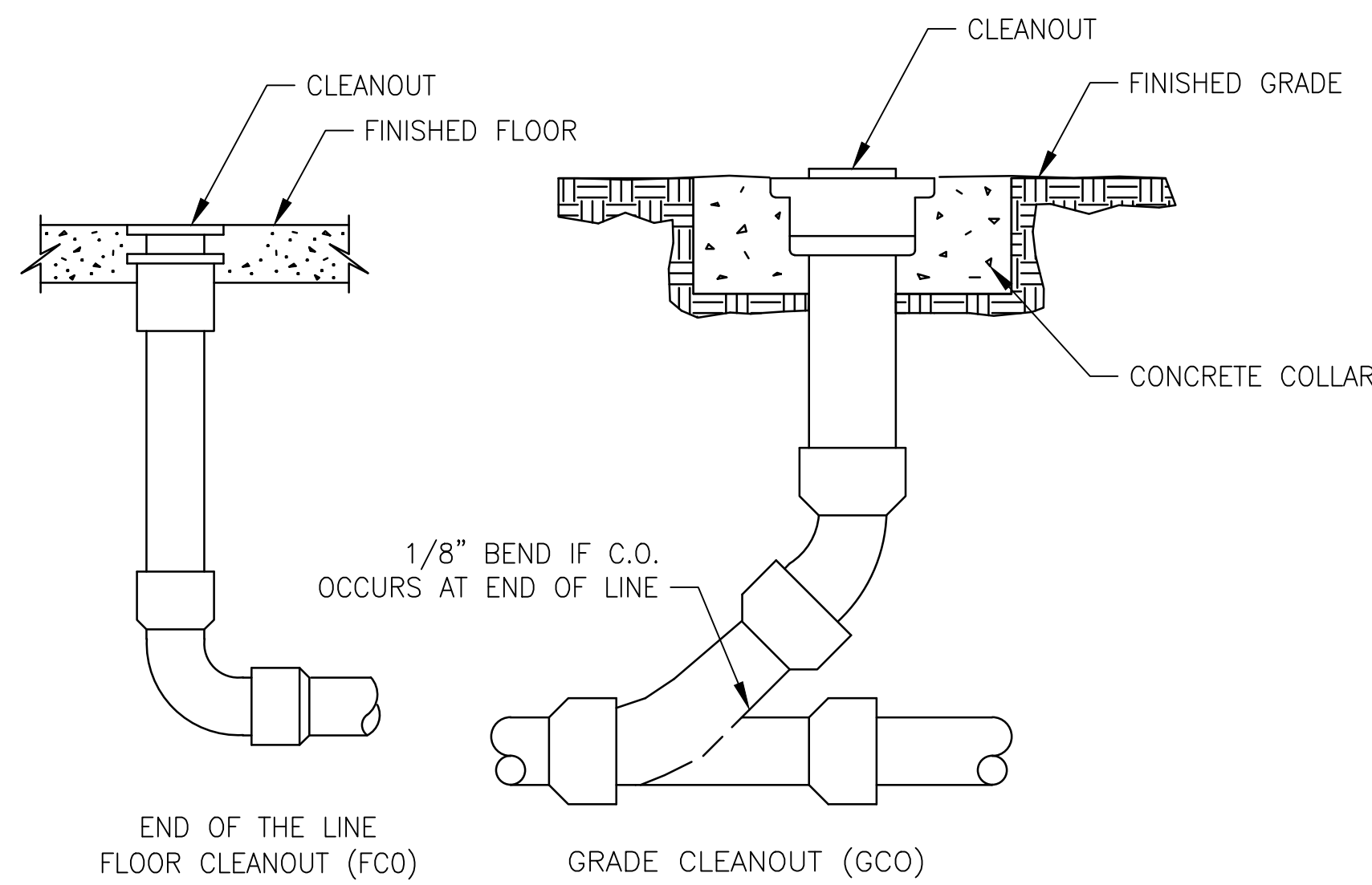
**BID SET**

| Rev. | Date       | Description |
|------|------------|-------------|
| 0    | 03.11.2021 | BID SET     |

DRAWN BY: X. WILLIAMS  
 CHECKED BY: G. ULMER  
 PROJECT NUMBER: 19006  
 DATE: 09.21.2020

SHEET TITLE:  
**PLUMBING  
 GENERAL NOTES,  
 LEGENDS, &  
 ABBREVIATIONS**  
 SHEET NUMBER:  
**P001**

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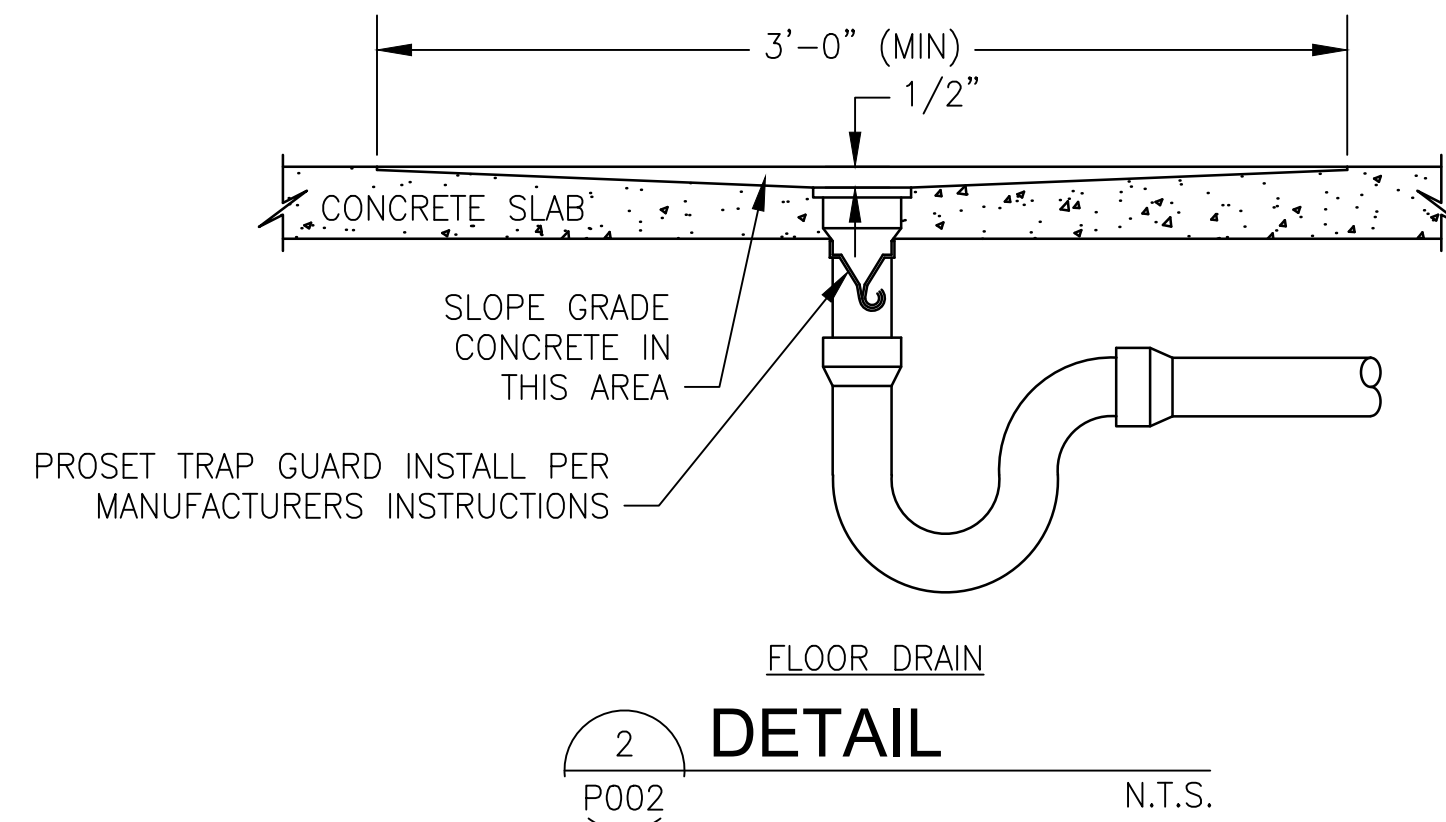
**WALL, FLOOR, & GRADE CLEANOUTS**  
**1 DETAIL**  
 P002 N.T.S.

| WATER HEATER SCHEDULE |             |            |
|-----------------------|-------------|------------|
| BUILDING              | REC. CENTER | RESTROOMS  |
| MARK                  | WH-1        | WH-2       |
| STORAGE (GAL)         | 50          | 10         |
| RECOVERY (GPH @ Δ.T.) | 30 @ 60°F   | 10 @ 60°F  |
| TOTAL KW              | 4.5         | 1.5        |
| # OF ELEMENTS         | 2           | 1          |
| KW OF EACH ELEMENT    | 4.5         | 1.5        |
| ELECTRICAL V/φ/Hz     | 208/1/60    | 120/1/60   |
| MANUFACTURER          | A.O. SMITH  | A.O. SMITH |
| MODEL NO.             | DEL-50      | DEL-10     |
| NOTES:                | 1,2,3       | 1,3        |

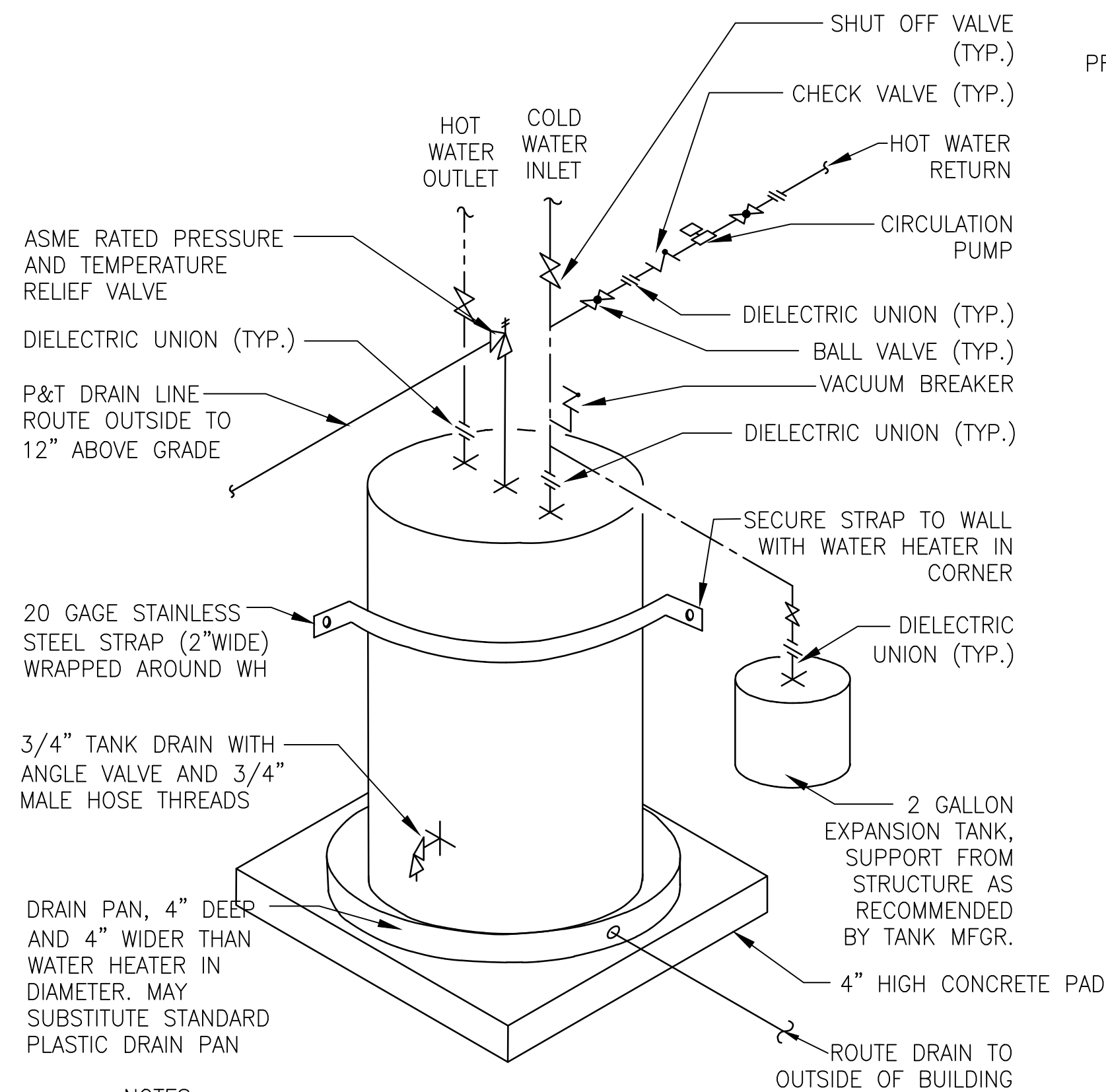
**NOTES:**  
 1. SET WATER HEATER ON A 4" HIGH CONCRETE PAD THAT IS 8" WIDER AND DEEPER THAN WATER HEATER DIAMETER.  
 2. ELECTRIC HEAT ELEMENTS SHALL NOT OPERATE SIMULTANEOUSLY.  
 3. PROVIDE SEISMIC RESTRAINTS.

| PLUMBING FIXTURE SCHEDULE |   |             |      |        |        |  |
|---------------------------|---|-------------|------|--------|--------|--|
| MARK                      | DESCRIPTION   | CONNECTIONS |      |        |        |  |
|                           |   | CW          | HW   | WASTE  | VENT   |  |
| P-1 & 1A                  | WALL MOUNTED WATER CLOSET (ADA): AMERICAN STANDARD MODEL# 3351.101; WHITE; PROVIDE SEAT MODEL# 5901.100; PROVIDE MANUAL FLUSH VALVE MODEL# 6047.161.002; 1.6 GPF; PROVIDE MANUFACTURER RECOMMENDED WALL HANGING BRACKET AND ANCHOR TO FLOOR PER MANUFACTURER'S RECOMMENDATIONS. | 1"          | -    | 3"     | 2"     |  |
| P-2                       | WALL MOUNTED URINAL: AMERICAN STANDARD MODEL# 6601.012, WHITE; PROVIDE MANUAL FLUSH VALVE MODEL# 6045.601; PROVIDE MANUFACTURER WALL HANGER.  | 3/4"        | -    | 2"     | 1-1/2" |  |
| P-3 & 3A                  | WALL MOUNTED LAVATORY (ADA): AMERICAN STANDARD MODEL# 0321.026; SENSOR OPERATED FAUCET MODEL# 6059.205; 0.5 GPM; PROVIDE MANUFACTURER RECOMMENDED WALL HANGER; SEE NOTES 1 AND 2  | 1/2"        | 1/2" | 1-1/2" | 1-1/4" |  |
| P-4                       | KITCHEN/BREAKROOM SINK: ELKAY MODEL# DCR252210; SS; SINGLE BOWL DROP-IN SINK; FAUCET MODEL# LK2500CR; MOUNTING HARDWARE INCLUDED; SEE NOTE 3  | 1/2"        | 1/2" | 1-1/2" | 1-1/4" |  |
| P-5                       | MOP/JANITORS SINK: FIAT MODEL TSB200; 24"x24"x12"; MOLDED STONE; PROVIDE FAUCET MODEL 830AA; HOSE & BRACKET MODEL 832AA; STRAINER DRAIN & P-TRAP.   | 1/2"        | 1/2" | 2"     | 2"     |  |
| EWC                       | WATER COOLER: (ADA) SINGLE; ELKAY MODEL EZS8; PROVIDE MOUNTING FRAME AND WALL HANGERS. SEE NOTE 3.  | 1/2"        | -    | 1-1/2" | 1-1/4" |  |
| FD                        | FLOOR DRAIN: ZURN MODEL ZNB400-6C; PROVIDE P-TRAP AND PROSET TRAP GUARD   | -           | -    | 3"     | -      |  |
| GCO                       | GRADE CLEANOUT: ZURN MODEL EZ-6; 6" TOP ASSEMBLY ADJUSTABLE; CAST IRON.   | -           | -    | 4"     | -      |  |
| FCO                       | FLOOR CLEANOUT: ZURN MODEL ZN1400; "LEVEL-TROL" ADJUSTABLE; CAST IRON.  | -           | -    | 4"     | -      |  |
| HB                        | HOSE BIBB: MIFAB MODEL MHY-30; LOW LEAD MODERATE CLIMATE WALL HYDRANT; SELF DRAINING; OPERATING KEY INCLUDED.   | 3/4"        | -    | -      | -      |  |

**NOTES:**  
 1. PROVIDE "TRUEBRO" INC, HANDI-LAV GUARD INSULATION KITS FOR ADA COMPLIANCE.  
 2. PROVIDE 17 GAUGE TUBULAR BRASS P-TRAP AND OFFSET TAIL PIECE, ANGLED STOP VALVES WITH RIGID TUBE RISERS AND ESCUTCHEONS.  
 3. PROVIDE 17 GAUGE TUBULAR BRASS P-TRAP, TAILPIECE, ANGLED STOP VALVES WITH RIGID TUBE RISERS AND ESCUTCHEONS.  
 4. PROVIDE ANGLED STOP VALVE AND RIGID TUBE RISER.  
 5. PROVIDE MODEL SPECIFIED OR APPROVED EQUAL.



**FLOOR DRAIN**  
**2 DETAIL**  
 P002 N.T.S.



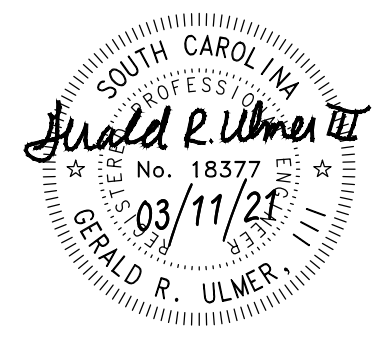
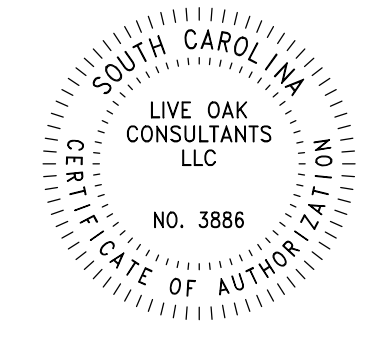
**NOTES:**  
 1. PROVIDE AN INLINE CIRCULATING PUMP 4 GPM @ 24' TDH, 115V/1PH, 1/15HP, 325 RPM BRONZE CONSTRUCTION. (TACO 009 OR APPROVED EQUAL) CONTROL WITH AQUASTAT AND SET TO OPERATE WHEN TEMPERATURE DROPS BELOW 100°F.

**ELECTRIC WATER HEATER (WH-1) WITH CIRCULATION PUMP**  
**3 DETAIL**  
 P002 N.T.S.

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**LOC**  
**Live Oak Consultants, LLC**  
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 P.O. Box 60410  
 Norfolk, VA 23506  
 www.LiveOakConsultants.com  
 Project # 2020015E

New Recreation Building for:  
**HANAHAN CITY PARK**  
 City of Hanahan  
 Hanahan, South Carolina

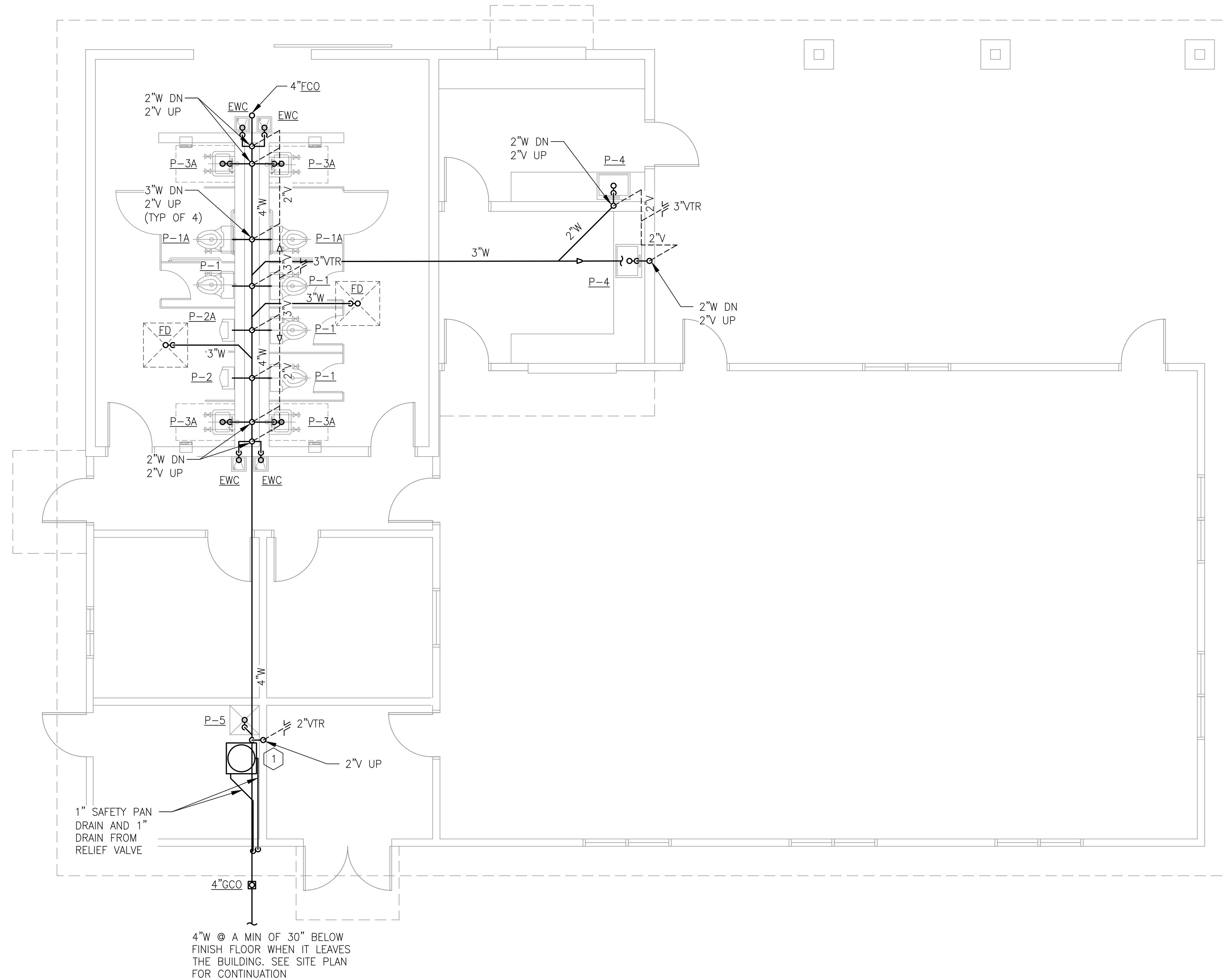


**BID SET**  
 Rev. 0 Date 03.11.2021 Description BID SET

DRAWN BY: X. WILLIAMS  
 CHECKED BY: G. ULMER  
 PROJECT NUMBER: 19006  
 DATE: 09.21.2020

SHEET TITLE:  
**PLUMBING SCHEDULES & DETAILS**  
 SHEET NUMBER:  
**P002**

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**P1** REC. CENTER SANITARY SEWER PLAN  
SCALE: 1/4"=1'-0"

**GENERAL NOTES:**

- REFER TO DRAWING P001 FOR PLUMBING GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
- REFER TO DRAWING P002 FOR PLUMBING SCHEDULES & DETAILS.

**KEYED NOTES:**

- SEE DETAIL ON SHEET P002 FOR THE INSTALLATION DETAIL FOR THE WATER HEATER.

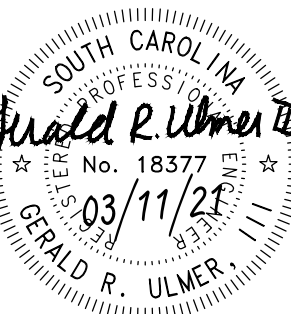
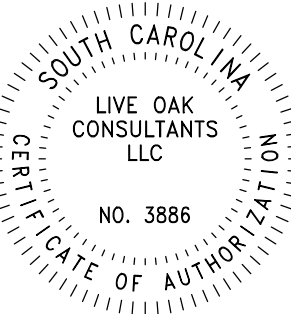


KARPUS DESIGN, LLC  
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Live Oak Consultants, LLC  
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Project # 20200158

New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina



**BID SET**

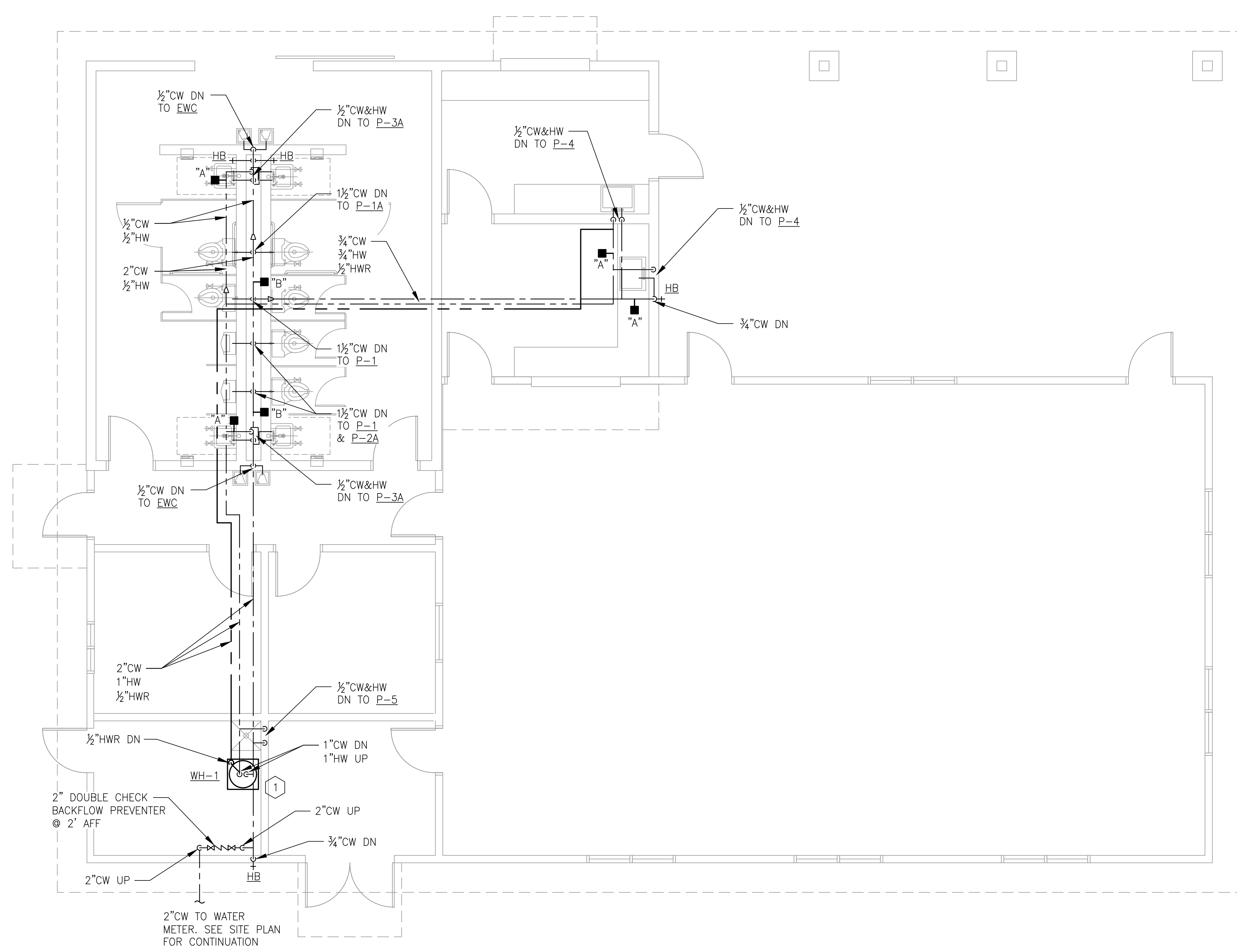
| Rev. | Date       | Description |
|------|------------|-------------|
| 0    | 03.11.2021 | BID SET     |

DRAWN BY: X. WILLIAMS  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:  
REC. CENTER BLDG.  
PLUMBING  
SANITARY SEWER  
PLAN  
SHEET NUMBER:  
**P101**



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**GENERAL NOTES:**

1. REFER TO DRAWING P001 FOR PLUMBING GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
2. REFER TO DRAWING P002 FOR PLUMBING SCHEDULES & DETAILS.

**KEYED NOTES:**

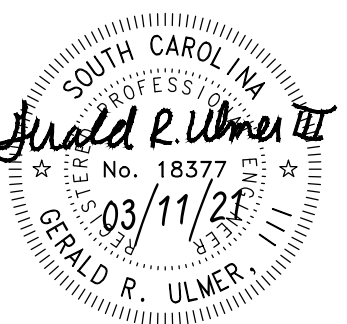
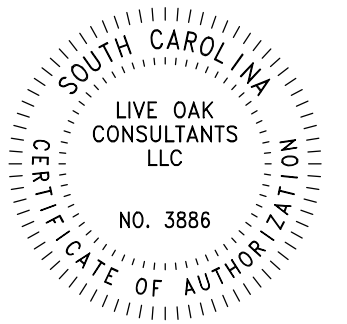
- 1 SEE DETAIL ON SHEET P002 FOR THE INSTALLATION DETAIL FOR THE WATER HEATER.

P1 REC. CENTER DOMESTIC WATER PLAN  
SCALE: 1/4"=1'-0"

**KARPUS DESIGN, LLC**  
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Project#\_2020015E

New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina



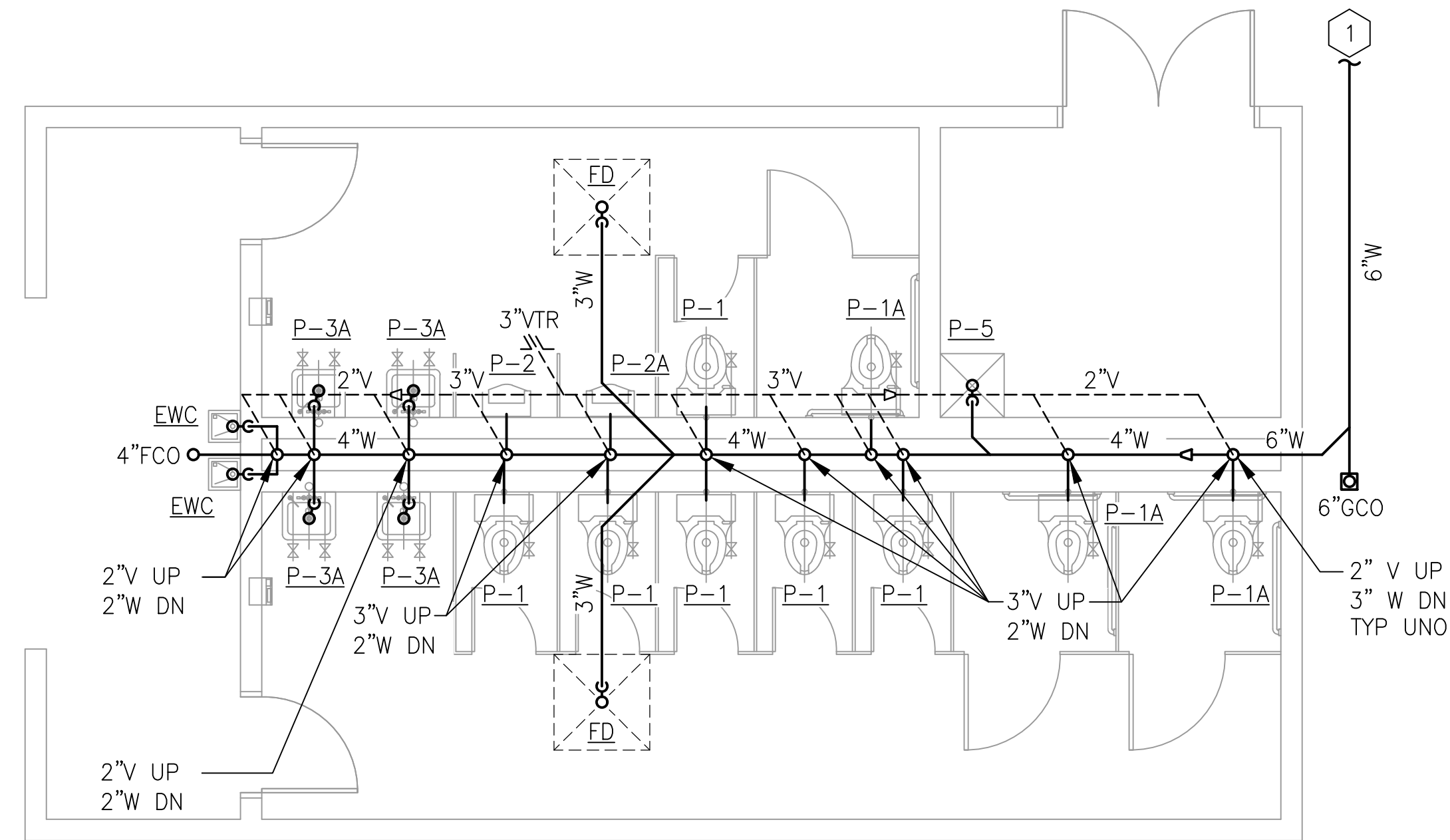
**BID SET**

| Rev. | Date       | Description |
|------|------------|-------------|
| 0    | 03.11.2021 | BID SET     |

DRAWN BY: X. WILLIAMS  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:  
**REC. CENTER BLDG.  
PLUMBING  
DOMESTIC WATER  
PLAN**  
SHEET NUMBER:  
**P102**

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**P1** RESTROOMS BUILDING SANITARY SEWER PLAN  
SCALE: 1/4"=1'-0"

**GENERAL NOTES:**

- 1. REFER TO DRAWING P001 FOR PLUMBING GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
- 2. REFER TO DRAWING P002 FOR PLUMBING SCHEDULES & DETAILS.

**KEYED NOTES:**

- 1 4"W @ A MINIMUM OF 30" BELOW FINISH FLOOR WHEN IT LEAVES THE BUILDING. SEE SITE PLAN FOR CONTINUATION.

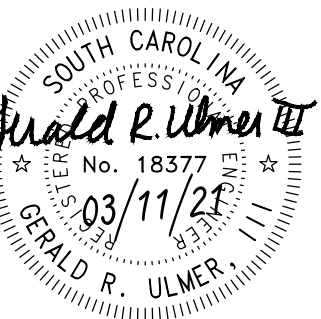
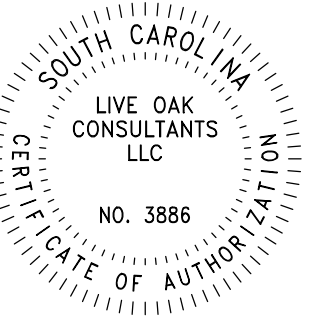


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New Recreation Building for:  
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DRAWN BY: X. WILLIAMS  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:  
**RESTROOMS BLDG.  
PLUMBING  
SANITARY SEWER  
PLAN**  
SHEET NUMBER:  
**P103**

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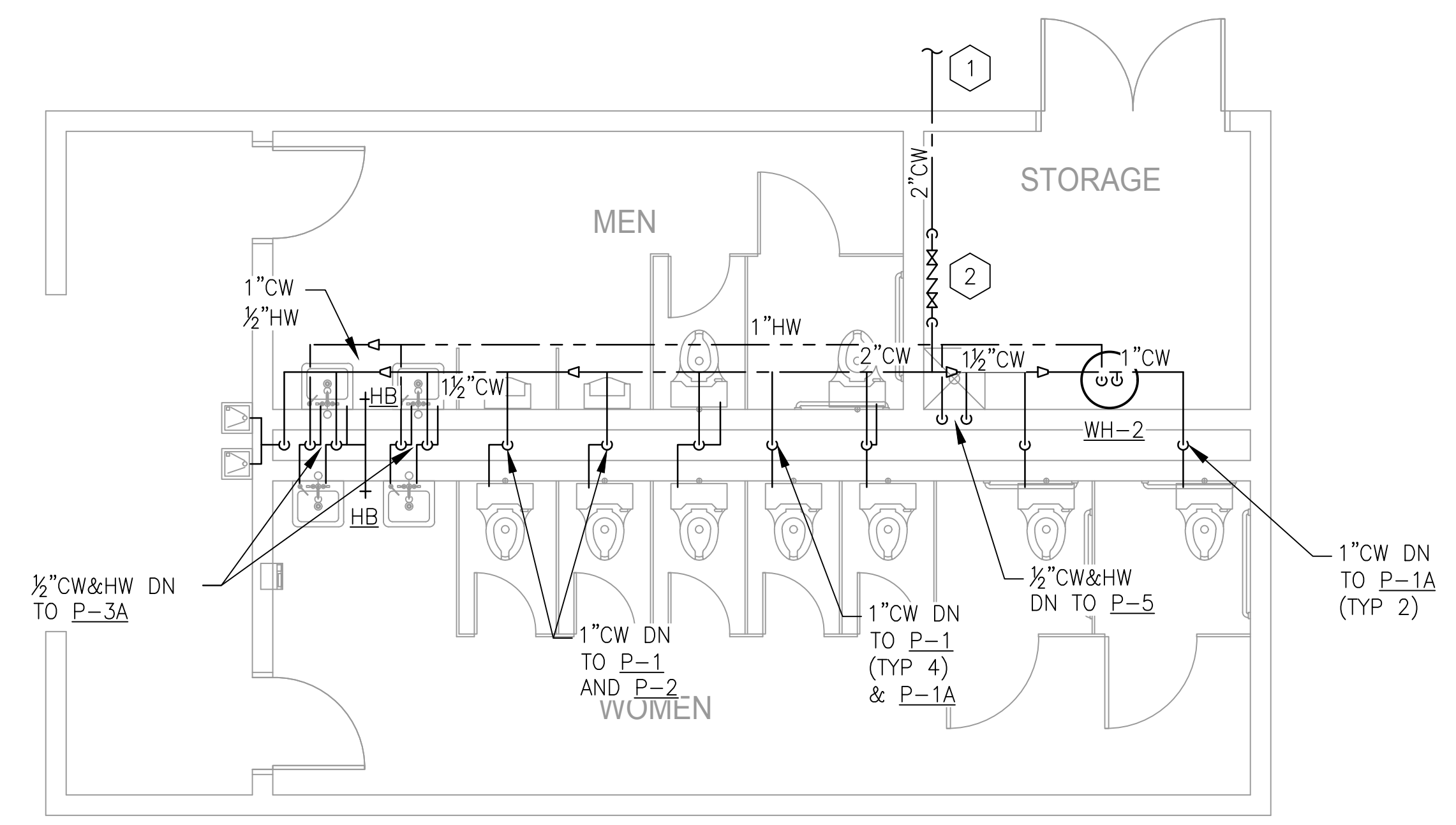
A B C D E

**GENERAL NOTES:**

- 1. REFER TO DRAWING P001 FOR PLUMBING GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
- 2. REFER TO DRAWING P002 FOR PLUMBING SCHEDULES & DETAILS.

**KEYED NOTES:**

- 1 2" CW FROM WATER METER SEE SITE PLAN FOR CONTINUATION.
- 2 INSTALLED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER @ 2'-0" AFF.



P1 RESTROOMS BUILDING DOMESTIC WATER PLAN  
SCALE: 1/4"=1'-0"

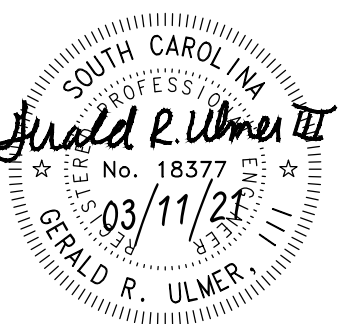
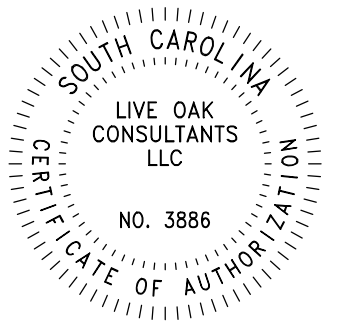


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New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina



**BID SET**

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| 0    | 03.11.2021 | BID SET     |

DRAWN BY: X. WILLIAMS  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:  
RESTROOMS BLDG.  
PLUMBING  
DOMESTIC WATER  
PLAN  
SHEET NUMBER:  
**P104**

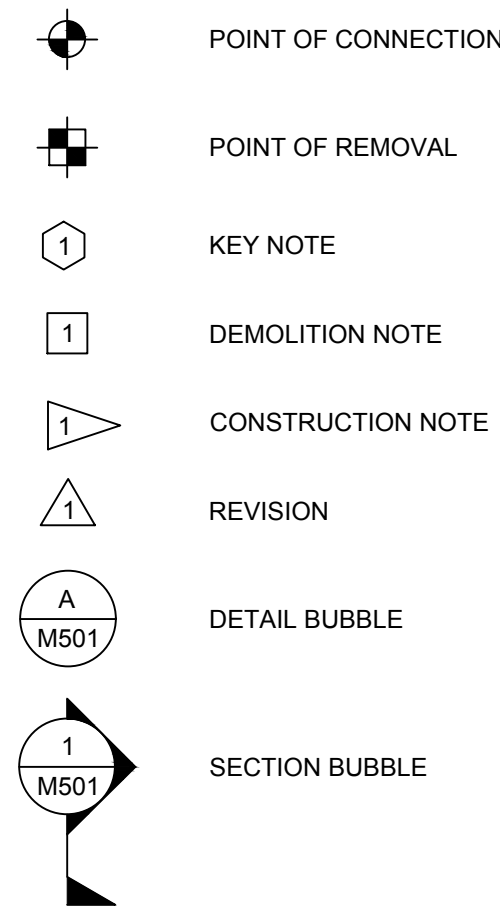
**GENERAL NOTES:**

- PROVIDE ALL MATERIALS AND LABOR FOR COMPLETE AND PROPERLY FUNCTIONING MECHANICAL SYSTEMS. WARRANTY ALL WORK AND ALL MATERIALS, EQUIPMENT AND DEVICES FOR A PERIOD OF ONE YEAR AFTER OWNER'S ACCEPTANCE.
- WORK SHALL CONFORM TO OR MEET THE REQUIREMENTS OF THE MOST CURRENT EDITION OF:
  - A: INTERNATIONAL MECHANICAL CODE
  - B: SMACNA
  - C: ASHRAE
  - D: ALL FEDERAL, STATE AND LOCAL CODES AND ORDINANCES WHICH APPLY TO THIS WORK.
- DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE NOT INTENDED TO BE SCALED FOR DIMENSIONS.
- ALL MATERIALS, EQUIPMENT AND DEVICES SHALL MEET THE REQUIREMENTS OF UL WHERE UL STANDARDS ARE ESTABLISHED FOR THOSE ITEMS. ALL ITEMS SHALL BE CLASSIFIED BY UL AS SUITABLE FOR THE PURPOSE USED.
- COORDINATE LOCATION OF MECHANICAL WORK WITH OTHER TRADES TO AVOID CONFLICTS AND INTERFERENCES.
- INSTALL ALL EQUIPMENT AND MATERIAL IN ACCORDANCE WITH MANUFACTURE'S WRITTEN, PRINTED INSTRUCTIONS AND RECOMMENDATIONS.
- PROVIDE OWNER WITH CERTIFICATES OF FINAL INSPECTION AND ACCEPTANCE FROM AUTHORITY HAVING JURISDICTION.
- MAKE CONNECTIONS FROM MECHANICAL EQUIPMENT TO DUCTWORK USING FLEXIBLE DUCT CONNECTIONS.
- ALL EQUIPMENT, PIPE AND DUCTWORK ABOVE CEILING SHALL BE SUPPORTED FROM BUILDING STRUCTURE ABOVE.
- DUCT SIZES INDICATED ARE NET FREE INSIDE DIMENSIONS OF RECTANGULAR METAL DUCT. AT CONTRACTOR'S OPTION, EQUIVALENT SIZE ROUND DUCT MAY BE USED.
- PROVIDE FLOAT SWITCH IN ALL SECONDARY PANS TO SHUT OFF UNITS WHEN DRAINS BECOME OBSTRUCTED.
- FURNISH AND INSTALL ALL MANUAL DAMPERS INDICATED ON DRAWINGS OR NECESSARY TO PROPERLY DISTRIBUTE AND BALANCE AIR. ALL DAMPERS SHALL BE OFFSET, LOCKING, QUADRANT TYPE DAMPERS.
- BALANCE SYSTEM TO AIR FLOWS SHOWN ON FLOOR PLAN. PROVIDE TEST AND BALANCE REPORT TO ENGINEER FOR APPROVAL.
- WHERE PIPES PENETRATE FIRE RATED WALLS, FLOORS OR CEILING, SEAL OPENING AROUND PIPES WITH U.L. LISTED FIRE STOPPING MATERIAL TO MAINTAIN THE FIRE RATING OF THE WALL, FLOOR OR CEILING IN ACCORDANCE WITH U.L. LISTED DESIGN FOR 1 HOUR PENETRATIONS. SUBMIT U.L. DESIGN FOR FIRE RATED PENETRATIONS SEALS TO ARCHITECT/ENGINEER FOR APPROVAL PRIOR TO START OF WORK.
- ALL DUCTWORK, EXCEPT EXPOSED DUCTWORK, SHALL BE SINGLE WALL GALVANIZED STEEL. ALL JOINTS AND SEAMS SHALL BE CLEANED, COATED AND SEALED WITH MASTIC OR MASTIC TAPE PRIOR TO APPLYING THE EXTERNAL INSULATION.
- SUPPLY AND RETURN DUCTWORK SHALL BE INSULATED WITH 3" FIBERGLASS DUCT WRAP WITH FOIL FACE (OWENS CORNING TYPE 75 OR APPROVED EQUAL). THE RETURN DUCT MIXING BOX SHALL BE INSULATED WITH 1" DUCT LINER (OWENS CORNING AEROFLEX PLUS TYPE 300 OR APPROVED EQUAL).
- ALL ROOF PENETRATIONS SHALL BE COORDINATED WITH ROOFING CONTRACTOR TO ENSURE ROOF BOND WILL BE MAINTAINED.
- ALL CONDENSATE AND REFRIGERANT PIPING SHALL BE INSULATED WITH 3/4" AEROCEL INSULATION.
- PROVIDE ALL OPERATION AND MAINTENANCE MANUALS FOR MECHANICAL EQUIPMENT TO BUILDING OWNER.

**MECHANICAL LEGENDS & ABBREVIATIONS**

**NOTE: ALL SYMBOL DESCRIPTIONS ARE SUBJECT TO MODIFICATION ON THE DRAWINGS. ALL SYMBOLS NOT NECESSARILY USED ON THIS PROJECT.**

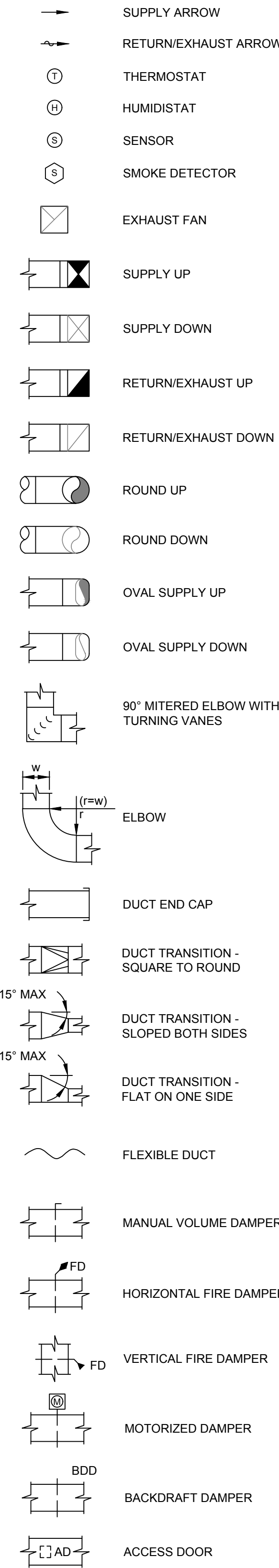
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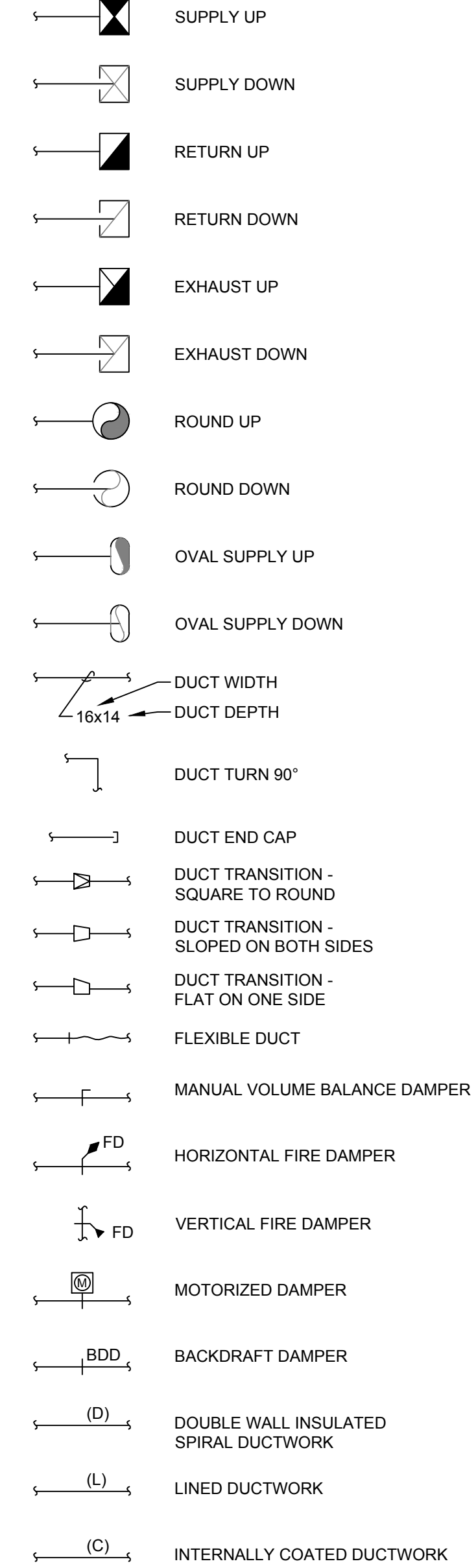
**MECHANICAL ABBREVIATIONS:**

|          |                            |
|----------|----------------------------|
| AFF      | ABOVE FINISHED FLOOR       |
| AFG      | ABOVE FINISHED GRADE       |
| A/100    | AIR DEVICE MARK/CFM        |
| AHU      | AIR HANDLING UNIT          |
| AD       | ACCESS DOOR                |
| B        | BOILER                     |
| BDD      | BACK DRAFT DAMPER          |
| BHP      | BRAKE HORSEPOWER           |
| BLDG     | BUILDING                   |
| BOD      | BOTTOM OF DUCT             |
| BOS      | BOTTOM OF STEEL            |
| CH       | CHILLER                    |
| CD       | CONDENSATE DRAIN           |
| DB       | DRY BULB                   |
| Ø or DIA | DIAMETER                   |
| DN       | DOWN                       |
| DH       | DUCT HEATER                |
| ERV      | ENERGY RECOVERY VENTILATOR |
| EF       | EXHAUST FAN                |
| EG       | EXHAUST GRILLE             |
| EL       | ELEVATION                  |
| (E)      | EXISTING                   |
| FCU      | FAN COIL UNIT              |
| FD       | FIRE DAMPER OR FLOOR DRAIN |
| FLA      | FULL LOAD AMPS             |
| FUR      | FURNACE                    |
| HP       | HEAT PUMP                  |
| HX       | HEAT EXCHANGER (HX)        |
| HUM      | HUMIDIFIER                 |
| L        | LOUVER (EXTERIOR)          |
| MVD      | MANUAL VOLUME DAMPER       |
| (N)      | NEW                        |
| NC       | NORMALLY CLOSED            |
| NO       | NORMALLY OPEN              |
| O.A.     | OUTSIDE AIR                |
| P        | PUMP                       |
| PHP      | PACKAGE HEAT PUMP          |
| PTHP     | PACKAGE TERMINAL HEAT PUMP |
| (R)      | REMOVE / RELOCATE          |
| RF       | RETURN FAN                 |
| RG       | RETURN GRILLE              |
| S.A.     | SUPPLY AIR                 |
| SD       | SUPPLY DIFFUSER            |
| SF       | SUPPLY FAN                 |
| SG       | SUPPLY GRILLE              |
| SH       | STEAM HUMIDIFIER           |
| TG       | TRANSFER GRILLE            |
| TSP      | TOTAL STATIC PRESSURE      |
| UH       | UNIT HEATER                |
| VD       | VOLUME DAMPER              |
| VTR      | VENT THROUGH ROOF          |
| WB       | WET BULB                   |

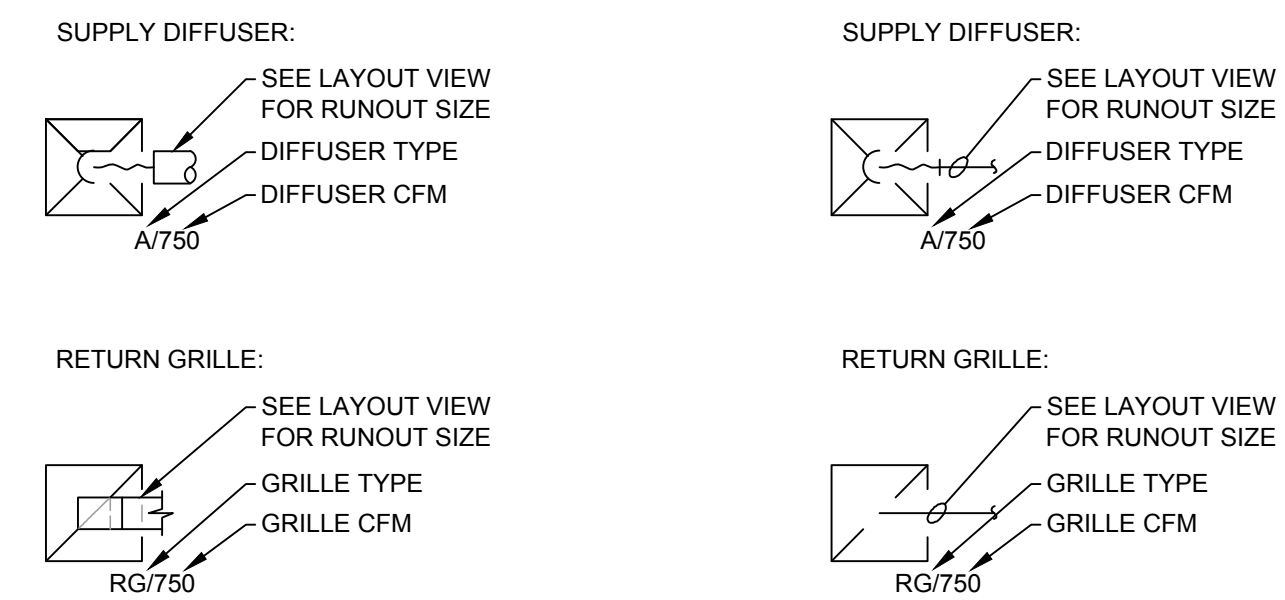
**DUCTWORK:**



**DUCTWORK: SINGLE LINE REPRESENTATION:**



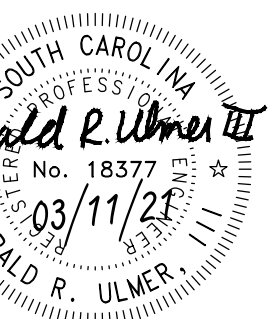
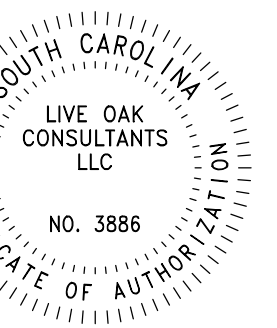
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 City of Hanahan  
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DRAWN BY: R. LEHNHOFF  
 CHECKED BY: G. ULMER  
 PROJECT NUMBER: 19006  
 DATE: 09.21.2020

SHEET TITLE:  
**MECHANICAL GENERAL NOTES, LEGENDS, & ABBR.**  
 SHEET NUMBER:  
**M001**

**SPLIT SYSTEM HEAT PUMP SCHEDULE**

| MARK                                    | AHU-1       | AHU-2       | AHU-3       |
|---|-------------|-------------|-------------|
| SUPPLY AIR – CFM                        | 700         | 1200        | 1200        |
| OUTSIDE AIR – CFM                       | 120         | 180         | 180         |
| EXT. S.P. – IN. W.G.                    | 0.5         | 0.5         | 0.5         |
| BLOWER MOTOR – HP (MINIMUM)             | 0.5         | 0.5         | 0.5         |
| ELECTRICAL – V/φ/Hz                     | 208/1/60    | 208/3/60    | 208/3/60    |
| MINIMUM CIRCUIT AMPACITY (MCA)          | 39          | 29          | 29          |
| PROT. RTG. RECMD. (AMPS)                | 40          | 30          | 30          |
| APPROXIMATE WEIGHT – LB.                | 116         | 146         | 146         |
| <b>FAN</b>                              |             |             |             |
| TOTAL CAPACITY – MBTUH                  | 24.0        | 36.0        | 36.0        |
| SENSIBLE CAPACITY – MBTUH               | 19.0        | 28.5        | 28.5        |
| ENT. AIR TEMP. – °F dB/wB               | 80/67       | 80/67       | 80/67       |
| <b>COOLING</b>                          |             |             |             |
| HIGH TEMP. HEATING – MBTUH AT ARI       | 23.5        | 35.5        | 35.5        |
| AUXILIARY HEATER-KW/STEPS *             | 5.76/1      | 7.20/1      | 7.20/1      |
| <b>HEATING</b>                          |             |             |             |
| MARK                                    | HP-1        | HP-2        | HP-3        |
| AMBIENT AIR TEMP. – °F db               | 95          | 95          | 95          |
| COMPRESSORS – NO.                       | 1           | 1           | 1           |
| ELECTRICAL – V/φ/Hz                     | 208/1/60    | 208/3/60    | 208/3/60    |
| APPROXIMATE WEIGHT – LB.                | 236         | 210         | 210         |
| COMPR. RLA/FAN MOTOR FLA                | 11.7/.71    | 15.3/.74    | 15.3/.74    |
| MINIMUM CIRCUIT AMPACITY                | 15          | 21          | 21          |
| PROT. RTG. RECMD. (AMPS)                | 25          | 35          | 35          |
| <b>HEAT PUMP UNIT</b>                   |             |             |             |
| SYSTEM EER/SEER AT ARI                  | 17          | 17          | 17          |
| SYSTEM HSPF – HIGH TEMP. HEATING AT ARI | 8.9         | 8.9         | 8.9         |
| MANUFACTURER (SEE NOTE 5)               | TRANE       | TRANE       | TRANE       |
| INDOOR UNIT MODEL NO.                   | TAM9A0A24   | TAM9A0A36   | TAM9A0A36   |
| HEAT PUMP MODEL NO.                     | 4TWR7024    | 4TWR7036    | 4TWR7036    |
| NOTES                                   | 1,2,3,4,5,6 | 1,2,3,4,5,6 | 1,2,3,4,5,6 |

**NOTES:**

- EXTERNAL STATIC PRESSURE IS FOR DUCTWORK SYSTEM ONLY. FILTERS, COILS AND CASING LOSSES ARE INTERNAL.
- PROVIDE WITH VARIABLE SPEED BLOWER AND BALANCE THE SYSTEM WITH ACTUAL FIELD CONDITIONS. PROVIDE WITH SOFT START – GRADUAL INCREASE OF FAN SPEED.
- PROVIDE WITH 1" PLEATED, 30% EFFICIENT THROWAWAY FILTERS. FILTERS SHALL BE REPLACEABLE WITHOUT THE NEED FOR ANY TOOLS.
- INSTALL A SMOKE DETECTOR IN THE RETURN DUCTWORK. THE SMOKE DETECTOR SHALL SHUT DOWN THE ASSOCIATED UNIT UPON DETECTION OF SMOKE.
- PROVIDE A SINGLE POINT ELECTRICAL CONNECTION, AND A 7-DAY PROGRAMMABLE THERMOSTAT.
- PROVIDE TRANE OR EQUAL BY CARRIER, RUUD, AMERICAN STANDARD OR YORK.
- THE OUTDOOR HEAT PUMP UNIT SHALL BE PROVIDED WITH LOCKING-TYPE, TAMPER-RESISTANT CAPS TO PREVENT UNWANTED ACCESS TO THE REFRIGERANT CIRCUIT ACCESS PORTS.

\* KW RATING AT THE SPECIFIED VOLTAGE.

**AIR DEVICE SCHEDULE**

| MARK | TYPE                      | NECK SIZE | FACE SIZE | AIR – PATTERN | MAX. NC | NOTES   | MANUFACTURER AND MODEL NO.                   |
|------|---------------------------|-----------|-----------|---------------|---------|---------|--|
| A    | PERFORATED CEILING SUPPLY | 6         | 24x24     | 4-WAY         | 25      | 1,2,6   | PRICE MODEL APDC FOR T-BAR LAY-IN CEILINGS   |
| B    | PERFORATED CEILING SUPPLY | 8         | 24x24     | 4-WAY         | 25      | 1,2,6   | PRICE MODEL APDC FOR T-BAR LAY-IN CEILINGS   |
| EG1  | LOUVERED CEILING EXHAUST  | 18x14     | 20x16     | –             | 25      | 1,2,6,7 | PRICE MODEL 635FF FOR SURFACE MOUNTING       |
| EG2  | LOUVERED CEILING EXHAUST  | 14x10     | 16x12     | –             | 25      | 1,2,6,7 | PRICE MODEL 635FF FOR SURFACE MOUNTING       |
| EG3  | LOUVERED CEILING EXHAUST  | 10x6      | 12x8      | –             | 25      | 1,2,6,7 | PRICE MODEL 635FF FOR SURFACE MOUNTING       |
| RG1  | PERFORATED CEILING RETURN | 20x20     | 24x24     | –             | 25      | 1,2,6,8 | PRICE MODEL 635FF FOR SOLID SURFACE CEILINGS |

**NOTES:**

- PROVIDE MODEL SPECIFIED OR APPROVED EQUAL BY PRICE, NAILOR, KRUEGER, METALAIRE, TUTTLE & BAILEY, OR TITUS.
- PROVIDE WITH ALUMINUM CONSTRUCTION AND STANDARD FINISH.
- COLOR BY ARCHITECT. PROVIDE SELECTION OPTIONS.
- PROVIDE WITH OPPOSED BLADE DAMPER.
- PROVIDE WITH MULTI-SHUTTER DAMPER.
- PROVIDE SQUARE TO ROUND TRANSITION.
- PROVIDE TO ACCEPT 14x14x1 PLEATED FILTERS. CONTRACTOR SHALL PROVIDE INITIAL FILTERS.
- PROVIDE TO ACCEPT 20x20x1 PLEATED FILTERS. CONTRACTOR SHALL PROVIDE INITIAL FILTERS.

**ELECTRIC UNIT HEATER SCHEDULE**

| MARK                | UH-1     | UH-2     | UH-3     | UH-4     | UH-5     | UH-6     |
|---------------------|----------|----------|----------|----------|----------|----------|
| TYPE                | ELECTRIC | ELECTRIC | ELECTRIC | ELECTRIC | ELECTRIC | ELECTRIC |
| ELECTRICAL – V/φ/Hz | 208/1/60 | 208/1/60 | 208/1/60 | 208/1/60 | 208/1/60 | 208/1/60 |
| HEATER KW/AMPS      | 3.0/14.5 | 3.0/14.5 | 3.0/14.5 | 3.0/14.5 | 3.0/14.5 | 2.2/11.0 |
| MANUFACTURER        | QMARK    | QMARK    | QMARK    | QMARK    | QMARK    | QMARK    |
| MODEL NUMBER        | MUH03-81 | MUH03-81 | MUH03-81 | MUH03-81 | MUH03-81 | MUH03-21 |
| NOTES               | 1,2,3    | 1,2,3    | 1,2,3    | 1,2,3    | 1,2,3    | 1,2,3    |

**NOTES:**

- PROVIDE WITH BUILT-IN THERMOSTAT CONTROL.
- PROVIDE WITH MOUNTING BRACKET.
- PROVIDE QMARK OR APPROVED EQUAL.

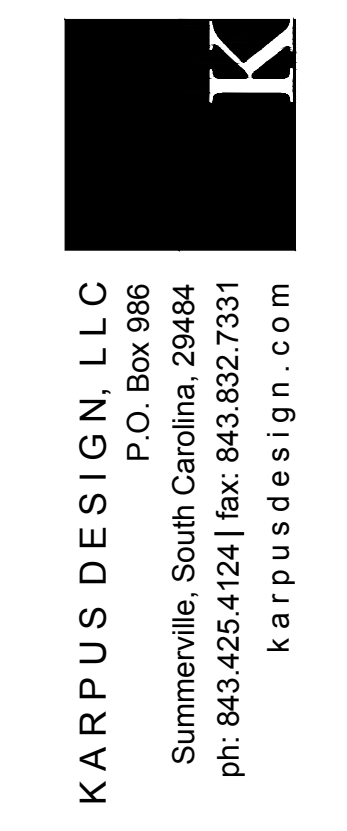
**FAN SCHEDULE**

| MARK                 | EF-1                     | EF-2                     | EF-3                     | EF-3A                   | EF-4                     | EF-5                     | CF-1        |
|----------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------|
| FAN TYPE             | CENTRIFUGAL ROOF EXHAUST | CENTRIFUGAL ROOF EXHAUST | CENTRIFUGAL ROOF EXHAUST | CEILING CABINET EXHAUST | CENTRIFUGAL ROOF EXHAUST | CENTRIFUGAL ROOF EXHAUST | CEILING FAN |
| AIR QUANTITY – CFM   | 400                      | 400                      | 400                      | 70                      | 250                      | 350                      | 1283/6207   |
| EXT. S.P. – IN. W.G. | 0.25                     | 0.25                     | 0.25                     | 0.25                    | 0.25                     | 0.25                     | –           |
| DRIVE                | BELT                     | BELT                     | BELT                     | DIRECT                  | BELT                     | BELT                     | DIRECT      |
| SONES (MAXIMUM)      | 5.1                      | 5.1                      | 5.1                      | 1.6                     | 7.3                      | 5.1                      | –           |
| MOTOR – HP (WATTS)   | 1/6                      | 1/6                      | 1/6                      | (49)                    | 1/6                      | 1/6                      | 2.3–21.7    |
| ELECTRICAL – V/φ/Hz  | 120/1/60                 | 120/1/60                 | 120/1/60                 | 120/1/60                | 120/1/60                 | 120/1/60                 | 120/1/60    |
| MANUFACTURER         | GREENHECK                | GREENHECK                | GREENHECK                | GREENHECK               | GREENHECK                | GREENHECK                | BIG ASS FAN |
| MODEL NO.            | GB-081                   | GB-081                   | GB-081                   | SP-A110-VG              | GB-071                   | GB-081                   | 52" HAIKU   |
| NOTES                | 1,2,4                    | 1,2,4                    | 1,2,3                    | 1,2,4                   | 1,2,4                    | 1,2,4                    | 3,5,6       |

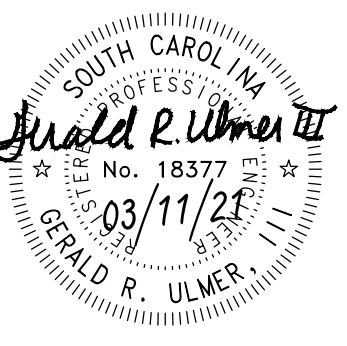
**NOTES:**

- PROVIDE GREENHECK OR APPROVED EQUAL BY COOK, ACME, CARNES, BRIEDERT, OR TWIN CITY FANS.
- PROVIDE A UNIT MOUNTED DISCONNECT SWITCH, BACKDRAFT DAMPER, AND ENERGY EFFICIENT VARIGREEN MOTOR.
- CONTROL WITH LOCAL SWITCH.
- CONTROL WITH LOCAL LIGHT SWITCH.
- FAN SHALL BE RATED FOR OUTDOOR INSTALLATION.
- COLOR BY ARCHITECT. PROVIDE BIG ASS FAN OR APPROVED EQUAL BY GREENHECK OR MINKA-AIRE.

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New Recreation Building for:  
**HANAHAN CITY PARK**  
 City of Hanahan  
 Hanahan, South Carolina



**BID SET**

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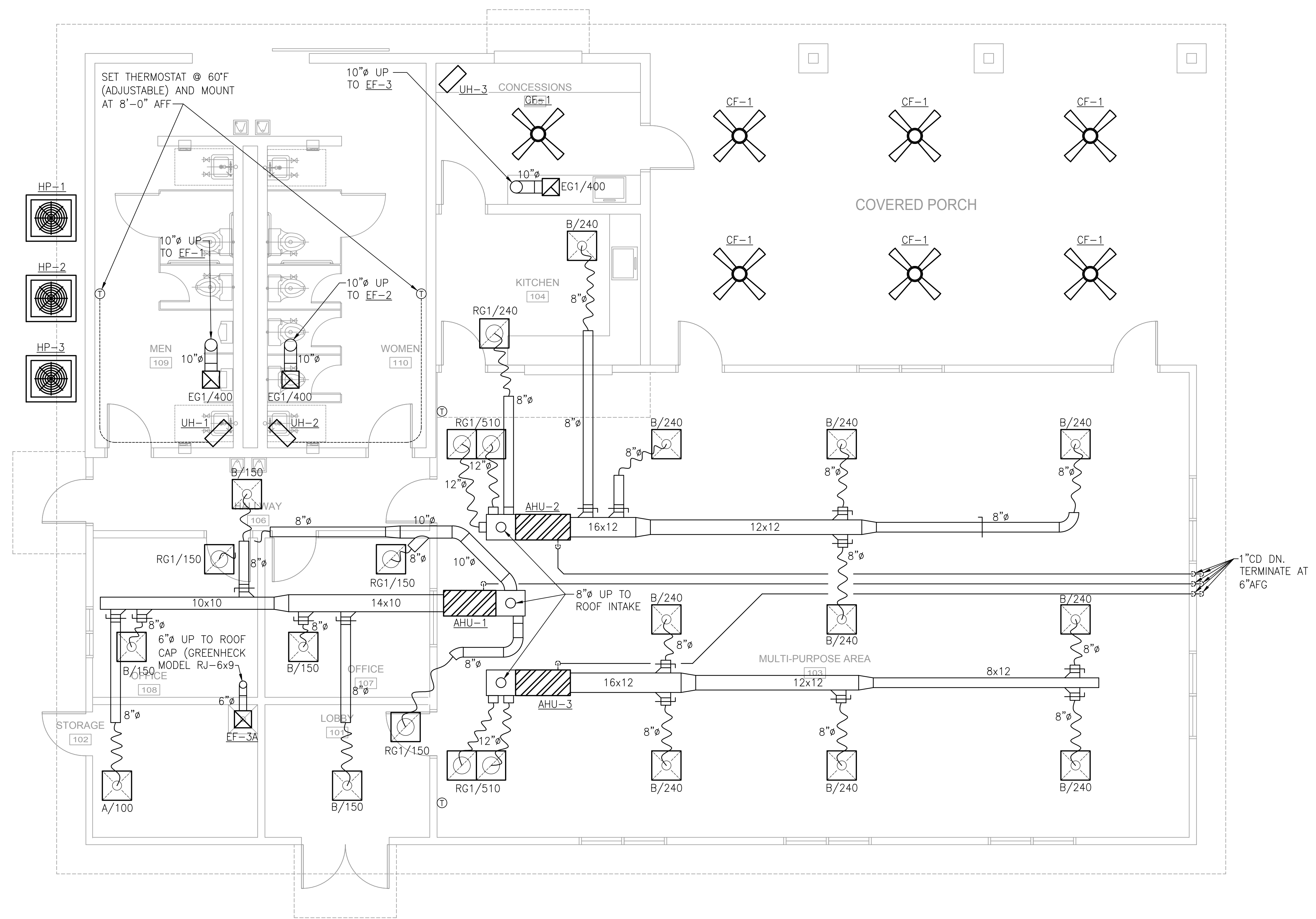
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 PROJECT NUMBER: 19006  
 DATE: 09.21.2020

SHEET TITLE:  
**MECHANICAL SCHEDULES**  
 SHEET NUMBER:  
**M002**

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**GENERAL NOTES:**

1. REFER TO DRAWING M001 FOR MECHANICAL GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
2. REFER TO DRAWING M002 FOR MECHANICAL SCHEDULES.
3. REFER TO DRAWING M501 FOR MECHANICAL DETAILS..



**M1** REC. CENTER MECHANICAL PLAN  
SCALE: 1/4"=1'-0"

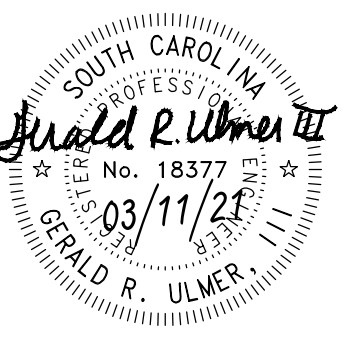


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Project # 20200158

New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina



**BID SET**

| Rev. | Date       | Description |
|------|------------|-------------|
| 0    | 03.11.2021 | BID SET     |

DRAWN BY: R.LEHNHOFF  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:

REC. CENTER BLDG.  
MECHANICAL PLAN

SHEET NUMBER:  
**M101**

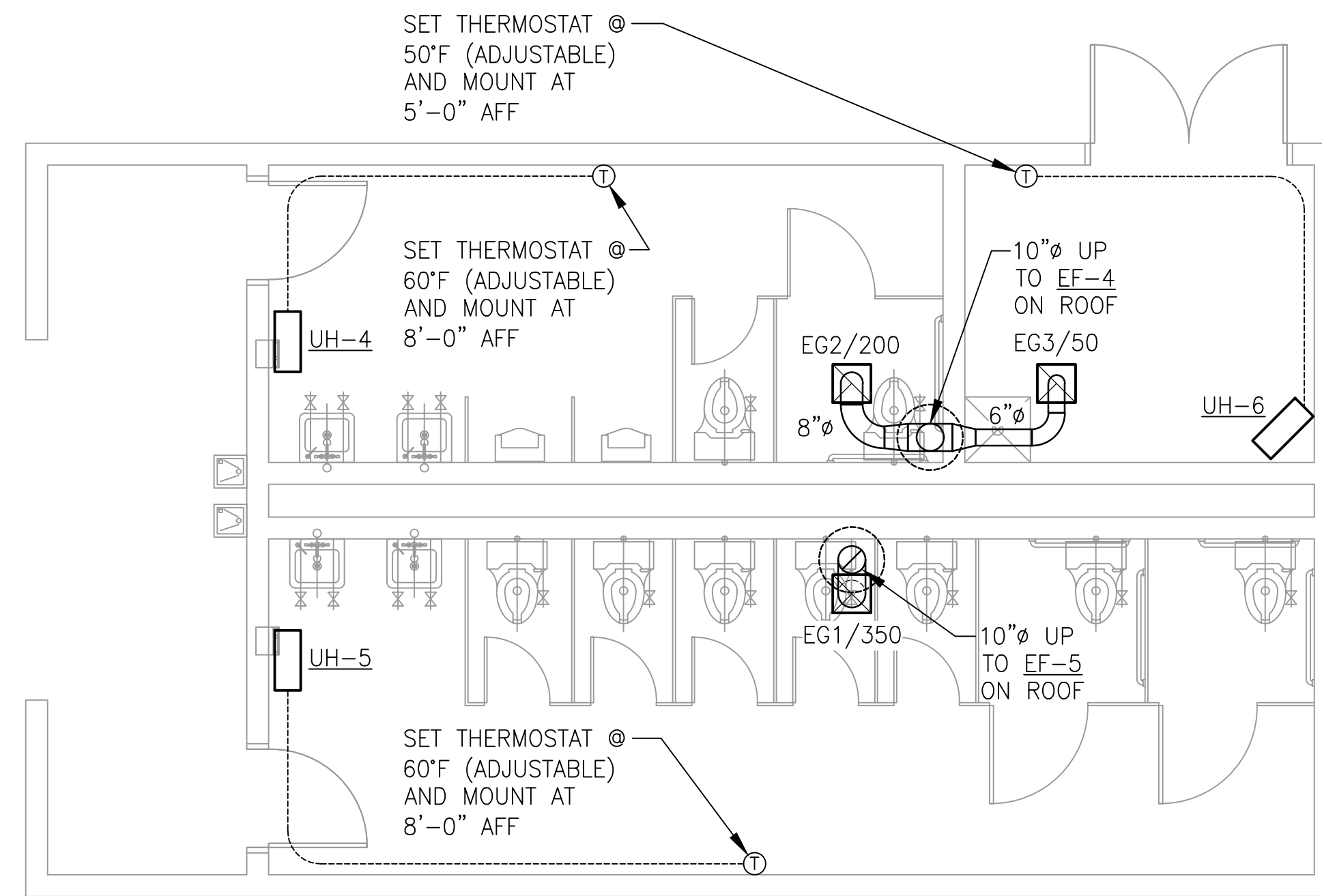
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E  
D  
C  
B  
A

1 2 3 4 5 6 7

**GENERAL NOTES:**

1. REFER TO DRAWING M001 FOR MECHANICAL GENERAL NOTES, LEGENDS, & ABBREVIATIONS.
2. REFER TO DRAWING M002 FOR MECHANICAL SCHEDULES.
3. REFER TO DRAWING M501 FOR MECHANICAL DETAILS..



**M1** RESTROOMS BUILDING MECHANICAL PLAN  
SCALE: 1/4"=1'-0"

1 2 3 4 5 6 7

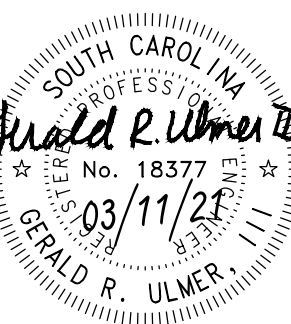
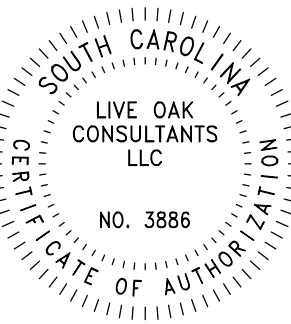


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Project # 2020015E

New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina



**BID SET**

| Rev. | Date       | Description |
|------|------------|-------------|
| 0    | 03.11.2021 | BID SET     |

DRAWN BY: X.WILLIAMS  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

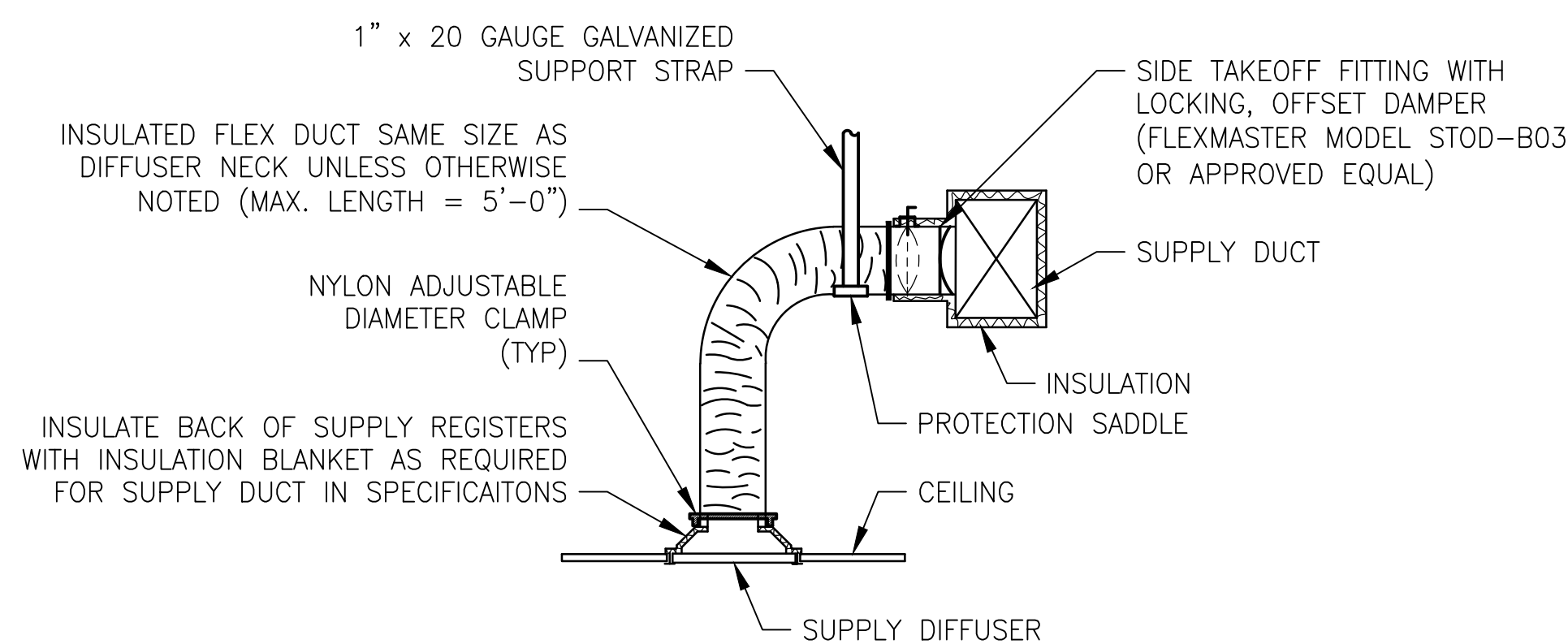
SHEET TITLE:

RESTROOMS BLDG.  
MECHANICAL PLAN

SHEET NUMBER:

**M102**

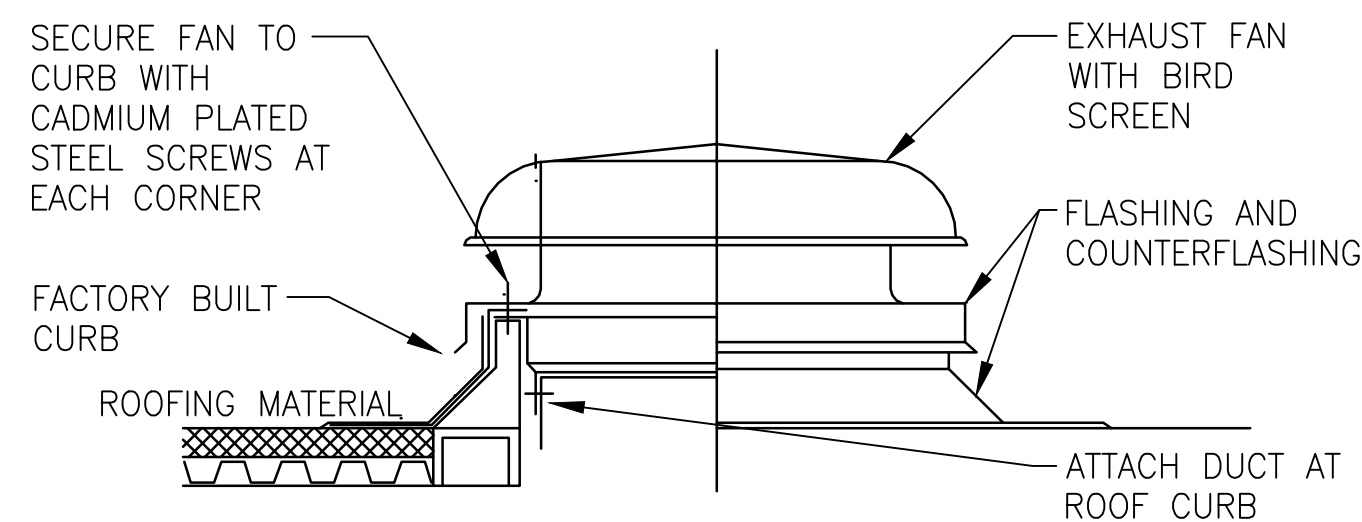
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- NOTES:
1. FLEXIBLE DUCT SHALL NOT BE USED FOR OFFSETS OR ELBOWS EXCEPT FOR FINAL TURN DOWN TO DIFFUSER NECK.
  2. PROVIDE EARTHQUAKE CLIPS ON DIFFUSERS TO HOLD DIFFUSERS TO CEILING GRID.

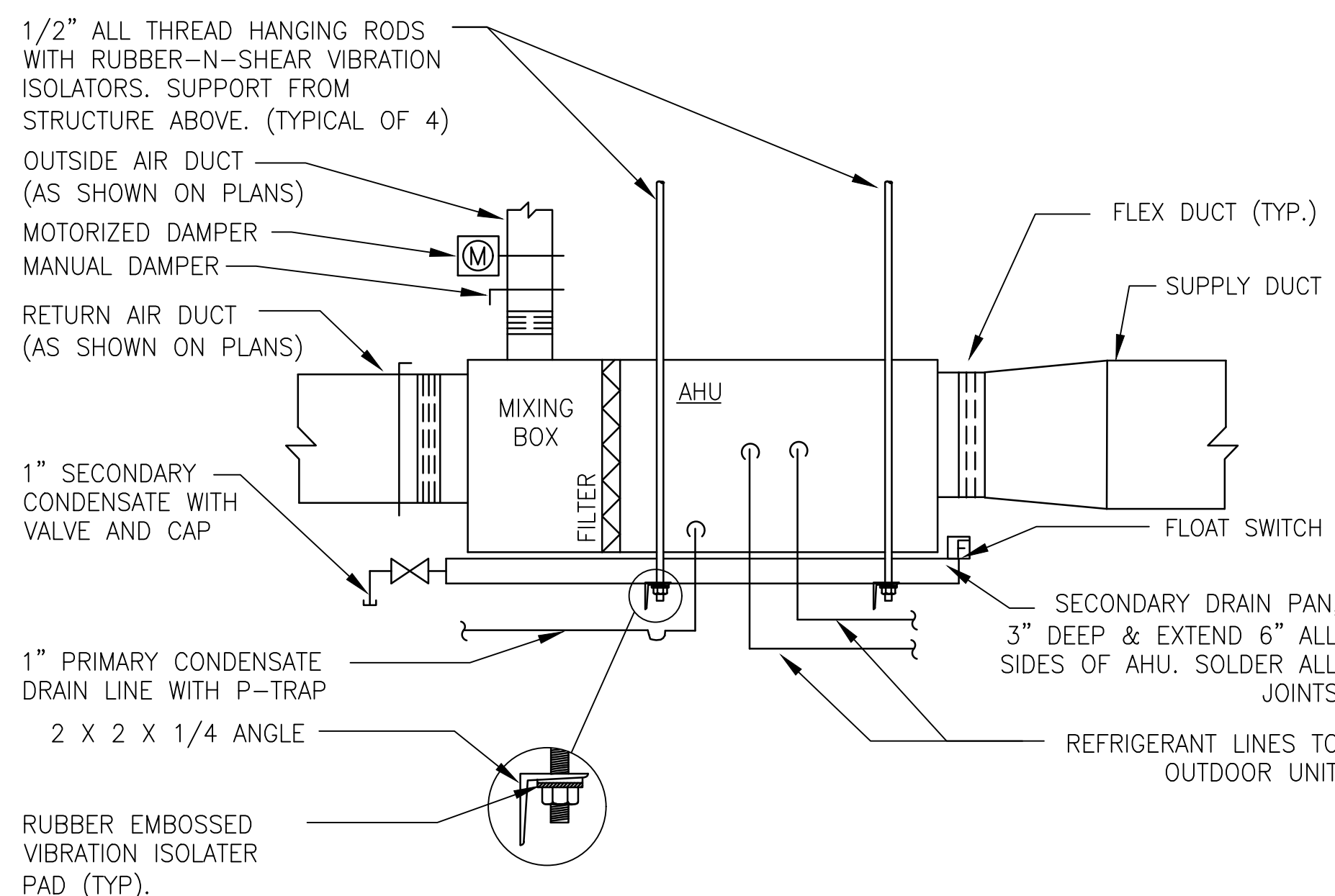
TYPICAL FLEX DUCT AND SIDE TAKE-OFF FITTING

1 DETAIL  
M501 N.T.S.



NOTE:  
COORDINATE ROOF WORK WITH ARCHITECTURAL PLANS AND ROOFING CONTRACTOR.

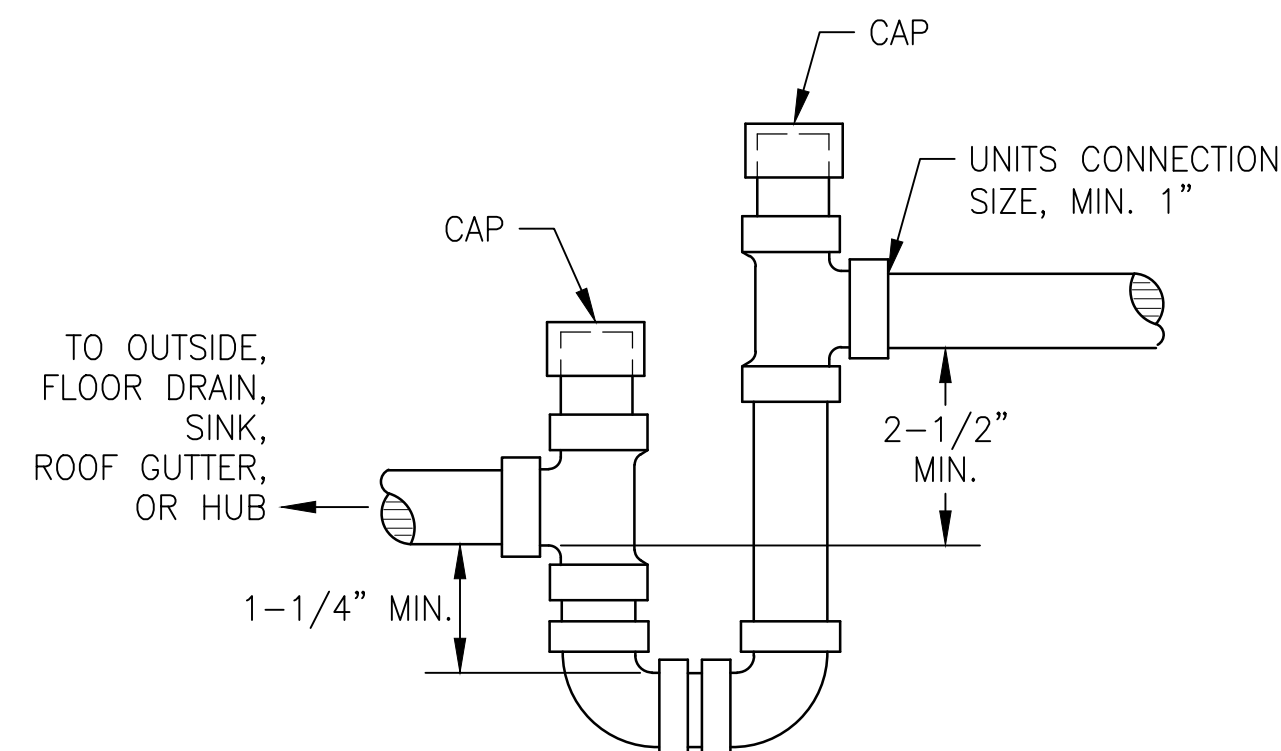
5 EXHAUST FAN INSTALLATION DETAIL  
M501 NOT TO SCALE



- NOTES:
1. SET AHU ON PRESSURE TREATED 2"x4" RUNNERS (LENGTH OF AHU) IN THE DRAIN PAN.
  2. PROVIDE A FLOAT SWITCH TO SHUT DOWN UNIT IF SECONDARY DRAIN PAN FILLS WITH WATER.
  3. FILTER SHALL BE REMOVABLE WITHOUT REQUIRING TOOLS.
  4. FIELD ROUTE CONDENSATE DRAIN TO OUTSIDE OF BUILDING. DROP DOWN INSIDE WALL AND TERMINATE 6" A.F.G.
  5. PROVIDE 24 VOLT MOTORIZED, LOW LEAK DAMPER ACTUATOR(RUSKIN MODEL CDRS25) AND INTERLOCK WITH COMPRESSOR. THE NORMALLY CLOSED DAMPER SHALL ONLY OPEN WHEN THE COMPRESSOR IS OPERATING IN HEATING OR COOLING MODE.

SPLIT SYSTEM HORIZONTAL INSTALLATION

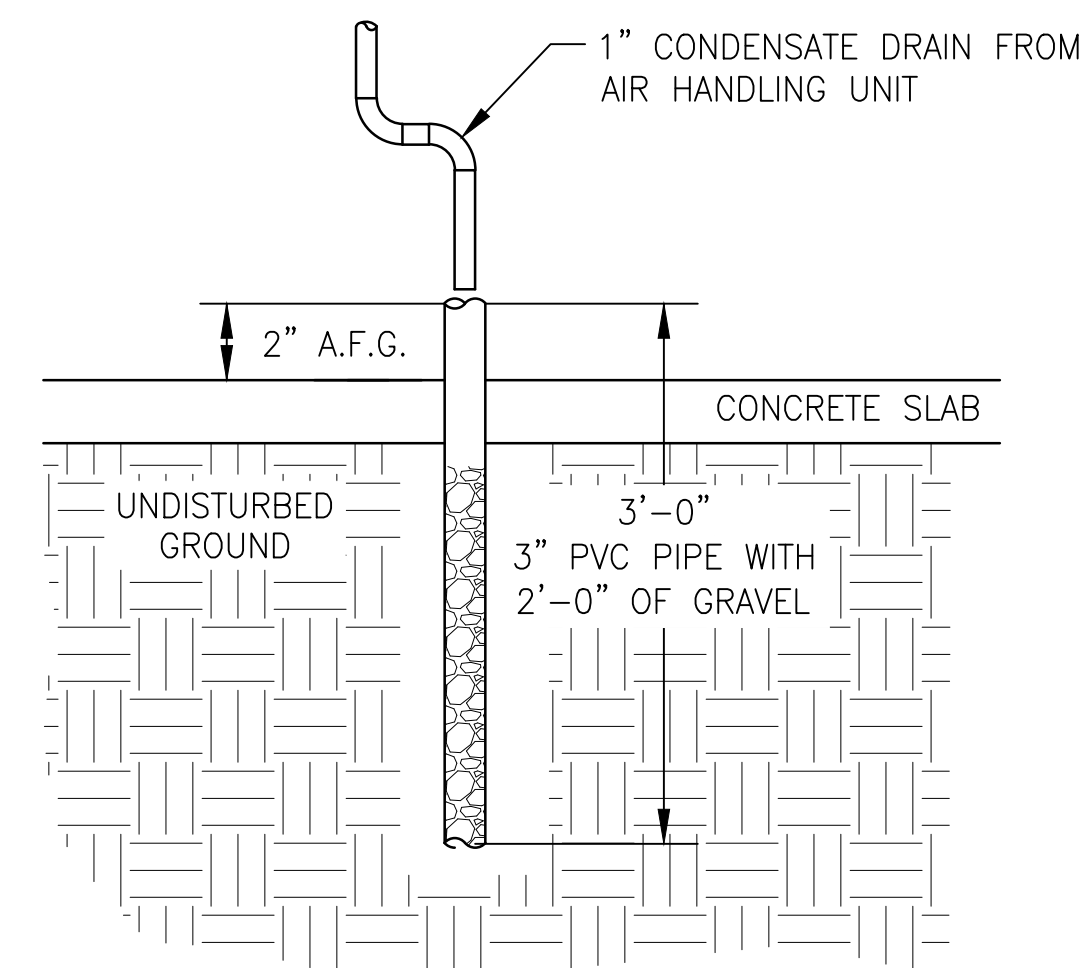
7 DETAIL  
M501 N.T.S.



- NOTES:
1. MINIMUM SLOPE OF PIPE SHALL BE 1/4" PER FOOT.

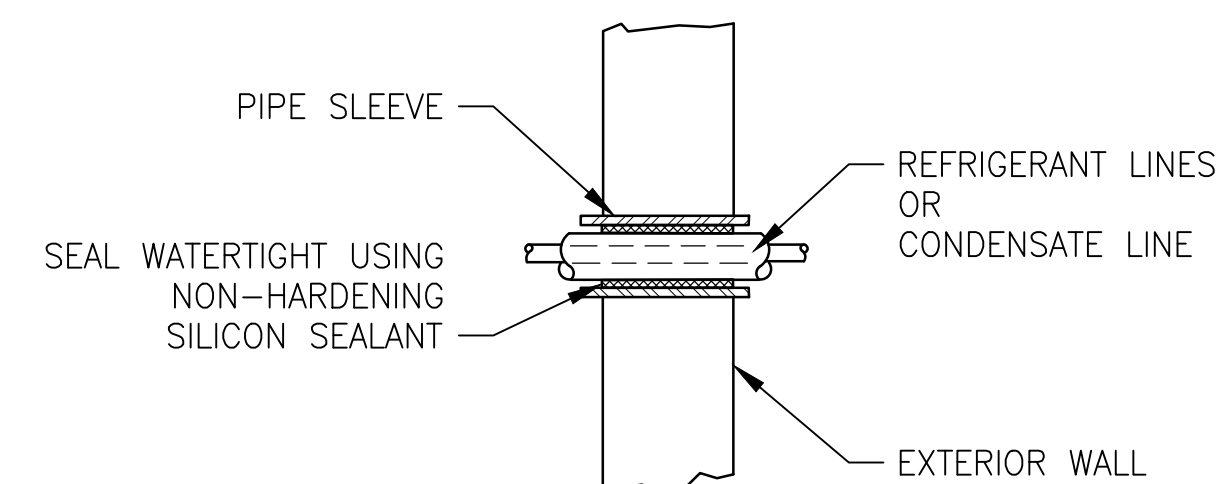
CONDENSATE DRAIN LINE WITH P-TRAP

2 DETAIL  
M501 N.T.S.



TYPICAL CONDENSATE DRAIN FIELD

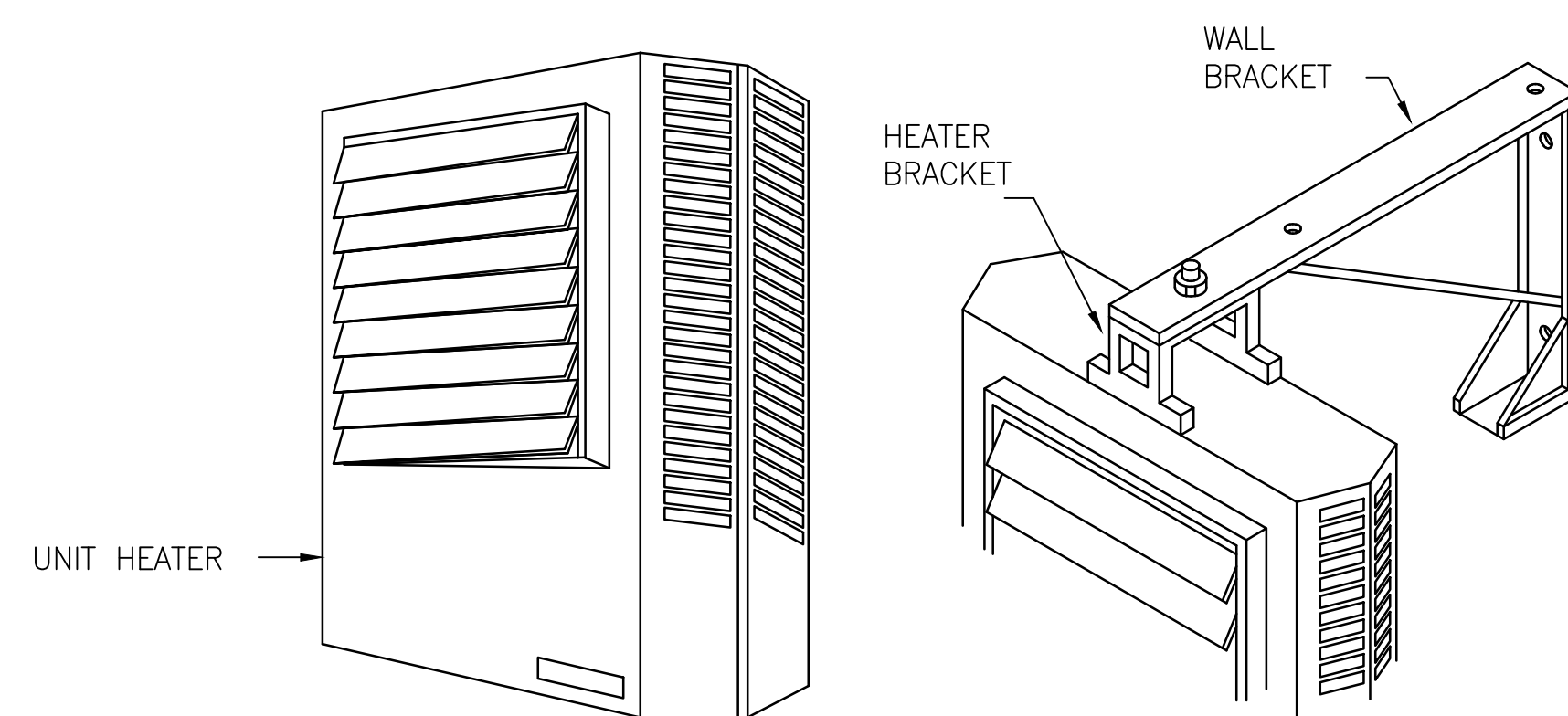
3 DETAIL  
M5.2 N.T.S.



- NOTES:
1. FIELD PAINT ALL METAL SURFACES.
  2. REFRIGERANT LINES SHALL RUN DOWN INSIDE EXTERIOR WALL.

REFRIGERANT PIPE THROUGH EXTERIOR WALL

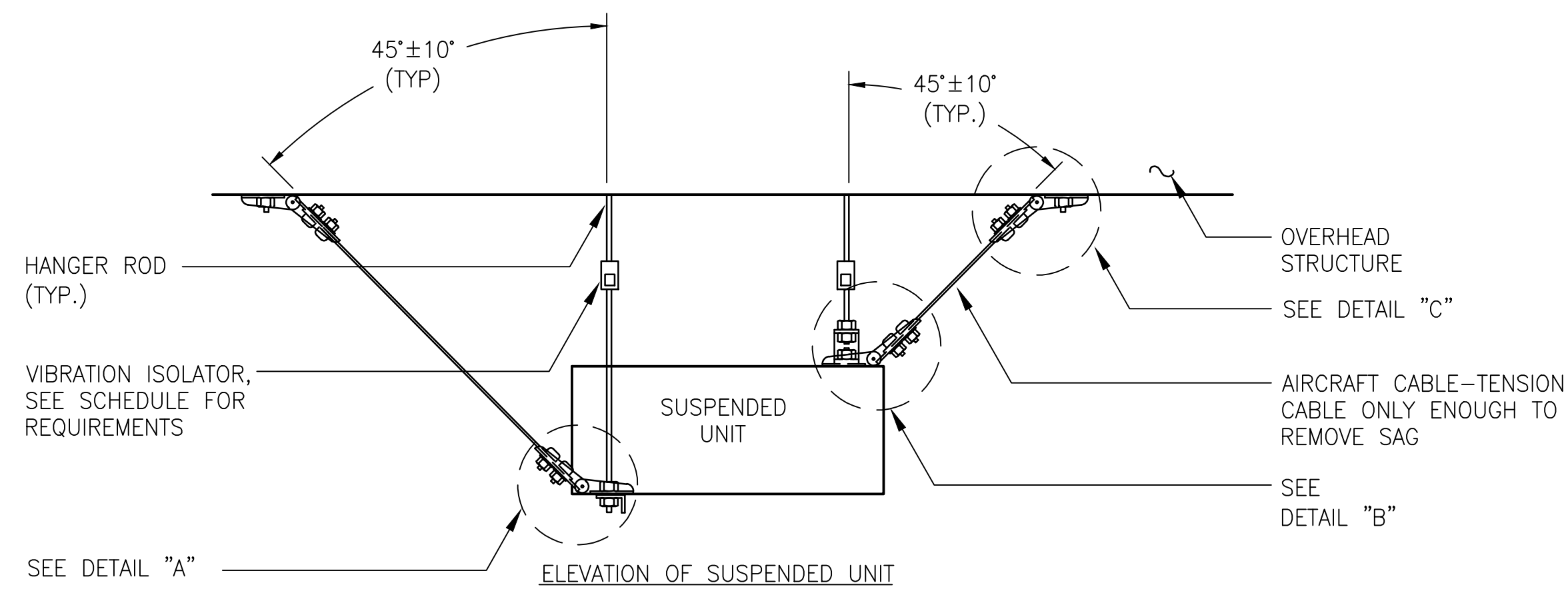
4 DETAIL  
M501 N.T.S.



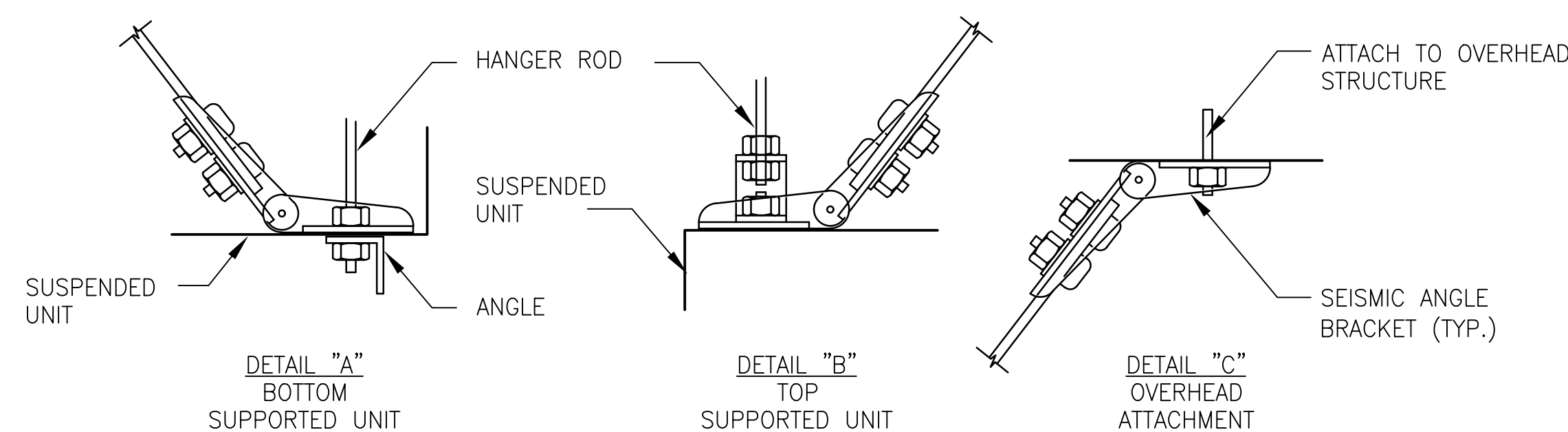
- NOTE:  
ALL UNIT HEATERS SHALL BE 208V/3ø. SEE SCHEDULE ON SHEET M002 FOR KW RATINGS.

SUSPENDED UNIT HEATER

6 DETAIL  
M501 N.T.S.



ELEVATION OF SUSPENDED UNIT



DETAIL "A" BOTTOM SUPPORTED UNIT  
DETAIL "B" TOP SUPPORTED UNIT  
DETAIL "C" OVERHEAD ATTACHMENT

- NOTES:
1. PROVIDE ENGINEER SEALED DESIGN DRAWINGS FROM MANUFACTURER FOR SEISMIC RESTRAINTS USING THE CORRECT AIR HANDLING UNIT WEIGHTS AND SIZE.
  2. SEISMIC RESTRAINTS SHALL BE MASON INDUSTRIES, AMBER BOOTH, KINETICS, OR APPROVED EQUAL.

SUSPENDED UNIT SEISMIC RESTRAINT

8 DETAIL  
M501 N.T.S.

**K**  
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Project # 2020015E

New Recreation Building for:  
**HANAHAN CITY PARK**  
City of Hanahan  
Hanahan, South Carolina

SOUTH CAROLINA PROFESSIONAL SEAL  
LIVE OAK CONSULTANTS, LLC  
NO. 3886  
STATE OF AUTHORIZATION

SOUTH CAROLINA PROFESSIONAL SEAL  
Gerald R. Ulmer  
No. 18377  
03/11/2021  
GERALD R. ULMER

BID SET

| Rev. | Date       | Description |
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DRAWN BY: R. LEHNHOFF  
CHECKED BY: G. ULMER  
PROJECT NUMBER: 19006  
DATE: 09.21.2020

SHEET TITLE:

MECHANICAL DETAILS

SHEET NUMBER:

M501