COUNTY OF GREENVILLE
STAUNTON BRIDGE COMMUNITY CENTER GYMNASIUM
IFB# 68-05/02/16

Greenville County

DEPARTMENT OF GENERAL SERVICES
PROCUREMENT SERVICES DIVISION
GREENVILLE COUNTY SQUARE
301 UNIVERSITY RIDGE, SUITE 100
GREENVILLE, SOUTH CAROLINA 29601
www.greenvillecounty.org
Phone: 864-467-7200

GREENVILLE COUNTY COUNCIL
PROCUREMENT SERVICES DIVISION
GREENVILLE COUNTY SQUARE
301 UNIVERSITY RIDGE, SUITE 100
GREENVILLE, SOUTH CAROLINA 29601-3660

NOTICE **Date April 1, 2016**

Sealed bids for furnishing THE CONSTRUCTION OF THE STAUNTON BRIDGE COMMUNITY CENTER GYMNASIUM subject to the conditions and all provisions set forth herein and attached, will be received at this office until 3:00 P.M., E.D.T., MAY 2, 2016, then publicly opened. The commodities and/or services must be furnished as described and specified to Greenville County.

SHOW THIS NUMBER ON ENVELOPE

IFB No. #68-05/02/16

PROCUREMENT SERVICES DIVISION
By Nadine Chastain
Director

	COMMODITIES OR SERVICES	
	GREENVILLE COUNTY IS REQUESTING SUBMISSION OF SEALED BIDS FROM VENDORS TO PROVIDE THE CONSTRUCTION OF THE STAUNTON BRIDGE COMMUNITY CENTER GYMNASIUM LOCATED AT 165 STAUNTON BRIDGE ROAD, GREENVILLE, SC 29611. BIDS MUST BE SUBMITTED ON THE BID FORM (PAGE 28). PLEASE SUBMIT ONE (1) ORIGINAL AND FIVE (5) COPIES OF YOUR BID. A PRE-BID MEETING WILL BE HELD AT 10:00 A.M., E.D.T., MONDAY, APRIL 11, 2016, LOCATED AT GREENVILLE COUNTY PROCUREMENT SERVICES, 301 UNIVERSITY RIDGE, SUITE 100, GREENVILLE, SC 29601. QUESTIONS CONCERNING THE IFB ARE TO BE SUBMITTED IN WRITING TO BOB BREWER, CPPO, CPPB, GREENVILLE COUNTY PROCUREMENT SERVICES DIVISION, SUITE 100, 301 UNIVERSITY RIDGE, GREENVILLE, SC 29601, BY FAX (864) 467-7304 OR EMAIL rbrewer@greenvillecounty.org NO LATER THAN 5:00 P.M., E.D.T. APRIL 20, 2016. PLEASE SIGN THE FOLLOWING PAGE AND BID FORM (PAGE 28). FAILURE TO SIGN WILL VOID YOUR BID. PLEASE MARK YOUR ENVELOPE TO READ: IFB #68-05/02/16.	

INSTRUCTIONS TO RESPONDENTS

IFB# 68-05/02/16 STAUNTON BRIDGE COMMUNITY CENTER GYMNASIUM

1. Unless otherwise required, submit only one (1) original and five (5) copies of each RFI/RFQ/IFB/Proposals.
2. RFI/RFQ/IFB/Proposals, amendments thereto or withdrawal requests received after the time advertised for opening will be void regardless of when they were mailed.
3. Quote prices on units specified with packing included.
4. Attach complete specifications for and permitted substitutions offered, or when amplification is desirable or necessary.
5. If specifications or descriptive papers are submitted with RFI/RFQ/IFB/Proposals, enter respondents name thereon.
6. If the article bid upon has a trade name or brand, show same in the RFI/RFQ/IFB/proposal.
7. When required, furnish samples, free of expense, prior to opening of RFI/RFQ/IFB/Proposals. Label each sample with respondents name and the item number. Should you wish samples returned, at your expense, when not destroyed in tests, make request for return within 10 days following bid/proposal opening.
8. Show delivery time required after order is received (see below).
9. Address and mark bids/proposals as indicated in the notice.

CONDITIONS

1. The County Agency or Institution submitting this notice reserves the right to reject any and all RFI/RFQ/IFB/Proposals, and to waive all technicalities.
2. Unit prices will govern over extended prices, unless otherwise stated in notice.
3. Time in connection with discount offered will be computed from date of delivery of commodities to carrier, when inspecting and acceptance is at point of origin; or date of delivery at destination; or if laboratory inspection is made part of bid, from date of laboratory report.
4. In case of default of contractor, Greenville County reserves the right to purchase any or all items in default on open market, charging contractor with any excessive costs.
5. All materials and products offered must be guaranteed to meet the requirements of the specifications indicated, given or referred to.
6. Prices bid must be based upon payment in thirty (30) days. Discounts for payment in less than thirty (30) days will not be considered in making award.
7. The right is reserved, in case of tie bids, to make award considered to be most advantageous to Greenville County.
8. The right is reserved to reject any RFI/RFQ/IFB/Proposal in which the delivery time indicated is considered sufficient to delay the operation for which the commodity is intended.
9. Unless otherwise indicated by County Agency or Institution submitting this notice, prices must be firm.

RFI/RFQ/IFB/PROPOSAL

(DATE) _____

In compliance with invitation, and subject to all conditions, thereof, the undersigned offers and agrees, if this RFI/RFQ/IFB/Proposal is accepted within _____days from date of opening, furnish any or all items quoted on at prices as set forth after the item and unless otherwise specified, within _____ days after receipt of order, delivered, all transportation costs included,

Discount will be allowed as follows: 30 calendar days _____ %.

FIRM NAME _____

ADDRESS _____

_____

BY_____

(RFI/RFQ/IFB/PROPOSAL MUST BE SIGNED IN WRITING)

PRINT NAME_____

_____

TITLE_____

EMAIL: _____

PHONE_____

FAX_____

COUNTY OF GREENVILLE
STAUNTON BRIDGE COMMUNITY
CENTER GYMNASIUM
IFB# 68-05/02/16

SCHEDULE

April 11, 2016	A **pre-bid meeting** will be held at **10:00 A.M., E.D.T.,** Greenville County Procurement Services, **301 University Ridge, Suite 100, Greenville, SC 29601**.
April 20, 2016	**All questions** must be submitted in writing to Bob Brewer, CPPO, CPPB, Procurement Services Division, 301 University Ridge, Suite 100, Greenville, SC 29601, by Fax (864)467-7304, or by email rbrewer@greenvillecounty.org, by **5:00 P.M., E.D.T.**
May 2, 2016	**Bids** must be delivered to the Procurement Services Division, 301 University Ridge, Suite 100, Greenville, SC 29601 no later than **3:00 P.M. E.D.T**.
May 2 -16, 2016	**Review** of Bids
May 16, 2016	Tentative Date of **Award**
May 16 - 30, 2016	**Contract** Negotiations
May 30, 2016	Issue **Notice to Proceed**

INVITATION FOR BIDS
STAUNTON BRIDGE COMMUNITY
CENTER GYMNASIUM
IFB# 68-05/02/16

I. Introduction

Greenville County is requesting sealed bids from vendors for the construction of the Staunton Bridge Community Center Gymnasium located at 165 Staunton Bridge Road, Greenville, SC 29611.

II. Scope of Work

Greenville County is seeking bids from vendors to provide all labor, materials and equipment to perform the construction of the Staunton Bridge Community Center Gymnasium located at 165 Staunton Bridge Road, Greenville, SC 29611. Contractor shall provide all work and materials in accordance with the specifications and drawings (prepared by LS3P) included as Attachment A of this IFB document and all federal, state and local codes.

III. Bonding

Information on Bid Bonds, Performance and Payment Bonds is listed in the Instructions/Terms and Conditions (page 11).

IV. Pre-Bid Meeting

A **pre-bid meeting** will be held at **10:00 A.M., E.D.T., Monday, April 11, 2016** at Greenville County Procurement Services Division, **301 University Ridge, Suite 100, Greenville SC 29601.**

V. Bid and Sub-Contractors

Base bids, alternates, unit prices, and sub-contractors and their services (mechanical, electrical, etc.) must be listed on the Bid Form (page 28). Alternate pricing must not be included in the base bid but listed separately in the appropriate area.

Awarded Contractor will be required to complete a Schedule of Values with each invoice submitted.

VI. Submission Procedures, Requirements

A. Submittals

All submissions must be received by **3:00 P.M., E.D.T., MONDAY, MAY 2, 2016** and delivered to Greenville County Procurement Services Division, 301 University Ridge, Suite 100, Greenville, South Carolina 29601. If the submission is late the bid will be rejected. There will be no exceptions. Responders submitting bids shall be responsible for all cost of preparing such bids.

Responders to this Invitation for Bids shall closely examine the specific requirements noted herein and the attached Terms and Conditions and submit one (1) original and five (5) bound copies of their bid to the address listed below. To ensure acceptance of the bid, the Invitation for Bids number (IFB#68-05/02/16) should be clearly shown on the lower left corner of the return envelope. Facsimile transmittals or offers communicated by telephone will not be accepted or considered.

County of Greenville
Department of General Services
Procurement Services Division, Attn: Procurement Director
301 University Ridge, Suite 100
Greenville, South Carolina 29601-3665
IFB# 68-05/02/16

B. License and Permits

The contractor shall obtain all applicable licenses, and promptly pay all taxes required by the State of South Carolina, and/or Greenville County.

VII. Statement of Qualifications

Vendors shall provide the following with their response:

1. Overview of company background.
2. Copy of General Contractor's License and Certifications.
3. Staffing or organizational chart showing staff that will be used for this project.
4. Corporate/individual qualifications and experiences, including certifications.
5. Current resume(s) for individuals(s) assigned to this project.
6. A list of at least three (3) references where Vendor provides services similar to the services under consideration in this IFB. Include the name of the facilities, address and telephone number, plus the name of a contact person and title. Greenville County may contact the references at any time during the review of the IFB.

VIII. Inquiries and Addenda

A. Questions

All questions concerning this IFB are to be submitted in writing via fax, electronic mail, or regular mail to Bob Brewer, CPPO, CPPB, Procurement Services Division, to the

address listed below, no later than **5:00 P.M., E.D.T., APRIL 20, 2016**. Please refer all questions in writing about this Invitation for Bids and project to:

County of Greenville
Bob Brewer, CPPO, CPPB
Procurement Services Division
301 University Ridge, Suite 100
Greenville, South Carolina 29601-3665
Phone: (864) 467-7206 Fax:(864) 467-7304
E-mail: rbrewer@greenvillecounty.org

All inquiries and responses will be distributed to all vendors known to have received the IFB document. The County will not be responsible for or bound by any oral instructions made by any employee(s) of the County in regard to this IFB.

B. Addenda

This IFB represents the most definite statement Greenville County will make concerning information upon which bids are to be based. Any changes to this IFB will be in the form of a written addendum, which will be furnished to all vendors who are listed with the County as having received an IFB document. No addenda will be issued later than five (5) working days prior to the date for receipt for bids except an addendum which, if necessary, postpones the date for receipt of bids or cancels this IFB. Venders shall acknowledge receipt of all addenda with their Bid.

IX. General Information

A. Proprietary Information

The County of Greenville is a public body and governed by the South Carolina Freedom of Information Act. Documents submitted to the County relating to this Invitation for Bids are subject to requirements of the Freedom of Information Act and may be deemed public records.

B. Errors and Omissions

The Responder will not be allowed to take advantage of any errors or omissions in the Invitation for Bids. Where errors or omissions appear in the IFB, the Responder shall promptly notify the County of Greenville in writing of such error or omission it discovers. Any significant error, omission and/or inconsistency in the specifications are to be reported as soon as possible but no later than five (5) days before such time the response is to be submitted.

C. Withdrawal of Bid

An official representative of a Responder may withdraw a Responder's response at any time prior to the bid submission deadline. Acceptable proof establishing that he/she is the representative of the Responder must be provided.

D. Non-Endorsement

If the County awards contract, the successful Responder shall not issue any news release or other statement relating to the award or servicing of the agreement which state or imply the County of Greenville's endorsement of the successful Responder's services.

X. Insurance

The Contractor is responsible for and must have all required insurance listed below and shall not commence work under the associated contract until it has obtained all insurance required, and the County has approved such insurance in writing, nor shall the Contractor allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained. All insurance policies shall be maintained for the life of the contract.

A. **THE COUNTY SHALL BE NAMED AS "ADDITIONAL INSURED" FOR ITS INTEREST** on all policies of insurance except Worker's Compensation, Automobile Liability, and Professional Errors and Omissions, as regards ongoing operations, products and completed operations, and this shall be noted on the face of the Certificate of Insurance. As a part of the certificate of insurance requirement the contractor shall also include acknowledgement and acceptance of the wavier of subrogation provision granted to the County of Greenville. This acknowledgement and acceptance should be included in the same section of the Certificate of Insurance that evidences the "Additional Insured" provision.

B. Certificates for all such policies of insurance shall be provided by the **Contractor's** insurance agent or broker to the **County** within 10 working days from the date of Notice of Award.

C. All Certificates of Insurance submitted shall provide on the face of the certificate reference to **County's** IFB# 68-05/02/16.

D. **Contractor** will provide **County** a minimum of 30 days advance notice in the event the insurance policies (or an insurance policy) are canceled. Subcontractors approved to perform work on this project are subject to all of the requirements in this Section.

E. **Contractor** agrees to maintain and keep in force during the life of this Agreement, with a company or companies authorized to do business in South Carolina, the following insurance policies:

Comprehensive General Liability:
$1,000,000 per occurrence - combined single limit / $2,000,000 general aggregate, to include products and completed operations.

Automobile Liability:
$1,000,000 per occurrence - combined single limit (Coverage shall include bodily injury and property damage and cover all vehicles including owned, non-owned and hired)

Statutory Worker's Compensation:
Coverage A - State of SC
Coverage B - Employers liability
$1,000,000 Each Accident
$1,000,000 Disease, Per Employee
$1,000,000 Disease, Policy Limit
Policy shall contain a waiver of subrogation in favor of and/or applies to the County of Greenville, its departments, agencies, boards, employees, and commissions for losses from work performed by or on behalf of the contractor.

No deviation from this coverage's will be accepted unless, in the County's sole discretion, it is more advantageous to the County, i.e., $1,000,000 - a $2,000,000 or $5,000,000 limit would be acceptable.

XI. Evaluation Criteria

The bids will be evaluated on the following criteria which are in no particular order. Greenville County reserves the right to interview responders to this IFB at its discretion. Greenville County will not be responsible for any costs associated with interviews of responders.

- Responsiveness to this Invitation for Bids
- Cost
- Experience in providing services of similar size and scope
- References

XII. Illegal Immigration Reform Act Compliance

By submitting an offer, Contractor 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 Reform 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 Contractor and any subcontractors or sub-subcontractors; or (b) the compliance with Title 8, Chapter 14 by Contractor and any subcontractor or sub-subcontractor. 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." Contractor 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-subcontractors language requiring the sub- subcontractor to comply with the applicable requirements of Title 8, Chapter 14. In the event any contractor, subcontractor and/or sub-subcontractor is found not to be in compliance with the SC Immigration Reform Act [hereinafter "The Act"], the contractor agrees to fully indemnify the County for

any loss suffered by the County as a result of such contractor, subcontractor or sub-subcontractor's failure to comply with the Act.

XIII. Sample Contract

A sample Contract is attached for review.

COUNTY OF GREENVILLE
PROCUREMENT SERVICES DIVISION
STAUNTON BRIDGE COMMUNITY
CENTER GYMNASIUM
IFB #68-05/02/16

INSTRUCTIONS/TERMS AND CONDITIONS:

1. IFB Opening and Award: Bids will be examined promptly after opening and each bid will be announced to all participants. However, no decision will be made until Procurement and the user Division have had ample time to review each bid. However, award will be made at the earliest possible date. The County reserves the right to award in whole or in part, by item, group of items, geographic area or by section where such action serves the County's best interest. The contract will be awarded to the bid that meets the requirements and criteria set forth in the invitation for bid. No bid may be withdrawn for a period of sixty (60) days after bid opening date. Bids, whether mailed or hand delivered, must be received and time/date stamped in the Procurement Services Office by the closing time and date indicated on the bid. Bids received after the bid closing time/date will not be accepted. By submission of a bid, you are guaranteeing that all goods and services meet the requirement of the solicitation during the contract period.

2. Rights Reserved by Greenville County: Greenville County reserves the right to reject any and all bids, any portion thereof, and waive any technicalities. Accordingly, the right is reserved to make awards in the best interest of the County. Integrity, reputation, experience and past performance will be heavily weighed in bid evaluation. This solicitation does not commit the County of Greenville to award a contract, to pay any costs incurred in the preparation of the bid, or to procure or contract for goods or services listed herein.

3. Responders Qualification: Responders must, upon request of the County, furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. The County reserves the right to make the final determination as to the bidders ability to provide the products or services requested herein.

4. Responders Responsibility: Each bidder shall be fully acquainted with the conditions relating to the scope and restrictions attending the execution of the work under the conditions of this bid. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to be acquainted with existing conditions shall in no way relieve the bidder of any obligations with respect to this bid or to any contract as a result of this bid.

5. References: The County requires bidders to list at least three (3) references, names, addresses and telephone numbers of contact persons for companies with whom the bidder has performed or provided similar work, service or product.

6. Waiver: The County reserves the right to waive any Instructions to Bidders, General or Special Terms and Conditions, specifications, or technicalities when it is deemed to be in the best interest of the County to do so.

7. Rejection: Greenville County reserves the right to reject any bid that contains prices for individual items or services that are inconsistent or unrealistic when compared to pricing of like bids; or ambiguous bids which are uncertain as to terms, delivery, quantity, or compliance with specifications may be rejected or otherwise disregarded if such action is in the best interest of the County.

8. Bid form: Each bidder must submit a bid on the form provided. The bidder shall sign his bid correctly or the bid may be rejected. If the bid shows any omissions, alteration of form, unauthorized additions, a conditional bid or any irregularities of any kind, bid may be rejected. Bid may not be accepted on any other form then the bid form provided.

9. Questions: Questions shall be submitted in writing to Bob Brewer, CPPB, Procurement Services Division, County of Greenville, 301 University Ridge, Suite 100 by Fax (864) 467-7304 or by E-Mail to rbrewer@greenvillecounty.org by 5:00 P.M., E.D.T., April 20, 2016.

10. Bid Bond: Bidders shall submit with their bid a bid bond in the amount of 5% of the bid price. This bond may be in the form of Bid Bond from the American Institute of Architects, Certified Check, Cashier's or Bank Money Order of any national or state bank and shall be made payable to Greenville County. Bids submitted without being accompanied by any of the foregoing as required, shall be considered informal and will be rejected. Any bid accompanied by a bid bond not properly executed in the opinion of the County Attorney, may be rejected. The bond will be forfeited to the County by the successful bidder as liquidated damages in case a bid award is made to that bidder and the contract and bond are not promptly and properly executed.

11. Return of Bid Bond: When bids are awarded, the Procurement Services Division will return immediately all checks, except that of the successful bidder. The check of the successful bidder will be returned upon compliance with the performance and payment bond requirements.

12. Performance and Payment Bond: The successful bidder, within fifteen (15) working days after acceptance of the bidder's offer by the County, shall furnish a satisfactory performance and payment bond in the amount of the total bid price. The performance and payment bond must be received by the county prior to issuance of an executed contract and Notice to Proceed. The fifteen (15) working days may be extended upon written approval by the Procurement Services Director. A copy of the written approval shall be transmitted to the successful bidder stating the terms of any extension. In the event that the bidder fails to deliver to the County Procurement Services Division the performance and payment bond in said period of fifteen (15) working days after acceptance of the bidder's offer by the County, then the bid bond of the bidder shall be retained by the County in its entirety and the award will be withdrawn from the bidder. The Bond must have approval by the County Attorney's Office before it is made effective. The successful bidder shall have as surety a corporate surety authorized to act as surety in South Carolina. The Performance and Payment Bond will insure that the successful bidder will promptly make payments to all persons supplying labor or materials to the bidder; and shall guarantee to indemnify and save the County, its officers, divisions, and employees harmless from all costs, damages, and expenses growing out of or by reason of the successful bidder's failure to comply and perform the work and complete the contract in accordance with the specifications in the matter of making, furnishing and/or delivering said work or supplies. The Performance and Payment Bond will be in effect for one year after completion of the contract.

13. Availability of Bonding Agency: In addition, the bonding company must have an agent available to meet with County officials to clarify and explain the County's responsibility in maintaining the integrity of the bond.

14. Specification Changes, Additions and Deletions: All changes in specifications shall be in writing in the form of an addendum and furnished to all bidders. The County of Greenville shall not be responsible for any verbal information given by any employees of the County of Greenville in regard to this bid.

15. Number of Bid Copies: Please submit One (1) Original and Five (5) Copies of your bid.

16. Bid Changes: Bids, amendments thereto or withdrawal requests received after the advertised time for bid opening, shall be void regardless of when they were mailed.

17. Bid Price: The bid price presented as a result of these specifications shall be for the contract period. The bid shall be acceptable for sixty (60) days from the date of opening. All prices and notations shall be printed in ink or typewritten. Errors should be crossed out, corrections entered and initialed by the person signing the bid. Erasures or use of typewriter correction fluids may be cause for rejection. No bid shall be altered or amended after specified time for opening.

18. 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 the 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.

19. Tie Bids: In the case of tie bids, the County reserves the right to make the award based on the factors outlined in Section 3-202 of the Procurement Ordinance, or in what it considers to be in the best interest of the County.

20. Deduction and Holdbacks: In addition to the County's right of termination, the County shall be entitled to full reimbursement for any costs incurred by the County by reason of the contractor's failure to perform or to satisfactorily perform its responsibilities and duties. Such costs may include, but are not limited to, the cost of using the County's employees or employees of any other entity to perform the obligations of the contract. The County may obtain any such reimbursement by deduction from payments otherwise due to the contractor or by any other proper and lawful means. All deductions from any money due the contractor are to be as liquidated damages and not as a penalty. It is the County's intent to give the contractor a reasonable opportunity whenever practicable, to correct any such failure to perform or satisfactorily perform its responsibilities and duties. In no circumstances shall any uncorrected situation extend for more than five (5) days. The County will make the following deductions from the contract sum in the event that the contractor fails to perform any of the required work within the required time limits in the event the County carries out the work using its forces or another contractor.

    1. For use of County's forces – actual cost involved.

    2. For use of another contractor – the amount charged by said contractor.

The County reserves the right to hold back and/or withhold part of complete payments for unsatisfactory work, deficiencies, etc. until said defects are satisfactorily corrected or cleared.

21. Evaluation Criteria: The bids will be evaluated on the following criteria which are in no particular order. Greenville County reserves the right to interview responders to this IFB at its discretion. Greenville County will not be responsible for any costs associated with interviews of responders.

- Responsiveness to this Invitation for Bids
- Cost
- Experience in providing services of similar size and scope
- References

22. Quality: Unless otherwise indicated in this bid it is understood and agreed that any items offered or shipped on this bid shall be new and in first class condition unless otherwise indicated herein.

23. MBE/WBE Participation – Affirmative Action:

A. MBE/WBE – Vendors submitting bids are encouraged to solicit MBE/WBE participation in fulfilling their contract. Indicate in your response any MBE/WBE areas of involvement for monitoring purposes.

B. The successful bidder will take affirmative action in complying with all Federal and State requirements concerning fair employment and treatment of all employees, without regard or discrimination by reason of race, color, religion, age, sex, national origin or physical handicap.

24. Default: In case of default by vendor the County may procure the item or services from other sources and may recover the loss occasioned thereby from any unpaid balance due the vendor or by proceeding against the vendor's performance bond, if any, and/or by suit against vendor.

25. Termination: This contract is subject to termination for failure to comply with the specifications, terms and conditions by the County or the contractor upon written notice by registered mail. Such termination will be effective not less than ten (10) days nor more than sixty (60) days after receipt of such notice from the County nor less than thirty (30) days nor more than sixty (60) days after receipt by the County from the contractor. Receipt of notice by one party to terminate the contract will nullify any subsequent reciprocal notice by the receiving party prior to the announced termination date. In the event of termination the County shall be responsible to pay the contractor only for work satisfactorily completed upon the effective date of termination and shall not be responsible for any other charges.

26. Termination for Convenience: Greenville County may terminate for convenience any contract resulting from this solicitation by providing sixty (60) calendar days advance written notice to the vendor.

27. Non-Appropriation: Any contract entered into by the County resulting from this invitation shall be subject to cancellation without damages or further obligation when funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal period or appropriated year.

28. Incorporation of Bid into Contract: The terms, conditions, and specifications of this bid and the selected firm's response are to be incorporated into the contract.

29. S.C. Law Clause: Upon award of contract under this bid, the person, partnership, association or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business with this State. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this State, by submission of this signed bid, the bidder understands and agrees to be bound to the jurisdiction and process of the courts of the State of South Carolina, as to all matters and conflicts or future conflicts under the contract and the performance thereof, including any questions as to the liability for taxes, licenses, or fees levied by the State.

30. Assignment Clause: Successful bidder will be required to give the County ninety (90) days notice in the event of a change in the ownership of this contract. The County is under no obligation to continue this contract with an assignee. No contract or its provisions may be assigned, sublet, or transferred without the written consent of the County.

31. Indemnification: The contractor agrees to indemnify and save harmless the County of Greenville and all County officers, agents and employees from any and all claims, suits, actions, legal proceedings, damages, costs, expenses & attorney fees of every name and description, arising out of or resulting from the use of any materials furnished by the contractor, or any work done in the performance of the contract arising out of a willful or negligent act or omission of the provider, its officers, agents and employees; provided that such liability is not attributable to a willful or negligent act or omission on the part of the County, its officers, agents and employees.

32. Deviations from Specifications: Any deviation from specifications indicated herein must be clearly pointed out; otherwise, it will be considered that items offered are in strict compliance with these specifications, and successful bidder will be held responsible therefore. Deviations must be explained in detail on separate attached sheets(s). The listing of deviations, if any, is required but will not be construed as waiving any requirements of the specifications. Deviations found in the evaluation of the bid and not listed may be cause for rejection. Bidders offering substitute or equal items must provide information sufficient enough to determine acceptability of item offered.

33. Minor Deviations: The County reserves the right to negotiate minor deviations from the prescribed terms, conditions and requirements with the selected vendor.

34. Price Reductions: By submitting a bid in response to this solicitation, bidder guarantees that Greenville County is receiving the lowest price offered by bidder's company for like

items/services to other customers. If at any time during the contract period, bidder offers a lower price to another customer, upon discovery Greenville County shall reserve the right to take any or all of the following actions:

a) Cancel the contract, if it is currently in effect;

b) Determine the amount, which the County was overcharged and submit a request for payment from the bidder for that amount or deduct the difference from any amount due the bidder;

c) Demand that the bidder offer the County the same pricing schedule;

d) Take the necessary steps to collect any performance surety provided on the applicable contract.

35. 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.

36. Conflict of Interest Statement: The contractor may become involved in situations where a conflict of interest could occur due to individual or organizational activities within the County. The vendor, by submitting a bid, is in essence assuring the County that his company, and/or subcontractors, is in compliance with all federal, state, and local conflict of interest laws, statutes, and regulations.

37. Insurance:

The Contractor is responsible for and must have all required insurance listed below and shall not commence work under the associated contract until it has obtained all insurance required, and the County has approved such insurance in writing, nor shall the Contractor allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained. All insurance policies shall be maintained for the life of the contract.

A. THE COUNTY SHALL BE NAMED AS "ADDITIONAL INSURED" FOR ITS INTEREST on all policies of insurance except Worker's Compensation and Professional Errors and Omissions regarding ongoing operations, products and completed operations, and this shall be noted on the face of the Certificate of Insurance. As a part of the certificate of insurance requirement the contractor shall also include acknowledgement and acceptance of the wavier of subrogation provision granted to the County of Greenville. This acknowledgement and acceptance should be included in the same section of the Certificate of Insurance that evidences the "Additional Insured" provision.

B. Certificates for all such policies of insurance shall be provided by the contractor's insurance agent or broker to the County within 10 working days from the date of Notice of Award.

C All Certificates of Insurance submitted shall provide on the face of the certificate reference to County's IFB# 68-05/02/16.

D. Contractor will provide County a minimum of 30 days advance notice in the event the insurance policies (or an insurance policy) is canceled.
Subcontractors approved to perform work on this project are subject to all of the requirements in this Section.

E. Contractor agrees to maintain and keep in force during the life of this Agreement, with a company or companies authorized to do business in South Carolina, the following insurance policies:

Comprehensive General Liability:
1,000,000 per occurrence - combined single limit / $2,000,000 general aggregate, to include products and completed operations.

Automobile Liability:
$1,000,000 per occurrence - combined single limit (Coverage shall include bodily injury and property damage and cover all vehicles including owned, non-owned and hired)

Statutory Worker's Compensation:
Coverage A - State of SC
Coverage B - Employers liability
$1,000,000 Each Accident
$1,000,000 Disease, Per Employee
$1,000,000 Disease, Policy Limit
Policy shall contain a waiver of subrogation in favor of and/or applies to the County of Greenville, its departments, agencies, boards, employees, and commissions for losses from work performed by or on behalf of the contractor.

No deviation from these coverages will be accepted unless, in the County's sole discretion, it is more advantageous to the County, i.e., $1,000,000 - a $2,000,000 or $5,000,000 limit would be acceptable.

38. Contracts: The County reserves the option to prepare and negotiate its own contract with the vendor, giving due consideration to the stipulations of the vendor's contracts and associated legal documents. Vendors should include with their submittal a copy of any proposed standard contract.

39. 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 County 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 County 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 County and suit brought against the County for attorney's fees and for all other expenses incurred by the County in connection with or as a result of any such suit, claims, or loss. Under no

circumstances and with no exception will Greenville County 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.

40. Sub-Contracting: The contractor shall not subcontract any portion of this contract without proper written approval from the County.

41. Non-Collusion: The contractor expressly warrants and certifies that neither the Contractor nor its employees or associates has directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in conjunction with this bid.

42. Prohibition of Gratuities: Neither the contractor nor any person, firm or corporation employed by the contractor in the performance of the contract shall offer or give, directly or indirectly, to any employee or agent of the County, any gift, money, or anything of value, or promise any obligations, or contract for future reward or compensation at any time during the term of this contract.

43. Publicity Releases: Contractor agrees not to refer to the award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the user. The contractor shall not have the right to include the County's name in its published list of customers without prior approval of the County. With regard to news releases, only the name of the County, type and duration of contract may be used and then only with prior approval of the County. The contractor also agrees not to publish, or cite in any form, any comments or quotes from the County Staff unless it is a direct quote from the Public Information Officer.

44. Public Record: All information submitted relating to this bid, except for proprietary information, shall become part of the public record to the extent required by the Freedom of Information Act. Vendors shall be responsible for clearly marking all information submitted that is proprietary based on the Freedom of Information Act. The County assumes no responsibility for the release of information not clearly and properly labeled as proprietary.

45. Precedence: In the event of conflict between the terms and conditions and the specifications, the more restrictive instruction shall take precedence unless stated otherwise in the specifications.

46. Illegal Immigration Reform Act Compliance: By submitting an offer, Contractor 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 Reform 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 Contractor and any subcontractors or sub-subcontractors; or (b) the compliance with Title 8, Chapter 14 by Contractor and any subcontractor or sub-subcontractor. 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." Contractor 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-subcontractors language requiring the sub- subcontractor to comply with the applicable requirements of Title 8, Chapter 14. In the event any contractor, subcontractor and/or sub-subcontractor is found not to be in compliance with the SC Immigration Reform Act [hereinafter "The Act"], the contractor agrees to fully indemnify the County for any loss suffered by the County as a result of such contractor, subcontractor or sub-subcontractor's failure to comply with the Act.

47. Safety, Health, and Security: Contractor shall be solely responsible for its activities, that of its employees on the site and activities of its consultants, contractors and/or subcontractors for maintaining a safe job site. Contractor's activities and activities of its consultants, contractors and/or subcontractors shall comply with all local, state, and federal safety regulations and their enforcement agencies. Contractor shall at all times conduct its operations under this Contract in a manner to avoid risk of endangerment to the health and safety of persons and property. The Contractor shall have sole responsibility for implementing its safety and health programs, taking all safety and health precautions necessary and continuously inspecting all equipment, materials and work to prevent, discover, determine and correct any conditions which might result in personal injury, equipment damage or damage to property or the public. Contractor's safety, health and security programs shall be in compliance with all regulatory requirements and shall furnish accident, incident, injury, and other records and reports required by the Occupational Safety and Health Administration, State and Local laws, or by the County.

STATE OF SOUTH CAROLINA)
COUNTY OF GREENVILLE)

CONSTRUCTION AGREEMENT

THIS AGREEMENT is made and entered into on this _____ day of _____, 2016, by and between the **COUNTY OF GREENVILLE**, a political subdivision of the State of South Carolina, having its principle place of business at 301 University Ridge, Greenville, S.C. 29601 ("**COUNTY**"), and _____, located at _____ ("**CONTRACTOR**").

IN CONSIDERATION of the covenants hereinafter set forth, the parties mutually agree as follows:

1. **CONTRACT PERIOD**

This Agreement shall begin on the date the NOTICE TO PROCEED is issued by **COUNTY**. All work phases specified herein must be completed no later than June 1, 2016. If the **Contractor** fails to satisfactorily complete the work within the specified time, liquidated damages of $500.00 per calendar day shall be assessed up to value of the contract (total bid). The penalty may be drawn from any payment due, or the performance bond, at the discretion of the **County**.

2. **PROJECT SCOPE**

COUNTY has employed **CONTRACTOR** to provide all labor, materials and equipment to perform the construction of the Staunton Bridge Community Center Gymnasium located at 165 Staunton Bridge Road, Greenville, SC 29611. The services to be provided by **CONTRACTOR** are more particularly described in **COUNTY'S** IFB #68-05/02/16 and in **CONTRACTOR'S** response to IFB #68-05/02/16 received _____, which are both attached hereto and incorporated herein by reference. **CONTRACTOR** acknowledges that it is an independent contractor and that it will at all times act as such. Nothing in this Agreement shall be deemed to constitute **CONTRACTOR** or any of its employees as the agent, representative or employee of **COUNTY**, or create a joint venture between the parties.

3. **PAYMENT TERMS**

3.1 **COUNTY** agrees to pay **CONTRACTOR** for the services described in the Project Scope an amount not to exceed _____.

3.2 **CONTRACTOR** will submit monthly invoices to the **COUNTY**. Such invoices shall include a detailed listing of charges. **COUNTY** shall notify **CONTRACTOR** within ten (10) days of receipt of invoice of any dispute with the invoice and **CONTRACTOR**, upon such notice, shall provide back-up data to **COUNTY**. **COUNTY** and **CONTRACTOR** will, thereafter, promptly resolve any disputed items. Payment on undisputed invoice amounts is due upon receipt of invoice by **COUNTY** and is past due thirty (30) days from the date the invoice is received. If payment on undisputed invoice amounts remains past due sixty (60) days from the date the invoice is received by **COUNTY**, then **CONTRACTOR** shall have the right to either suspend all work under this Agreement, without prejudice, or terminate this Agreement in

SAMPLE CONTRACT

accordance with the provisions of Section 13.2. **COUNTY** shall, prior to making payment on any invoice, withhold ten (10%) percent from any payment due. The amounts so withheld shall be released to **CONTRACTOR** upon satisfactory completion of the Project.

3.3 Approval and/or payment of such invoices shall not in any way relieve **CONTRACTOR** of its liability to **COUNTY** for deficiencies in the performance of its services. **COUNTY'S** approval or acceptance of, or payment for any of the services shall not operate as a waiver of any rights to which **COUNTY** may be entitled.

3.4 **NO INTEREST OR OTHER LATE PENALTIES SHALL ACCRUE ON LATE PAYMENTS.**

3.5 **IT IS UNDERSTOOD AND AGREED BY THE PARTIES THAT IN THE EVENT FUNDS ARE NOT APPROPRIATED IN THE CURRENT FISCAL YEAR OR ANY SUBSEQUENT FISCAL YEAR, THIS CONTRACT WILL BECOME NULL AND VOID AND THE COUNTY WILL ONLY BE REQUIRED TO PAY FOR SERVICES COMPLETED TO THE SATISFACTION OF THE COUNTY.**

4. **CHANGES**

4.1 **COUNTY** may, at any time, in writing, and within the general scope of this Agreement, make "Request for Changes" in the services or work to be performed. In the event **CONTRACTOR** is requested to perform additional services or work not contemplated by this Agreement, **CONTRACTOR** will promptly notify **COUNTY** if such change causes an increase in **CONTRACTOR'S** cost of, or time required for, performance of any services under this Agreement, an equitable adjustment shall be made and this Agreement shall be modified in writing accordingly. In the event **CONTRACTOR** is requested to reduce the performance of services or scope of work, such request must be in writing. In the event **CONTRACTOR** is requested to reduce the performance of services or scope of work **COUNTY** shall be entitled to a decrease in the amount of compensation to be paid to **CONTRACTOR** accordingly.

4.2 All change orders must be in writing to be valid, and no services for which any additional compensation will be charged by **CONTRACTOR** shall be furnished without the written authorization of **COUNTY**.

4.3 **COUNTY** may add to or reduce the scope of work by generating mutually agreed upon contract exhibits to this basic agreement.

5. **WARRANTIES**

In addition to any express and/or implied warranties provided to **COUNTY** by law, **CONTRACTOR** warrants to **COUNTY** that the performance of the services covered by this Agreement will be competent to perform the tasks undertaken, that the product of such paving services will yield only first-class results, that materials and equipment furnished will be of good quality and new unless otherwise permitted by this Agreement, and that the work

SAMPLE CONTRACT

will be of good quality, free from faults and defects and in strict conformance with this Agreement. All work not conforming to these requirements may be considered defective. In the event any of the work is found to be defective or not in accordance with this Agreement within one (1) year after completion of the contract services, **CONTRACTOR** will promptly correct the work without additional compensation from **COUNTY**, upon written notice from **COUNTY**. All corrective work shall be completed within thirty (30) days of receipt of written notice from **COUNTY**. Establishment of the one year time period in this section relates only to the duty of **CONTRACTOR** to specifically correct the work.

6. **WITHHOLDING PAYMENT**

COUNTY has the right, but not the obligation, to withhold funds to the extent and only to the extent necessary to protect **COUNTY** from loss because of:

a) Defective work not remedied by **CONTRACTOR** within a reasonable time or for which **CONTRACTOR** has failed to initiate a remedy within a reasonable time;

b) Claims of third parties against **COUNTY** or **COUNTY'S** property for which **CONTRACTOR** is liable;

c) Failure by **CONTRACTOR** to pay subcontractors or others in a prompt and proper fashion the amounts due and owing to such subcontractor or others relating to the Project.

d) Evidence that the balance of the work cannot be completed in accordance with this Agreement for the unpaid balance of the Contract Price;

e) Evidence that the work will not be completed in the time required for final completion;

f) Persistent failure to carry out the work in accordance with this Agreement, or

g) Damage to the **COUNTY** or a third party to whom the **COUNTY** is, or may be, liable and for which **CONTRACTOR** is liable pursuant to the terms of this Agreement.

7. **RIGHT TO STOP WORK**

In the event **CONTRACTOR** fails to perform the work in accordance with this Agreement, **COUNTY** may order **CONTRACTOR** to stop the work and **COUNTY** may then perform the work in accordance with Section 8, below, or terminate this Agreement in accordance with Section 13.1.2. In such event, **CONTRACTOR** shall immediately obey such stop work order.

8. **COUNTY'S RIGHT TO PERFORM WORK**

In the event **CONTRACTOR'S** work is stopped pursuant to Section 7, above, entitled "Right to Stop Work", and **CONTRACTOR** fails to provide adequate assurance to **COUNTY**, within seven (7) days of such stoppage, that the cause of such stoppage will be eliminated or corrected, then **COUNTY** may proceed to carry out the subject work or terminate this Agreement. In such a situation, an appropriate Change Order shall be issued deducting from the Contract Price the documented and agreed to cost of correcting the deficiencies, including any professional services and expenses necessitated thereby. If the unpaid portion of the Contract Price is insufficient to cover the amount due **COUNTY**, **CONTRACTOR** shall pay the difference to **COUNTY**; provided, however if **COUNTY** stops
the work, takes over a portion of or all of the work and performs the work, then

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CONTRACTOR'S WARRANTY OBLIGATIONS relating to such work performed by **COUNTY** shall be null and void.

9. **INDEMNIFICATION.**

CONTRACTOR agrees to assume responsibility for any damage, loss, or injury, including death, of any kind or nature whatever to person or property, including employees and property of **COUNTY**, caused by or resulting from any negligent act or omission of **CONTRACTOR** or its subcontractors or any of their officers, agents, servants, or employees, arising from the performance of the work under this Agreement. **CONTRACTOR** shall defend, indemnify, and hold harmless **COUNTY** and all of its officers, agents, servants, or employees from and against any and all claims, loss, damage, charge, or expense to which they or any of them may be put or subjected by reason of any such damage, loss, or injury. **CONTRACTOR** expressly agrees to defend against any claims brought or filed against **COUNTY**, where such claim or action involves, in whole or in part, the subject of the indemnity contained herein, whether such claims or actions are rightfully or wrongfully brought or filed.

10. **INSURANCE.**

The contractor is responsible for and must have all required insurance listed below and shall not commence work under the associated contract until it has obtained all insurance required, and the County has approved such insurance in writing, nor shall the Contractor allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained. All insurance policies shall be maintained for the life of the contract.

A. **THE COUNTY SHALL BE NAMED AS "ADDITIONAL INSURED" FOR ITS INTEREST** on all policies of insurance, except Worker's Compensation, Auto Liability and Professional Errors and Omissions, regarding ongoing operations, products and completed operations, and this shall be noted on the face of the Certificate of Insurance. As a part of the certificate of insurance requirement the contractor shall also include acknowledgement and acceptance of the wavier of subrogation provision granted to the County of Greenville. This acknowledgement and acceptance should be included in the same section of the Certificate of Insurance that evidences the "Additional Insured" provision.

B. Certificates for all such policies of insurance shall be provided by the **Contractor's** insurance agent or broker to the **County** within 10 working days from the date of Notice of Award.

C. All Certificates of Insurance submitted shall provide on the face of the certificate reference to County's IFB #68-05/02/16.

D. **Contractor** will provide **County** a minimum of 30 days advance notice in the event the insurance policies (or an insurance policy) are canceled.
Subcontractors approved to perform work on this project are subject to all of the requirements in this Section.

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E. **Contractor** agrees to maintain and keep in force during the life of this Agreement, with a company or companies authorized to do business in South Carolina, the following insurance policies:

Comprehensive General Liability:
1,000,000 per occurrence - combined single limit / $2,000,000 general aggregate, to include products and completed operations.

Automobile Liability:
$1,000,000 per occurrence - combined single limit (Coverage shall include bodily injury and property damage and cover all vehicles including owned, non-owned and hired)

Statutory Worker's Compensation:
Coverage A - State of SC
Coverage B - Employers liability
$1,000,000 Each Accident
$1,000,000 Disease, Per Employee
$1,000,000 Disease, Policy Limit
Policies shall contain a waiver of subrogation in favor of and/or that applies to the County of Greenville, its departments, agencies, boards, employees, and commissions for losses from work performed by or on behalf of the contractor.

No deviation from these coverages will be accepted unless, in the County's sole discretion, it is more advantageous to the County, i.e., $1,000,000 - a $2,000,000 or $5,000,000 limit would be acceptable.

11. **PERFORMANCE AND PAYMENT BOND**

Contractor shall furnish a satisfactory Performance and Payment Bond in the amount of the total contract price no later than fifteen (15) business days after the date of the Notice of Award. The Bond must have approval by the County Attorney's Office before it is made effective. The **Contractor** shall have as surety a corporate surety authorized to act as surety in South Carolina. The Performance and Payment Bond shall remain in effect for one year after completion of the contract.

12. **ILLEGAL IMMIGRATION REFORM ACT COMPLIANCE**

By submitting an offer, **Contractor** 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 Reform 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 **Contractor** and any subcontractors or sub-subcontractors; or (b) the compliance with Title 8, Chapter 14 by **Contractor** and any subcontractor or sub-subcontractor. 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." **Contractor** agrees to include in any contracts with its

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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-subcontractors language requiring the sub- subcontractor to comply with the applicable requirements of Title 8, Chapter 14. In the event any contractor, subcontractor and/or sub-subcontractor is found not to be in compliance with the SC Immigration Reform Act [hereinafter "The Act"], the contractor agrees to fully indemnify the County for any loss suffered by the County as a result of such contractor, subcontractor or sub-subcontractor's failure to comply with the Act.

13. TERMINATION

13.1 TERMINATION BY COUNTY

13.1.1 This Agreement may be terminated by **COUNTY** upon fifteen (15) days written notice at **COUNTY'S** election. In the event of termination at **COUNTY'S** election and not due to the fault of **CONTRACTOR**, **CONTRACTOR** will be paid only for the work actually completed to the satisfaction of the **County** as of the date of termination.

13.1.2 Should **CONTRACTOR** default or persistently fail or neglect to carry out the work in accordance with the terms of this Agreement, **COUNTY** may by written notice to **CONTRACTOR**, without prejudice to any other right or remedy under this Agreement, terminate the employment of **CONTRACTOR** and take possession of the site and all materials, equipment, tools and construction equipment and machinery thereon owned by **CONTRACTOR** as well as all drawings, plans and specifications and finish the work by whatever methods **COUNTY** may deem expedient; provided, however, prior to such termination,
CONTRACTOR shall be given notice of the default and an opportunity to cure such default within seven (7) days. Such termination shall be deemed "for cause". Should this Agreement be terminated "for cause", **CONTRACTOR** shall not be entitled to any further payment. In the event the actual and documented cost of finishing the work, including compensation for professional services and expenses made necessary thereby, if any, exceed the unpaid balance, **CONTRACTOR** shall pay the difference to **COUNTY**. This obligation for payment shall survive the termination of this Agreement.

13.2 TERMINATION BY CONTRACTOR

Should **COUNTY** fail to make payment on any undisputed invoice amount within sixty (60) days of receipt of such invoice, **CONTRACTOR** may elect to either suspend the work or terminate this Agreement; provided, however, prior to termination, **COUNTY** shall be given notice of the default and an opportunity to cure such default within seven (7) days. Should this Agreement be terminated by **CONTRACTOR**, **CONTRACTOR** shall be entitled to be paid only for the work actually completed to the satisfaction of the **County** as of the date of termination.

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14. **CLEANING THE SITE AND SAFETY**

14.1 **CONTRACTOR** shall keep the site reasonably clean during performance of the work. **CONTRACTOR** shall dispose of all refuse at a South Carolina DHEC approved landfill.

14.2 **CONTRACTOR** shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to (1) employees on the job and other persons who may be affected thereby; (2) the work and materials and equipment to be incorporated herein; and (3) other property at or adjacent to the site.

14.3 **CONTRACTOR** shall give notices and comply with all laws, ordinances, rules, regulations and orders of public authorities bearing on the safety of persons and property and their protection from damage, injury or loss.

15. **ASSIGNMENT**

This Agreement shall not be assigned by either party without the prior written consent of the other party.

16. **SUBCONTRACTS**

16.1 **CONTRACTOR** shall promptly furnish to **COUNTY**, in writing, the bid list proposed by **CONTRACTOR** to act as subcontractors on the Project. **COUNTY** shall, within seven (7) days, reply to **CONTRACTOR**, in writing, stating any objections **COUNTY** may have to such proposed subcontractors. **CONTRACTOR** may enter into a subcontract with any subcontractor on the approved bid list. **CONTRACTOR** shall not be required to enter into a subcontract with any subcontractor to whom **CONTRACTOR** has objection.

16.2 All subcontractors shall provide performance and payment bonds in accordance with bonding requirements set forth in the Greenville County procurement policies and shall name **COUNTY** as an additional obligee on such bonds.

16.3 All subcontractors will be required to furnish Certificates of Insurance to the **County** in accordance with all of the requirements set forth in Section 10 of this Agreement.

17. **NOTICES**

All notices made pursuant to this Agreement shall be in writing and delivered personally or sent by registered or certified mail, return receipt requested, to the parties at their respective addresses set forth below:

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COUNTY
Nadine Chasteen, CPPO, CPPB
Director
County of Greenville
Procurement Services Division
301 University Ridge, Suite 100
Greenville, SC 29601

CONTRACTOR

Any party may change the person to whom notices are to be sent by giving ten (10) days written notice of such change to the other party.

18. **APPLICABLE LAW AND VENUE**

18.1 The construction, interpretation and performance of this Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina.

18.2 **CONTRACTOR** and **COUNTY** further agree that this Agreement shall be deemed to have been made and performed in Greenville County, South Carolina. For the purposes of venue, all suits or causes of action arising out of this Agreement shall be brought in the courts of Greenville County, South Carolina.

19. **COMPLIANCE WITH FEDERAL, STATE AND LOCAL LAWS**

CONTRACTOR shall comply with all federal, state and local statutes, ordinances and regulations, and shall obtain all permits that are applicable to this Agreement.

20. **SUCCESSORS AND ASSIGNS**

CONTRACTOR and **COUNTY** each binds itself and its partners, successors, executors, administrators and assigns to the other party of this Agreement and to the partners, successors, executors, administrators, and assigns of such other party, in respect to all covenants of this Agreement.

21. **SEVERABILITY**

Should any section, paragraph, clause, phrase, or provision of this Agreement be adjudged invalid or held unconstitutional by a court of competent jurisdiction, such declaration shall not affect the validity of this Agreement as a whole or any part or provision thereof, other than the part so decided to be invalid or unconstitutional.

22. **ENTIRE AGREEMENT**

This Agreement, along with the provisions contained in **COUNTY'S** IFB #68-05/02/16, and **CONTRACTOR'S** RESPONSE TO IFB #68-05/02/16, attached hereto, represents the entire agreement between the parties and supersedes any and all prior agreements, whether written or oral, that may exist between the parties regarding same. If there is a conflict between any of the terms of these contract documents the order of precedence of these contract documents shall be:

SAMPLE CONTRACT

A. Any Change Order or Amendment signed and executed by the parties;
B. This Agreement;
C. **CONTRACTOR'S** RESPONSE TO IFB #68-05/02/16
D. Addenda to **COUNTY'S** IFB# 68-05/02/16
E. **COUNTY'S** IFB #68-05/02/16.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date hereinabove written.

WITNESSES:

_____

_____

CONTRACTOR

By: _____

Its: _____

COUNTY

By: _____
Bob Taylor, Chairman
Greenville County Council

By: _____
Joseph M. Kernell
County Administrator

ATTEST:

_____
Theresa B. Kizer, c.c.c.
Clerk to Council

SAMPLE CONTRACT

STAUNTON BRIDGE COMMUNITY
CENTER GYMNASIUM
IFB# 68-05/02/16
Bid Form

BASE BID

Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Greenville County and LS3P ASSOCIATES, LTD and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled/indicated allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

_____ Dollars ($_____)

BID ALTERNATES:

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. Alternate bids shall include the costs of all materials, delivery, overhead & profit, general conditions, taxes, installation, and coordination with other trades for the alternate construction.

Alternate No. 1 (Greyhound Waiting Room): All demolition & work associated with area indicated as "Alternate 1". This cost shall include purchasing of materials, storage, installation, and any other additional cost for proper demolition & installation.

Add: $_____

Alternate No. 2 (Light Boxes & Light Fixtures): All work associated with areas indicated as "Alternate 2". This cost shall include purchasing of materials, storage, installation, light fixtures, electrical wiring and any other additional cost for proper construction & installation.

Add: $_____

ALLOWANCES:

A. Allowance No. 1: Lump-Sum Signage Allowance: Include in the Base Bid a lump-sum allowance of $4,500.00 for all interior and exterior building signage required for the project

B. Allowance No. 2: Lump-Sum Landscape Planting Allowance: Include in the Base Bid a lump-sum allowance of $5,000.00 for landscape planting only as selected by the Owner's Representative. Other landscaping elements shall be covered in the base bid as specified in the Contract Documents.

UNIT PRICES:

Refer to Technical Specifications Section 012200 Unit Prices for a full description of each unit cost.

Unit Price No. 1: Unsatisfactory Soil Removal with off-site Disposal

Unit of Measure: Cubic yard, measured in situ.

Unit Price_____

Unit Price No. 2: On-Site Satisfactory Soil Replacement

Unit of Measure: Cubic yard, measured in situ.

Unit Price_____

Unit Price No. 3: Off-Site Satisfactory Soil Replacement

Unit of Measure: Cubic yard, measured in situ.

Unit Price _____

Unit Price No. 4: Rock Removal; Trenching

Unit of Measure: Cubic yard, measured in situ, of rock trenched.

Unit Price _____

Unit Price No. 5: Rock Removal; Excavation

Unit of Measure: Cubic yard, measured in situ, of rock trenched

Unit Price _____

Unit Price No. 6: #57 Stone

Unit of Measure: Cubic yard, measured in situ

Unit Price _____

Unit Price No. 7: Undercutting

Unit of Measure: Cubic yard, measured in situ, of undercut material

Unit Price _____

SUPERINTENDENT AND PROJECT MANAGER:

If the Undersigned is awarded the Contract for the Work, the following individuals will be responsible for the supervision and the management of the Work: (As Apply)

	Experience	Experience in Current Position	Total Experience in Company
Superintendent:	_____	_____	_____
Project Manager:	_____	_____	_____

SUB-CONTRACTORS:

The Undersigned proposes to employ the following major subcontractors to execute the following divisions of the Work:

Masonry:_____

Dry Wall:_____

Plumbing:_____

HVAC:_____

Electrical:_____

Pre Cast Concrete:_____

Storefront/Curtain Wall:_____

Grading:_____

Pavement/Ashpalt:_____

Concrete (Foundation):_____

TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within and not exceed _____ consecutive calendar days.

B. Note: The Bidder acknowledges that time of completion may be a determining factor in the Owner's decision to award.

ACKNOWLEDGEMENT OF ADDENDA

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. __, dated _____
Addendum No. __, dated _____
Addendum No. __, dated _____
Addendum No. __, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in the State of South Carolina, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

SUBMISSION OF BID

Submitted By:_____(Name of bidding firm or corporation)

Authorized Signature:_____(Handwritten signature)

Signed By:_____(Type or print name)

Title:_____(Owner/Partner/President/Vice President)

Street Address:_____

City, State, Zip:_____

Phone:_____

License No.:_____

Federal ID No.:_____(Affix Corporate Seal Here)

Attachment A

Specifications and Drawings

PROJECT MANUAL

Greenville County

Staunton Bridge Community Center Gymnasium Addition

165 Staunton Bridge Road
Greenville, SC 29611

LS3P COMMISSION NUMBER: 3702-155430

CONSTRUCTION DOCUMENTS

ARCHITECT

110 WEST NORTH STREET
GREENVILLE, SOUTH CAROLINA 29601
PHONE: (864) 235-0405 FAX: (864) 233-4027

March © 2016

CONSULTING ENGINEERS

SEALS

MECHANICAL, PLUMBING

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 16175 WILLIAM GRADY BARTLETT

SOUTH CAROLINA W.G. BARTLETT ENGINEERING SERVICES, LLC No. C02469 CERTIFICATE OF AUTHORIZATION

3-11-2016

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Greenville County

Staunton Bridge Community Center

Gymnasium Addition

Greenville, South Carolina

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EVALUATION

PROPOSED STAUNTON BRIDGE
COMMUNITY CENTER ADDTION

165 STAUNTON BRIDGE ROAD
GREENVILLE, SOUTH CAROLINA
EAS-16-303

Prepared For:

LS3P
110 West North Street, Suite 300
Greenville, South Carolina 29601

Prepared By:

EAS PROFESSIONALS, INC.
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February 3, 2016

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February 3, 2016

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Attention: Mr. Dean Oang, AIA

Reference: Report of Subsurface Exploration and
Geotechnical Engineering Evaluation
Proposed Staunton Bridge Community Center Addition
165 Staunton Bridge Road
Greenville, South Carolina
EAS Project No.: EAS 16-303

Mr. Oang:

The purpose of this report is to present the results of the subsurface exploration program and geotechnical engineering analyses undertaken by Engineering and Surveying Professionals, Inc. (EAS) in connection with the above referenced project in Greenville, South Carolina. The attached report presents our understanding of the project information provided to EAS, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents our evaluations, conclusions, and recommendations.

We have enjoyed working with you on this project, and we are prepared to assist you with the recommended quality assurance monitoring and testing services during construction. Please do not hesitate to contact us if you have any questions regarding this report or if we may be of further service.

Respectfully Submitted,
EAS PROFESSIONALS, INC.

Westley C. Godfrey
Project Engineer

SOUTH CAROLINA EAS PROFESSIONAL INC. No. 3363 CERTIFICATE OF AUTHORIZATION

Douglas R. Dunko, PE
Senior Geotechnical Engineer
South Carolina PE License No. 21288

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 21288 2-3-16 DOUGLAS R. DUNKO

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1. EXECUTIVE SUMMARY OUTLINE

The executive summary is provided solely for purpose of overview. Any party who relies on this report must read the full report. The executive summary omits a number of details, any one of which could be critical to the proper application of this report.

1.1. SUBSURFACE CONDITIONS

- All of the soil test borings encountered residual soils below the surficial soil layer or to the boring termination depths of approximately 10 to 20 feet below existing site grades. The sampled residual soils generally consisted of sandy CLAY (CL) and silty SAND (SM) soils. Standard Penetration Resistance (SPT) N-values of the sampled residual soils ranged from 3 to 65 blows per foot (bpf) with an average of approximately 17 bpf, which indicated very loose/soft to very dense/hard conditions of the residual soils encountered at the soil test boring locations.
- Weathered rock (N-values greater than 100 bpf) was encountered at 2 of the 5 soil test boring locations (B-1 and B-2) within the planned development area. At soil test boring location B-1, the weathered rock was encountered at approximately 6 feet below existing site grades and extended to where residual soils were encountered at 13.5 feet. At soil test boring location B-2, the weathered rock was encountered at 13.5 feet and extended to the boring termination depth of 13.8 feet below existing site grades. The encountered weathered rock was sampled as very dense silty fine to coarse SAND (SM).
- Ground water was encountered at 4 of the 5 soil test boring locations (B-1, B-2, B-3 and B-4) at depths ranging from approximately 9 to 19.5 feet below existing site grades during drilling activities. All of the boreholes in which ground water was encountered were dry at the cave-in depths ranging from approximately 7 to 15 feet below existing site grades prior to backfilling upon completion of drilling. Based on these observations, **shallow ground water (perched ground water) could affect the planned deeper cut areas of the site and the site foundation and utility excavations.** Typically, the ground water will be found perched at the soil to weathered rock and/or rock interface. It should be noted that drilling was performed during early winter (mid-January) and encountered ground water levels may be significantly higher if site grading or foundation construction is performed during late winter or spring when seasonal high ground water levels are typically observed, especially within the lower elevation areas of the site.

1.2. SITE PREPARATION

- Initial site preparation will require the removal of all existing organic laden soils, trees, vegetation, and surface soils containing organic matter or other deleterious materials should be removed from within the proposed development area. If any existing utilities (e.g., water lines or wells, sewer lines or septic tanks, etc.) are encountered within the proposed development area, they should be properly abandoned and/or removed. Open

pipes or conduits, if any, left in-place adjacent to the construction area should be bulkheaded and grouted as they might serve as conduits for subsurface erosion.

- Upon completion of initial site preparation activities, all areas to receive engineered fill, foundations and/or pavements should be proofrolled with a loaded tandem axle dump truck, scraper, or other similar heavy construction equipment to confirm the stability of the subgrade soils and detect the presence of any near surface soft or unstable areas. **EAS's geotechnical engineer or his representative should observe the proofrolling operations.**
- **Based on the results of the soil test borings, we do not anticipate that widespread areas of unstable subgrade will be encountered across the site.** However, very loose, sandy (SC) near surface conditions (upper approximately 1.5 feet) were encountered at soil test boring location B-5 drilled in the planned driveway area that travels around the north side of the planned addition, and similar loose soil conditions could be encountered at other locations across the site. The grading contractor should be prepared to undercut and/or re-work the existing subgrade at and around this location and at other locations with similar loose soils. It should also be noted that significant wet weather and/or substantial construction traffic during site clearing and/or site grading, could negatively impact the subgrade soils within the planned development area, especially if clearing or site grading is performed during seasonally cold or wet weather conditions. If proofrolling reveals unstable conditions, the grading contractor should be prepared to undercut and/or re-work the existing subgrade to provide a stable subgrade for any structural fill, foundations, building slab-on-grade or pavements, especially if site clearing and/or site grading is performed during seasonally cold or wet weather conditions.
- **The near surface CLAY (CL), silty SAND (SM) and clayey SAND (SC) soils are moisture sensitive and can become unstable during normal construction traffic and activities when wet. Protect the subgrade from becoming wet through proper surface water runoff drainage.**

1.3. Structural Fill

- Based on review of the provided A-001 Architectural Site Plan, C3 - Exiting Conditions and Demolition Plan, and a C9 – Utility Plan, we anticipate that minimal grading will be required to slightly raise/level existing site grades to achieve finish subgrade elevations for the planned building addition besides the existing community center. We anticipate significant cut grading (up to approximately 12 feet) will be required to achieve finish subgrade elevations for the planned entrance drive and parking area for the new development. Required structural fill will be derived from on-site cut grading activities.
- The encountered SAND (SM/SC) soils should be suitable for re-use as structural fill**. The encountered sandy CLAY (CL) soils are marginally suitable for re-use as structural fill and will require a high degree of quality control during placement.** The grading contractor

should be prepared to moisture condition (wet or dry) structural fill soils prior to placement. It is important to note that if water is needed to moisture condition (wet) the site clayey soils, it will typically takes 12 to 24 hours for the clays to hydrate the added water and be workable with uniform moisture content for compaction. Structural fill should be placed in accordance with structural fill recommendations to the planned finish subgrade bearing elevations.

1.4. Cut and Fill Slopes

- A formal slope stability analysis of the anticipated cut and structural fill slopes resulting from anticipated cut/fill grading in order to achieve finish subgrade elevations for the planned development was beyond the scope of this subsurface exploration and geotechnical analysis. Typically, permanent project earthen fill and cut slopes should be designed at a maximum of 2.5 horizontal to 1 vertical (2.5H: 1V) or flatter and maximum 2 horizontal to 1 vertical (2H: 1V) or flatter, respectively, to promote long and short term stability. Permanent slopes of 3H: 1V or flatter are usually desired for mowing. **EAS recommends performing laboratory testing to determine the soil's wet density (γ_{wet}), the soil's dry density (γ_{dry}) and the soil's internal angle of friction (Φ) in order to properly design/optimize the anticipated cut and structural fill slopes.**
- EAS recommends a maximum slope of 2.5H: 1V for structural fill slopes and a maximum slope of 2H: 1V for cut slopes consisting of soils similar to the medium dense SAND (SM) encountered at the soil test borings. Fill slopes less than 5 feet in height should be stable provided the structural fill soils used are properly moisture conditioned, placed with a relatively high degree of compaction (minimum 95% of standard Proctor) and full time observation and monitoring of EAS's Geotechnical engineer and/or technician during construction.
- Fill slopes placed over existing slopes should be adequately benched/keyed into the existing slopes so that structural fill is not placed and/or compacted on a sloping subgrade. All fill slopes should be adequately compacted, as outlined in the structural fill placement and compaction section of this report, and all slopes should be seeded and maintained as soon as possible after construction.

1.5. Foundations

- Foundations can be designed for a **2,500 psf maximum net allowable soil bearing pressure** bearing on approved medium dense/stiff or better site soils or properly compacted structural fill. Actual foundation sizes, depths and steel reinforcement should be determined by the project structural engineer based on actual design loads, building code requirements and other structural considerations.

1.6. Floor Slabs

- Ground floor slabs may be designed as a free-floating slab-on-grade supported by at least 4 inches of properly compacted ABC stone (aggregate base course) overlying approved site soils or properly compacted structural fill soils placed in accordance with structural fill recommendations within this report.

1.7. Site Seismic Classification

- Based upon the subsurface conditions encountered at the soil test borings and in accordance with appropriate sections of the 2012 IBC, the subject site currently meets the conditions for a **Site Classification D**, for sites with a stiff soil profile where 15 blows per foot (bpf) $\leq$ the average N-value $\leq$ 50 bpf within the upper 100 feet.
- Based on the design spectral response accelerations and the structure's seismic use group (assumed as Use Group II), the site is assigned a Seismic Design Category B for S_{DS} and a Seismic Design Category C for S_{D1}. Utilizing the most severe of these design categories, the site is assigned a **Seismic Design Category C** in general accordance with the procedures outlined in Chapter 16 of the 2012 IBC.

1.8. Pavements

- An assumed California Bearing Ratio (CBR) value of 5.0 for approved site soils or properly compacted structural fill similar to the encountered SAND (SM/SC) soils sampled at the soil test boring locations was used to analyze the pavement sections. EAS recommends that CBR testing is performed as part of a formal pavement design for flexible pavements to confirm that adequate bearing of the planned pavement subgrade soils is available. Recommended pavement sections are provided in Section 5.6 of this report.

2. SCOPE OF SERVICES

The purposes of our involvement on this project were as follows: 1) provide general descriptions of the subsurface conditions encountered at the project site, 2) provide shallow foundation and pavement design recommendations, and 3) comment on geotechnical aspects of the proposed construction. In order to accomplish the above objectives, we undertook the following scope of services:

1. Visited the site to observe existing surface conditions and to field locate the soil test boring locations.
2. Coordinated utility clearance with applicable utility services.
3. Reviewed readily available geologic and subsurface information relative to the project site.
4. Executed a subsurface exploration consisting of five soil test borings with split-spoon testing (SPT): two borings within the proposed building footprint besides the existing community center (B-1 and B-2); three borings within the proposed parking and drive

areas (B-3, B-4 and B-5). The borings were drilled to the boring termination depths ranging from approximately 10 to 20 feet below existing site grades.

5. Evaluated the findings of the soil test borings relative to general subsurface characterization, foundation and pavement support, and other geotechnical aspects of the project.
6. Prepared this written report summarizing our services for the project, and providing descriptions of the subsurface conditions encountered, foundation and pavement design recommendations, as well as geotechnical considerations for construction. Copies of the boring logs are provided in Appendix A.

3. SITE AND PROJECT DESCRIPTION

We understand that LS3P has been selected to design the Staunton Bridge Community Center Addition for Greenville County Rec. The addition will occur within the 9.87-Acre parcel at 165 Staunton Bridge Road in Greenville, South Carolina. Provided project information included an A-001 Architectural Site Plan, C3 - Exiting Conditions and Demolition Plan, and a C9 – Utility Plan. EAS also conducted a survey of the property. The proposed construction will consist of a new building and paved parking and drive areas. Access to the new addition will be via the existing entrance off of Staunton Bridge Road.

At the time of our subsurface investigation (drilling activities), the planned development area was undeveloped land that was predominantly covered with grass. Aerial and buried utilities (marked by others) were observed within the right-of-way of Staunton Bridge Road and within the site. The topography of the planned development area is relatively flat beside the existing building, but slopes up around the existing development and then downwards towards the south-southeast. There are approximately 20 feet of elevation change within the planned development area.

Structural loads were not provided to us; however, based upon our past experience, we have assumed that the building will likely require shallow foundations with column and continuous wall footings that have loads comparable to similar facilities. Typically, heavy duty pavement will be used within the planned drive areas with standard duty pavement utilized within the parking areas. Our assumptions for traffic loading are outlined/discussed in the *Assumed Traffic for Pavement Design* section of this report. Based on review of the provided A-001 Architectural Site Plan, C3 - Exiting Conditions and Demolition Plan, and a C9 – Utility Plan, we anticipate that minimal grading will be required to slightly raise/level existing site grades to achieve finish subgrade elevations for the planned building addition besides the existing community center. We anticipate significant cut grading (up to approximately 12 feet) will be required to achieve finish subgrade elevations for the planned entrance drive and parking area for the new development. Required structural fill will be derived from on-site cut grading activities.

The information presented in this section was used in our evaluation for the planned development. Estimated loads and corresponding foundation sizes have a direct effect on the recommendations, including the type of foundation, the allowable bearing pressure, and settlement due to foundation loads. In addition, estimated finish subgrade elevations and assumed cut/fill grading quantities can have a direct effect on the provided recommendations. If any of the noted/assumed information is incorrect or has changed, please inform EAS so that we may amend the recommendations presented in this report, if necessary.

4. SUBSURFACE EXPLORATION

Five (5) soil test borings with split-spoon testing (SPT) were drilled for this project to the boring termination depths of approximately 10 to 20 feet below existing site grades. The borings were located in the field based on the provided site plan by an EAS representative by making tape measurements from known site features. Given the method of determination, the boring locations should only be considered approximate. The approximate test boring locations are indicated on the Boring Location Plan (Figure No. 2) enclosed in the Appendix to this report.

The soil test borings were advanced using hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split barrel sampler in general compliance with ASTM Standards. The number of blows required to drive the split barrel sampler three consecutive 6-inch increments was recorded, and the blows of the last two 6-inch increments were added to obtain the Standard Penetration Test (SPT) N-values representing the penetration resistance of the soil. Standard Penetration Tests were performed at frequent intervals to evaluate the consistency and general engineering properties of the subsurface soils.

Representative portions of the soil samples obtained from each SPT interval were sealed in containers, labeled, and transported to our laboratory for final classification by our geotechnical staff. The soil samples were visually classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM Method D 2488). Copies of the Boring Logs are enclosed in Appendix A.

4.1. REGIONAL GEOLOGY

The project site is located within the Piedmont region of South Carolina. This physiographic region is located at the base of the Blue Ridge Mountains; the term *piedmont* literally means "foot of the mountain." The topography of the region primarily consists of low, rolling hills and flat areas. Many monadnocks, lone mountains that rise above the surrounding relatively flat and/or low areas due to their more resistant rock composition, dot the region. Some of South Carolina's monadnocks include Little Mountain, Table Rock, Caesar's Head, Glassy Mountain, and Paris Mountain.

According to maps of the United States Geologic Survey (USGS), the site lies on strata dating back to the Cambrian or Neoproterozoic geologic ages. The planned development area is underlain by biotite-plagioclase-quartz gneiss and biotite-muscovite schist. This formation is variably interlayered and contains subordinate layers of amphibolite and sillimanite-mica schist.

The boundary between soil and rock is not clearly defined. The transitional zone, termed as "weathered rock", is normally found overlying the parent bedrock. Weathering is facilitated by fractures, joints, and by the presence of less resistant rock types. Also, the rock structure governs groundwater movement and may affect rock weathering more than mineral dissolution kinetics. In some areas, weathering has resulted in a structureless soil termed residuum or "residual soil". In general, a gradual downward lithological and textural change from residuum to weathered rock and from weathered rock to bedrock exists.

The depth of the soil profile is continually altered over geologic time by gradual weathering at the soil/rock interface, and more rapidly by erosion of surficial soils. As discussed above, weathering is facilitated by fractures, joints, and by the presence of less resistant rock types and weathering of the parent rock is generally more rapid near fracture zones. Consequently, the profile of the weathered rock and hard rock may be highly irregular and erratic, even over short horizontal distances. Lenses and boulders of hard rock and zones of weathered rock are often encountered within the soil mantle, well above the general bedrock level.

4.2. Subsurface Conditions

This section of the report provides a general discussion of the subsurface conditions encountered within areas of proposed construction at the project site. The subsurface conditions discussed in the following paragraphs and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the boring logs. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

The soil test borings were performed within grassed areas across the planned development area. The soil test borings generally encountered residual soils to the boring termination depths of approximately 10 to 20 feet below existing site grades. The materials encountered in our soil test borings are generally discussed in the following paragraphs. The following discussion of the subsurface conditions has been simplified for ease of report interpretation. More detailed descriptions of the subsurface conditions at the individual boring locations are presented on the Boring Logs in Appendix A.

4.2.1. Surficial/Organic Laden Soils (Topsoil)

Surficial soils typically contain root mat and/or other fibrous organic matter and are generally unsuitable for engineering purposes. Surficial soils containing significant root and organic content were observed to depths ranging from approximately 1 to 5 inches (average of approximately 3 inches) at the soil test boring locations. Actual surficial soil depths may vary in unexplored areas of the site. For stripping estimates, we do not anticipate that the surficial soil depths will vary greatly from those encountered at the soil test boring locations.

4.2.2. Residual Soils

Residual soils are formed by the weathering of the bedrock immediately beneath it. A residual soil is formed 'in place'. It is made up of rock particles weathered from the bedrock below and it is therefore chemically similar to that bedrock.

All of the soil test borings encountered residual soils below the surficial soil layer or to the boring termination depths of approximately 10 to 20 feet below existing site grades. The sampled residual soils generally consisted of sandy CLAY (CL) and silty SAND (SM) soils. Standard Penetration Resistance (SPT) N-values of the sampled residual soils ranged from 3 to 65 blows per foot (bpf) with an average of approximately 17 bpf, which indicated very loose/soft to very dense/hard conditions of the residual soils encountered at the soil test boring locations.

4.2.1. Weathered Rock

Weathered rock is formed by the in-place weathering of the parent rock and is generally encountered above the upper surface of bedrock. For engineering purposes Weathered Rock is defined as soil with N-values greater than 100 bpf. Weathered rock was encountered at 2 of the 5 soil test boring locations (B-1 and B-2) within the planned development area. At soil test boring location B-1, the weathered rock was encountered at approximately 6 feet below existing site grades and extended to where residual soils were encountered at 13.5 feet. At soil test boring location B-2, the weathered rock was encountered at 13.5 feet and extended to the boring termination depth of 13.8 feet below existing site grades. The encountered weathered rock was sampled as very dense silty fine to coarse SAND (SM).

Based on the absence of auger refusal within the soil test borings and planned grading, we do not anticipate difficult excavation will be encountered within confined excavations for foundations and utility installations for the planned development. However, the elevation of denser weathered rock and rock could vary significantly between the widely spaced borings drilled for this site. We recommend the grading contractor provide a rock ripping and blasting unit price in their bid.

4.2.2. Ground Water

Ground water was encountered at 4 of the 5 soil test boring locations (B-1, B-2, B-3 and B-4) at depths ranging from approximately 9 to 19.5 feet below existing site grades during drilling activities. All of the boreholes in which ground water was encountered were dry at the cave-in

depths ranging from approximately 7 to 15 feet below existing site grades prior to backfilling upon completion of drilling. Based on these observations, **shallow ground water (perched ground water) could affect the planned deeper cut areas of the site and the site foundation and utility excavations.** Typically, the ground water will be found perched at the soil to weathered rock and/or rock interface. It should be noted that drilling was performed during early winter (mid-January) and encountered ground water levels may be significantly higher if site grading or foundation construction is performed during late winter or spring when seasonal high ground water levels are typically observed, especially within the lower elevation areas of the site.

We note that the elevation of the groundwater table is dependent upon seasonal factors, such as precipitation and temperature. Therefore, the elevation of the groundwater table may be different at other times of the year and from the elevations presented in this report. Generally, the highest groundwater levels occur in late winter and early spring; and the lowest levels in late summer and early fall. **If earthwork, foundation construction, or pavement construction are performed during wet weather months (typically November to April) or soon after periods of significant precipitation, fine-grained (clay and silt) subgrade soils may become saturated (pump) and require undercutting and/or remediation measures to provide a stable subgrade for structural fill, building and pavement loads.** Typical remediation measures include: discing and aerating the soil during dry weather; mixing the soil with drier materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. EAS should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

5. ENGINEERING EVALUATION AND RECOMMENDATIONS

The following evaluations and recommendations contained in this section of the report are based on the results of the soil test borings, site observations, interpretation of the field data obtained during this exploration, and information provided regarding the proposed development. Provided our recommendations are strictly followed throughout the design and construction phases of this project the project site is suitable for the proposed construction.

Soil penetration data have been used to estimate an allowable bearing pressure range and settlement using established correlations. Subsurface conditions in unexplored locations may vary from those encountered. If structure locations, loadings, or elevations are changed, we request that we be advised so that we may re-evaluate our recommendations.

Determination of an appropriate foundation system for a given structure is dependent on the proposed structural loads, soil conditions, and construction constraints such as proximity to other structures. The subsurface exploration aids the geotechnical engineer in determining the soil stratum appropriate for structural support. This determination includes considerations with

regard to both allowable bearing capacity and compressibility of the soil strata. In addition, since the method of construction greatly affects the soils intended for structural support, consideration must be given to the implementation of suitable methods of site preparation, fill compaction, and other aspects of construction.

5.1. Site Preparation Recommendations

Initial site preparation will require the removal of all existing organic laden soils, trees, vegetation, and surface soils containing organic matter or other deleterious materials should be removed from within the proposed development area. If any existing utilities (e.g., water lines or wells, sewer lines or septic tanks, etc.) are encountered within the proposed development area, they should be properly abandoned and/or removed. Any resulting excavations from the removal of trees or utilities should be backfilled with controlled structural fill placed in accordance with the recommendations presented in subsequent sections of this report. Open pipes or conduits, if any, left in-place adjacent to the construction area should be bulkheaded and grouted as they might serve as conduits for subsurface erosion.

Upon completion of initial site preparation activities, all areas to receive engineered fill, foundations and/or pavements should be proofrolled with a loaded tandem axle dump truck, scraper, or other similar heavy construction equipment to confirm the stability of the subgrade soils and detect the presence of any near surface soft or unstable areas. **EAS's geotechnical engineer or his representative should observe the proofrolling operations.** Proofrolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. The proofrolling observation is a good opportunity for the geotechnical engineer to locate inconsistencies intermediate of our boring locations in the existing subgrade. **Based on the results of the soil test borings, we do not anticipate that widespread areas of unstable subgrade will be encountered across the site.** However, very loose, sandy (SC) near surface conditions (upper approximately 1.5 feet) were encountered at soil test boring location B-5 drilled in the planned driveway area that travels around the north side of the planned addition, and similar loose soil conditions could be encountered at other locations across the site. The grading contractor should be prepared to undercut and/or re-work the existing subgrade at and around this location and at other locations with similar loose soils. It should also be noted that significant wet weather and/or substantial construction traffic during site clearing and/or site grading, could negatively impact the subgrade soils within the planned development area, especially if clearing or site grading is performed during seasonally cold or wet weather conditions. If proofrolling reveals unstable conditions, the method of repair should be as directed by EAS's project geotechnical engineer, but will likely consist of undercutting the unsuitable soils and replacement with adequately compacted structural fill. A stabilization geotextile or geogrid and/or select materials may be required in areas that continue to deflect excessively to stabilize subgrades within the building and/or pavement areas, especially if site grading is performed during seasonally cold/wet weather conditions.

The near surface CLAY (CL), silty SAND (SM) and clayey SAND (SC) soils are moisture sensitive and can become unstable during normal construction traffic and activities when wet. During earthwork and construction activities, surface water runoff should be drained away from the construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades. However, if the subgrade should become desiccated, the affected soils should be removed and replaced or the materials should be scarified, moisture conditioned (wetted) and re-compacted prior to placement of additional fill, slabs, or pavements, etc. It is imperative to maintain the specified moisture levels in the silty soils prior to placement. **Earthwork construction during seasonally wet times of the year (typically November to April) may result in unstable subgrade conditions, difficulties in properly placing and compacting the on-site soils and possible undercutting in excess than would otherwise be expected.** The presence of EAS's geotechnical engineer during site preparation activities will aid in eliminating any unnecessary undercutting of otherwise suitable soils.

5.2. Structural Fill Materials, Compaction and Placement

Based on review of the provided A-001 Architectural Site Plan, C3 - Exiting Conditions and Demolition Plan, and a C9 – Utility Plan, we anticipate that minimal grading will be required to slightly raise/level existing site grades to achieve finish subgrade elevations for the planned building addition besides the existing community center. We anticipate significant cut grading (up to approximately 12 feet) will be required to achieve finish subgrade elevations for the planned entrance drive and parking area for the new development. Required structural fill will be derived from on-site cut grading activities.

The encountered SAND (SM/SC) soils should be suitable for re-use as structural fill**. The encountered silty and/or sandy CLAY (CL) soils are marginally suitable for re-use as structural fill and will require a high degree of quality control during placement.** Prior to using any of the site soils for structural fill, we recommend performing a standard Proctor (ASTM D698) test on samples of soils planned for use. If Proctor test results yield maximum dry densities below 90 pounds per cubic foot (pcf), then the soils shall be classified as unsuitable for use as structural fill. The grading contractor should be prepared to moisture condition (wet or dry) structural fill soils prior to placement. It is important to note that if water is needed to moisture condition (wet) the site clayey soils, it will typically take 12 to 24 hours for the clays to hydrate the added water and be workable with uniform moisture content for compaction. We recommend using fill soils similar to the encountered SAND (SM/SC) soils. We recommend that our geotechnical engineer or his representative help identify the best-suited engineering fill soils. Any imported fill soils should be approved by EAS's project geotechnical engineer. Generally, structural fill should consist of non-expansive soils having a maximum dry density of 95 pcf, and be free of organic and other deleterious materials.

5.2.1. Compaction Requirements for Structural Fill

Structural fill should be adequately keyed into existing subgrade soils that have been stripped and scarified, exposing acceptable subgrade soils. All structural earth fill should be placed in loose lifts not exceeding 8 inches and be compacted to at least 95 percent of the standard Proctor maximum dry density as determined by ASTM D698. The top 18 inches of fill below the building slabs and pavements in load bearing areas should be compacted to 100 percent of the standard Proctor value. EAS recommends that all structural fill material be compacted at a moisture content ±3 percent of the soil's optimum moisture content (as determined by ASTM Test Method D698). Any **clay fills and scarified clay subgrades which receive fill should be compacted at a moisture content of at least 2 percent over the soil's optimum moisture content** (as determined by ASTM Test Method D-698). It is imperative to maintain the specified moisture levels in the CLAY (CL) soils prior to placement. As previously mentioned, it is important to note that if water is needed to moisture condition (wet) the clay it typically takes 12 to 24 hours for the clay to hydrate the added water and be workable with uniform moisture content for compaction. Placing and compacting the clayey soils at moisture contents above the optimum moisture content is intended to reduce the potential for post construction heave of the compacted clay material. Aggregate base course (underlying the building floor slab) should be compacted to least 98 percent of the material's maximum dry density as determined by ASTM Test Method D1557. All structural fill should be placed under the **full-time** control and supervision of EAS's geotechnical engineer or engineering technician working under the direction of our geotechnical engineer. The placement and compaction of all fill material should be tested frequently in order to confirm that the recommended degree of compaction is obtained.

Recommended compaction criteria:

Location or Area	Standard Proctor Density, % ASTM D698 AASHTO T 99	Modified Proctor Density, % ASTM D1557 AASHTO T 180	Minimum Testing Frequency 1 lift per
Structures and Walkways	95	92	15,000 sf with max spacing of 150 feet
Retaining Walls	95	92	1,000 sf with max spacing of 100 feet
Trenches	95	92	100 lf on both sides of pipe and a min of one per reach of trench
Storm Drainage Manholes, Catch Basins and Storm Inlets	95	92	Structure (each successive test shall be 90 deg from previous)
Lawn or Unimproved Areas	92	90	20,000 sf with max spacing of 200 feet
Building and Pavement Subgrades (Top 18 inches)	100	95	10,000 sf with max spacing of 100 feet
Building and Pavement Subgrades (Below Top 18 inches)	95	92	15,000 sf with max spacing of 150 feet
Out-Parcels (Below Top 18 inches)	95	92	20,000 sf with max spacing of 200 feet

5.2.2. Structural Fill Placement

EAS recommends that earthwork operations be performed during the seasonally drier months (typically May to October) when weather conditions are more conducive to soil moisture conditioning (drying/wetting) and achieving proper compaction of structural fill. It should also be noted that any excavated soils that are intended to be used as structural fill may be wet of optimum conditions, which will also require adequate drying time prior to use as structural fill. **If earthwork is performed during the seasonally wet months, it may be more difficult to properly compact structural fill and additional subgrade undercutting and repair will likely be required**.

We recommend that the contractor have equipment on site during earthwork for both drying and wetting of fill soils. Moisture control may be difficult during winter months or extended periods of rain. As previously discussed, EAS recommends that earthwork operations be performed during the seasonally drier months (typically May to October) when weather

conditions are more conducive to soil moisture conditioning (e.g. drying) and achieving proper compaction of structural fill. During fill operations, positive surface drainage should be maintained to prevent the accumulation of water. Attempts to work the soils when wet can be expected to result in deterioration of otherwise suitable soil conditions or of previously placed and properly compacted fill. Where construction traffic or weather has disturbed the subgrade, the upper 8 inches of soils intended for structural support should be scarified, moisture conditioned and re-compacted.

5.3. Cut and Fill Slopes

As previously discussed, we understand cut and fill grading will be required in order to achieve finish subgrade elevations for the planned development which will likely result in structural cut/fill slopes as part of the final grading plan. Based on the provided civil site plans, an approximately 14-foot tall cut slope is planned to the north of the planned driveway. A formal slope stability analysis of the anticipated cut and/or structural fill slopes resulting from anticipated cut/fill grading in order to achieve finish subgrade elevations for the planned development was beyond the scope of this subsurface exploration and geotechnical analysis. Typically, permanent project earthen structural fill and cut slopes should be designed at a maximum of 2.5 horizontal to 1 vertical (2.5H: 1V) or flatter and maximum 2 horizontal to 1 vertical (2H: 1V) or flatter, respectively, to promote long and short term stability. Permanent slopes of 3H: 1V or flatter are usually desired for mowing. **We recommend performing laboratory testing to determine the soil's wet density (γ_{wet}), the soil's dry density (γ_{dry}) and the soil's internal angle of friction (Φ) in order to properly design/optimize the anticipated cut and structural fill slopes.**

In general, geotechnical evaluation methods widely employed to anticipate the stability of soil cut and fill slopes under various geometries involve estimating the sliding, overturning and resisting forces of the soils involved. The critical soil properties involved in the analysis are the soil's internal angle of friction (Φ), the soil's wet density (γ_{wet}), and the soil's dry density (γ_{dry}). Other factors such as the pore water pressure and the soil's cohesion play some role in the evaluation. Sampled soils were generally described as sandy CLAY (CL) and silty SAND (SM) soils. Standard Penetration Resistance (SPT) N-values of the sampled residual soils ranged from 3 to 65 blows per foot (bpf) with an average of approximately 17 bpf, which indicated very loose/soft to very dense/hard conditions of the residual soils encountered at the soil test boring locations.

The site preparation recommendations of this report should be strictly followed prior to beginning construction of any site slopes. The grading contractor should remove organic laden soils and undercut and/or re-work any soft subgrade soils within the footprint of the anticipated structural fill slopes. EAS recommends a **maximum slope of 2.5H: 1V for structural fill slopes and a maximum slope of 2H: 1V for cut slopes consisting of soils similar to the medium dense SAND (SM)** encountered at the soil test borings. **Fill slopes less than 5 feet in height should be stable provided**

the structural fill soils used are properly moisture conditioned, placed with a relatively high degree of compaction (minimum 95% of standard Proctor) and full time observation and monitoring of EAS's Geotechnical engineer and/or technician during construction. All fill slopes should be constructed by overbuilding and cutting back to obtain adequate compaction along the slope face. The tops and bases of all slopes should be located a minimum of 10 feet from structural limits. **Fill slopes placed over existing slopes should be adequately benched/keyed into the existing slopes so that engineering fill is not placed and/or compacted on a sloping subgrade.** All fill slopes should be adequately compacted, as outlined in the structural fill placement and compaction section of this report, and all slopes should be seeded and maintained as soon as possible after construction. All fill slope construction should be performed under the **full-time** control and supervision of EAS's geotechnical engineer or engineering technician working under the direction of our geotechnical engineer.

Due to the erodible characteristics of the on-site soils, all slopes should be protected by silt fencing during construction, stabilized and hydro-seeded or similarly seeded for permanent protection. We note that surficial sloughing of the slope face soils is most likely to occur until the face of the slopes are completely stabilized with vegetation. During construction and as part of the final design, we recommend that drainage and/or run off from nearby structures be directed away from the crest and toe of both cut and fill slopes. We note that diversion of surface water away from the slope crest and face is critical to reducing the potential of surface erosion and shallow failures. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

Seepage and surface runoff may cause parts of the slopes to slough and erode resulting in shallow surface failures. The soil slopes should be vegetated as soon as possible to prevent surface sloughing and erosion. If sloughing or erosion occurs, the use of a vegetation mat or geotextile and large stone may be required to stabilize the slopes. A swale or shallow ditch should be constructed near the top of slopes to prevent surface water from flowing onto the slopes. We recommend that all cut and fill slopes be observed by a geotechnical engineer or his representative during construction. Additional slope drainage and protection measures may be required in certain areas depending upon conditions observed at the time of slope construction.

5.4. Foundations

Based on the results of the soil test borings, the proposed Staunton Bridge Community Center Addition can be supported on conventional shallow spread foundations bearing on approved medium dense/stiff or better residual soils encountered at the soil test borings or properly compacted structural fill placed in accordance with structural fill recommendations in this report. Spread foundations constructed in accordance with the recommendations presented in this report can be proportioned for a **net allowable soil bearing pressure of 2,500 psf**. All exterior foundations should bear at least 12 inches below the adjacent finished grade for bearing capacity and frost protection considerations (actual frost embedment depth should be verified by local building officials). Interior foundations should bear at a nominal depth of at least 1-foot. Wall and column foundations should have minimum widths of 24 and 30 inches, respectively. *The project structural engineer should determine final foundation sizes and minimum foundation excavation depths based on the actual design loads; building code requirements and other structural considerations.*

We recommend that EAS's geotechnical engineer or his representative evaluate the foundation excavations and bearing grades prior to installation of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. The foundation bearing soils are anticipated to be either approved existing site soils or properly compacted structural fill suitable to support the recommended bearing pressure. Although not anticipated, soft zones of soils could be encountered during construction below the foundation bearing level that may require selective undercutting to repair these areas. The actual need for, and extent of, undercutting should be based on field observations and testing performed by the geotechnical engineer at the time of construction. The field-testing will likely consist of performing shallow hand auger borings and Dynamic Cone Penetrometer (DCP) testing of the bearing grade soils in selected areas. If soft, loose or otherwise unsuitable soils are encountered at the footing bearing level, undercutting and repair of footing subgrades will likely be recommended.

Exposure to the environment may weaken the soils at the foundation bearing level if excavations remain open for long periods of time. The foundation-bearing surface should be level or suitably benched and free of loose soil, ponded water and debris. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation immediately prior to placement of concrete. Foundation excavations must be maintained in a drained/de-watered condition throughout the foundation construction process. If the foundation excavations must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, we recommend that a 2 to 4-inch thick "mud mat" of lean concrete (1,500 psi) be placed on the exposed subgrade or additional undercutting/mucking of soft, saturated subgrade soils may be required prior to placement of the reinforcing steel and/or

foundation concrete. In addition, EAS stresses the need for positive perimeter surface drainage around the building area to direct all runoff water away from the building and foundations.

5.5. Floor Slabs

Ground floor slabs may be designed as a free-floating slab-on-grade supported by approved existing site soils or properly compacted structural fill soils placed in accordance with structural fill recommendations within this report. **A modulus of subgrade reaction (k) of 120 pounds per cubic inch (pci) can be used for slab design for slabs placed on approved medium dense/stiff or better residual soils or structural fill compacted to at least 98% of the soil's maximum dry density as determined by ASTM test method D698 within the upper 18 inches of finish subgrade elevation.** Slab-on-grade support is contingent upon completion of site preparation activities and properly placed structural fill as described in Sections 5.1 *Site Preparation Recommendations* and 5.2 *Structural Fill Materials, Compaction and Placement* of this report. Although not anticipated, some subgrade undercutting and/or in-place stabilization may be necessary in soil-supported slab areas underlain by low-consistency soils. If the subgrade should become desiccated, the affected soils should be removed and replaced or the materials should be scarified, moisture conditioned (wetted) and re-compacted prior to placement of additional fill, aggregate base course, layer or building slab concrete. The floor slab should be supported on at least 4 inches of ABC stone (aggregate base course) compacted to 98 percent of the material's modified Proctor maximum dry density value to provide a uniform well-compacted material immediately beneath the slab.

A minimum 10-mil thick vapor barrier should be used beneath ground floor slabs that will be covered by tile, wood, carpet, impermeable floor coatings, and/or if other moisture-sensitive equipment or materials will be in contact with the floor. However, the use of vapor retarders may result in excessive curling of floor slabs during curing. We refer the floor slab designer to ACI 302.1R-96, Sections 4.1.5 and 11.11, for further discussion on vapor retarders, curling, and the means to minimize concrete shrinkage and curling.

After finishing operations have been completed, immediately after free water has evaporated, and before jointing begins, the surface of the slab and any exposed edges should be uniformly coated with a high-solids curing compound meeting ASTM C309 or C1315 (Type II) requirements. The application rate should be at least that recommended by the manufacturer. A second application at 90 degrees offset is recommended on windy days or whenever a single application results in coverage that is not uniform. Other acceptable curing methods and materials can be used and are described in more detail in ACI 308R-01, Section 2.4.2.3.

Proper jointing of the ground floor slab is of key importance to minimize cracking. Contraction joints pre-determine the location of cracks caused by restrained shrinkage of the concrete and by the effects of loads and warping or curling. The purpose of contraction joints is to create planes of weakness that subsequently produce, and control the location of, cracks as the

concrete shrinks. ACI suggests that unreinforced, plain concrete slabs may be jointed at spacings of 24 to 36 times the slab thickness, up to a maximum of 18 feet for standard concrete mixtures. Saw-cutting of contraction joints should begin as soon as the concrete has hardened sufficiently to avoid raveling of the coarse aggregate. The early-entry dry-cut process should be used so that joints can be placed before development of tensile stresses that are great enough to initiate cracking, thus increasing the probability of cracks forming at the joint. The time of cut is immediately after initial set of the concrete in that joint location, which will typically vary from 1 hour after finishing in hot weather, to 4 hours after finishing in cold weather. The sawing of any joint should be discontinued or omitted if a crack occurs at or near the joint location before or during sawing. For additional jointing guidance, refer to "Concrete Intersections – A Guide for Design and Construction" (American Concrete Pavement Association 2007).

Floor slab construction should incorporate isolation joints around any fixed objects including columns, utility penetrations and along bearing walls, to allow for minor differential movement of the slab without damage to the floor. Utility or other construction excavations in the prepared floor slab subgrade should be backfilled in accordance with previously referenced structural fill criteria to aid in providing uniform floor support. Controlled low-strength material (CLSM), a mixture of granular and cementitious materials and water, is often recommended for use instead of backfill.

5.6. Site Seismic Classification

The following recommendations are based on Section 1613.3.1 of the 2012 International Building Code (IBC). Our scope of services did not include a seismic conditions survey to determine site-specific shear wave velocity information. IBC 2012 provides a methodology for interpretation of Standard Penetration Test resistance values (N-values) to determine a Site Class Definition. However, this method requires an averaging of N values over the top 100 feet of the subsurface profile. We note that the soil test borings for this project were assigned to depths of approximately 10 to 20 feet below existing site grades in order to characterize soils within the zone of influence for anticipated new foundation and pavement loads.

Based upon the subsurface conditions described herein, and in accordance with appropriate sections of the 2012 IBC, the subject site currently meets the conditions for a **Site Classification D**. The D classification is assigned for sites with a very dense soil and soft rock profile where the 15 blows per foot (bpf) $\leq$ the average N-value $\leq$ 50 bpf within the upper 100 feet.

Based on a site class D determination, the geographical site location, and the mapped Maximum Considered Earthquake (MCE) ground motion for 0.2 and 1.0-second spectral response acceleration, we have estimated the following design spectral response coefficients:

Period (sec)	Mapped MCE Spectral Response Acceleration (g)		Site Coefficients		Adjusted MCE Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_S	0.281	F_a	1.575	S_{MS}	0.443	S_{DS}	0.295
1.0	S_1	0.107	F_v	2.373	S_{M1}	0.253	S_{D1}	0.169

The Seismic Design Category for a structure is based on the structure's seismic use group and the design spectral response acceleration, S_{DS} and S_{D1}, determined in accordance with Section 1613.3.5 and the most severe seismic design category in accordance with Table 1613.3.5(1) or 1613.5.6(2). Based on the above design spectral response accelerations and the structure's seismic use group (assumed as Use Group II), the site is assigned a Seismic Design Category B for S_{DS} and a Seismic Design Category C for S_{D1}. Utilizing the most severe of these design categories, the site is assigned a **Seismic Design Category C** in general accordance with the procedures outlined in Chapter 16 of the 2012 IBC. *The project architect and/or structural engineer should verify the above information taking into account the appropriate Seismic Use Group and other code specific requirement.*

5.7. Pavement Recommendations

5.7.1. Assumed Traffic for Pavement Design

For the purpose of evaluating the proposed flexible (asphalt) pavement section, EAS utilized the AASHTO design method's Equivalent Single Axle Load (ESAL) method for determining a loading profile. To accomplish this, EAS assumed traffic volumes similar to those used in similar facilities. This includes daily traffic counts of approximately 300 passenger vehicles and light trucks, and 3 light dual-wheel trucks and/or heavy tractor-trailers or other similar heavy truck traffic (1% truck traffic) over a 20-year design life with a 2% annual growth factor. Should this traffic profile not fit the intended site utilization, please inform EAS so that we may revise our pavement recommendations.

For the purpose of evaluating the proposed rigid (concrete) pavement section, EAS utilized the PCA design methodology employed by the ACI 330R design procedure. When using the ACI design procedure, the expected vehicle types to use the facility are categorized from A to D. The assumed traffic type (light vehicles such as cars, SUV's, and light trucks) for the standard duty pavement correspond to a traffic category of A, while the heavy vehicles using the heavy duty section correspond to traffic Category C. Category C uses a minimum 100 applications per day, while only 20 per day are expected (to correlate with the equivalent number of ESALs over a 20-year design life). In order to design for the specific truck volumes, EAS used the actual software

(Streetpave) used to develop the ACI 330 design tables. This software is capable of using the actual ADTT with axle load distribution for type of vehicles in each design category.

5.7.2. Pavement Subgrade Conditions and Preparation

All pavement areas should be proofrolled and inspected as recommended within this report to confirm the stability of the subgrade soils and detect the presence of any near surface soft or unstable areas. **Based on the results of the soil test borings, very loose, sandy (SC) near surface conditions (upper approximately 1.5 feet) were encountered at soil test boring location B-5 drilled in the planned driveway area that travels around the north side of the planned addition. The grading contractor should be prepared to undercut and/or re-work the existing subgrade at and around this location and at other locations with similar loose soils.** EAS's geotechnical engineer or his representative should observe the proofrolling operations. If proofrolling reveals unstable conditions, the method of repair should be as directed by EAS's project geotechnical engineer, but will likely consist of undercutting the unsuitable soils and replacement with adequately compacted structural fill. If this phase of the project is performed during seasonally cold/wet weather, a stabilization geotextile (Mirafi 500x) or geogrid (Tensar TX140) and/or select materials may be required in areas that continue to deflect excessively to stabilize subgrades within pavement areas, especially where minimal structural fill is required to achieve finish subgrade elevations.

Structural fill for flexible and/or rigid pavements placed within pavement and drive areas should be compacted to a minimum of 98 percent of the material's standard Proctor maximum dry density as determined by ASTM Test Method D698 within the upper eighteen inches below planned finish subgrade elevations. The aggregate base course (ABC) beneath flexible or rigid pavements should be compacted to least 98 percent of the material's modified Proctor maximum dry density as determined by ASTM D1557. Density testing should be performed at a sufficient frequency to verify that the fill has been compacted in accordance with the guidelines of this report or project specification requirements. If this phase of the project is being performed during seasonally cold/wet weather, a stabilization geosynthetic and an approximate 6-inch thick layer of ABC may be required to protect the subgrade and allow for construction equipment. This stone may be considered part of the recommended pavement section if it is maintained in a structurally sound, clean condition.

5.7.3. Recommended Pavement Sections

An assumed California Bearing Ratio (CBR) value of 5.0 for approved site soils or properly compacted structural fill similar to the encountered SAND (SM/SC) soils sampled at the soil test boring locations was used to analyze the pavement sections. EAS recommends that CBR testing is performed as part of a formal pavement design for flexible pavements to confirm that adequate bearing of the planned pavement subgrade soils is available.

Based on the anticipated subgrade soil conditions upon completion site preparation activities and proper placement of structural fill, the recommended minimum values found in the tables below for flexible (asphalt) and rigid (concrete) pavements may be used.

EAS Recommended Minimum Flexible (Asphalt) Pavement Sections [1, 2]

Traffic Area	Material Thickness			Total Pavement Section (inches)
	Aggregate Base Course (ABC) (inches)	Asphalt Course Binder (inches)	Asphalt Course Surface (inches)	
Standard Duty	6	1.5	1.5	**9**
Heavy Duty	8	1.5	1.5	**11**

(1) Recommendation based on EAS's engineers and/or technician being retained to provide the recommended laboratory testing and observation and testing during construction.

(2) This design is based on an assumed CBR value of 5.0 for soils similar to the encountered near surface SAND (SM/SC) soils. A laboratory CBR test may be performed prior to construction (note: test requires 5 to 7 days to perform) that may reduce recommended pavement sections. EAS should be retained to perform an alternate pavement design if more suitable structural fill soils are used.

EAS Recommended Minimum Rigid (Concrete) Pavement Sections [3, 4, 5, 6]

Traffic Area	Material Thickness		Total Pavement Section (inches)
	Aggregate Base Course (ABC) (inches)	Portland Cement Concrete (inches)	
Standard Duty	0	5	**5**
Heavy Duty	0	6	**6**

(3) Recommendation based on EAS's engineers and/or technician being retained to provide the recommended laboratory testing and observation and testing during construction.

(4) This design is based on an assumed CBR value of 5.0 for soils similar to the encountered near surface SAND (SM/SC) soils. A laboratory CBR test may be performed prior to construction (note: test requires 5 to 7 days to perform) that may reduce recommended pavement sections. EAS should be retained to perform an alternate pavement design if more suitable structural fill soils are used.

(5) Recommendation based on EAS's engineers be retained to prepare a comprehensive concrete jointing plan and EAS's engineer and/or engineering technician observation and testing during construction.

(6) Recommendation based on 4,000-psi (570 psi flexural strength) air-entrained Portland cement concrete with micro-fiber overlying a properly prepared/approved soil subgrade. All non-curbed and/or confined outside pavement edges must be thickened 2 inches to increase edge support. The store entrance apron area, dumpster pad and dumpster approach area should be a minimum 7 inches thick. Jointed concrete panels that have a length to width ratio greater than 1.25 shall include crack control reinforcement consisting of #4 rebar placed 24 inches on-center both directions at approximately 2 inches below the finished concrete surface. The crack control reinforcement should not overlap into adjacent concrete panels.

Although ACI 330 allows concrete pavement sections without a stone base, placement of 4 to 6 inches of compacted aggregate base may be required in order to confine/stabilize moisture sensitive subgrade soils. We recommend that a detailed concrete jointing plan, construction details and specifications be prepared for any/all planned concrete pavements. The jointing of

the concrete pavement should incorporate design guidelines in general accordance with ACI 330R. If EAS's engineers are not retained to prepare the comprehensive concrete jointing plan and specifications, then we recommend that we are at least retained to **review the final jointing plan prior to construction.** EAS recommends that rigid concrete pavement be used in loading dock areas, dumpster and dumpster approach areas or any other area subjected to concentrated truck loading.

5.7.4. General Asphalt and Concrete Pavement Guidelines

In general, long-term pavement performance requires good drainage, performance of periodic maintenance activities, and particular attention to subgrade preparation. Proper drainage may be aided by grading the site such that surface water is directed away from pavements and by construction of swales adjacent to the pavements. All pavements should be graded such that surface water is directed towards the outer limits of the paved area or to catch basins located such that surface water does not remain on the pavement. A minimum pavement grade of 2 percent is recommended. **All pavements shall have a minimum 5 feet wide stable subgrade shoulder (properly compacted structural fill) adjacent to any site slopes (including detention ponds, ditches or swales).**

Flexible asphalt pavements and bases should be constructed in accordance with the guidelines of the latest applicable South Carolina Department of Transportation Specifications. Materials, weather limitations, placement and compaction are specified under appropriate sections of these publications. While the flexible pavement sections are designed utilizing a life of 20 years, routine maintenance, including seal-coating and re-surfacing, will be required due to normal wear and tear of the asphalt surface if a 20-year pavement life is desired.

Rigid concrete pavement construction should be in accordance with applicable American Concrete Institute (ACI) guidelines, in particular the latest version of ACI 330.1 in print at time of construction. The jointing of the concrete pavement should incorporate design guidelines in general accordance with ACI 330R-08. Recent pavement studies by the American Concrete Pavement Association (ACPA) have indicated that jointed plain concrete pavements perform at least as well as, and usually somewhat better than, jointed reinforced concrete pavements. These studies also conclude that transverse joint spacing has a very significant effect on pavement performance. Decreasing the longitudinal joint spacing to more equally spaced transverse and longitudinal joints and square sections has the following beneficial effects:

- Decreases thermal curl stress
- Decreases transverse cracking
- Decreases upward curling of slab at joint
- Decreases joint spalling
- Decreases seasonal and daily joint opening (which increases joint load transfer effectiveness and reduces sealant extension)

5.8. Temporary Excavation Recommendations

Mass excavations and other excavations required for construction of this project must be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions.

6. CONSTRUCTION OBSERVATIONS AND TESTING

We recommend that a review of plans and specifications, with regard to foundations and earthwork, be completed by EAS Professionals, Inc. prior to construction bidding. Our continued involvement on the project will aid in the proper implementation of the recommendations discussed herein.

As previously discussed, the Geotechnical Engineer of record should be retained to monitor and test earthwork activities, and subgrade preparations for foundations, floor slabs and pavements. It should be noted that the actual soil conditions at the various subgrade levels and foundation bearing grades may vary across this site and thus the presence of EAS's Geotechnical Engineer and/or his representative during construction will serve to validate the subsurface conditions and recommendations presented in this report. EAS's representative(s) should be on site on a full time basis during placement, treatment and compaction of all site structural (building and parking lot) fill materials. EAS's observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. Moisture content of the building pad (footings and slab subgrade) should be tested immediately prior to concrete placement.

EAS should observe foundation excavations prior to placement of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. EAS should also observe placement of all foundation, slab and or pavement concrete on a full-time basis.

The following is a list of generally accepted minimum construction inspection requirements. The site construction contractor is responsible to schedule EAS's representative/technical staff for the testing and observation of ALL the following:

1. **Pre-construction meeting** (detail scheduling, review geotechnical data, plans and specifications)

2. **Site work**

   a. Subgrade proofroll with a loaded tandem axle truck; undercut and replace unsuitable material as required by EAS's Geotechnical representative.

   b. Soil sample of proposed structural fill. The types of tests needed per sample are: Standard Proctor (ASTM D698- maximum dry density) or Modified Proctor (ASTM D1557), Atterberg Limits (soil classification) and Moisture Content (in-situ condition). The material must meet the requirements for structural fill as specified in this geotechnical report and will be verified on site by EAS's engineering technician.

   c. Fill Density testing (full-time observation, documentation and testing): Nuclear Density Testing of each lift of compacted fill: 8" maximum compacted lifts, 1 test per 5,000 SF in building, 1 test per 10,000 SF in paved areas, or a minimum of five tests per lift throughout site. Determines percent compaction as compared to maximum dry density determined per soil sample required.

   d. Utility pipe backfill density testing (full-time observation, documentation and testing): Nuclear Density Testing, a minimum of 1 test per structure, or 1 test per 100 lineal feet per 8" lift. Test results should comply with recommendation of Geotechnical Report and will be verified on site by EAS's engineering technician.

3. **Foundation Inspection**

   Required inspections are: Reinforcing Steel Observation (Inspect for clean, dry footing bottom; size and spacing of reinforcing steel; size and depth of footing; clearances from sides and bottom of footing) and Dynamic Cone Penetrometer Testing of Foundation Sub-grade. Test results should comply with recommendation of Geotechnical Report and will be verified on site by EAS's engineering technician.

4. **Concrete Testing**

   Compressive Strength Testing of Concrete (full-time observation, documentation and testing): Number and frequency of tests are as follows: 1 Set of 4 Concrete Cylinders per 50 Placed Yards, Compression testing at (1) at 7 Days, (2) at 28 Days of Curing, and (1) Hold. A minimum of 3 Sets per Project (footings, slab, dumpster pad). Test results will be verified by testing lab/EAS and provided to LS3P.

5. **Structural Steel Inspection**

   Observe all welds and bolted connections for compliance with AISC, AWS and/or metal building project specifications. Welding tolerances are determined by requiring all welds and bolted connection to adhere to AISC (American National Standards Institute/American Institute of Steel Construction) and AWS (American Welding Society) Standards. Test results should comply with recommendation of onsite structural engineering representative.

6. **Floor Flatness Testing**

   Testing for floor flatness and floor level should reflect the following values: FF – 35, FL – 30. Floor flatness can be no lower than 30, Floor Levelness no lower than 25 for any test set grouping.

7. **Asphalt Pavement Testing**

   a. Base course density testing and thickness measurements.

   b. Full-time observation, documentation and testing during placement. Coring of Asphalt Parking Lot for thickness testing. A minimum of three cores will be required spaced evenly throughout parking area. Cores are measured for compliance with project paving profiles recommended in Geotechnical Report and bulk specific gravity tests conducted for density (minimum of 93% compaction based on design unit weight).

8. **Concrete Pavement Testing**

   a. Base course density testing and thickness measurements.

   b. Compressive Strength Testing of Concrete (full-time observation, documentation and testing): Number and frequency of tests are as follows: 1 Set of 4 Concrete Cylinders per 50 Placed Yards, Compression testing at (1) at 7 Days, (2) at 28 Days of Curing, and (1) Hold. Minimum 3 Sets Per Project (footings, slab, and dumpster pad). Test results will be verified by testing lab/EAS and provided to LS3P.

   c. A detailed concrete jointing plan shall be prepared for any/all planned concrete pavements. The Jointing of the concrete pavement should incorporate design guidelines in general accordance with ACI 330R. If EAS's engineers are not retained to prepare the concrete jointing plan, then we recommend that EAS is retained to review the final plan prior to construction.

7. LIMITATIONS

This report has been prepared for the exclusive use of LS3P for specific application to the referenced property in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our conclusions and

recommendations are based on design information furnished to us; the data obtained from the previously described subsurface exploration program, and generally accepted geotechnical engineering practice. The conclusions and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon on-site observations of the conditions.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, pavement, and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the design or location of the proposed structure, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. Prior to final design, EAS should be afforded the opportunity to review the site grading and layout plans to determine if additional or modified recommendations are necessary. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

FIGURES

Site Vicinity Map
Boring Location Map

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Construction Materials Testing | Laboratory Testing Land Surveying | Special Inspections

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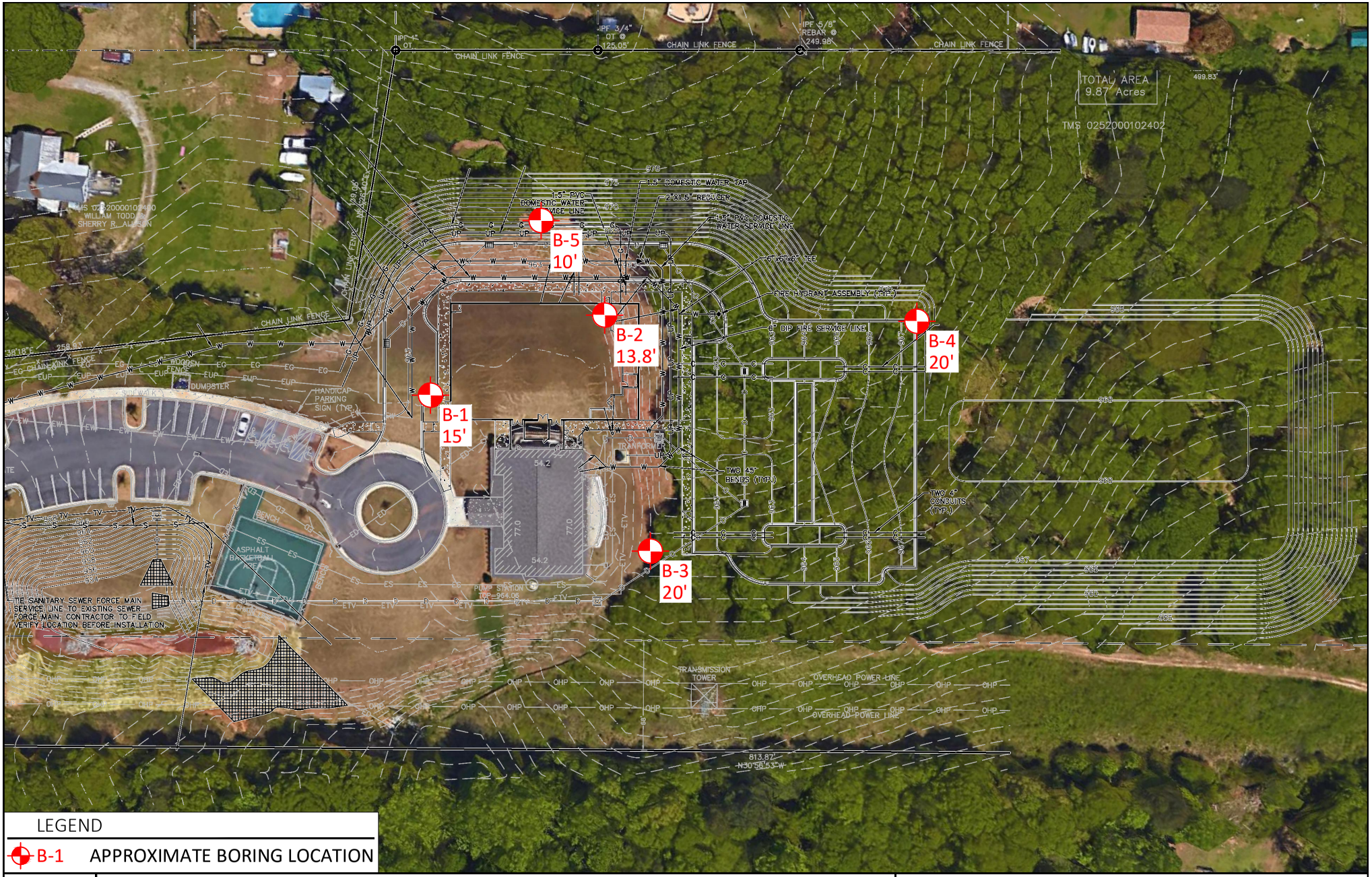
SITE VICINITY MAP

STAUNTON BRIDGE COMMUNITY CENTER ADDITION
GREENVILLE, SOUTH CAROLINA

EAS PROJ NO.	DATE	SCALE	FIGURE NO.
EAS-16303	FEB. 2016	NOT TO SCALE	1



LEGEND

B-1 APPROXIMATE BORING LOCATION

N

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BORING LOCATION PLAN

STAUNTON BRIDGE COMMUNITY CENTER ADDITION
GREENVILLE, SOUTH CAROLINA

EAS PROJ NO.	DATE	SCALE	FIGURE NO.
EAS-16303	FEB. 2016	NOT TO SCALE	2

APPENDIX

SUBSURFACE INVESTIGATION

Key to Soil Classification Chart
Unified Soil Classification System (USCS)
SPT Boring Logs

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KEY TO BORING LOG SOIL CLASSIFICATIONS

Soil Identification

Identification of soil type is made on the basis of an estimate of particle size for predominantly coarse-grained soils and on the basis of cohesiveness (plasticity) for predominantly fine-grained soils. When a soil sample consists of two or more soil types, the percentages of the types are estimated by weight and indicated by descriptive terminology.

Soil Type	Particle Size
Boulder	> 12 in
Cobble	3 – 12 in
Gravel – Coarse	3/4 – 3 in
Gravel – Fine	#4 – 3/4 in
Sand – Coarse	#10 – #4
Sand – Medium	#40 – #10
Sand – Fine	#200 – #40
Silt (Non-Cohesive)	< #200
Clay (Cohesive)	< #200

Soil Component	Descriptive Term	Percentage
Major	Capital Letters	> 50%
Secondary	Adjective	20 – 50%
Others	Some	20 – 35%
	Little	10 – 20%
	Trace	0 – 10%

(1) Particle Size is designated by US Standard Sieve Sizes.
(2) Atterberg Limit determinations are often used to classify fine-grained soils (silts and clays).

Relative Density or Consistency

The standard penetration resistance values (N-values) are used to describe the relative density of coarse-grained soils or the consistency of fine-grained soils.

Relative Density

Term	N-Value
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

Consistency

Term	N-Value
Very Soft	0 - 1
Soft	2 – 4
Medium Stiff	5 – 8
Stiff	9 – 15
Very Stiff	16 – 30
Hard	> 30

(3) The N-value is the number of blows of a 140 lb. hammer freely falling 30 inches required to drive a standard split spoon sampler (2.0 in O.D., 1 3/8 in I.D.) 12 inches into the soil after properly seating the sampler into undisturbed soils.
(4) Large gravel size particles are often not recovered by the standard split-spoon sampler and therefore the true percentage of gravel is not accurately estimated.
(5) When encountered, large gravel size particles often increase the N-value of the standard penetration test.

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UNIFIED SOIL CLASSIFICATION SYSTEM LEGEND

Major Divisions				Typical Description
Coarse Grained Soils More than 50% of material is larger than No. 2	**Gravel and Gravelly Soils** More than 50% of coarse fraction is retained on No. 4 Sieve	**Clean Gravels** Little or no fines	**GW**	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels With Fines Appreciable amounts of fines	**GM**	Silty gravels, Gravel-sand-silt mixtures
			GC	Clayey gravels, Gravel-sand-clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction passes No. 4 Sieve	**Clean Sand** Little or no fines	**SW**	Well-graded sands, gravelly sand, little or no fine
			SP	Poorly-graded sands, gravelly sand, little or no fines
		Sands With Fines Appreciable amounts of fines	**SM**	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine Grained Soils More than 50% of material is smaller than No. 200 Sieve	**Silts and Clays** Liquid Limit is less than 50		**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit is greater than 50		**MH**	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH	Inorganic clays of high plasticity
			OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils				Topsoil, peat, humus, swamp soils with high organic contents
Miscellaneous Materials				Aggregate Base Course Stone
				Partially Weathered Rock (PWR)
				Asphalt Pavement
				Concrete Pavement

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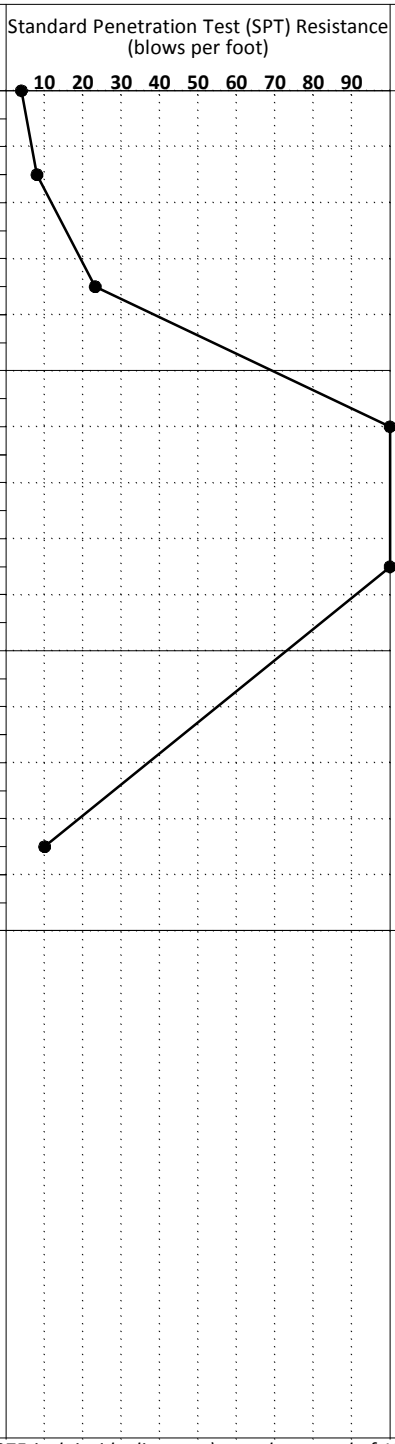
BORING LOG

EAS Project No.: 16303 | Date: February 2016

Client: **LS3P**			
Project: **Staunton Bridge Community Center Addition - Greenville, SC**			
Boring No.: B-1	Total Depth: 15.0 feet	Elevation: 964.0± feet	Location: See Boring Location Plan
Type of Boring: **HSA / SPT**		Date Drilled: 1/12/16	Driller: Carolina Drilling

Depth (feet)	Ground Water Depth	USCS	Description of Materials (Classification)	Sample Blows*	Sample Depth (feet)	Samp. Type	Elevation (feet)	"N" Value
0.2			**ORGANIC LADEN SOIL** 1-2 inches	3-2-3	0.0		963.8	5
1.5			**RESIDUAL** Medium stiff, moist to wet, brown and tan, fine to coarse sandy CLAY (CL) with little silt, trace organics	3-4-5	1.5		962.5	9
3.5			Stiff, moist, reddish brown and tan, fine to coarse sandy CLAY (CL) with little silt, trace mica	6-10-14	3.5		960.5	24
6.0			Medium dense, moist, tan, brown and light gray, silty fine to coarse SAND (SM) with little clay, trace mica	25-50/5"	6.0		958.0	50/5"
			WEATHERED ROCK Sampled as very dense, moist, greenish gray, silty fine to coarse SAND (SM) with trace clay	26-50-50/5.5"	8.5			50/5.5"
13.5	▽		**RESIDUAL** Medium dense, moist to wet, gray and light gray, silty fine to coarse SAND (SM)	4-6-5	13.5		950.5	11
15.0			**Boring terminated at 15 feet. Ground water encountered at 12.5 feet during drilling. Borehole was dry above the cave-in depth of 13 feet prior to backfilling upon completion of drilling activities.**				949.0	



Number of blows required for a 140-pound hammer dropping 30 inches to drive a 2-inch outside diameter (1.375-inch inside diameter) sampler a total of 18 inches in three 6-inch increments. The sum of the last two increments of penetration is termed the Standard Penetration Resistance ("N").

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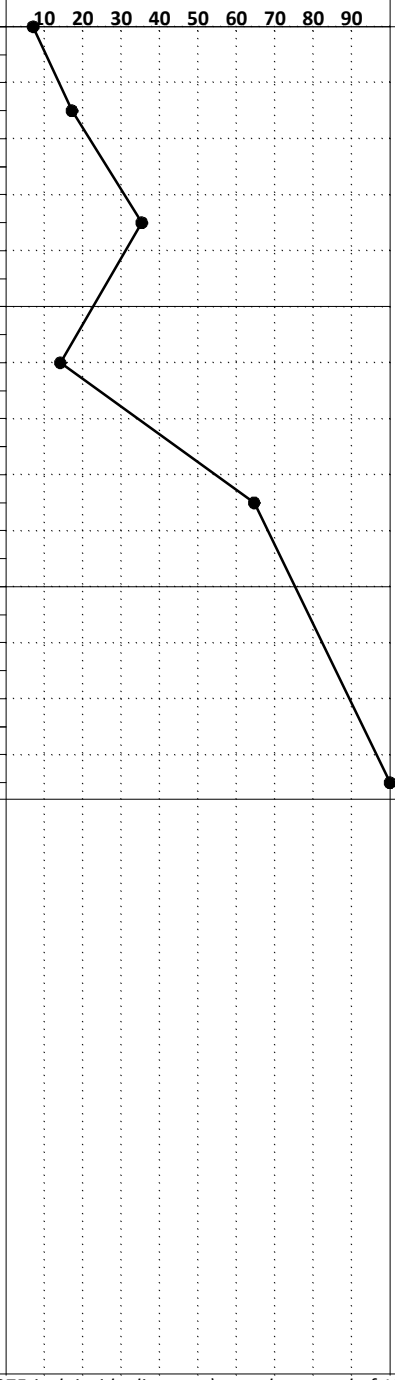
BORING LOG

EAS Project No.: 16303 | Date: February 2016

Client: **LS3P**			
Project: **Staunton Bridge Community Center Addition - Greenville, SC**			
Boring No.: B-2	Total Depth: 13.8 feet	Elevation: 965.0± feet	Location: See Boring Location Plan
Type of Boring: **HSA / SPT**		Date Drilled: 1/12/16	Driller: Carolina Drilling

Depth (feet)	Ground Water Depth	USCS	Description of Materials (Classification)	Sample Blows*	Sample Depth (feet)	Samp. Type	Elevation (feet)	"N" Value
0.2			**ORGANIC LADEN SOIL** 2-3 inches	2-3-5	0.0		964.8	8
1.5			**RESIDUAL** Loose, moist, red, purple and dark brown, silty fine to coarse SAND (SM) with trace clay and mica	4-6-12	1.5		963.5	18
3.5			Medium dense, moist, brown and reddish brown, silty fine to medium SAND (SM) with trace clay and mica	4-15-21	3.5		961.5	36
6.0			Dense, moist, brown, reddish brown, dark brown and pale yellow, silty fine to coarse SAND (SM) with trace clay and mica	10-10-5	6.0		959.0	15
			Medium dense, moist, brown, silty fine to coarse SAND (SM) with trace clay					
8.5	▽		Very dense, moist, dark brown to black, silty fine to coarse SAND (SM) with trace clay	13-35-30	8.5		956.5	65
13.5				50/3"	13.5		951.5	50/3"
13.8			**WEATHERED ROCK** Sampled as very dense, moist, brown, silty fine to coarse SAND (SM) with trace clay and mica				951.2	

Boring terminated at 13.8 feet. Ground water encountered at 9 feet during drilling. Borehole was dry above the cave-in depth of 7 feet prior to backfilling upon completion of drilling activities.



Number of blows required for a 140-pound hammer dropping 30 inches to drive a 2-inch outside diameter (1.375-inch inside diameter) sampler a total of 18 inches in three 6-inch increments. The sum of the last two increments of penetration is termed the Standard Penetration Resistance ("N").

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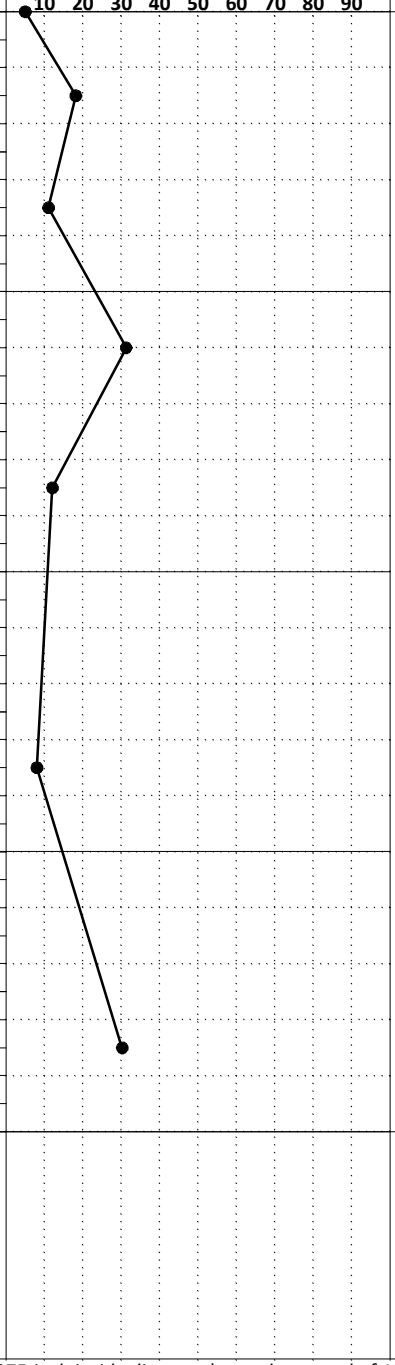
BORING LOG

EAS Project No.: 16303 | Date: February 2016

Client: **LS3P**			
Project: **Staunton Bridge Community Center Addition - Greenville, SC**			
Boring No.: B-3	Total Depth: 20.0 feet	Elevation: 965.0± feet	Location: See Boring Location Plan
Type of Boring: **HSA / SPT**		Date Drilled: 1/12/16	Driller: Carolina Drilling

Depth (feet)	Ground Water Depth	USCS	Description of Materials (Classification)	Sample Blows*	Sample Depth (feet)	Samp. Type	Elevation (feet)	"N" Value
0.3			**ORGANIC LADEN SOIL** 3-4 inches	1-2-4	0.0		964.7	6
1.5			**RESIDUAL** Loose, moist, reddish brown and tan, silty fine to coarse SAND (SM) with little clay	9-13-6	1.5		963.5	19
3.5			Medium dense, moist, reddish brown and tan, silty fine to coarse SAND (SM) with little clay	3-5-7	3.5		961.5	12
6.0			Stiff, moist, tan and light brown, micaceous, fine to medium sandy SILT (ML) with little clay	11-13-19	6.0		959.0	32
8.5			Dense, moist, reddish brown and brown, micaceous, silty fine to medium SAND (SM) with little clay	6-5-8	8.5		956.5	13
13.5			Medium dense, moist, reddish brown and brown, micaceous, silty fine to medium SAND (SM) with little clay	3-3-6	13.5		951.5	9
18.5	▽		Loose, moist, reddish brown and brown, micaceous, silty fine to medium SAND (SM) with little clay	9-13-18	18.5		946.5	31
20.0			Dense, moist, pale yellow, brown and light gray, silty fine to medium SAND (SM) with trace clay and mica				945.0	

Boring terminated at 20 feet. Ground water encountered at 19 feet during drilling. Borehole was dry above the cave-in depth of 15 feet prior to backfilling upon completion of drilling activities.



Number of blows required for a 140-pound hammer dropping 30 inches to drive a 2-inch outside diameter (1.375-inch inside diameter) sampler a total of 18 inches in three 6-inch increments. The sum of the last two increments of penetration is termed the Standard Penetration Resistance ("N").

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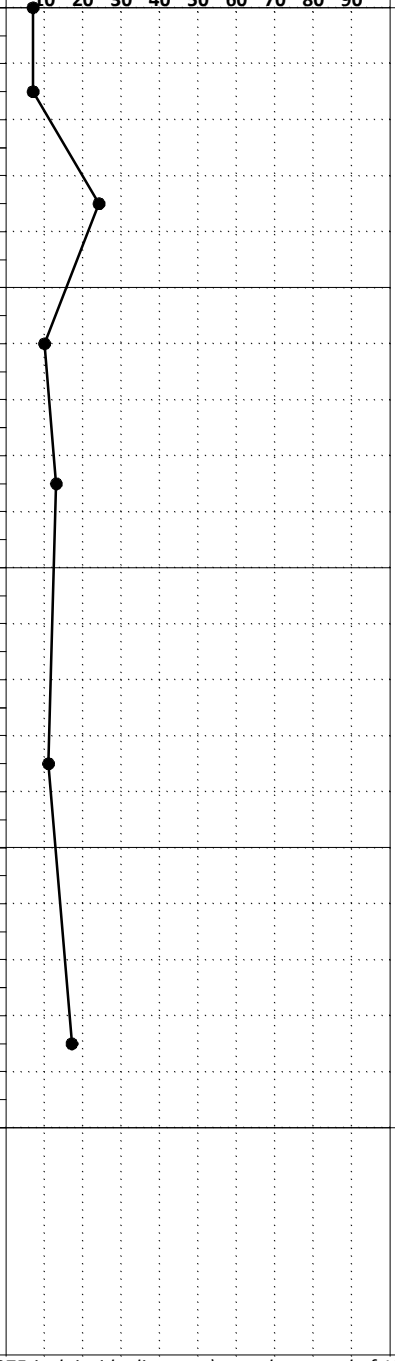
BORING LOG

EAS Project No.: 16303 | Date: February 2016

Client: **LS3P**			
Project: **Staunton Bridge Community Center Addition - Greenville, SC**			
Boring No.: B-4	Total Depth: 20.0 feet	Elevation: 965.0± feet	Location: See Boring Location Plan
Type of Boring: **HSA / SPT**		Date Drilled: 1/12/16	Driller: Carolina Drilling

Depth (feet)	Ground Water Depth	USCS	Description of Materials (Classification)	Sample Blows*	Sample Depth (feet)	Samp. Type	Elevation (feet)	"N" Value
0.3			**ORGANIC LADEN SOIL** 3-4 inches	2-3-5	0.0		964.7	8
1.5			**RESIDUAL** Medium stiff, wet, reddish brown, fine to coarse sandy CLAY (CL) with little silt, trace organics	3-4-4	1.5		963.5	8
3.5			Medium stiff, wet, reddish brown, fine to coarse sandy CLAY (CL) with little silt	9-13-12	3.5		961.5	25
			Medium dense, moist, brown to reddish brown and dark brown, silty fine to coarse SAND (SM) with trace clay and mica	4-5-6	6.0			11
8.5			Medium dense, moist, brown and dark brown, silty fine to coarse SAND (SM) with trace clay	6-7-7	8.5		956.5	14
13.5			Medium dense, moist, brown and reddish brown, silty fine to coarse SAND (SM) with little clay, trace mica	4-6-6	13.5		951.5	12
				7-8-10	18.5			18
20.0	▽		**Boring terminated at 20 feet. Ground water encountered at 19.5 feet during drilling. Borehole was dry above the cave-in depth of 15 feet prior to backfilling upon completion of drilling activities.**				945.0	



Number of blows required for a 140-pound hammer dropping 30 inches to drive a 2-inch outside diameter (1.375-inch inside diameter) sampler a total of 18 inches in three 6-inch increments. The sum of the last two increments of penetration is termed the Standard Penetration Resistance ("N").

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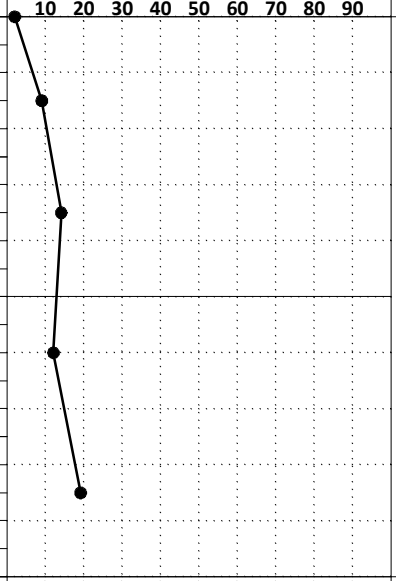
BORING LOG

EAS Project No.: 16303 | Date: February 2016

Client: **LS3P**			
Project: **Staunton Bridge Community Center Addition - Greenville, SC**			
Boring No.: B-5	Total Depth: 10.0 feet	Elevation: 975.0± feet	Location: See Boring Location Plan
Type of Boring: **HSA / SPT**		Date Drilled: 1/12/16	Driller: Carolina Drilling

Depth (feet)	Ground Water Depth	USCS	Description of Materials (Classification)	Sample Blows*	Sample Depth (feet)	Samp. Type	Elevation (feet)	"N" Value
0.2			**ORGANIC LADEN SOIL** 2-3 inches	1-1-2	0.0		974.8	3
1.5			**RESIDUAL** Very loose, moist to wet, reddish brown and tan, clayey fine to coarse SAND (SC) with little silt	3-5-5	1.5		973.5	10
3.5			Stiff, moist, reddish brown, fine to coarse sandy CLAY (CL) with little silt	4-7-8	3.5		971.5	15
6.0			Medium dense, moist, brownish red, silty fine to coarse SAND (SM) with little clay	4-6-7	6.0		969.0	13
8.5			Medium dense, moist, reddish brown and purple, silty fine to coarse SAND (SM) with trace clay and mica	5-8-12	8.5		966.5	20
10.0			Medium dense, moist, reddish brown, tan and light gray, silty fine to coarse SAND (SM) with trace clay and mica				965.0	

Boring terminated at 10 feet. Ground water was not encountered during drilling or prior to backfilling borehole upon completion of drilling activities.



Number of blows required for a 140-pound hammer dropping 30 inches to drive a 2-inch outside diameter (1.375-inch inside diameter) sampler a total of 18 inches in three 6-inch increments. The sum of the last two increments of penetration is termed the Standard Penetration Resistance ("N").

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February 22, 2016

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deanoang@ls3p.com

Attention: Mr. Dean Oang, AIA

Reference: Addendum to the Report of Subsurface Exploration and Geotechnical Engineering Evaluation
Proposed Staunton Bridge Community Center Addition
165 Staunton Bridge Road
Greenville, South Carolina
EAS Project No.: EAS 16-303 Addendum-1

Mr. Oang:

The purpose of this addendum to the EAS 16-303 geotechnical report is to clarify the information presented in the Section 5.7.3. *Recommended Pavement Sections* of the report.

Selection of surface and binder type asphalt pavements should be in general accordance with the SCDOT Pavement Guidelines. We understand that the new pavements will have a daily traffic volume of less than 1,500 vehicles per day. Therefore, based on the SCDOT Table III - Guidelines for Hot-Mix Asphalt Type Selection, a Type D surface asphalt; a Type C intermediate (binder) asphalt; and a Type D base asphalt can be used. Please refer to the attached tables for more detailed information on Hot-Mix Asphalt Selection and Material Properties.

Please do not hesitate to contact us if you have any questions regarding this addendum or if we may be of further service.

Respectfully Submitted,
EAS PROFESSIONALS, INC.

Westley C. Godfrey
Project Engineer

SOUTH CAROLINA EAS PROFESSIONAL INC. No. 3363 CERTIFICATE OF AUTHORIZATION

Douglas R. Dunko, PE
Senior Geotechnical Engineer
South Carolina PE License No. 21288

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 21288 2-22-16 DOUGLAS R. DUNKO

Attachments:
- SCDOT Pavement Design Guidelines dated July 2008
- Guidelines For Asphalt Mixture Selection
- Suplemental Technical Specification for Hot-Mix Asphalt Properties dated March 1, 2011

Table III – Guidelines for Hot Mix Asphalt Type Selection

		Type Facility				
		Interstate, Intersections, and Problem Areas	NHS, Primary, and High Volume Secondary (more than 10,000 vpd)	Primary and High Volume Secondary (10,000 vpd or less)	Low Volume Primary and High Volume Secondary (5,000 vpd or less)	Low Volume Secondary (1500 vpd or less)
Asphalt Type	Surface	Type A	Type B	Type CM	Type C	Type D
	Intermediate	Type B -or- Type A (problem areas only)	Type B (min. rate 200 psy)	Type C (minimum rate 200 psy)		
	HMA Base	Type A or C		Type B, C, or D		
	Leveling and Build-up	Surface Types B, CM, C, or E Intermediate Type B HMA Base Type A or C		Surface Types C, D, or E Intermediate Type C HMA Base Type B or D		

GUIDELINES FOR ASPHALT MIXTURE SELECTION

COURSE	TYPE FACILITY	TYPE	EST. % BINDER	BINDER GRADE	RECOM. RATE (LBS/SY)	COMMENTS
SURFACE	• Interstate • Problem intersections and areas (severe rutting and shoving potential)	A	5.0	PG 76-22	200	• Consult with OMR Pavement Design Unit when other facilities are being considered.
	• High volume primary & secondary • ADT ≥ 5,000	B	5.3	PG 64-22	150 - 200	• Surface CM and Surface B were combined into one mixture type
	• Low volume primary & secondary • ADT 1,500 – 5,000	C	6.0	PG 64-22	150 - 175	• Truck traffic ≥ 20%, use Surface Type B
	• Low volume secondary routes • ADT < 1,500	D	6.3	PG 64-22	125 - 150	• Truck traffic ≥ 20%, use Surface Type C
	• Multiple facility usage • Consult with OMR Pavement Design Unit	E	6.5	PG 64-22	45 - 80	• Used for ride correction and seal course • Leveling between 0.5 – 2.0 inches
INTERMEDIATE	• Interstate & High volume primary • (New Construction)	A	4.6	PG 64-22	250 - 300	• Use when no drop off restrictions • Use Intermediate B when there are drop off restrictions
	• High volume primary & secondary • ADT ≥ 5,000	B	5.1	PG 64-22	200	• Old Surface Type B Mixture
	• Primary to low volume secondary	C	4.8	PG 64-22	200 - 300	• Use for build-up and non-mainline paving and FDP
BASE	• Intersections & problem areas • Interstate • Primary & secondary routes with ADT ≥ 5,000	A	4.5	PG 64-22	300 - 450	
	• Primary & secondary routes with ADT < 5,000	B	4.5	PG 64-22	300 - 450	
	• Special - Consult with OMR Pavement Design Unit	C	5.5	PG 64-22	200 - 300	• Screening asphalt base – high stability
	• Special – Consult with OMR Pavement Design Unit	D	5.0	PG 64-22	200 - 300	• Sand asphalt base – low stability
SPECIALTY MIXES	• Interstate	OGFC	6.5	PG 76-22	110 - 150	• Open graded friction course
	• Primary and secondary	PMTLSC	6.0	PG 64-22	0.75" Uncompacted	• Preventative maintenance thin lift seal course
	• Primary and Secondary	SHOULDER WIDENING	5.0	PG 64-22	400 - 600	• Non-structural mix • Use on outer edge of pavement that does not carry traffic loads.

Revised: 2-1-13

Hot-Mix Asphalt Material Properties

SCDOT Designation: SC-M-402 (03/11)

1. SCOPE

1.1 Use the following specifications for preparing, constructing, and accepting Hot-Mix Asphalt (HMA) material properties. **NOTE: Refer to the Standard Specifications, Division 300 for HMA Base Courses and Division 400 for HMA Surface and Intermediate Courses for additional properties and specifications that are not included here.**

2. REFERENCED DOCUMENTS

2.1 SCDOT Standard Specifications

2.1.1 Division 300, Division 400, SC-M-407

2.2 AASHTO Standards

2.2.1 T85, T96, T104, T355

2.3 SCDOT Test Methods

2.3.1 SC-T-77, SC-T-102

3. REQUIREMENTS FOR MIXTURES

3.1 Requirements for all HMA mixtures.

3.1.1 Have no more than 10% flat and elongated particles based on a 5:1 ratio based on SC-T-77.

3.1.2 Determine coarse aggregate Sodium Sulfate Soundness by AASHTO T 104.

3.1.3 Determine LA Abrasion by AASHTO T 96.

3.1.4 Determine Absorption by AASHTO T 85.

3.1.5 The composition limits are master ranges of tolerances. Conform to a closer control meeting the tolerance requirements as specified in Section 401.2.3.3.

3.1.6 VMA requirements for Surface and Intermediate Courses:

Nominal Max. Aggregate Size	Minimum, %
3/4"	13.5
1/2"	14.5
3/8"	15.5
No. 4	17.5

3.1.7 Use hydrated lime as an asphalt anti-stripping additive (ASA) in all mixes unless otherwise permitted in the following tables.

3.2 If crushed stone is required in the following tables, use crushed coarse aggregate meeting the following requirements:

3.2.1 Have 2 or more freshly mechanically-induced fractured faces meeting the percentage stated in each table based on count of the material retained on the No. 4 sieve as determined by AASHTO T-355.

3.3 Ensure the Recycled Asphalt Pavement (RAP) conforms to Supplemental Technical Specification SC-M 407.

3.4 D/A Ratio requirements for Surface and Intermediate Courses:

D/A Ratio	**Mix Design Requirement (Washed Gradation)**	**Field Requirement (Dry Gradation) SC-T-102**
Range Limits	0.60 -1.20	0.40-1.00

3.2 Summary of Surface Course Requirements

HMA Surface Courses						
Designation	**Type A**	**Type B**	**Type CM**	**Type C**	**Type D**	**Type E**
Old Designation	*12.5 mm Superpave*	*Surface Type 1C*	*Surface Type 1D*	*Surface Type 1 & 3*	*Surface Type 4*	*Thin Lift Seal Course*
System Application	Interstate / Intersections	High Volume Primary	Low Volume Primary	Secondary	Low Volume Secondary	Seal Course
Gradation Requirements						
1”	100.0	100.0	----	----	----	----
¾”	98.0 – 100.0	98.0 – 100.0	100.0	100.0	100.0	----
½”	90.0 – 100.0	90.0 – 100.0	97.0 – 100.0	97.0 – 100.0	97.0 – 100.0	----
3/8”	72.0 - 90.0	72.0 - 90.0	83.0 – 100.0	83.0 – 100.0	90.0 – 100.0	100.0
No. 4	44.0 - 62.0	44.0 - 62.0	58.0 – 80.0	58.0 – 80.0	70.0 – 95.0	90.0 – 100.0
No. 8	23.0 – 43.0	23.0 - 43.0	42.0 – 62.0	42.0 – 62.0	50.0 – 82.0	70.0 – 100.0
No. 30	10.0 – 25.0	10.0 - 25.0	20.0 – 40.0	20.0 – 40.0	20.0 – 50.0	36.0 – 70.0
No. 100	4.0 - 12.0	4.0 - 12.0	5.0 – 20.0	5.0 – 20.0	6.0 – 20.0	4.0 – 28.0
No. 200	2.00 - 8.00	2.00 - 8.00	2.00 – 9.00	2.00 – 9.00	2.00 – 10.00	2.00 – 10.00
Required Job Mix Criteria						
Gyrations	100	75	75	50	50	50
Binder Limits, %	4.5 - 6.0	4.5 - 6.0	5.0 - 6.8	5.0 - 6.8	5.0 - 6.8	6.0 - 7.0
Binder Grade	PG 76-22	PG 64-22	PG 64-22	PG 64-22	PG 64-22	PG 64-22
Air Voids, %	3.0 – 4.0	3.0 – 4.0	3.5 – 4.5	3.5 – 4.5	4.0 – 9.0	NR
VFA, %	70.0 – 80.0	70.0 – 80.0	70.0 – 77.0	70.0 – 77.0	60.0 – 70.0	NR
Design D/A Ratio	0.60 - 1.20	0.60 - 1.20	0.60 - 1.20	0.60 - 1.20	0.60 - 1.20	NR
Min. Stability – 6” (lbs.)	No Requirement (NR)					2500
ITS Testing Required?	Yes	Yes	Yes	Yes	No	No
Rutting Susceptibility (max mm)	3.0	5.0	5.0	NR	NR	NR
Liquid ASA Permitted	No	No	No	Yes	Yes	Yes
Required Aggregate Criteria						
Local Sand Allowed?	No	No	No	Yes	Yes	No
Crushed Coarse Aggr. Required? (% fractured faces)	Yes (90% min)	Yes (90% min)	Yes (90% min)	Yes (70% min)	No	NR
Coarse Aggr. Max. % Passing No.200	1.50	1.50	1.50	1.50	1.50	NR
LA Abrasion (B), max %	55.0	55.0	55.0	60.0	60.0	60.0
Sodium Sulfate Soundness, max %	15.0	15.0	15.0	15.0	NR	NR
Crusher Run / Asphalt Sand Allowed?	No	No	No	Yes (25% max)	Yes (50% max)	No
Absorption, max. %	1.5	1.5	1.5	1.5	NR	1.5
Limestone Allowed? (CA / Screenings)	No / No	No / Yes	No / Yes	No / Yes	Yes / Yes	No
Slag Allowed?	No	No	No	Yes	Yes	No
RAP	Yes	Yes	Yes	Yes	Yes	Yes (-4)

3.3 Summary of HMA Intermediate Course Requirements

HMA Intermediate Courses			
Designation	**Type A**	**Type B**	**Type C ***
Old Designation	*19.0 mm for Intersections*	*19.0 mm / Binder T-1*	*Binder Type 2*
System Application	Intersections	Interstates / High Volume Primary (> 15% Truck Traffic)	Low Volume Primary / Secondary / Build up / Leveling / Patching
Gradation Requirements			
1”	100.0	100.0	100.0
¾”	90.0 – 100.0	90.0 – 100.0	90.0 – 100.0
½”	75.0 – 90.0	75.0 – 90.0	80.0 – 95.0
3/8”	64.0 – 80.0	64.0 – 80.0	68.0 – 87.0
No. 4	38.0 – 54.0	38.0 – 54.0	45.0 – 68.0
No. 8	22.0 – 36.0	22.0 – 36.0	30.0 – 46.0
No. 30	8.0 – 22.0	8.0 – 22.0	12.0 – 29.0
No. 100	3.0 - 10.0	3.0 - 10.0	4.0 – 13.0
No. 200	2.00 - 8.00	2.00 - 8.00	2.00 – 8.00
Required Design Criteria			
Gyrations	100	75	50
Binder Limits, %	4.0 – 5.5	4.5 - 6.0	4.0 - 6.0
Binder Grade	PG 76-22	PG 64-22	PG 64-22
Air Voids, %	3.0 - 4.0	3.0 - 4.0	3.5 - 4.5
VFA, %	70.0 – 80.0	70.0 – 80.0	70.0 – 77.0
Design D/A Ratio	0.60 - 1.20	0.60 - 1.20	0.60 - 1.20
Min. Stability (lbs.)	No Requirement (NR)		
ITS Testing Required?	Yes	Yes	Yes
Rutting Susceptibility (max mm)	3.0	5.0	NR
Liquid ASA Permitted	No	No	Yes
Required Aggregate Criteria			
Local Sand Allowed?	No	No	Yes
Crushed Coarse Aggregate Required? (% fractured faces)	Yes (90% min.)	Yes (90% min.)	No
Coarse Aggr. – max. % Passing No. 200	1.5	1.5	NR
LA Abrasion (B), max. %	55.0	55.0	60.0
Sodium Sulfate Soundness, max %	No Requirement (NR)		
Crusher Run / Asphalt Sand Allowed?	No	No	Yes (50% max)
Absorption, max. %	1.5	1.5	NR
Limestone Allowed? (CA / Screenings)	No / No	No / Yes	Yes / Yes
Slag Allowed?	Yes	Yes	Yes
RAP	Yes	Yes	Yes

3.4 Summary of HMA Base Course Requirements

HMA Base Courses				
Designation	**Type A**	**Type B**	**Type C**	**Type D**
Old Designation	*Base Type 1*	*Base Type 2*	*Sand Base Type 3*	*Sand Base Type 2*
System Application	Interstates / Primary	Secondary	Specialty	Specialty
Gradation Requirements				
1 ½”	100.0	100.0	----	----
1”	85.0 - 100.0	85.0 - 100.0	----	----
½”	60.0 - 80.0	60.0 - 80.0	----	----
3/8”	----	----	100.0	----
No. 4	40.0 - 55.0	40.0 - 55.0	90.0 – 100.0	----
No. 8	30.0 - 45.0	30.0 - 45.0	70.0 – 100.0	----
No. 30	----	----	36.0 – 70.0	----
No. 100	----	----	4.0 – 28.0	----
No. 200	----	----	2.00 – 10.00	----
Required Design Criteria				
Gyrations	----	----	50	50
Binder Limits, %	4.0 - 5.5 *	4.0 - 5.5 *	4.3 - 5.7	3.8 - 5.2
Binder Grade	PG 64-22	PG 64-22	PG 64-22	PG 64-22
Min. Stability, lbs.	NR	NR	2500	1500
ITS Testing Required?	No Requirement (NR)			
Rutting Susceptibility (max mm)	No Requirement (NR)			
Liquid ASA Permitted	No	Yes	Yes	Yes
Required Aggregate Criteria				
Local Sand Allowed?	No	Yes	No	Yes
Crushed Coarse Aggregate Required? (% fractured faces)	Yes (90% min)	No	No	No
LA Abrasion (B), max. %	60.0	60.0	60.0	60.0
Sodium Sulfate Soundness, max %	No Requirement (NR)			
Crusher Run / Asphalt Sand Allowed?	Yes (50% max)	Yes (50% max)	No	No
Absorption, max. %	No Requirement (NR)			
Limestone Allowed? (CA / Screenings)	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
Slag Allowed?	Yes	Yes	Yes	Yes
RAP	Yes	Yes	Yes (-4)	Yes (-4)

* Binder content determined visually during design.

SPECIAL INSPECTION PROCEDURE
IBC CHAPTER 17 2012 EDITION

When Required
All projects that require a SC licensed Architect or Engineer per SC Architectural and Engineering registration law.

Overview
The program consists of five forms, which must be filled out by the SC Design Professional in Responsible Charge and submitted to the building department. The *Identification of the Design Professional in Responsible Charge, Earthquake Design Data Form, Checklist of Required Special Inspection Reports, & The Statement of Special Inspections* must be submitted at the time of application for Plan Review. The *Final Report of Special Inspections* is to be placed at the jobsite with all the field reports upon completion of the project, and made available to the Building Inspector during or prior to the Final Building Inspection. The *Owners Acknowledgement of Special Inspections* must also be submitted at the time of application for plan review. The *Contractor's Statement of Responsibility for Seismic-Force-Resisting Systems* must be submitted prior to permitting.

Identification of the Design Professional in Responsible Charge
This form provides the general information about the project and identifies the SC Design Professional in Responsible Charge as required in IBC Section 106.3.4.1. This form is submitted as a condition for permit issuance and as a commitment to Special Inspections.

Earthquake Design Data Form
This form is to be completed by the Structural Engineer and must be consistent with the Structural Analysis on the construction documents.

Checklist of Required Inspection Reports,
The Statement of Special Inspections
These forms are to be filled out by the SC Design Professional in Responsible Charge by checking the boxes of the required inspections specific to the project. The names of the individuals or firms providing these inspections will be entered at this time. The qualifications for the inspector will be specific to the inspection performed. The minimum qualifications will be as listed by the South Carolina Building Code Council Special Inspection Policy document, or as approved by the Building Official. The forms will be reviewed by the Greenville County Plan Review Department for completeness. The Statement of Special Inspections is required for all projects.

Field Reports
Inspectors to be registered by SCLLR in the applicable specialty of inspections performed IBC 1703.1.3.
These reports are the results of the required inspections and must be performed by the individuals/firms designated by the SC Design Professional in Responsible Charge.

All field reports generated from the inspections must be kept on the jobsite in a binder with the County of Greenville approved drawings and contain the following information: (A generic example form is included in this package).

- The project name and Permit Number.
- The project address.
- The name address and phone number of the individual/firm performing the inspection and generating the report.
- The IBC Section or Table number of the inspection. The criteria for each inspection must be performed as outlined in the appropriate code section or table and as specified in *The Checklist of Special Inspections*. Some inspections are periodic, some are continuous, and others are performed only once. When tables are referenced all applicable criteria in the table must be addressed.

Final Report of Special Inspections
The SC Design Professional in Responsible Charge shall collect final inspection reports from all inspections requiring more than one inspection then fill out the *Final Report of Inspections*. This report is certifying that all required inspections have been performed and all corrections have been made. The report is then put with the field reports in the binder on the jobsite prior to requesting a Final Building Inspection. An updated *Checklist of Required Special Inspection Reports & The Statement of Special Inspections* including all names and addresses of firms that performed the inspections must also to be provided.

Contractor's Statement of Responsibility for Seismic-Force-Resisting Systems
This form is to be filled out by the contractor.

Owners Acknowledgement of Special Inspections
This form is to be filled out by the owner of the project.

Project: STAUNTON BRIDGE CC ADDITION Application No._____

IDENTIFICATION OF THE DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE

Project location: GREENVILLE, SC

Project Owner: STAUNTON BRIDGE CC

Address: 165 STAUNTON BRIDGE RD, GREENVILLE, SC 29611

SC Registered Design
Professional in Responsible Charge: A JOHN ARROWOOD

Firm (optional): ARROWOOD & ARROWOOD, PC

License Number: SC 20477 Phone: 864.233.9383 Fax: 864.232.7855

E-Mail Address: john@arrowoodarrowood.com

Architect: _____

Firm (optional): _____

License Number: SC_____ Phone: _____ Fax: _____

Structural Engineer: A. JOHN ARROWOOD

Firm (optional): ARROWOOD & ARROWOOD PC

License Number: SC 20477 Phone: 864 233 9383 Fax: 864 232 7855

This *Identification of the Design Professional in Responsible Charge* is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the International Building Code. It includes a Schedule of Special Inspection Services applicable to this project as well as the name of the Special Inspector(s) and the identity of other approved agencies that are to be retained for conducting these inspections.

The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Design Professional in Responsible Charge and the Building Official. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Design Professional in Responsible Charge and the Building Official. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Design Professional in
Responsible Charge:
A JOHN ARROWOOD
Type or print name

3/11/16
Signature Date

Accepted by: (Code Official)

_____
Type or print name

_____
Signature Date

Individual Seal

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
No. 20477
ANTHONY JOHN ARROWOOD

Firm Seal

SOUTH CAROLINA
CERTIFICATE OF AUTHORIZATION
ARROWOOD & ARROWOOD, PC
No. C03056

3 January 2005/Rev. 18 Mar. 2015

Project STAUNTON BRIDGE LL ADDITION Application No. _____

Earthquake Design Data Form

IBC section 1613 for earthquake.

IBC section 1603.1.5 "The following information related to seismic loads shall be shown, regardless of whether seismic loads govern the design of the lateral-force-resisting system of the building":

1. **Occupancy Category:** III **Risk Category** III

   IBC 1604.5 (IBC table 1604.5)

2. **Mapped spectral response accelerations S_S** 0.28 **and S_1** 0.11.

   USGS website, http://earthquake.usgs.gov/ 2002 maps, IBC1613.5.1

3. **Site Class:** D.

   IBC section 1613.5.2 and IBC Table 1613.5.2 Verify by soil test 1802.4

4. **Spectral Response Coefficients S_{DS}** 0.28, **S_{D1}** 0.17.

   IBC 1613.5.3(1) and 1613.5.3(2), (equations 16-37 through 16-38)

5. **Seismic Design Category** C.

   IBC sections 1613.2, 1613.5.6 and IBC Tables 1613.5.6(1) or 1613.5.6(2) Note: Most severe shall apply.

6. **Basic Seismic Force Resisting System(s)** INTERMEDIATE PRECAST WALLS.

   IBC 1613.2 must conform with Section 12.2 of ASCE 7

7. **Design base shear** 42.7k.

   Total design lateral force or shear at the base.

8. **Seismic response coefficient(s) C_S** 0.0875.

   ASCE 7 section 9.5.5.2.1 (equation)

9. **Response modification factor(s), R** 4.

Individual Seal	Firm Seal
SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 20477 ANTHONY JOHN ARROWOOD	SOUTH CAROLINA ARROWOOD & ARROWOOD, PC No. C03036 CERTIFICATE OF AUTHORIZATION

10. **Analysis procedure used**

    ELF.

11. **A SC Licensed Engineer to affix seal on this document and provide phone number.**

    Name A. JOHN ARROWOOD **Phone** 864. 233.9383.
    Firm ARROWOOD & ARROWOOD, PC **Fax** 864.232.7855.

Project STAUNTON BRIDGE CC ADDITION Application No._____

OWNERS ACKNOWLEGEMENT OF SPECIAL INSPECTIONS

I hereby acknowledge that I am the owner of the project referenced below and I have contracted with the design professional listed below to act as my agent in contracting and coordinating the required special inspections for the project.

Project Address: _____

Owner's Name: _____

Owner's Address: _____

_____

Owner's Phone Number: _____

SC Registered Design
Professional in Responsible Charge: _____

Firm (optional): _____

License Number: SC_____ Phone: _____ Fax_____

Address: _____

_____

_____ _____
Signature Date

_____
Print Name

Project STAUNTON BRIDGE CC ADDITION Application No._____

CHECKLIST OF REQUIRED SPECIAL INSPECTION REPORTS & FIRMS/INDIVIDUALS PERFORMING INSPECTIONS

Fabricator Provide Special Inspector or Third Party Plant Certification per IBC 1704.2.5

- ☐ **Metal Building Fabrication** Manufacturer: _____
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☒ **Precast Concrete Fabrication** Manufacturer: _____
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Prefabricated Trusses** (Wood Truss fabricator requires WTCA or TPI certification)
  Manufacturer: _____
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Steel Bar Joist Fabrication** Manufacturer: _____
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Structural Steel Fabrication** Manufacturer: _____
  Firm/Individual Name: _____ Phone: _____
  Address: _____

☒ **Site Welding** IBC Table 1705.2.2.1
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Steel Frame** IBC Table 1705.2.2
Firm/Individual Name: _____ Phone: _____
Address: _____

☒ **High Strength Bolts** IBC Table 1705.2
Firm/Individual Name: _____ Phone: _____
Address: _____

☒ **Concrete** IBC Table 1705.3
Firm/Individual Name: _____ Phone: _____
Address: _____

☒ **Masonry** IBC Table 1705.4
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Wood Construction** IBC 1705.5
Firm/Individual Name: _____ Phone: _____
Address: _____

☒ **Soils** IBC Sections 1705.6 Table 1705.6
Firm/Individual Name: _____ Phone: _____
Address: _____

☒ **Fill Placement** IBC 1705.6 Table 1705.6
Firm/Individual Name: _____ Phone: _____
Address: _____

Project STAUNTON BRIDGE LL ADDITION Application No._____

☐ **Pile Foundations** IBC 1705.7, 1705.8, 1705.9
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Pier Foundations** IBC Section 1705.8
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Sprayed Fire Resistance Materials** IBC Section 1705.13
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Mastic and Intumescent Fire-Resistant Coatings** IBC Section 1705.14
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Exterior Insulation and Finish Systems (EIFS)** IBC Section 1705.15
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Special Cases** IBC Section 1707
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Special Inspection for Smoke Control** IBC Section 1705.17
Firm/Individual Name: _____ Phone: _____
Address: _____

Special Inspections for Seismic Resistance IBC Section 1707.1

- ☐ **Structural Steel** IBC Section 1705.11.1 AISC 341
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Structural Wood** IBC Section 1705.2, 1711.1
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Cold Formed Steel Framing** IBC Section 1705.11.3
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Pier Foundations** IBC Section 1705.8
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Storage Racks and Access Floors** IBC Section1705.11.7
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Architectural Components** IBC Section 1705.11.5
  Firm/Individual Name: _____ Phone: _____
  Address: _____
- ☐ **Mechanical and Electrical Components** IBC Section 1705.11.6
  Firm/Individual Name: _____ Phone: _____
  Address: _____

Project STAUNTON BRIDGE CC ADDITION Application No._____

THE STATEMENT OF SPECIAL INSPECTIONS & CONTRACTOR STATEMENT

Statement of Special Inspections IBC Section 1704.3

☒ **The Statement of Special Inspections Prepared by the Design Professional In Responsible Charge.** IBC Section 1704.3, 1704.3.1 **Statement to be attached for review.**

☐ **Contractor Statement of Responsibility for Seismic System** IBC Section 1704.4
Complete forms on page 8.

CHECKLIST OF REQUIRED TESTING & FIRMS/INDIVIDUALS PERFORMING TESTS

☐ **Masonry** IBC Sections 1705.4
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Reinforcing and Prestressing Steel** IBC Section 1705.2.2 Table 1705.2.2
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Structural Steel** IBC Sections 1705.11.1
Firm/Individual Name: _____ Phone: _____
Address: _____

☐ **Mechanical and Electrical Equipment** IBC Section 1705.11.6 (As Req. by1705.12 #3)
Firm/Individual Name: _____ Phone: _____
Address: _____
(This section includes Sprinkler Systems)

SPECIAL INSPECTION FIELD REPORT TO INCLUDE THE FOLLOWING INFORMATION:

Application/Permit Number	Project name and address
Firm/ Individual Performing Inspection	Firm/Individual address
Firm/Individual Phone Number	IBC Code Section or Table Number

Project STAUNTON BRIDGE CC ADDITION Application No. _____

Contractor Statement of Responsibility

IBC 1704.4 Contractor(s) responsibility: For the construction of a seismic-force-resisting system, designated seismic system, wind or seismic resisting component listed the Statement of Special Inspections.

Project Name: _____

Project Address: _____

Contractor's Name: _____

Contractors Phone Number: _____

Contractor's E-Mail Address: _____

Contractor's License Number: _____

Contractors Address: _____

_____

1. I hereby acknowledge that I have read and am aware of the special requirements contained in the Statement of Special Inspections.

2. I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.

3. The reports will be put in the jobsite 3 ring binder in reverse chronological order

4. Control of this process will be exercised by:

Name: _____ Qualification: _____

Position in the Organization: _____

_____
Signature

_____
Date

_____
Print Name

Project: STAUNTON BRIDGE CC ADDITION Application No.: _____

FINAL REPORT OF SPECIAL INSPECTIONS

Project location: _____

Project Owner: _____

Address: _____

SC Registered Design
Professional in Responsible Charge: _____

Firm (optional): _____

License No.: SC_____ Phone: _____ Fax: _____

Address: _____

To the best of my information, knowledge, and belief, the Special Inspections and/or Testing required for this project, and designated for this Agent in the *Checklist of Required Inspection Reports, Statement of Special Inspections* and the *Checklist of Required Testing* submitted for permit, have been completed in accordance with the contract documents.

Field reports submitted prior to this *Final Report of Inspections* form a basis for, and are to be considered an integral part of this Final Report. All discrepancies that were outstanding in all of the Field reports have been corrected.

Prepared by:

_____
Type or print name

_____
Firm (optional)

_____
Signature Date

Individuals Seal	Firm Seal

SECTION 011000 - SUMMARY

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:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished products.
4. Work Restrictions
5. Access to site.
6. Specification and drawing conventions.

1.3 PROJECT INFORMATION

A. Project Identification: Staunton Bridge Community Center - . Gymnasium Addition
   1. Project Location: 165 Staunton Bridge Road, Greenville, SC.

B. Owner: Greenville County.

   1. Owner's Representative: Facility Project Manager, Greenville County

C. Architect Identification: The Contract Documents, were prepared for Project by LS3P ASSOCIATES LTD.,110 West North Street, Suite 300, Greenville, SC 29601.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists, generally, of the following:
   1. A new multi-purpose gymnasium with accompany supporting spaces is being proposed as an addition to the existing Staunton Bridge Community Center. The new facility will house one main basketball court, two side basketball courts, two volleyball court, and two pickle ball courts. Additional bathroom facilities for both men and women will also be provided along with one separate family restroom that will be unisex. Additional storage room will also be provided to support the new multi-purpose gymnasium. The storage room will housed on the second floor above the restrooms and be accessible by employee only. The existing community center is fully equipped with an automatic sprinkler system and the new addition will also be equipped with an automatic sprinkler system.
   2. The Work also includes all site work, grading, and drainage systems, paving, mechanical, plumbing, electrical, equipment and other work as required as part of the Work.

B. Type of Contract: Project will be constructed under a single prime contract.

C. The Work shall be conducted in a single phase, with the date of Substantial Completion to be as indicated in the Agreement**.**

1.5 OWNER-FURNISHED PRODUCTS

A. Owner will furnish equipment indicated for installation by Contractor. The Work includes providing support systems to receive Owner-furnished equipment and making building services connections.

B. Owner's Responsibilities:

1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
2. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule. Contractor shall work with the Owner & Architect to determine the best possible delivery date.

C. Contractor's Responsibilities:

1. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
2. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
3. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
4. Contractor is responsible for providing time and/or labor for coordination and/or installation of Owner provided items as required for product, unless instructed otherwise.

D. Owner-Furnished Products:

1. Refer to Construction Documents for Items noted to be provided by the Owner

1.6 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site 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 Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to areas where work is permitted.

C. Firearms: No firearms, concealed or otherwise, are permitted on site. Post notice at entrance to site.

1.7 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 6 a.m. to 9 p.m., Monday through Friday, except as otherwise indicated.

1. Weekend Hours: 6 a.m. to 9 p.m.
2. Noise: Comply with local ordinances and other regulatory agency regulations for hours of construction operations that may result in excessive noise.

C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI/CSC's "MasterFormat 2004" numbering system.

B. The Specifications are directed to the Contractor. Requirements expressed as directions are to be performed by Contractor or by sub-contractors under his direction. Occasionally, for clarity, requirements for Work to be performed by Contractor, indirectly by the Contractor, or by Others will be so stated.

C. 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 context. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. 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.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

E. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

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. 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 direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.

C. Related Requirements:

1. Section 012200 "Unit Prices" for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, 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. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

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

1.7 LUMP-SUM ALLOWANCES

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

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

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. Allowance No. 1: Lump-Sum Signage Allowance: Include in the Base Bid a lump-sum allowance of $4,500.00 for all interior and exterior building signage required for the project

B. Allowance No. 2: Lump-Sum Landscape Planting Allowance: Include in the Base Bid a lump-sum allowance of $5,000.00 for landscape planting only as selected by the Owner’s Representative. Other landscaping elements shall be covered in the base bid as specified in the Contract Documents.

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. Section includes administrative and procedural requirements for unit prices for earthwork and replacement of damaged materials at existing building.

B. Related Sections:

1. Section 012600 "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 assumed quantities of Work required by the Contract Documents are increased or decreased.

B. Assumed Quantity: For the purpose of bidding, an estimated quantity or extent of a product, assembly, or portion of the Work that cannot be measured prior to construction, but is reasonably anticipated.

1.4 SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in performing work for which quantities were assumed for purpose of bidding.

B. Coordinate and process submittals Work performed under this section in same manner as for other portions of the Work.

C. Document extent of repair work performed under the assumed quantities. Note on record drawings location of work and actual extent or quantity of work. Photograph areas of damage before repairs. Review extent of work proposed with Architect prior to proceeding with repairs.

D. Submit documentation with Application for Payment and identify as a line item on Schedule of Values.

1. When 80 percent of the assumed quantity of Work is complete, notify Architect.
2. Work in access of the assumed quantities must be authorized by Change Order.

E. Adjustments to Contract Sum will be made on the basis of unit costs, established by the Agreement.

1.5 ASSUMED QUANTITES

A. All costs for performing the assumed quantity or extent of the work are included in the GMP. These costs include materials, delivery, installation, taxes, insurance, equipment rental, and similar costs, and Contractor's overhead and profit. Include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

B. Perform Work under assumed quantities only as authorized. Authorized work includes work required by Drawings and the Specifications and work authorized in writing by Architect.

C. When work is performed and actual quantity or extent is measured, the Contract Sum will be adjusted by Change Order based on Unit Cost indicated in the Agreement.

D. Submit claims for increased costs because of a change in scope or nature of the work described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to assumed quantities.
2. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

1.6 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 schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1 – Unsatisfactory Soil Removal with off-site Disposal:
1. Description: Unsatisfactory soil removal from site and disposal off-site.
2. Unit of Measurement: Cubic yard, measured in situ. Truck counts are not acceptable.

B. Unit Price No. 2 – On-Site Satisfactory Soil Replacement:
1. Description: Soil replacement using satisfactory engineered on-site soil, compacted.
2. Unit of Measurement: Cubic yard, measured in situ. Truck counts are not acceptable.

C. Unit Price No. 3 – Off-Site Satisfactory Soil Replacement:
1. Description: Soil replacement using satisfactory engineered off-site soil, compacted.
2. Unit of Measurement: Cubic yard, measured in situ. Truck counts are not acceptable.

D. Unit Price No. 4 – Rock Removal; Trenching:
1. Description: Trenching in accordance with the earthwork specifications.
2. Unit of Measurement: Cubic yard, measured in situ, of rock trenched. Truck counts are not acceptable.

E. Unit Price No. 5 – Rock Removal; Excavation:
1. Description: Rock excavation in accordance with the earthwork specifications.
2. Unit of Measurement: Cubic yard, measured in situ, of rock trenched. Truck counts are not acceptable.

F. Unit Price No. 6 – #57 Stone:
1. Description: Soil replacement using #57 Stone.
2. Unit of Measurement: Cubic yard, measured in situ. Truck counts are not acceptable.

G. Unit Price No. 7 – Undercutting:
1. Description: Undercutting and disposal off site of unsuitable material below sub-grade elevations in accordance with the earthwork specification.
2. Unit of Measurement: Cubic yard, measured in situ, of undercut material.

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. 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. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. 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: Revise 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 revisions 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. **Alternate No. 1: Florescent Light Fixtures.**

1. Base Bid: Provide LED light fixtures as specified in the Contract Documents. See Electrical Drawings and Specifications for information.

2. Alternate: Provide florescent light fixtures in exchange to the base LED light fixtures as shown in the Contractor Documents. Provide all necessary components required for the conversion. See Electrical Drawings and Specifications for additional information.

B. Alternate No. 2: Structural Double Tee's.

1. Base Bid: Provide structural roof joist and decking as specified in the Contract Documents. See Structural Drawings and Specification for information.

2. Alternate: Provide structural concrete double Tee’s in exchange to the structural roof joist and decking as shown in the Contract Documents. Provide all necessary components required for the conversion. See Structural Drawings and Specifications for additional information.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements: Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of form provided in Project Manual.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination 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 substitution 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 and 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 substitution 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.

3. 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: 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.

1.4 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.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Requested substitution provides sustainable design characteristics that specified product provided for achieving Green Globe prerequisites and credits.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. 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.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice of Award.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
   a. 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.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Requested substitution provides sustainable design characteristics that specified product provided for achieving Green Globe prerequisites and credits.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. 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 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

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. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 10 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.
   e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim 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 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes 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 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit prices.
3. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

1. Coordinate 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. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub schedules showing values coordinated with each phase of payment.

B. Format and Content: Use 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. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
   a. Include separate line items under Contractor and principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
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.
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.

1.3 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. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 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 three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. 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 lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

   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 conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit executed waivers of lien on forms 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. Submittal 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 Architect issues 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: After completing Project closeout requirements, 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 G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
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 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

B. Related Requirements:

1. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

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 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. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
   a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor 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.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect 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 inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
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 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

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 seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 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: Entity responsible for conducting meeting will 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: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. All sub-contractors intending to bid on or who are awarded work on the project are required to attend pre-bid and pre-construction meetings respectively. The purpose of these meetings is to review all air plenum specifications and details including but not limited to pre-construction mock-ups and plenum sealing requirements.
3. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Critical work sequencing and long-lead items.
   c. Designation of key personnel and their duties.
   d. Procedures for processing field decisions and Change Orders.
   e. Procedures for RFIs.
   f. Procedures for testing and inspecting.
   g. Procedures for processing Applications for Payment.
   h. Distribution of the Contract Documents.
   i. Submittal procedures.
   j. Green Globe requirements.
   k. Preparation of record documents.
   l. Use of the premises.
   m. Work restrictions.
   n. Working hours.
   o. Owner's occupancy requirements.
   p. Responsibility for temporary facilities and controls.
   q. Procedures for moisture and mold control.
   r. Procedures for disruptions and shutdowns.
   s. Construction waste management and recycling.
   t. Parking availability.
   u. Office, work, and storage areas.
   v. Equipment deliveries and priorities.
   w. First aid.
   x. Security.
   y. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and 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, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Green Globe requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility problems.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   p. Compatibility of materials.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. 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: Contractor shall conduct progress meetings at biweekly intervals, or as required by stage of construction or request of Owner.

1. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority 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 meeting 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) Status of Green Globe documentation.
   5) Deliveries.
   6) Off-site fabrication.
   7) Access.
   8) Site utilization.
   9) Temporary facilities and controls.
   10) Progress cleaning.
   11) Quality and work standards.
   12) Status of correction of deficient items.
   13) Field observations.
   14) Status of RFIs.
   15) Status of proposal requests.
   16) Pending changes.
   17) Status of Change Orders.
   18) Pending claims and disputes.
   19) Documentation of information for payment requests.

3. Minutes: General Contractor is responsible for conducting the meeting; they will record and distribute the meeting minutes to each party present and to parties requiring information.
   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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. 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. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at monthly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

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, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities 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 commencement of the Work to date of Substantial 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. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
2. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Uninterruptible services.
   c. Partial occupancy before Substantial Completion.
   d. Use of premises restrictions.
   e. Environmental control.
3. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice of Award.
   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.

d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing and commissioning.
j. Punch list and final completion.
k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.

6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. 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 final 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 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Contractor’s use of Architect’s CADD Files

1. Digital Reproduction of Documents and Instruments of Service (CADD Drawings): CADD Drawings are not to be considered Contract Documents as defined by the General Conditions for the Contract for Construction. CADD files on electronic media are available to the Contractor, for specific qualified purposes, from the Architect at fees stipulated below and in accordance with the “CADD File Letter of Agreement” stating Terms and Conditions for release. Only architectural plan files will be available; detail sheet files will not be available. The following per sheet billing rates will apply to Electronic Documents:

Electronic Documents	Autocad® DWG
CADD sheets	$50.00

2. Autodesk®AutoCAD® drawings are represented in the DWG file format. Additional charges for file format conversion may apply. Adobe® PDF files are not modifiable and may be viewed using Adobe Acrobat Reader®, available as a free download at www.Adobe.com.

3. The Contract Documents executed or identified in the Owner Contractor Agreement, shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers.
4. The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without the prior written consent of the Architect.
5. Refer to 'CADD File Letter of Agreement' following this section.

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. Processing Time: Allow 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. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner**,** containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.

o. Indication of full or partial submittal.
p. Transmittal number, numbered consecutively.
q. Submittal and transmittal distribution record.
r. Other necessary identification.
s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.
   e. .

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Resubmittals: Make resubmittals in same form and number of copies 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 with approval notation from Architect's action stamp.

H. 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.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

J. Use for Project Record Documents: Retain complete copies of submittals for Owner’s record and present for final project closeout.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.
   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Certificates and Certifications Submittals: Provide a 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.
   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.

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 published 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. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.

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 based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
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 42 inches .
3. Submit Shop Drawings in the following format:
   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 applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. 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.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
      1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:
   a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

L. Green Globe Submittals: Comply with requirements specified in Division 01 sustainable design requirements Section.

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit 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.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit 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.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

V. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

W. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

X. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Y. Field Test Reports: Submit written reports 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.

Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 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.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic 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. Action and Informational Submittals: 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. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."

C. 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 revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. Reviewed: Contractor may proceed.
2. Revise as Noted: Contractor may proceed in accordance with notations provided.
3. Revise and Resubmit: Revise submittal and resubmit prior to proceeding.
4. Rejected: Submittal not acceptable

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. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal 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 SUMMARY

A. 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. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction (AHJ) are not limited by provisions of this Section.

C. Related Requirements: Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and to substantiate that proposed construction will comply with requirements.

B. 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. Services do not include contract enforcement activities performed by Architect.

C. 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.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. 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, 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).

I. Experienced: When used with an entity or individual, "experienced" 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.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards 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 a decision 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.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. 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. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
11. Name and signature of laboratory inspector.
12. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. 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.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. 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.

C. 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.

D. 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.

E. 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 products that are similar in material, design, and extent to those indicated for this Project.

F. 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.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 ; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's 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.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these 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.

2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. 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.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. 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:

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.

G. 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.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews 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.

B. Air Plenum Testing: Special inspections must be conducted by an independent quality auditor or commissioning agent to ensure that plenum sealing work is performed by all subcontractors in compliance with specifications and drawings. Inspections shall occur as work progresses and whenever possible in the presence of a representative from the general contractor. Reports of inspections will be submitted to the general contractor.

1. The constructed plenum is to be inspected and tested by an independent commissioning agent for air leakage to verify that it was constructed and sealed in accordance with specifications and drawings including meeting the air leakage requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: 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 revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority'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.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

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 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

IAPMO	International Association of Plumbing and Mechanical Officials
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

COE	Army Corps of Engineers
CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration
PBS	Public Buildings Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USDA	Department of Agriculture
USPS	Postal Service

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board
CFR	Code of Federal Regulations Available from Government Printing Office
FED-STD	Federal Standard (See FS)
FTMS	Federal Test Method Standard (See FS)

UFAS Uniform Federal Accessibility Standards
Available from Access Board

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements: Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Are not required, Contractor may use space within the building for construction project management.

B. Common-Use Field Office space within the building: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep area clean and orderly.

2.2 EQUIPMENT

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

B. HVAC Equipment: Owner authorizes use of permanent HVAC system.

1. Use of permanent HVAC system for temporary use during construction, provide filter with MERV 8 rating at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."

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: Connect to and extend existing service as needed.

B. Sewers and Drainage: Connect sewers to existing building system.

C. Water Service: Connect to existing building system.

D. Sanitary Facilities: Use Owner’s existing facilities. If temporarily taken out of service provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use Owner’s existing system, provide by-passes and extend temporary power as needed.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:
   a. Provide a dedicated telephone line for each facsimile machine in each field office.
2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. Electronic Communication Service: Provide a desktop or laptop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications.

B. General: Comply with the following:
1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

C. Parking: Use areas designated by Owner for parking areas for construction personnel. Do not park in adjacent garage.

D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as required by the owner or architect.
2. Temporary Signs: Provide other signs as indicated and as required informing public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.

E. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

E. 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; manage fire prevention program.

1. Prohibit smoking in construction 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.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

3.6 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. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

C. 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. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean 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 SUMMARY

A. 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; and comparable products.

B. Related Requirements: Division 01 Section "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. 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 determine compliance with the Contract Documents and to determine 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. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
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.

1.6 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.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 33. Sections for specific content requirements and particular requirements for submitting special warranties.

C. 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, are undamaged and, unless otherwise indicated, 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. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
   b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
   b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated 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 requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Division 01 Section "Summary" for limits on use of Project site.
2. Division 01 Section “Cutting and Patching”
3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor .

D. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

1.3 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. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. 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 result in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or 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.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements of Division 01 sustainable design requirements Section.

B. In-Place Materials: Use materials for patching 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 provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, 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; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. 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.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

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 limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. 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 rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

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. 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.

B. 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.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

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.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. 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.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

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.

I. 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.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Comply with requirements of Section 017329 – Cutting and Patching.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. 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 waste materials more than seven days during normal weather or three 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. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. 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.

I. 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.

J. 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.

3.8 STARTING AND ADJUSTING

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

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

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: 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.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition waste.
2. Disposing of nonhazardous construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate salvage of materials, including the following:

1. Lamp posts.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Green Globe Submittal: letter template for Credit signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator.

1.6 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within ten days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Are not permitted on Project site.

C. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

D. General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. 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. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
3. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
4. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit test/adjust/balance records.
6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. 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.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

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

B. Inspection: Submit a written request for final inspection to determine 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.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:
   a. MS Excel electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: 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, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-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.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

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.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project areas disturbed by construction activities, including waste material, litter, and other foreign substances.
   b. Remove tools, construction equipment, machinery, and surplus material from Project site.
   c. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances
   d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, and similar spaces.
   e. Sweep concrete floors broom clean in unoccupied spaces.
   f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   h. Remove labels that are not permanent.
   i. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   l. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   m. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Division 01 Section "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.
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 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 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. Use designations for systems and equipment indicated on Contract Documents.
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. Use designations for products indicated on Contract Documents.
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 PRODUCT MAINTENANCE MANUALS

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 and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard 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 video recording, 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.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. 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.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. 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.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. 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 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Initial Submittal:
      1) Submit PDF electronic files of scanned record prints and one set of file prints.
      2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   b. Final Submittal:
      1) Submit PDF electronic files of scanned record prints and one set of prints.
      2) Print each drawing, whether or not changes and additional information were recorded.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

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 provide information for preparation of corresponding 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. Record data as soon as possible after obtaining it.
   c. Record and check the markup before enclosing concealed installations.
2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

4. Note Construction Change Directive numbers, 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. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

2.2 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.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

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 revisions to project record documents as they occur; do not wait until 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 SUMMARY

A. 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.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and 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. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 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.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for 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 as applicable to the system, equipment, or component:

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 training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

   1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

   1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 017900

SECTION 024116 - STRUCTURE DEMOLITION

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. Demolition and removal of site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.
4. Salvaging items for reuse by Owner.

1.3 DEFINITIONS

A. Demolish: Completely remove and legally dispose of off-site.

B. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

C. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.

1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.

C. Schedule of Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping or re-routing of utility services.

D. Demolition Plans: Drawings indicating the following:

1. Locations of temporary protection and means of egress for adjacent occupied buildings.

E. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

F. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

G. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before the Work begins.

H. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

J. Minutes of predemolition conference.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

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.

E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demolition including, but not limited to, the following:

1. Review requirements of the authorities having jurisdiction.
2. Review drawings, specifications and contract requirements.
3. Inspect and discuss condition of construction to be demolished.
4. Review structural load limitations of existing structures.
5. Review and finalize demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.

6. Review and finalize protection requirements.
7. Review procedures for noise control and dust control.
8. Review procedures for protection of adjacent buildings.
9. Review items to be salvaged and returned to Owner.

1.7 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. On-site storage or sale of removed items or materials is not permitted.

1.8 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations and operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. 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. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents, where available, of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations. Comply with Division 01 Section "Photographic Documentation."

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during demolition operations.

E. Verify that hazardous materials, if present, have been remediated before proceeding with demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
   1. Arrange to shut off indicated utilities with utility companies.
   2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
   3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

   1. Strengthen or add new supports when required during progress of demolition.

D. Salvaged Items: Comply with the following:

   1. Clean salvaged items of dirt and demolition debris.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to storage area designated by Owner.
   5. Protect items from damage during transport and storage.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

    a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection as required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around demolition area and to and from occupied portions of adjacent buildings and structures as required.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures as required to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least 2 hours after flame cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: During demolition, perform surveys as required to detect hazards that may result from demolition activities.

C. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, 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.
2. Use water mist and other suitable methods where necessary to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

D. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Salvage: Items to be salvaged are indicated on Drawings.

D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

E. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition operations with satisfactory soil materials according to backfill requirements in Section titled "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.

END OF SECTION 024116

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Demolition and removal of selected building elements.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREDEMOLITION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Predemolition Photographs or Video: Submit before Work begins.

C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

D. Survey of Existing Conditions: Record existing conditions by use of pre-demolition photographs.

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove components indicated to be removed.
   a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 034100 - PRECAST STRUCTURAL CONCRETE

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. Precast structural concrete with commercial architectural finish.

1.3 DEFINITIONS

A. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by Architect.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and, if required, water-absorption tests.

C. Shop Drawings:

   1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
   2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
   3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
   4. Indicate separate face and backup mixture locations and thicknesses.
   5. Indicate type, size, and length of welded connections by AWS standard symbols.
   6. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
   7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
   8. Include and locate openings larger than 10 inches. Where additional structural support is required, include header design.

9. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
10. Indicate relationship of precast structural concrete units to adjacent materials.
11. Indicate shim sizes and grouting sequence.
12. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

D. Samples:

1. For each type of finish indicated on exposed surfaces of precast structural concrete units with architectural finish, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.

   a. Where other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

E. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Show precast structural concrete unit types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement.

2. Show bracing of panels to include “deadmen” temporary footings, connection to panels, and connections to footings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **fabricator**.

B. Welding certificates.

C. Material Certificates: For the following:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Insulation.
6. Structural-steel shapes and hollow structural sections.

D. Material Test Reports: For aggregates, by a qualified testing agency.

E. Preconstruction test reports.

F. Source quality-control reports.

G. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a PCI-certified plant as follows:

a. Group C, **Category C3 - Prestressed Straight Strand Structural Members**.

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

E. Sample Panels: After sample approval and before fabricating precast structural concrete units with **architectural finish**, produce a minimum of **two** sample panels approximately **16 sq. ft.** in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

1. Locate panels where indicated or, if not indicated, as directed by Architect.
2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
3. After approval of repair technique, maintain one sample panel at fabricator's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
4. Demolish and remove sample panels when directed.

1.8 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.

B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
2. Place adequate dunnage of even thickness between each unit.
3. Place stored units so identification marks are clearly visible, and units can be inspected.

C. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

D. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design precast structural concrete units.

B. Design Standards: Comply with ACI 318 and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

C. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
1. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318 (ACI 318M).

a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of **120 deg F.**

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

B. Surface Retarder: Chemical set retarder, capable of temporarily delaying setting of newly placed concrete mixture to depth of reveal specified.

2.3 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from **ASTM A 615/A 615M, Grade 60,** deformed bars, assembled with clips.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from **as-drawn steel** wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M or ASTM A 1064/A 1064M, flat sheet.

F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.4 PRESTRESSING TENDONS

A. Pretensioning Strand: **ASTM A 416/A 416M, Grade 250 or Grade 270, uncoated, seven-wire** low-relaxation strand.

B. Unbonded Post-Tensioning Strand: ASTM A 416/A 416M, Grade 270, uncoated, seven-wire, low-relaxation strand.

1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.7 and sheath with polypropylene tendon sheathing complying with ACI 423.7. Include anchorage devices and coupler assemblies.

C. Post-Tensioning Bars: ASTM A 722/A 722M, uncoated high-strength steel bar.

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Metakaolin: ASTM C 618, Class N.
3. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with **Class 5S**. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

   a. Gradation: **Uniformly graded**.

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate to match approved finish sample.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing Admixture: ASTM C 1017/C 1017M, Type I.
8. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
9. Corrosion-Inhibiting Admixture: ASTM C 1582/C 1582M.

2.6 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.

C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.

D. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.

E. Carbon-Steel Structural Tubing: ASTM A 500/A 500M, Grade B or Grade C.

F. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.

G. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.

H. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 and hardened carbon-steel washers, ASTM F 436.

I. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply **SSPC-Paint 25** according to SSPC-PA 1.

J. Welding Electrodes: Comply with AWS standards.

K. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.7 BEARING PADS

A. Provide one of the following bearing pads for precast structural concrete units **as recommended by precast fabricator for application**:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi, ASTM D 412.

2.8 ACCESSORIES

A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install structural precast concrete units.

2.9 GROUT MATERIALS

A. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

2.10 INSULATED FLAT-WALL PANEL ACCESSORIES

A. Expanded-Polystyrene Board Insulation: ASTM C 578, Type X, 1.30 lb/cu. ft. (21 kg/cu. m); square edges; with thickness of 4 inches (R-18 min).

B. Wythe Connectors: **Glass-fiber-reinforced vinylester connectors**, **Polypropylene pin connectors**, **Fiberglass trusses** manufactured to connect wythes of precast concrete panels.

2.11 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

2. Limit use of fly ash to 25 percent replacement of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion **face and backup mixtures or full-depth mixtures, at fabricator's option** by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: For structural precast concrete with an architectural finish, limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.12 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.

B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces of structural precast concrete with an architectural finish that is exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly **chamfered**.

2.13 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.

1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete unit.
2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.

4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
5. Protect strand ends and anchorages with a minimum of 1-inch- thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.

H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

J. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

K. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

L. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.

M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.

N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.14 CASTING INSULATED WALL PANELS

A. Cast, screed, and consolidate wythe supported by mold.

B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.

C. Ensure bottom wythe and insulation layer are not disturbed after bottom wythe reaches initial set.

D. Cast, screed, and consolidate top wythe to meet required finish.

E. Maintain temperature below 150 deg F in bottom concrete wythe.

2.15 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.16 COMMERCIAL ARCHITECTURAL FINISHES

A. Manufacture member faces free of joint marks, grain, and other obvious defects with corners, including false joints, uniform and straight. Finish exposed-face surfaces of precast concrete units to match approved **sample panels** and as follows:

1. As-Cast-Surface Finish: Provide surfaces to match approved sample or mockup for acceptable surface, air voids, sand streaks, and honeycomb.
2. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
   (See drawings for locations)

   a. Light Sand Blast
   b. Medium Sand Blast

2.17 SOURCE QUALITY CONTROL

A. Testing Agency: **Owner will engage** a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.

1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712/C 1712M.

1. Test and inspect self-consolidating concrete according to PCI TR-6.

C. Strength of precast structural concrete units is considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.

D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, employ a qualified testing agency to obtain, prepare,

and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.

1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
2. Test cores in an air-dry condition or, if units are wet under service conditions, test cores after immersion in water in a wet condition.
3. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
4. Report test results in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports include the following:

    a. Project identification name and number.
    b. Date when tests were performed.
    c. Name of precast concrete fabricator.
    d. Name of concrete testing agency.
    e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Do not install precast concrete units until supporting, cast-in-place concrete has attained minimum allowable design compressive strength and until supporting steel or other structure is structurally ready to receive loads from precast concrete units.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.

1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

1. Do not permit connections to disrupt continuity of roof flashing.

D. Field cutting of precast units is not permitted without approval of Architect.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1-mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780/A 780M.
3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:

a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
c. Twist-off Tension Control Bolt: ASTM F 1852.
d. Direct-Tension Control Bolt: ASTM F 1852.

3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.

H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

1. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces.
2. Fill joints completely without seepage to other surfaces.
3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
4. Place grout end cap or dam in voids at ends of hollow-core slabs.
5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
6. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: **Owner will engage** a qualified special inspector to perform the following special inspections:

1. Erection of precast structural concrete members.

B. Testing Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.

C. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

G. Prepare test and inspection reports.

3.5 REPAIRS

A. Repair precast structural concrete units if permitted by Architect.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.6 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

SECTION 055100 - METAL PAN STAIRS

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. Preassembled steel stairs with concrete-filled formed-metal treads.
2. Nonslip-Aggregate Concrete Finish.
3. Steel railings attached to metal stairs.
4. Steel handrails attached to walls adjacent to metal stairs.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

1.4 ACTION SUBMITTALS

A. Product Data: For metal pan stairs and the following:

1. Metal-pan-stair treads.
2. Abrasive nosings.
3. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings .

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs and railings.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

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

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

2.3 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

D. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

2.4 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

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

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

D. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

E. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 PRECAST CONCRETE TREADS

A. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a total air content of not less than 4 percent or more than 6 percent.

B. Reinforcement: Galvanized, welded wire reinforcement, 2 by 2 inchesby 0.062-inch- diameter wire; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.8 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel tubes.

   a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel ubet headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld[or bolt] stringers to headers; weld[or bolt] framing members to stringers and headers.[If using bolts, fabricate and join so bolts are not exposed on finished surfaces.]
4. Where stairs are enclosed by gypsum board[shaft-wall] assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Steel Sheet: Uncoated cold-rolled steel sheet[unless otherwise indicated].
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they are concealed by concrete fill. Do not weld risers to stringers.
3. Shape metal pans to include nosing integral with riser.
4. At Contractor's option, provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.
5. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slip-resistant, abrasive surface.
6. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

D. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness [needed to comply with performance requirements, but not less than 0.097 inch] [indicated].

1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
2. Directly weld risers and treads to stringers; locate welds on underside of stairs.
3. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
4. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

2.9 STAIR RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Rails and Posts: 1-1/2-inch-square top and bottom rails and 1-1/2-inch- square posts.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for [Type 1 welds: no evidence of a welded joint] [Type 2 welds: completely sanded joint, some undercutting and pinholes are okay] [Type 3 welds: partially dressed weld with spatter removed] [Type 4 welds: good quality, uniform undressed weld with minimal splatter] as shown in NAAMM AMP 521.

C. Form changes in direction of railings as follows:

1. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
2. By inserting prefabricated elbow fittings of radius indicated.

D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inchor less.

G. Connect posts to stair framing by direct welding unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
2. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
3. Provide type of bracket [with flange tapped for concealed anchorage to threaded hanger bolt] [with predrilled hole for exposed bolt anchorage] and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.10 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor posts to steel by [welding] [or] [bolting] to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction[as required to comply with performance requirements.][as follows:]

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed partitions, use hanger or lag bolts set into [fire-retardant-treated]wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055113

SECTION 055213 - PIPE AND TUBE RAILINGS

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: Steel pipe and tube railings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards:
   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
   b. Infill load and other loads need not be assumed to act concurrently.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified professional engineer.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

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

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

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

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed).

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. General: Provide the following:

1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

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

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

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

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

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

D. Shop Primers: Provide primers that comply with Division 09 Section "High-Performance Coatings."

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form changes in direction as follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.

J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings: Exterior railings and where indicated.

1. Hot-dip galvanize steel and iron railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with primers specified in Division 09 Section "High-Performance Coatings."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

3.5 ATTACHING RAILINGS

A. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
5. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "High-Performance Coatings."

3.7 PROTECTION

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

END OF SECTION 055213

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Wood blocking.
2. Wood furring.
3. Plywood backing panels.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

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

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

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

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood blocking, furring, and similar concealed members in contact with concrete.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking and furring.
2. Plywood backing panels.
3. Plywood panels as noted on drawing “Wall Types” sheets.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 3 grade; SPIB.
2. Hem-fir or hem-fir (north), Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 3 Common grade; NELMA.
5. Northern species, No. 3 Common grade; NLGA.
6. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood panels, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

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

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

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

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

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

1. Use for interior locations unless otherwise indicated.

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

1. Use where indicated.

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

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

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring and Sleepers to Concrete: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing

system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

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

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Wall sheathing.
   2. Flexible flashing at openings in sheathing.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Product: Subject to compliance with requirements, provide one of the following:
   1. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
      a. "Dens-Glass Gold" by G-P Gypsum Corporation.
      b. "GlasRoc" by CertainTeed (formerly BPB).
      c. eXP Sheathing by National Gypsum.
      d. “Securock” by USG.
   2. Type and Thickness: Regular, 1/2 inch, or Type X, 5/8 inch thick, where required as part of a fire-resistance-rated assembly indicated or as indicated on the drawings.
   3. Size: 48 by 96 inches.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.

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

C. Power-Driven Fasteners: NES NER-272.

D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
   1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
   2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.3 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.

b. MFM Building Products Corp.; Window Wrap.
c. Polyguard Products, Inc.; Polyguard 300.
d. Protecto Wrap Company; PW100/40.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
   1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

B. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
   1. Fasten gypsum sheathing to cold-formed metal framing with screws.
   2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
   3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
   1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer's written instructions.
   1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

2. Install sheathing tape just prior to the installation of the insulation system to avoid UV degradation due to lengthy exposure to the elements.

3.3 FLEXIBLE FLASHING INSTALLATION

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

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets
2. Solid-surface countertops

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 ACTION SUBMITTALS

A. Product Data: For solid-surfacing material cabinet hardware and accessories and finishing materials and processes.

B. Green Globes Submittals:

1. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates: Chain-of-custody certificates indicating that interior architectural woodwork complies with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
3. Product Data: For installation adhesives, documentation including printed statement of VOC content.
4. Product Data: For composite wood products and adhesives, documentation indicating that products contain no urea formaldehyde.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

D. Samples:

1. Plastic-laminates, for each type, color, pattern, and surface finish.
2. Solid-surfacing materials.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. Wood Products:

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Manufacturers: Basis-of –Design: Subject to compliance with requirements, provide Corian solid surface by DuPont, or a comparable product by one of the following:
   a. Avonite, Inc.
   b. Formica Corporation.
   c. Nevamar Company, LLC; Decorative Products Div.
   d. Transolid, Inc.
   e. Wilsonart International; Div. of Premark International, Inc.

2.2 MISCELLANEOUS MATERIALS

A. Adhesives, General: Adhesives shall not contain urea formaldehyde.

B. VOC Limits for Installation Adhesives: Installation adhesives hall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: As indicated.
2. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:
   a. Horizontal Surfaces Other Than Tops: Grade HGL.
   b. Vertical Surfaces: Grade HGS.
   c. Edges: Grade HGS.
   d. Doors and Drawer fronts: 3mm PVC edge banding
3. Materials for Semi-exposed Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
4. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of solid colors, patterns, gloss and matte finish.

C. Solid-Surfacing-Material Countertops:

1. Solid-Surfacing-Material Thickness: 3/4 inch.
2. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
3. Fabricate tops in one piece with loose backsplashes for field application. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
4. Install under mount sink bowls in countertops in field.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork.

B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:

1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141 or Roller catches, BHMA A156.9, B03071.

E. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches high or 24 inches wide.
4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches high and 24 inches wide.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.

F. Cabinets:

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-adhering modified bituminous sheet waterproofing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. American Hydrotech, Inc.; VM75.
   b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
   c. Grace, W. R., & Co. - Conn.; Bituthene 3000/Low Temperature or Bituthene 4000.
   d. Henry Company; Blueskin WP 100/200.
   e. Meadows, W. R., Inc.; SealTight Mel-Rol.
2. Physical Properties:

a. Tensile Strength, Membrane: 250 psi minimum; ASTM D 412, Die C, modified.
b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
g. Water Vapor Permeance: 0.05 perms maximum; ASTM E 96/E 96M, Water Method.

3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/8 inch, nominal.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

PART 3 - EXECUTION

3.1 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Prepare surfaces and install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets, if ambient or substrate temperature is higher than 60 deg F.

D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

E. Seal edges of sheet-waterproofing terminations with mastic.

F. Immediately install protection course with butted joints over waterproofing membrane.

3.2 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071326

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation
2. Sound Attenuation Batts
3. Glass-fiber blanket insulation.
4. Mineral-wool blanket insulation.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. DiversiFoam Products.
   b. Dow Chemical Company (The).
   c. Owens Corning.
   d. Pactiv Building Products.
2. Type IV, 25 psi, 1.6 lb./cu. ft. minimum density, unless otherwise indicated.
3. Provide manufacturer's standard shiplap or tongue and groove edges on vertical applications below grade and over exterior sheathing on metal stud cavity wall assembly.
4. Thickness: As indicated on Drawings.
5. Thermal Resistance, per ASTM C518, at 75 deg. F mean temperature shall be R-5 per inch.

B. Adhesive for Bonding Insulation: Product recommended and approved by insulation manufacturer, with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates and complying with other listed performance characteristics.

2.2 SOUND ATTENUATION BATTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.

4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 10 and 10, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Fire Resistance Ratings: Passes ASTM E 119 as part of a complete fire tested wall assembly. Dimensional Stability: Linear Shrinkage less than 0.1%.

2.3 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

C. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. Owens Corning.
2. Thermafiber.

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

C. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.3 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.4 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass.
2. Maintain cavity width of dimension indicated between insulation and glass.
3. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

END OF SECTION 072100

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

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 fluid-applied, vapor-retarding membrane air barriers.

B. Related Requirements: Section 061600 "Sheathing" for wall sheathing.

1.3 DEFINITIONS

A. ABAA: Air Barrier Association of America.

B. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

C. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

D. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints, penetrations and junctions to abutting construction, to control air movement through the wall.

1.4 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier meets ABAA performance for vapor-retarding air barrier assemblies.

C. Air Barrier Assembly Air Leakage: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57 lbf/sq. ft.; ASTM E 2357.

D. Water Resistance: Material shall resist 21.6 in water for 5 hours before and after aging when tested per ICC-ES 212.

E. Nail Seal ability: Material shall allow no water found on nail shanks, on underside of sheathing and/or between sheathing and product coating when tested per ASTM D 1970.

F. Flammability**:** Material shall allow a Flame Spread of less than 25 and Smoke Development of less than 450 when tested per ASTM E 84.

G. Adhesion: Material shall exhibit a minimum adhesion of 15 psi when tested per ASTM D 4541.

H. Compatibility: Material shall be compatible with adjacent materials.

I. UV Stability: Material shall survive a minimum of 6 months UV Exposure during construction.

J. System Continuity: Material Manufacturer shall provide materials/system for an interface with windows, door and other penetrations that integrate into a compatible and continuous air barrier assembly.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.
2. Include Owner, Architect, Installer, Manufacturer's technical representative, and installers of other construction affecting or connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
3. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. NFPA-285 Assembly testing report.

C. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.8 QUALITY ASSURANCE

A. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified system and qualified to determine Installer's compliance with the requirements of this Project.

B. A firm with three to five years experience in applying air barrier materials similar in material, design, complexity, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

D. Installer Limitations: Each type of air barrier system material, fluid-applied and sheet membrane shall be installed by a single installation firm.

E. All associated products used in conjunction with air barrier membranes and forming an integral part of the waterproofing system must be furnished and approved by the air barrier manufacturer and covered by the applicable total system warranties.

F. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly , min. of 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
   a. Coordinate construction of mockups to permit inspection by Owner's testing agency of air barrier before external insulation and cladding are installed.
   b. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Mockup: freestanding wall assembly mockup panel or can be part of the building wall assembly but will need to be removed if mock up is not acceptable.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in their original undamaged packages, with labels intact and legible.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Protect stored materials from direct sunlight.

E. Store materials according to manufacturer's written instructions.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

B. Product/system selection shall be coordinated with construction sequence to ensure that manufacturer’s exposure limits are adequate for anticipated schedule. Air barrier membrane exposed beyond the manufacturer’s exposure limits shall be recoated per manufacturer’s recommendations/instructions, reinspected and reapproved at Contractor’s own expense.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of air barrier material, fluid-applied and sheet membrane, and all related products needed to complete the air barrier membrane building envelope, through one source from a single manufacturer.

B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 VAPOR-RETARDING MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: synthetic polymer membrane.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Synthetic Polymer Membrane:
      1) Prosoco R-Guard VB;
      2) Carlisle Barritech NP
      3) BASF, Enershield-1
2. Physical and Performance Properties:
   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Vapor Permeance: Maximum 0.1 perm; ASTM E 96/E 96M.
   c. Flame Spread Index: Maximum 25; ASTM E-84
   d. Smoke Generation Index: Maximum 200; ASTM E-84
   e. Minimum 180 days UV Exposure

2.4 ACCESSORY MATERIALS

A. General: Not all items listed are required by every manufacture or system. Provide accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material and substrate.

B. Primer: As recommended for substrate by air-barrier material manufacturer.

C. Counterflashing Strip: As recommended for substrate by air-barrier material manufacturer.

D. Butyl Strip: As recommended for substrate by air-barrier material manufacturer.

E. Joint Reinforcing Strip: As recommended for substrate by air-barrier material manufacturer.

F. Substrate-Patching Membrane: As recommended for substrate by air-barrier material manufacturer.

G. Adhesive and Tape: As recommended for substrate by air-barrier material manufacturer.

H. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

I. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

J. Transition Strip: As recommended for substrate by air-barrier material manufacturer.

K. Adhesive-Coated Transition Strip: As recommended for substrate by air-barrier material manufacturer.

L. Elastomeric Flashing Sheet: As recommended for substrate by air-barrier material manufacturer.

M. Joint Sealant: Polyeither based, Butyl based or other manufacturer tested and approved compatible sealant."

N. Termination Mastic: As recommended for substrate by air-barrier material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 GENERAL

A. Installation/application methods vary between manufacturers and systems. Comply with manufacturers installation instructions and applicable procedures listed herein.

3.4 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions.

3.5 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip or elastomeric flashing sheet so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.

2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, counterflashing strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.6 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

1. Apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.

1. Vapor-Retarding Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 10-mil dry film thickness, applied in one or more equal coats.

C. Apply strip and transition strip according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.

3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests: As determined by Owner's testing agency from among the following tests:

1. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 2357.
2. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 15 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.8 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 180 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074610 – FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This Section includes the following:

1. Fiber cement siding.
2. Fiber cement panels.

1.3 ACTION SUBMITTALS

Product Data: For each type of product specified. Include identification of materials; dimensions of individual components; installation instructions; and available profiles, textures, and colors.

Samples: Full-size units of each type of siding and trim indicated; in sets for each color, texture, and pattern specified.

1. 12-inch- long-by-actual-width sample of siding.
2. 12-inch- long-by-actual-width sample of trim.

1.4 INFORMATIONAL SUBMITTALS

Product Certificates: For each type of siding, from manufacturer.

Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

Research/Evaluation Reports: For each type of siding required, from the ICC.

Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who has completed siding installations similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.

Mockups: Before installing siding, construct sample wall panels to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups as shown and to comply with the following requirements, using materials indicated for the completed Work.

1. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
2. Obtain Architect's approval of mockups before proceeding with siding installation.
3. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials to Project site in manufacturer's unopened packages or bundles with labels intact.

Store materials in a dry, well-ventilated, weathertight place. Comply with manufacturer's written instructions for storage, handling, and protection.

1.7 PROJECT CONDITIONS

Weather Limitations: Proceed with siding installation only if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions and if substrate is completely dry.

1.8 WARRANTY

General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Project Warranty: Submit a written warranty, executed by siding manufacturer, agreeing to repair or replace siding that fails in materials or workmanship within the specified warranty period.

1. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 color-difference units as measured according to ASTM D 2244.

1.9 EXTRA MATERIALS

Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish full lengths of siding in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide Fiber Cement Siding by one of the following:

1. James Hardie Building Products.
2. Cemplank, Inc.
3. CertainTeed Corporation.

2.2 SIDING

Fiber Cement Siding: Asbestos free, fiber cement siding complying with ASTM C1186, Type A, Grade II, and as follows:

1. Width: 7 1/2 inches.
2. Exposure: 5-1/4-inch exposure.
3. Texture: to match existing building (verify in field).
4. Thickness: 5/16-inch nominal.
5. Finish: Factory prime painted.
6. Combustibility: Non-combustible in accordance with ASTM E136.
7. Surface Burning Characteristics: Maximum Flame Spread 0, Fuel Contributed 0, Smoke Developed 5 when tested in accordance with ASTM E84

Fiber Cement Panel with Reveal Joints, noncombustible fiber-cement panel siding defined by ASTM C1186, Type A, Grade II and as follows:

8. Width: 47-1/2 inches
9. Length: 95-1/2 inches
10. Thickness: 7/16 inch
11. Texture: smooth
12. Finish: factory prime painted
13. Combustibility: Non-combustible in accordance with ASTEM E136

2.3 ACCESSORIES

Siding Accessories: Provide 1/4-inch lath starter strip, and other items as recommended by manufacturer for building configuration and type of siding.

Sealant: As specified in Section 079200.

Fasteners:

1. Screws for Siding: 5/16 min. No. 8-18 x 1 1/4-inch long x.0375-inch HD, self-drilling, corrosion-resistant ribbed, phil-wafer screws.
2. Screws for Accessories: Stainless steel, size and lengths as approved by manufacturer for accessory pieces.

Furring Strips: 3/4 inch Z-clips or manufacturer standards @ 16” o.c.

Horizontal and Vertical Reveals: Provide manufactures standards for reveals or provide reveals by Fry Reglet, Inc. for reveals indicated on the Contract Documents.

2.4 COLORS AND TEXTURES

Where manufacturer's standard products are indicated, provide siding and accessories complying with the following requirements:

1. Provide Architect's selections from manufacturer's full range of colors and textures for siding and accessories of type indicated. Accessories may be required to match siding or to be of a different color or texture as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of siding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Clean substrates of projections and substances detrimental to application.

Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

3.3 INSTALLATION

General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply. Overlap joints to shed water away from direction of prevailing wind.

1. Wind Resistance: Where a specified level of wind resistance is required, fiber cement lap siding is installed to framing members and secured with fasteners described in Table No. II in National Evaluation Service Report No. NER-405.

2. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.

Fiber Cement Siding:

1. Starting and Joining Methods: Install a minimum ¼” thick lath starter strip at the bottom course of the wall. Planks are applied horizontally with 1-1/4” wide laps at the top. The bottom edge of the first plank overlaps the starter strip. The vertical joints of the planks shall align over framing members or studs.

2. Off-Stud Splices: When vertical joints occur between stud or framing members, an off-stud metal joiner is utilized. The metal joiner is positioned so that the bottom lip is resting on the solid course of planks. The plank is then fastened to the framing. The abutting plank is positioned and fastened into place, ensuring that the lower edges of the two planks align. The metal joiner is located centrally behind the joint. Off-stud splices shall be located a minimum of two stud cavities from wall corners. Successive splices within the same plank course shall be located no closer than 48 inches. Splices shall be a least one stud cavity away from window and door openings. All splices shall be staggered at minimum 24-inch intervals when located in the same wall cavity.

Fiber Cement Panel with Reveal Joints:

1. Install materials in strict accordance with manufacturer's installation instructions.

2. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.

3. Install cavity vent strips along the bottom edge of framing or sheathing. Install furring over sheathing attaching to framing members.
4. Apply caulking over furring. Only apply enough caulking for one panel at a time.

5. Install first panel at the bottom corner working across and up. Ensure panels are square and level. Fasten bottom half of panel.

6. Apply caulking to horizontal “T” backing strip and insert over top of panel just installed.

7. Install second panel using 1/2 inch (13 mm) spacers at vertical joints. Fasten bottom half of second panel and finish attaching first panel.

8. Install a kickout flashing to deflect water away from the siding at the roof intersection.

9. Install a self-adhering membrane on the wall before the subfascia and trim boards are nailed in place, and then install the kickout.

10. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer’s installation instructions.

11. Maintain clearance between siding and adjacent finished grade.

12. All field cut edges shall be primed or sealed during the installation process using an exterior grade primer or sealer which is compatible with the type of paint to be used.

13. Specific framing and fastener requirements refer to the applicable building code compliance reports.

3.4 ADJUSTING AND CLEANING

Remove and replace damaged, improperly installed, or otherwise defective siding materials with new materials complying with specified requirements.

Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074610

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Mechanically Fastened TPO membrane roofing system.

1.2 PERFORMANCE REQUIREMENTS

A. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color specified.
2. Roof paver in each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

B. Research/evaluation reports.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product.

B. Source Limitations: Obtain components including roof insulation fasteners and walk pads for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

C. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

D. Preinstallation Roofing Conference: Conduct conference at Project site.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Carlisle SynTec Incorporated.
   b. GAF Materials Corporation.
   c. Johns Manville.
   d. Firestone
2. Thickness: 60 mils minimum, nominal.
3. Color: White

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Plastic Foam Adhesives: 50 g/L.
   b. Gypsum Board and Panel Adhesives: 50 g/L.
   c. Multipurpose Construction Adhesives: 70 g/L.
   d. Fiberglass Adhesives: 80 g/L.
   e. Single-Ply Roof Membrane Adhesives: 250 g/L.
   f. Other Adhesives: 250 g/L.
   g. Single-Ply Roof Membrane Sealants: 450 g/L.
   h. Nonmembrane Roof Sealants: 300 g/L.
   i. Sealant Primers for Nonporous Substrates: 250 g/L.
   j. Sealant Primers for Porous Substrates: 775 g/L.

B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.4 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.

C. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch.

D. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application or an additional layer of the 80 mil TPO sheet fully adhere as a protection layer.

PART 3 - EXECUTION

3.1 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

F. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.2 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

A. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.

B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.

D. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

E. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten TPO sheet to roof deck.

F. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.3 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.4 WALKWAY/PROTECTION SHEET INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

3.6 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Provide daily cleaning to include but not limited to: Picking up and storing all lose items, sweeping clean roof surface and removal and cleaning of all stains and spills prior to stopping of work for the day.

D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction

3.7 PATCHING LIMITATIONS & FINAL CLEANING REQUIREMENTS

A. Patching Restrictions: No more than 5 (in field) patches and no more than a total of 4 linear feet of seam patching per 100 sq. ft. of roof's total sq. footage and no more than 5 patches and no seam patches exceeding a total of 4 linear feet in any 100 sq. ft roofing area as determined by Owner. Seam patches shall be minimum 8" wide and 24" long strip patch. Manufacturer required circular seam intersection patches shall not be considered when calculating number of patches. Typical patch size shall be minimum 6" square with rounded corners or as recommended by the membrane manufacturer. The use of large size patches (covering multiple penetrations) to avoid exceeding the limits set forth above will not be permitted. The use of large patches in excess of 24 x 36" shall be justification for replacement or for providing over lay membrane.

1. Any area in excess of patching limits set forth above shall be replaced with new membrane or overlaid with a new minimum 100 sq. ft. un-patched membrane. Exact location and extent of new overlay membrane shall be determined by the Owner and membrane manufacturer's recommendations.

B. Final inspection and cleaning: Roofs surface shall be inspected for damage, trash and waste materials (fasteners and misc. other construction items.) Remove all such items, and all spilled materials per manufacturer's removal instructions. Sweep clean and wash membrane to optimum cleanness. Hand mop and hose clean (low pressure) with environmentally friendly (green) cleaners as recommended by roof membrane manufacturer. High pressure washers are not allowed. Final payment will not be made until this work has been completed and accepted.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:
   1. Manufactured reglets.
   2. Formed roof coping.
   3. Formed equipment support flashing.

B. Related Sections include the following:
   1. Division 4 Section "Unit Masonry Assemblies" for installing through-wall flashing, reglets, and other sheet metal flashing and trim.
   2. Division 13 Section “Metal Building Systems” for coordination.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:
   1. Design Pressure: As indicated on Structural Drawings.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
   1. Identify material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   4. For copings, detail of fabrication of radiused/curved sections, and corners.
   5. Details of expansion-joint covers, including showing direction of expansion and contraction.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
   2. Trim: 12 inches long. Include fasteners and other exposed accessories.
   3. Accessories: Full-size Sample.

C. Product Certificates: Signed by manufacturers of flashing products certifying that products furnished comply with requirements.
   1. For roof edge assemblies, provide test reports confirming prototypical assemblies have been tested in conformance with ANSI/SPRI ES-1.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation. Mockup
   1. Build mockup of typical exposed flashing condition, including supporting construction cleats, seams, attachments and accessories. Coordinate with mockup requirements of separate sections in Divisions 4, 7 and 8.
   2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
   1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
         1) Color: As selected by Architect from manufacturer’s full range.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

D. Elastomeric Sealant: ASTM C 920, elastomeric siliconepolymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.

1. Material: Aluminum, 0.022 inch thick.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
4. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
5. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomericsealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.

1. Joint Style: SMACNA standing seam, with 6-inch- wide concealed backup plate.
2. Fabricate copings from the following material:
   a. Aluminum: 0.050 inch thick.

B. Roof Expansion-Joint Cover: Fabricate from the following material:

1. Aluminum: 0.050 inch thick.

C. Base Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.

D. Counterflashing: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

E. Flashing Receivers: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
   1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
   2. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomericsealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
   1. Aluminum: Use aluminum or stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.
   1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Copings: Anchor to resist uplift and outward forces according to recommendations in ANSI SPRI-ES-1 for specified wind zone and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at intervals required by referenced standards to meet performance requirements.
   2. Anchor interior leg of coping with screw fasteners and washers at intervals required by referenced standards to meet performance requirements.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Reglets: Installation of reglets is specified in Division 4 Section "Unit Masonry Assemblies."

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

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. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for downspout guards and downspout boots.
2. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
4. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
5. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Green Globes Submittals:

1. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

D. Samples: For each type of roof specialty and for each color and texture specified.

E. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

F. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
2. Include copings, roof-edge specialties, roof-edge drainage systems, reglets and counterflashings made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of roof specialty.

C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.

D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are SPRI ES-1 tested to specified design pressure.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 075423 - TPO Roofing.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.

1. Build mockup of typical roof edge as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section "075423 - TPO Roofing".

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. FM Approvals' Listing: Manufacture and install copings and roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

D. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Architectural Products Company.
   b. ATAS International, Inc.
   c. Castle Metal Products.
   d. Cheney Flashing Company.
   e. Hickman Company, W. P.
   f. Merchant & Evans, Inc.
   g. Metal-Era, Inc.
   h. Metal-Fab Manufacturing, LLC.
   i. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
   j. Petersen Aluminum Corporation.
2. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal 0.028-inch thickness or thickness as required to meet performance requirements.
   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.
3. Formed Aluminum Sheet Coping Caps: Aluminum sheet, 0.050 inch thick.
   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.
4. Corners: Factory mitered and continuously welded.
5. Special Fabrications: Radiussed sections.
6. Coping-Cap Attachment Method: face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.
   a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
   b. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet or stainless steel.

2.3 ROOF-EDGE SPECIALTIES

A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of compression-clamped metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Architectural Products Company.
   b. ATAS International, Inc.
   c. Castle Metal Products.
   d. Cheney Flashing Company.
   e. Hickman Company, W. P.
   f. Merchant & Evans, Inc.
   g. Metal-Era, Inc.
   h. Metal-Fab Manufacturing, LLC.
   i. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.050 inch thick.
   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.
3. Corners: Factory mitered and continuously welded.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

2.4 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Architectural Products Company.
   b. ATAS International, Inc.
   c. Castle Metal Products.
   d. Cheney Flashing Company.
   e. Hickman Company, W. P.
   f. Merchant & Evans, Inc.
   g. Metal-Era, Inc.
   h. Metal-Fab Manufacturing, LLC.
   i. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
   j. Petersen Aluminum Corporation.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Aluminum Sheet: 0.050 inch thick.
2. Gutter Profile: As indicated according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and continuously welded.
4. Gutter Supports: Gutter brackets with finish matching the gutters..
5. Size: As indicated on Drawings

C. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.040 inch thick.
2. Size: As indicated on Drawings

D. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.5 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Architectural Products Company.
2. ATAS International, Inc.
3. Castle Metal Products.
4. Cheney Flashing Company.
5. Hickman Company, W. P.
6. Merchant & Evans, Inc.
7. Metal-Era, Inc.
8. Metal-Fab Manufacturing, LLC.

9. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
10. Petersen Aluminum Corporation.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Stainless Steel: 0.019 inch thick.
2. Corners: Factory mitered and continuously welded.
3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
6. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Stainless Steel: 0.019 inch thick.

D. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. Stainless-Steel Finish: No. 4 (bright, polished directional satin).

2.6 MATERIALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.7 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following:
   a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Grace Ice and Water Shield HT.
   c. Henry Company; Blueskin PE200 HT.
   d. Metal-Fab Manufacturing, LLC; MetShield.

e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. minimum.

2.8 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.9 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings and roof-edge specialties.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.5 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.6 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 30 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant.

1. Seal or solder exterior wall scupper flanges into back of conductor head.

3.7 REGLET AND COUNTERFLASHING INSTALLATION

A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Embedded Reglets: See Section 042000 "Unit Masonry" for installation of reglets.

C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: For roof accessories.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items.

B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
1. Exposed Coil-Coated Finish: Two-coat fluoropolymer finish; AAMA 621; system consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

B. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.

C. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

D. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

E. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

C. Sealants: As recommended by roof accessory manufacturer for installation indicated.

2.3 ROOF CURBS (refer to Mechanical Specification Sections)

2.4 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Bilco Type S-50T Roof Hatch or comparable product by one of the following:
   a. J. L. Industries, Inc.
   b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
   c. Nystrom.

B. Type and Size: Single-leaf lid, 30 inches x 48 inches.

C. Loads: Minimum 40-lbf/sq. ft., external live load and 20-lbf/sq. ft., internal uplift load.

D. Hatch Material: Aluminum sheet, 0.090 inch thick.

1. Finish: Mill.

E. Construction:

1. Insulation: Polyisocyanurate board.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches unless otherwise indicated.

F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

G. Safety Railing System: Roof-hatch manufacturer's safety railing system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches above finished roof deck.

2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
6. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
7. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
8. Fabricate joints exposed to weather to be watertight.
9. Fasteners: Manufacturer's standard, finished to match railing system.
10. Finish: Manufacturer's standard.
    a. Color: As selected by Architect from manufacturer's full range.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches above finished roof deck.
3. Material: Steel tube.
4. Post: 1-5/8-inch diameter pipe.
5. Finish: Manufacturer's standard baked enamel or powder coat.
    a. Color: As selected by Architect from manufacturer's full range.

2.5 PIPE SUPPORTS

A. Pipe Supports: Adjustable-height, extruded-aluminum tube, filled with urethane insulation; 2 inches in diameter; with aluminum baseplate, EPDM base seal, manufacturer's recommended hardware for mounting to structure or structural roof deck as indicated, and extruded-aluminum carrier assemblies; suitable for quantity of pipe runs and sizes.

1. Pipe Support Height: As indicated on Drawings.
2. Roller Assembly: With stainless-steel roller, sized for supported pipes.
3. Pipe Support Flashing: Manufacturer's standard insulated sleeve flashing with integral base flange; aluminum sheet, 0.063 inch thick.

B. Finish: Manufacturer's standard

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

C. Seal joints with sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.

C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and color Samples.

B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions. Sealant colors shall be coordinate with the adjacent material and finish. Verify colors with Architect in the field prior to installation.

B. Sealant for Use in Building Expansion Joints:

1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 50; for Use NT.

C. Sealant for General Exterior Use Where Another Type Is Not Specified:

1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.

D. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and Around Plumbing Fixtures:

1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.

E. Sealant for Interior Use at Perimeters of Door and Window Frames:

1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

F. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

2.2 MISCELLANEOUS MATERIALS

A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 1193.

B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, suitable for exposed applications.

B. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 or A60.

D. Frame Anchors: ASTM A 591/A 591M, 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.2 HOLLOW METAL DOORS AND FRAMES

A. Available Products:

1. Benchmark; a division of Therma-Tru Corporation.
2. Ceco Door Products; an Assa Abloy Group company.
3. Security Metal Products Corp.
4. Steelcraft; an Ingersoll-Rand company.
5. Windsor Republic Doors.

B. Fire-Rated Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

1. At vertical exit enclosures and exit passageways, provide doors that that have a temperature rise rating of 450 deg F.

C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

D. Doors: Complying with ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.

1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

2. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), metallic-coated steel sheet faces.

   a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets.

E. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.

1. Steel Sheet Thickness for Interior Doors: 0.042 inch.
2. Steel Sheet Thickness for Exterior Doors: 0.053 inch.
3. Fabricate interior frames with mitered or coped and continuously welded corners.
4. Fabricate exterior frames from metallic-coated steel sheet, with mitered or coped and continuously welded corners.
5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
6. Frame Anchors: Not less than 0.042 inch thick.

F. Glazing Stops: Non-removable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside, fabricated from same material as door face sheet in which they are installed.

G. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.

H. Grout Guards: Provide where mortar might obstruct hardware operation.

I. Prepare doors and frames to receive mortised and concealed hardware according to ANSI A250.6 and ANSI A115 Series standards.

J. Reinforce doors and frames to receive surface-applied hardware.

K. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hollow metal frames to comply with ANSI/SDI A250.11.

1. Fire-Rated Frames: Install according to NFPA 80.

B. Install doors to provide clearances between doors and frames as indicated in ANSI/SDI A250.11.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer. Use galvanizing repair paint for metallic coated surfaces.

END OF SECTION 081113

SECTION 083323 - OVERHEAD COILING DOORS

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: Counter doors.

B. Related Sections: Division 05 Section "Metal Fabrications" for miscellaneous steel supports.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
2. Seismic Component Importance Factor: As indicated on the Drawings.

B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required.

E. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Summary of forces and loads on walls and jambs.

F. Qualification Data: For qualified Installer.

G. Seismic Qualification Certificates: For overhead coiling doors, accessories, and components, from manufacturer.

H. Warranties: Sample of special warranties.

I. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of ten (10) years experience in producing rolling doors of the type specified.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

C. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

1.6 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Faulty operation of hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use, rust through.
   d. Delamination of exterior or interior facing materials.
2. Warranty Period: two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory applied finishes within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Aluminum Door Curtain Slats: ASTM B 209 (ASTM B 209M) sheet or ASTM B 221 (ASTM B 221M) extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch and as required to meet requirements.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

D. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Aluminum: 0.040-inch- thick aluminum sheet complying with ASTM B 209 (ASTM B 209M), of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.3 COUNTER DOORS

A. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:

1. Aluminum: 0.040-inch- thick aluminum sheet complying with ASTM B 209 (ASTM B 209M), of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer
2. Keys: Provide three for each cylinder.

2.5 CURTAIN ACCESSORIES

A. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

1. Provide pull-down straps or pole hooks for doors more than 84 inches high.

2.6 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft.of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.

B. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf.

2.8 DOOR ASSEMBLY

A. Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Cookson Company.
   b. Cornell Iron Works, Inc.
   c. McKeon Rolling Steel Door Company, Inc.
   d. Overhead Door Corporation.
   e. Raynor.
   f. Wayne-Dalton Corp.

B. Operation Cycles: Not less than 20,000.

1. Include tamperproof cycle counter.

C. Door Curtain Material: Aluminum.

D. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.

E. Curtain Jamb Guides: Galvanized steel or Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

F. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: Face of wall.

G. Sill Configuration for Counter Door: No sill.

H. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinder.

I. Manual Door Operator: Push-up operation with lift handle.

J. Door Finish:

1. Aluminum Finish: Clear anodized.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Exterior and interior manual-swing entrance doors and door frame units.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferring to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
   d. Noise or vibration created by wind and by thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind Loads: As indicated on Structural Drawings.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding percent of span.
2. Test Durations: 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. .

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

1.3 ACTION SUBMITTALS

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

B. Green Globes Submittals:

1. Product Data for sealants used inside of the weatherproofing system, documentation including printed statement of VOC content.

C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

D. Samples: For each type of exposed finish required.

E. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Field quality-control reports.

C. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one

another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

G. Preinstallation Conference: Conduct conference at Project site .

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Oldcastle Building Envelope Front Glazed (exterior window walls); Front Glazed (interior window walls); and Entrance Doors or comparable product by one of the following:

1. EFCO Corporation.
2. Kawneer
3. YKK AP America Inc.
4. Tublite
5. United States Aluminum.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Nonthermal and thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads , fabricated from stainless steel.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5-inch nominal width.
   a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

2.6 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section. Balance of hardware specified in Division 08 Section "Door Hardware."

B. Weather Stripping: Manufacturer's standard replaceable components. Include Bottom Rail Weather Stripping on exterior doors (Kawneer 200-799).

C. Silencers: BHMA A156.16, Grade 1.

D. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.7 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Water Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
   a. Test Area: A minimum area of 75 feet by 1 story of aluminum-framed systems.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 084113

SECTION 08 71 53 - DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hinges and Pivots.

B. Mortise Locksets and Deadbolts.

C. Dead Bolts.

D. Cylinders.

E. Keying.

F. Exit Devices.

G. Surface Door Closers.

H. Miscellaneous Trim.

1.2 RELATED SECTIONS

A. Section 06 10 53 – Miscellaneous Rough Carpentry.

B. Section 08 11 10 – Hollow Metal Doors and Frames.

C. Section 08 41 13 – Aluminum Framed Entrances and Storefronts.

1.3 REFERENCES

A. ANSI A117.1 - American National Standard for Accessible and Useable Buildings and Facilities.

B. ANSI/BHMA A156.1, "Butts and Hinges" (copyrighted by BHMA, ANSI approved).

C. ANSI/BHMA A156.3 - American National Standard for Exit Devices.

D. ANSI/BHMA A156.4 - American National Standard for Door Controls - Closers.

E. ANSI/BHMA A156.5 - American National Standard for Auxiliary Locks and Associated Products.

F. ANSI/BHMA A156.6, "Architectural Door Trim" (copyrighted by BHMA, ANSI approved).

G. ANSI/BHMA A156.7, "Template Hinge Dimensions" (copyrighted by BHMA, ANSI approved).

H. ANSI/BHMA A156.8, "Door Controls - Overhead Holders" (copyrighted by BHMA, ANSI approved).

I. ANSI/BHMA A156.13 - American National Standard for Mortise Locks and Latches Series 1000.

J. ANSI/BHMA A156.16 - Auxiliary Hardware.

K. ANSI/BHMA A156.18 - Materials and Finishes.

L. ANSI A156.28 - American National Standard for Keying Systems

M. NFPA 80 - Standard for Fire Doors, Fire Windows.

N. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

O. Underwriters Laboratories (UL). - Fire Resistance Directory.

P. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies.

1.4 PERFORMANCE REQUIREMENTS

A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.
   1. Comply with NFPA 80 for fire ratings indicated, based on testing according to NFPA 252.
   2. Comply with UL10C, Positive Pressure Fire Tests of Door Assemblies.

B. Accessibility Requirements: Comply with requirements of Local building code, and Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's catalog cuts on each product to be used.

C. Shop Drawings: Indicate locations and mounting heights of each type of hardware, schedules, electrical characteristics and connection requirements.

D. Schedule:
   1. Submit schedule indicating each type of hardware for each door.
   2. List manufacturer's name with each manufacturer's hardware number together with finishes in US standards.
   3. Show door number/location, handing, door and frame material, manufacture and catalog numbers, all finishes and keying information. Explain fully all abbreviations.

E. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware.
   2. Supply templates to door and frame manufacturer(s) to enable proper and accurate sizing and locations of cut-outs for hardware.
   3. Detail any conditions requiring custom extended lip strikes, or any other special or custom conditions.

F. Verification Samples: For each finish product specified.
   1. If required by the Architect, submit one sample of each type of typical hardware required illustrating style, color, and finish.
   2. Approved samples may be incorporated into Work.

G. Closeout Submittals:
   1. Project Record Documents: Schedule showing actual locations of installed cylinders and their master key code.
   2. Parts lists and maintenance instructions including data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   3. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer with a minimum of ten years' experience manufacturing door hardware.

B. Supplier Qualifications: A supplier with a minimum of two years demonstrated experience in the sale and distribution of builders' hardware for commercial projects and who has successfully completed at least three projects of similar complexity to the project specified.

C. Hardware Supplier Personnel: Employ Architectural Hardware Consultant (AHC) or equally qualified person to supervise and prepare all schedules, details, and services required for the project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually with necessary fasteners and installation templates when necessary; label and identify each package with door opening code to match hardware schedule.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

D. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Provide factory warranty against defects in material and workmanship as follows:
   1. Overhead Surface Closers, Grade 1, 25 Year Warranty.
   2. Mortise locks, Grade 1, 10 Year Warranty.
   3. Exit Devices, Grade 1, 10 Year Warranty.

1.10 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

1.11 COORDINATION

A. Coordinate work with other directly affected components involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Manufacturer (Basis of Design) : DORMA, which is located at: Dorma Dr. Drawer AC; Reamstown, PA 17567-0411; Toll Free Tel: 800-523-8483; Tel: 717-336-3881; Fax: 800-274-9724; Email: request; Web:www.dorma-usa.com

B. Requests for new manufacturers will be accepted during the Bid Process. Provide all information needed for Architect to verify that requested manufacturer meets the Contract Documents. Provide the following:
   1. All the information as indicated “Part 1.5 Submittals” of this Section except for the “closeout submittals.

2.2 HINGES AND PIVOTS

A. Hinges: ANSI A156.1, full mortise template type complying with following general requirements unless otherwise scheduled.
   1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
   2. Number: Furnish minimum three hinges to 90 inches (2 286 mm) high, four hinges to 120 inches (3 048 mm) high for each door leaf.
      a. Fire Rated Doors to 86 inches (2 184 mm) high: Minimum three ball bearing hinges.
   3. Size and Weight: 4-1/2 inch (114 mm) heavy weight typical for 1-3/4 inch (44 mm) doors.
      a. Doors over 40 inches (1 016 mm) wide: Extra heavy weight ball or oilite bearing hinges.
   4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked out swinging doors, non-rising pins at interior doors.
   5. Tips: Furnish with matching plug.
   6. Material: Steel - Polished and plated.

2.3 MORTISE LOCKSETS AND DEADBOLTS

A. Lockset: DORMA ML9000 Series.
   1. Standards:
      a. ANSI Conformance - ANSI A156.13, Operational Grade 1, Security Grade 1.
      b. U.L. and C.U.L. listed for use on 3-hour fire-rated doors and for all positive pressure applications.
      c. U.L. and C.U.L. listed for UL 10B/10C.
      d. Lever trim meets A117.1 and ADA requirements.
   2. Features:
      a. Stainless steel latch.
      b. Stainless steel dead bolt.
      c. Hardened steel rollers in dead bolt.
      d. Security spacer between inside and outside lever.
      e. Steel lock case and internal components.
      f. Full length face plate.
      g. All trim through-bolted through the lock case.
      h. Accepts standard and interchangeable core cylinders.
   3. Function:
      a. As noted on the hardware schedule attached to this section.
      b. ML9010 - F01 Passage Set
      c. ML9040 - F22 Privacy Lock
      d. ML9050 - F04 Single Cylinder Office Lock
      e. ML9070 - F05 Single Cylinder Classroom Lock
      f. ML9080 - F07 Single Cylinder Storeroom Lock

4. Trim:
   a. Lever: LRA, 2-1/4 inch (57 mm) rose.
   b. Interchangeable Core.
5. Finish:
   a. Stainless: 630 (Satin).

2.4 CYLINDRICAL LOCKSETS AND DEADBOLTS

2.5 KEYING

A. Keying:
1. Keying: Factory Grand master keyed.
2. Include SFIC cores construction keyed, mounted in hardware.
3. Include 10 Construction Operating Keys.
4. Deliver directly to the Project Owner's Representative the following:
   a. Two (2) each Construction Control.
   b. Two (2) each Permanent Control Keys.
   c. Six (6) each Master and Grand Master Keys.
   d. Two (2) each Permanent Change Keys

2.6 EXIT DEVICES

A. General:
1. DORMA exit devices are listed by U.L. and C.U.L. under their continuing reinspection programs and conform to standards U.L. 10C and U.B.C. 7-2 (1997) positive pressure testing. They are BHMA certified to the requirements of ANSI A156.3 for Grade 1 exit devices.
2. Exit Devices: Exit devices shall be type and function as listed in hardware sets. Use fire exit hardware where exit devices are scheduled for fire door assemblies. Where lever handle trim is specified, match lever trim on locksets. Furnish freewheeling lever trim as standard. Construct device touch bar, rail and cover assemblies of heavy gauge solid wrought materials for true architectural finishes. Provide cylinder dogging on all non-rated devices. Furnish all devices with stainless 3/4 inch (19 mm) throw deadlocking latch bolts.

B. 9000 Series, Heavy Duty Exit Device: ANSI A156.3, Grade 1, heavy duty exit devices. Heavy duty RIM devices shall maintain a minimum latch bolt static load rating of 3,000 lbs.
1. Model: 9300 Rim Device, panic listed only.
2. Model: F9300 Rim Device, panic and fire listed.
3. Trim:
   a. Pull - R.
   b. Cylinder: SFIC
   c. Keyway: D100
4. Strikes: Provide types suitable for opening.
   a. Stainless: 630 (Satin).

C. 9000 Series Narrow Stile, Heavy Duty Exit Device: ANSI A156.3, Grade 1, heavy duty exit devices. Narrow Stile RIM devices shall maintain a minimum latch bolt static load rating of 1,500 lbs.
1. Model: 9600 Concealed Exit Device, panic listed only.
2. Function:
3. Trim:
   a. Pull - R.
   b. Cylinder: SFIC
   c. Keyway: D100
4. Strikes: Provide types suitable for opening.
   a. Stainless: 630 (Satin).

D. Removable Mullions:
   1. 1340KR-8 Key Removable Steel Mullion: 8 foot non-fire rated (verify height)
      a. Finish: Prime 600.

2.7 SURFACE DOOR CLOSERS

A. Closers used in conjunction with overhead stops and holders shall be templated and coordinated to function properly. Properly detail closers to meet application requirements by providing drop plates, brackets, etc. to meet application and installation requirements as indicated.

B. TS93 Series: ANSI A156.4, Grade 1, heavy duty surface door closer.
   1. Compliant with UL10C for positive pressure.
   2. Certified to 10 million cycles by a recognized test lab.
   3. Non-handed.
   4. Featuring full range spring power adjustment and backcheck, with a narrow projection full cover and track style arm.
   5. Door control also features a backcheck positioning adjustment for parallel arm applications, to maintain an ANSI backcheck range similar to regular and top jamb applications.
   6. Independent sweep and latch non-critical closing speed adjustment.

C. 8900 Series: ANSI A156.4, Grade 1, heavy duty surface door closer.
   1. Compliant with UL10C for positive pressure.
   2. Certified to 10 million cycles by a recognized test lab.
   3. Non-handed.
   4. Featuring full range spring power adjustment and backcheck, with a narrow projection full cover and flat form style arm.
   5. Door control also features a backcheck positioning adjustment for parallel arm applications, to maintain an ANSI backcheck range similar to regular and top jamb applications.
   6. Independent sweep and latch non-critical closing speed adjustment.

D. 8600 Series: ANSI A156.4, Grade 1, surface door closer.
   1. Compliant with UL10C for positive pressure.
   2. Non-handed.
   3. Door control also features a backcheck positioning adjustment for parallel arm applications, to maintain an ANSI backcheck range similar to regular and top jamb applications.
   4. Independent sweep and latch non-critical closing speed adjustment.

2.8 MISCELLANEOUS TRIM

A. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch (1.27 mm) thick.
   1. Size: Push plates shall be ANSI J302, size 4 inches (102 mm) by 16 inches (406 mm), thickness .050 inch.
   2. Size: Pull plates shall be ANSI J405, size 4 inches (102 mm) by 16 inches (406 mm), thickness .050 inch.
   3. Cut plates for cylinder or thumb piece when used with deadlock.
   4. Provide with through bolts to secure from opposite door face.
   5. Finish: As specified in the Door Hardware Schedule.

B. Flush Bolts: ANSI A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike.
   1. Finish: As specified in the Door Hardware Schedule.

C. Weather-stripping and thresholds as listed in the Hardware Schedule.

D. Fire rated gaskets at perimeter of doors as listed in the Hardware Schedule.

E. Stops: Provide for all doors to control the desired limit of opening helping to prevent damage to adjacent walls, columns, equipment, the door or its hardware

1. Provide floor or wall stops when overhead stops have not been listed except in areas where their location would impede traffic. Stops of correct height shall be used on exterior and interior doors.
2. Doors with surface closers may be provided with S-DS or S-IS dead stop arms
3. Use roller type stops in areas where the interfering swing of one door may cause damage through contact with another door.

F. Standard Duty Door Stops and Holders: 700 Series, Standard Duty door stops and holders. Conforms to ANSI A156.8 Grade 3.
1. Built-in cushioned stop.
2. Non-handed.
3. Adjustable friction tension with friction stop unit

G. Heavy Duty Door Stops and Holders: 900 Heavy-Duty door stops and holders. Conforms to ANSI A156.8 Grade 1.
1. Built-in cushioned stop
2. Non-handed

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

C. Verify electric power is available to power operated devices and is of correct characteristics.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

C. Install with fasteners provided by hardware item manufacturer.

D. Adjust hardware for smooth operation.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.4 DOOR HARDWARE SCHEDULE:

HW: 01
Door #101A, 101B
Each pair to have:

2	Cont. Hinges	SL24HD 83"	CL	Select
1	Exit Device	9600-ALD x ZP02-CD-T	630	Dorma
1	Exit Device	9600-ALD x ZP03-CD-T	630	Dorma
3	Interchangeable Cores	77 BA	626	Dorma
2	Closers	TS9315 SPT	689	Dorma
1	Threshold	424	AL	NGP
1	Balance of Hardware	by Door Supplier		

HW: 02
Door #101E
Each to have:

1	Padlock	P120 T BLK	626	Dorma
1	Interchangeable Core	77 BA	626	Dorma

HW: 03
Door #102A
Each pair to have:

2	Cont. Hinges	SL24HD 83"	CL	Select
2	Exit Devices	9300	630	Dorma
1	Key Removable Mullion	1340KR	600	Dorma
1	Interchangeable Core	77 BA	626	Dorma
2	Closers	TS9315 SPT	689	Dorma
2	Kick Plates	K0050 12" ADH B4E	630	Trimco
1	Mullion Seal	5100S	B	NGP
1	Set Seal	5050B	B	NGP
2	Sweeps	C627A- FATT	A	NGP
1	Threshold	425	A	NGP
1	Drip Cap	16A FATT	A	NGP

HW: 04
Door #102B
Each to have:

1	Cont. Hinge	SL24HD 83"	CL	Select
1	Exit Device	9300	630	Dorma
1	Closer	TS9315 SPT	689	Dorma
1	Kick Plate	K0050 12" ADH B4E	630	Trimco
1	Set Seal	5050B	B	NGP
1	Sweep	C627A- FATT	A	NGP
1	Threshold	425	A	NGP
1	Drip Cap	16A FATT	A	NGP

HW: 05
Door #102C, 102D
Each pair to have:

2	Cont. Hinges	SL24HD 83"	CL	Select
2	Exit Devices	F9300 x YR08-T	630	Dorma
1	Key Removable Mullion	F1340KR	600	Dorma
3	Interchangeable Cores	77 BA	626	Dorma
2	Closers	8916 AF89P FC	689	Dorma
2	Kick Plates	K0050 12" ADH B4E	630	Trimco
1	Mullion Seal	5100S	B	NGP
1	Set Seal	5050B	B	NGP
2	Wall Stops	1270C	626	Trimco

HW: 06
Door #103, 108B, 109
Each pair to have:

6	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
2	Flush Bolts	3917-12	626	Trimco
1	Dust Proof Strike	3911	630	Trimco
1	Storeroom Lock	M9080 T LRA	630	Dorma
1	Interchangeable Core	77 BA	626	Dorma
1	Closer/ Coordinator Unit	TS9315 GSR/PT	689	Dorma
1	Astragal	158SA	A	NGP
1	Set Seal	5050B	B	NGP

HW: 07
Door #104
Each to have:

3	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
1	Privacy/Indicator Set	M9046 LRA	630	Dorma
1	Closer	8616 AF86P FC	689	Dorma
1	Wall Stop	1270CV	626	Trimco
3	Silencers	1229A	G	Trimco
1	Sign	529-Unisex		Trimco

HW: 08M
Door # 106
Each to have:

3	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
1	Deadbolt	D863 T x 5002-114	626	Dorma
1	Interchangeable Core	77 BA	626	Dorma
1	Push Pull Plate	1896-4B	630	Trimco
1	Closer	8616 AF86P FC	689	Dorma
1	Overhead Stop	902 S	626	Dorma
1	Kick Plate	K0050 12" 630 ADH B4E	630	Trimco
3	Silencers	1229A	G	Trimco
1	Sign	527		Trimco

HW: 08W
Door # 105
Each to have:

3	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
1	Deadbolt	D863 T x 5002-114	626	Dorma
1	Interchangeable Core	77 BA	626	Dorma
1	Push Pull Plate	1896-4B	630	Trimco
1	Closer	8616 AF86P FC	689	Dorma
1	Wall Stop	1270CV	626	Trimco
1	Kick Plate	K0050 12” ADH B4E	630	Trimco
3	Silencers	1229A	G	Trimco
1	Sign	528		Trimco

HW: 09
Door # 107, 108A
Each to have:

3	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
1	Storeroom Lock	M9080 T LRA	630	Dorma
1	Interchangeable Core	77 BA	626	Dorma
1	Wall Stop	1270CV	626	Trimco
3	Silencers	1229A	G	Trimco

HW: 10
Door # 110
Each to have:

3	Hinges	4B81 4 1/2" x 4 1/2"	US26D	PBB
1	Storeroom Lock	M9080 T LRA	630	Dorma
1	Interchangeable Core	77 BA	626	Dorma
1	Overhead Stop	702 S	626	Dorma
3	Silencers	1229A	G	Trimco

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications:

1. Doors.
2. Glazed entrances.
3. Storefront framing.

1.2 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. U-Values: Expressed in (BTU/hr/ft^2/F)

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
   a. Specified Design Wind Loads: As indicated on Structural Drawings.
   b. Specified Design Snow Loads: As indicated on Structural Drawings.
   c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 deg rees off vertical and under wind action.
      1) Load Duration: 60 seconds or less.
   d. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
   e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

1.4 SUBMITTALS

A. Samples: 12-inch- square, for each type of glass product indicated, other than clear float glass.

B. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

C. Qualification Data: For installers.

D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

E. Product Test Reports: For each of the following types of glazing products:
   1. Insulating glass.
   2. Glazing sealants.
   3. Glazing gaskets.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

C. Glazing Publications: Comply with recommendations of the following, unless more stringent requirements are indicated.
   1. GANA Publications: "Glazing Manual" and "Laminated Glass Design Guide."
   2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."

D. Insulating-Glass Certification Program: Permanently marked with certification label of Insulating Glass Certification Council.

E. Fenestration Rating and Labeling: Comply with fenestration rating and labeling requirements of ASHRAE 90.1.
   1. Coordinate glazing and framing systems for overall system performance and labeling.
   2. Provide permanent nameplate, installed by the manufacturer.
   3. List the following characteristics as determined by an independent laboratory acceptable to the Authority Having Jurisdiction:
      a. U-factor.
      b. Solar heat gain coefficient (SHGC).
      c. Air infiltration (Air leakage rate).
   4. For fenestration products that do not have a permanent nameplate, provide NFRC-certified product with an attached label, or signed and dated certification as indicated in Submittals in this Section.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by manufacturer, in which manufacturer agrees to furnish replacements for units that deteriorate from normal use by developing defects attributable to the manufacturing process, f.o.b. the nearest shipping point to Project site, within warranty period.
   1. Coated Glass:
      a. Defects: Peeling, cracking, and other indications of deg radation of metallic coating.
      b. Warranty Period: 10 years from date of Substantial Completion.
   2. Insulating Glass:
      a. Deterioration: Failure of hermetic seal resulting in obstruction of vision by dust, moisture, or film on interior surfaces of glass.
      b. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other articles including schedules where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Product: Subject to compliance with requirements, provide the product indicated, or comparable product approved by Architect from one of the specified manufacturers.

2.2 GLASS MATERIALS

A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed.

B. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
   1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
   2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
   3. Sealing System: Dual seal with polyisobutylene and silicone primary and secondary sealants.
   4. Spacer: Manufacturer's standard.
   5. Corner Construction: Manufacturer's standard.

2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
   1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Colors of Exposed Sealants: As selected.

B. Elastomeric Glazing Sealants: ASTM C 920, Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic), M, G, A, and, as applicable to glazing substrates indicated, O.
   1. Low-Modulus Nonacid-Curing Silicone: With additional movement capability of 50 percent movement in extension and 50 percent movement in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
      a. Products:
         1) Dow Corning; 790.
         2) GE Silicones; Silpruf UltraPruf SCS2300.
         3) Pecora Corporation; 864.
         4) Tremco; Spectrem 1.

C. Cylindrical Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.4 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.5 GLAZING GASKETS

A. Compression Gaskets: Molded or extruded gaskets of type and material indicated below and of profile and hardness required to maintain watertight seal:
   1. Silicone dense compression gaskets complying with ASTM C 1115.
   2. Silicone soft compression gaskets complying with ASTM C 509, Type II, black.

B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
   1. EPDM, ASTM C 864.
   2. Silicone, ASTM C 1115.
   3. Thermoplastic polyolefin rubber, ASTM C 1115.
   4. Any material indicated above.

C. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
   1. EPDM.
   2. Silicone.
   3. Thermoplastic polyolefin rubber.
   4. Any material indicated above.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

2.8 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units MG-1: Class 1 (clear) Kind FT (fully tempered) float glass
   1. Thickness: 6.0 mm.

2.9 GLASS UNITS

A. Passive Solar Low-E Insulating-Glass Units (GL-1):
   1. Products (Basis of Design):
      a. Guardian SunGuard; SuperNeutral 68 #2 (Clear on Clear)
   2. Overall Unit Thickness and Thickness of Each Lite: 1 inch.
   3. Interspace Content: Argon.
   4. Outdoor Lite: Class 1 (clear) float glass.

a. Color: Clear
b. Kind HS (heat strengthened). Provide Kind FT (fully tempered) where required.

5. Indoor Lite: Class 1 (clear) float glass.
   a. Annealed
   b. Color: Clear
   c. Kind HS (heat strengthened). Provide Kind FT (fully tempered) where required.
6. Low-E Coating: Sputtered on second surface.
7. Visible Light Transmittance: 68 percent minimum.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: .28 maximum.
10. Solar Heat Gain Co-efficient: .38 maximum.
11. Shading Co-efficient: .43 maximum.

B. Monolithic Interior Glass Units (GL-2):
   1. Construction: Provide units that comply with requirements specified for Monolithic Float Glass Units except for color finish.
   2. Indoor Lite: Class 1 (clear) float glass.
      a. Annealed
      b. Color: clear.
      c. Kind HS (heat strengthened). Provide Kind FT (fully tempered) where required.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
   1. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
   2. Protect glass edges from damage during handling and installation. Remove glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance from Project site and legally dispose of off Project site.
   3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by sealant compatibility and adhesion testing.
   4. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
   5. Provide spacers for glass lites where the length plus width is larger than 50 inches unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
   1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
   2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
   3. Apply heel bead of elastomeric sealant.
   4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
   5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing: Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
   1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.
4. Apply cap bead of elastomeric sealant over exposed edge of gasket.

D. Sealant Glazing:

1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
2. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
3. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

E. Protection:

1. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface.
2. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter.

F. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged, including natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

SECTION 088300 - MIRRORS

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 the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.
2. Film-backed glass mirrors qualifying as safety glazing**.**

B. Related Sections:

1. Division 10 Section "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.3 SUBMITTALS

A. Product Data: For mirror hardware and mastic.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples: For each type of the following products:

1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
2. Mirror Trim: 12 inches long.

D. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.

E. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing paint or film and substrates on which mirrors are installed.

F. Warranty: Sample of special warranty.

G. Maintenance Data: For mirrors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Glazing Publications: Comply with the following published recommendations:

1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

B. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

C. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing film and substrates on which mirrors are installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Arch Aluminum & Glass Co., Inc.
   b. Binswanger Mirror; a division of Vitro America, Inc.
   c. Lenoir Mirror Company.
   d. Virginia Mirror Company, Inc.
   e. Walker Glass Co., Ltd.

B. Clear Glass: Mirror Select Quality.

1. Nominal Thickness: 6.0 mm.

2.2 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Laurence, C. R. Co., Inc.
   b. Palmer Products Corporation.

c. Royal Adhesives & Sealants; Gunther Mirror Mastics Division.

D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 MIRROR HARDWARE

A. Top Channel/Cleat and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 5/16 and 3/4 inch in height, respectively.
   a. Basis of Design Product: Subject to compliance with requirements, provide D638 FHA Type "J" Channel by Laurence, C. R. Co., Inc.
2. Top Trim: Formed with front leg with a height of 5/16 inch and back leg designed to fit into the pocket created by wall-mounted aluminum cleat.
   a. Product: Subject to compliance with requirements, provide D 1638 Top Channel and D 1637M Mirror Mount System Cleat by Laurence, C. R. Co., Inc.
3. Finish: Clear anodized.

2.4 FABRICATION

A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes per approved shop drawings, and field verify.

B. Mirror Edge Treatment: Eased and polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

C. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
2. Install mastic as follows:
   a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
   b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
   c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 088300

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

2.2 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.027 inch.
2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Provide one of the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.
   a. Products: Subject to compliance with requirements, provide one of the following :
      1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
      2) MBA Building Supplies; FlatSteel Deflection Track.
      3) Steel Network Inc. (The); VertiClip SLD Series.
      4) Superior Metal Trim; Superior Flex Track System (SFT).
      5) Telling Industries; Vertical Slip Track.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.027 inch.

D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.033 inch.
2. Depth: 1-1/2 inches.

E. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E 488.
   a. Type: Postinstalled, expansion anchor.
2. Powder-Actuated Fasteners: Capable of sustaining, a load equal to 10 times that imposed as determined by ASTM E 1190.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 1-1/2 inches.

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.
   a. Minimum Base-Metal Thickness: 0.027 inch.
   b. Depth: 1-5/8 inches.

2.4 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide asphalt saturated organic felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior concrete walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Attach to concrete with stub nails, screws designed for concrete attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
3. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
4. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Seismic Bracing: Sway-brace suspension systems.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior gypsum board.
2. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. CertainTeed Corp.
2. Georgia-Pacific Gypsum LLC.
3. Lafarge North America Inc.
4. National Gypsum Company.
5. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered .

C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Gypsum Board (walls at toilets without tile): ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board (Single person toilets): ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Corp.; GlasRoc Tile Backer.
   b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10.

B. Cementitious Backer Units (Group Toilets): ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. C-Cure; C-Cure Board 990.
   b. CertainTeed Corp.; FiberCement Underlayment.
   c. Custom Building Products; Wonderboard .
   d. National Gypsum Company, Permabase Cement Board.
   e. USG Corporation; DUROCK Cement Board.
2. Thickness: 1/2 inch.
3. Mold Resistance: ASTM D 3273, score of 10.

2.5 TRIM ACCESSORIES

A. Aluminum Trim: ASTM B 221, Alloy 6063-T5.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.7 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

1. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

C. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation; AC-20 FTR.
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings.
2. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile .
3. Level 3: Not used.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
   a. Primer and its application to surfaces are specified in other Division 09 Sections.
5. Level 5: Not required.

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels for ceilings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 80 percent.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

C. Acoustical Panel Standard: Comply with ASTM E 1264.

D. Metal Suspension System Standard: Comply with ASTM C 635.

E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL PANELS ACT-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Ultima, fine texture or comparable product by one of the following:

1. USG, Corp.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.

B. Classification: Type IV, Form 1 & 2.

C. Color: White.

D. LR: 0.89.

E. NRC: .70, Type E-400 mounting according to ASTM E 795.

F. CAC: .35.

G. Edge/Joint Detail: Tegular / Reveal sized to fit flange of exposed suspension-system members.

H. Thickness: 3/4 inch.

I. Modular Size: 24 by 24 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Full Room:

1. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

C. Positioning Panel:

D. 1. Drop the ceiling panels into position by tilting them slightly, lifting them above the framework and letting them fall into place. Do not tear the foil on the back of panel. No visible gaps between the grid and panels should be seen.

E. Sprinkler Pipe Holes:

1. Use a fine toothed hole saw to drill a hole in the ceiling panel. Use multiple 2” wide ECPSA tape pieces on the top side of panel to seal the anular gap between the pipe and the drilled hole.

F. Electrically Grounded:

1. Provide electric ground connection to the earth or building source. Provide a sufficient number of grounding points to completely ground the entire metal ceiling grid system.
2. After metal ceiling grid suspension system is installed, verify that all grid components are grounded by checking continuity using an ohmmeter or multimeter.

END OF SECTION 095113

SECTION 096466 - MODULAR ATHLETIC FLOORING

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. Related work specified under other sections.
   1. POURED IN PLACE CONCRETE - SECTION 033000
      a. The general contractor shall furnish and install the concrete subfloors.
      b. The slab shall be steel troweled to a medium-dense finish to a tolerance of ±1/8" (3.2mm) in any 10' (3m) radius. Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized. High spots shall be ground level and low spots filled with approved leveling compound.

1.2 REFERENCES

A. ASTM (American Society for Testing & Materials)
   1. ASTM G-21

B. ISO (International Organization for Standardization)
   1. ISO 9001
   2. ISO 14001

C. Din (Deutsches Organization for Standardization)
   1. Din 18032-2

1.3 SUMMARY

A. This Section includes the following:
   1. Modular Sports flooring.
   2. Accessories.

1.4 SUBMITTALS

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

B. Sport Court Modular Sports Flooring Installation Guide.

C. Sport Court Modular Sports Flooring Care and Maintenance Guide.

D. Sport Court Response HG HR Warranty.

E. Shop Drawings: Show installation details and locations of the following:
   1. Wood floor pattern(s).
   2. Locations of any wood floor inserts for athletic equipment.

F. Samples for Initial Selection: For each type of wood flooring indicated.

G. Samples for Verification: For each type, color, and pattern of wood flooring indicated, 12-inch- square Samples of same thickness and material indicated for the Work.

H. Qualification Data: For wood flooring Installer.

I. Maintenance Data: For wood floorings to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.

B. Store materials on a clean, dry, and flat surface, protected from exposure to harmful weather conditions to prevent deterioration.

C. Storage temperature conditions shall be 55°F to 80°F (13°C to 27°C).
1. Close spaces to traffic for 48 hours after floor covering installation, unless manufacturer recommends longer period in writing.

D. Install floor coverings after other finishing operations, including painting, have been completed.

1.6 SITE CONDITIONS

A. In order to prevent damage and not void the warranty, installation of modular materials shall not commence until all other finishes and overhead mechanical trades have completed their work in the modular floor areas.

B. Permanent heat, light and ventilation shall be installed and operating during and after installation.

C. Subfloors shall be clean, dry and free from dirt, dust, oil, grease, paint, old adhesive residue, or other foreign materials.

D. Flooring installation shall not begin until the levelness requirements of concrete subfloors have been met. Plus or - 1/8" in any 10' area levelness.

E. The installation area shall be closed to all traffic and activity for a period to be set by the flooring contractor.

F. Product shall be conditioned at temperatures between 55°F to 80°F (13°C to 27°C) and shall be maintained for 72 hours prior to, during, and 72 hours after installation.

G. Environmental Limitations

H. Comply with the Sport Court requirements.

I. Adhere to all MSDS requirements for materials employed in the work.

J. Protect all persons from exposure to hazardous materials at all times.

K. After modular floors are installed and the game lines painted, the area is to be closed to allow curing time for the system, typically 3-5 days. No other trades or personnel are allowed on the floor until it has been accepted by the owner.

1.7 WARRANTY

A. Sport Court provides a limited warranty of fifteen (15) years on the materials it has supplied. (A copy of the full warranty, with its Terms and Exclusions, is available from the authorized Sport Court Dealer.) This 15-Year Limited Warranty is subject to the Response HG Flooring Warranty, , and all of their

provisions. This warranty is expressly limited to the flooring materials (goods) supplied by Sport Court. During the period covered under this Response HG Flooring Warranty, Sport Court shall repair/replace any tile(s) with a defective Response HG Flooring with the same or substantially similar product according to the schedule in the Response HG Flooring Warranty. To maintain your fifteen (15) year limited warranty, an "HG Maintenance Coat" must be applied by a certified Agent within the first three (3) years after installation of the new floor and again during each subsequent three (3) year period thereafter. Application of the maintenance coat, in accordance with Sport Court's published guidelines per Response HG Maintenance Coat Program, is required to maintain warranty coverage of the Response HG Products. If the Response HG Maintenance Coat Program has not been followed, then this limited warranty coverage for HG Products is for a period of three (3) years from the date of installation, and all subsequent warranty coverage is voided. This warranty does not cover floor damage caused (wholly or in part) by fire, winds, floods, moisture, other unfavorable atmospheric conditions or chemical action, nor does it apply to damage caused by ordinary wear, misuse, abuse, negligent or intentional misconduct, aging, faulty building construction, concrete slab separation, faulty or unsuitable subsurface or site preparation, settlement of the building walls or faulty or unprofessional installation of Sport Court flooring systems.

B. Sport Court shall not be liable for incidental or consequential losses, damages or expenses directly or indirectly arising from the sale, handling or use of the materials (goods) or from any other cause relating thereto, and their liability hereunder in any case is expressly limited to the replacement of materials (goods) not complying with this agreement or, at their election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such materials (goods), whether such claims are for breach of warranty or negligence. Any claim shall be deemed waived by buyer unless submitted to Sport Court in writing within 30 days from the date buyer discovered, or should have discovered, any claimed breach.

1.8 QUALITY ASSURANCE

A. MATERIAL SUPPLIER:
1. Shall be Sport Court International, Inc. (manufacturer).
2. Manufacturer must be ISO 9001:2008 and ISO 14001:2004 Certified to assure proper quality and environmental control.
3. Manufacturer shall be a Zero Waste company.
4. Manufacturer shall have produced sports surfaces for a longer time period than their stated warranty.
5. Surfaces must be certified for competition by the international federations for basketball (FIBA), volleyball (FIVB), handball (IHF), USA Volleyball, and badminton (BWF).
6. Product must have factory applied (4) layer clear urethane coating with in mold foil transfer process.
7. Manufacturer must have renewable recoating process to assure a 15 years warranty on factory applied coating.

B. INSTALLER:
1. The complete installation of the flooring system, as described in these specifications, shall be carried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with current installation instructions of Sport Court, International.
2. Installer (Flooring Contractor) shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.
3. Successful bidder must submit a minimum of five (5) completed modular projects of similar magnitude and complexity within the last two (2) years.
4. Bidder must provide all sample tile, accessory products, and documentation from accredited laboratory outside of the manufacturing facility.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish quantity for each type of material equal to (1) box per 50 boxes for each color provided.
2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide Basis-of-Design product Sport Court Response HG or an Architect approved substitute.

2.2 MODULAR ATHLETIC FLOORING

A. Gymnasium Wood Flooring:
1. Product: "Response HG " by Sport Court International Inc.
   Material: Positive interlocking system Response Maple HGHR solid top design with polymeric clear-coat, factory applied polyurethane, with supportive acoustical underlayment and striping.
2. Installation Method: Per manufacturer's instructions.
3. Standard Colors: Maple Select HR HG on basketball court with solid Response HG color for border. Confirm with Construction Documents.
4. Color Consistency: delta ECMC < 1.0
5. Size: 9.842" x 9.842" x ½" (25cm x 25cm x 12.7mm).
6. Thickness: 10mm.
7. Weight: Weight: 0.62 lbs. (280 grams).
8. Product Test Results:
   a. Force Reduction:(DIN 18032-2) 0.12"(3mm)-25%
   b. Flatness: 0.0" (0.0mm)
   c. Lateral Forgiveness™:+0.045" / -0" (+1.14mm / -0mm)
   d. Ball Rebound(DIN 18032-2): 0.12"(3mm)- greater than 95%
9. Load Bearing Capacity: Minimum of 220 psi (1.52 MPa)
10. Underlayment:
    a. Multi-purpose recycled rubber underlayment
    b. Thickness: 0.12" (3mm)
    c. Density: 60 lbs. cu. ft. (961 kg/m3)
    d. Durometer: 60 ±5 on the Shore M or Shore A scales.
11. Sanitary Information:
    1. Resistance to fungi (when tested in compliance with ASTM G-21 and MIL standard 810-D procedure 508.3). All basic organisms tested (ATCC #6205-11797) and were found to have zero growth.
    2. Resistance to the following:
       a. Bacteria and mildew resistance
       b. Gram-positive bacterial Staphylococcus Aureus
       c. Gram-negative Klebsiella Pneumoniae
       d. Pink-staining organism
       e. STV Reticulum
       f. Surface fungi growth prior to and following leaching
12. Game Line Paint:
    a. Adhesion Promoter: Proprietary tile adhesion promoter as supplied by Sport Court.
    b. Paint: aliphatic polyurethane as supplied by Sport Court. Select from standard colors.
13. Transitions:
    a. Roppe #20 reducer, metal T track #363, and Roppe #179
14. Color and Pattern: As indicated on Finish Schedule.

B. Accessories:
1. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.
   3. Installer (Flooring Contractor) shall document all working conditions prior to starting installation. Report any discrepancies to architect.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Alkalinity and Adhesion Testing: Perform tests recommended in writing by manufacturer. Proceed with installation only after substrates pass testing.
   3. Moisture Testing:
      a. Perform tests recommended in writing by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation, unless manufacturer recommends a longer period in writing.
   1. Do not install floor coverings until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 WOOD FLOORING INSTALLATION, GENERAL

A. Comply with all manufacturers’ written installation instructions.

3.4 WOOD FLOORING INSTALLATION

A. Underlayment – Rubber underlayment shall be unrolled and allowed to relax. All butt joints shall be properly trimmed, fitted, and seamed together with an approved all-purpose tape.

B. Floor shall be installed to pre-approved layout.

C. Minimum clearance at all vertical obstructions of 3/4 inch (19mm) is required.

D. Floor surface shall be clean and dust free.

1. Use only high quality masking tape approved by Sport Court.
2. Lines shall be primed and painted using Sport Court proprietary adhesion promoter and recommended aliphatic polyurethane paint.
3. Provide game lines as indicated on drawings.
4. Room temperature shall be >55° F (13°C) and rising during paint installation.
5. Remove all excess and waste materials from the area of work. Dispose of empty containers in accordance with federal and local statutes.
6. Provide NSS Auto Scrubber #1710 Battery with delivery of flooring and complete training and chemical starter kit to use with floor.

3.5 FIELD-APPLIED FINISHES (STRIPPING)

A. Apply finish according to manufacturer's written instructions to produce a sealed surface that is ready for use.

B. Do not cover floor coverings after finishing until finish reaches full cure.

3.6 CLEANING AND PROTECTING

A. Perform the following operations immediately after completing floor covering installation:
   1. Remove adhesive and other blemishes from floor covering surfaces.
   2. Sweep and vacuum floor coverings thoroughly.
   3. Damp-mop floor coverings to remove marks and soil.
      a. Do not wash floor coverings until after time period recommended in writing by manufacturer.

B. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
   1. When move heavy and sharp objects directly over floor coverings. Protect floor coverings with plywood or hardboard panels to prevent damage to flooring.

END OF SECTION 096466

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Resilient base.

1.2 ACTION SUBMITTALS

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

B. Green Globes Submittals: Product Data: For adhesives, documentation including printed statement of VOC content.

C. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

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

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
3. Endura Rubber Flooring; Division of Burke Industries, Inc.
4. Flexco, Inc.
5. Johnsonite.
6. Mondo Rubber International, Inc.
7. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
8. Roppe Corporation, USA.

B. Resilient Base:

1. Standard: ASTM F 1861.
2. Material Requirement: Type TP (rubber, thermoplastic).
3. Manufacturing Method: Group I (solid, homogeneous).
4. Style: Cove (base with toe).
5. Minimum Thickness: 0.125 inch.
6. Height: 4 inches.
7. Lengths: Coils in manufacturer's standard length.
8. Outside Corners: Preformed.
9. Inside Corners: Job formed.
10. Finish: Satin.
11. Colors and Patterns: Refer to Interior Finish Plans.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 098433 - SOUND-ABSORBING WALL PANELS

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 shop-fabricated, acoustical panel panels tested for acoustical performance, including the following:

1. Sound-absorbing wall panels.

1.3 DEFINITIONS

A. NRC: Noise Reduction Coefficient.

B. SAA: Sound Absorption Average.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include panel edge, core material, and mounting indicated.

B. Shop Drawings: For unit assembly and installation.

1. Include plans, elevations, sections, and mounting devices and details.
2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
3. Include details at cutouts and penetrations for other work.

C. Samples for Verification: For the following products:
1. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
2. Core Material: 12-inch- (300-mm-) square Sample at corner.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Electrical outlets, switches, and thermostats.
2. Items penetrating or covered by panels including the following:
   a. Alarms.
   b. Access panels.

B. Product Certificates: For each type of unit.

C. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include panel manufacturers' written cleaning and stain-removal instructions.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements and Approvals: Comply with requirements below..
   1. International Code Council (ICC):
      a. ICC-ES Evaluation Report ESR-1112.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Lighting: Do not install panels until a lighting level of not less than 50 fc (538 lx) is provided on surfaces to receive the panels.

C. Air-Quality Limitations: Protect panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.

D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to the following:

a. Acoustical performance.
b. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall panels specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.3 SOUND-ABSORBING WALL PANELS

A. Sound-Absorbing Wall Panel: Manufacturer's standard interior wall panel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Basis-of-Design Product: Subject to compliance with requirements, provide Tectum Inc. standard interior wall panels or approved equal.

2. Panel Shape: Flat.
3. Mounting: Edge square ends.

a. Finish Color at Exposed Edges: White.

4. Mounting: Back mounted with manufacturer's standard adhesive, secured to substrate.
5. Core: Manufacturer's standard. Provide wood or plywood nailing strips in core where indicated.
6. Retain "Core-Face Layer" Subparagraph below if different face layer is required for the core material to make the panels impact resistant, tackable, or both.
7. First option in "Edge Construction" Subparagraph below is most common and is used with glass- and mineral-fiber board cores. Last three options are sometimes used for panels with facing material stretched over front face of edge-framed core.
8. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
9. Edge Profile: Square.
10. Corner Detail in Elevation: Square with continuous edge profile indicated.
11. Acoustical Performance: Sound absorption NRC of 0.50 to 0.90.
12. Nominal Overall Panel Thickness: 1 1/2 inches (38 mm).
13. Panel Width: 24 inches (610 mm).
14. Panel Height: 96 inches (2438 mm).

2.4 MATERIALS

A. Core Materials:

1. Aspen wood fibers bonded with inorganic hydraulic cement.

2.5 FABRICATION

A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Edge Hardening: For cores, chemically harden core edges.

C. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch (1.6 mm) for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with manufacturer's written instructions for installation of panels directly to precast concrete panels using construction adhesives and masonry fasteners such as Tapcon or Kwik-Con II. Comply with manufacturer's written instructions for installation of furring strips using construction adhesive for precast concrete panels and masonry fasteners such as Tapcon or Kwik-Con II if substrate is unsuitable for direct mounting of panels. Mount panels securely to supporting substrate with recommended screw pattern for type of screw used.

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb and Level: Plus or minus 1/16 inch (1.6 mm) in 48 inches (1200 mm), noncumulative.

B. Variation of Joint Width: Not more than 1/16-inch (1.6-mm) variation from in 48 inches (1200 mm), noncumulative.

3.4 CLEANING

A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the exterior substrates indicated in the Exterior Painting Schedule at the end of this Section.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 09 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.2 SUBMITTALS

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

B. Samples for Verification: Labeled sample with stepped coats, for each type of paint system and each color and gloss of topcoat indicated.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: For each painting system, use a single manufacturer for primer and topcoats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

C. Material Quality: Provide products of indicated quality or better for each coating type specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Products: Proprietary names used to designate colors or materials are not intended to exclude equal or better products of other manufacturers. Equivalents products may submitted for approval by Architect through Product Requirements process indicated in Division 01, with executed CSI standard Substitution Request Form, complete with point-by-point comparison filled out for each proposed product compared with an MPI listed product. Proposed products must meet or exceed the test results of the MPI listed product, including abrasion resistance, adhesion, corrosion weathering, salt fog resistance, dry heat resistance, and other requirements of this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F .

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide indicated products from the following, or comparable products approved by Architect:

1. Duron Paints and Wallcoverings (Duron).
2. Imperial Chemical Industries (ICI).
3. Benjamin Moore and Co. (Moore).
4. PPG Industries, Pittsburgh Paints (Pittsburgh).
5. The Sherwin-Williams Company (S-W).
6. Tnemec Company

2.2 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: To match finish schedule, unless noted otherwise.

2.3 EXTERIOR LATEX PAINTS

A. Acrylic: direct-to-metal waterborne acrylic gloss or semi gloss enamel for use over structural steel and shop primed steel:
   1. ICI: Devflex 4218.
   2. Moore: Impervex Enamel #309.
   3. PPG: 90 Line Pitt-Tech One Pack Interior/Exterior High Performance Waterborne High Gloss DTM Industrial Enamels.
   4. P & L: Z/F 2900 Series Enducryl Acrylic Maintenance Enamel.
   5. S-W: DTM Acrylic Coating Gloss (Waterborne) B66W100 Series.
   6. Tnemec: Tnemec Series 1029 Enduratone

2.4 METAL PRIMERS

A. Synthetic, Rust-Inhibiting Primer: Quick-drying, rust-inhibiting primer for priming ferrous metal on exterior under alkyd enamel:
   1. Duron: Dura Clad Red Oxide Metal Primer, 33-250.
   2. Moore: Ironclad Retardo Rust-Inhibitive Paint #163.
   3. Pittsburgh: 6-208 Red Inhibitive Metal Primer.
   4. S-W: Kem Kromik Metal Primer B50N2/B50W1.
   5. Tnemec: Tnemec Series 18 Envriro-Prime

2.5 EXTERIOR ALKYD PAINTS

A. Alkyd Gloss Enamel: Weather-resistant Gloss enamel for use over primed metal surfaces:
   1. Duron: Dura Clad Alkyd Gloss Enamel, 12 Series.
   2. Moore: Impervo High-Gloss Enamel #133.
   3. Pittsburgh: 54 Line Quick-Dry Enamel.
   4. S-W: Metalastic II Enamel B-53 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Apply field primer to unfinished shop primed surfaces.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Masonry must be cured a minimum of 28 days.

F. Steel Substrates: If not shop prepared and primed, remove rust and loose mill scale. Clean using Power Tool Cleaning (SSPC-SP3) or other methods recommended in writing by paint manufacturer and approved by Design Builder.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Aluminum (not anodized or otherwise coated).
6. Gypsum board.

1.2 DEFINITIONS

A. Gloss Levels:

1. Gloss Level 1(flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
2. Gloss Level 2 (velvet): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
3. Gloss Level 3 (eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
4. Gloss Level 4 (satin): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
5. Gloss Level 5 (semi-gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.
6. Gloss Level 6 (gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Green Globe Submittals:

1. Product Data: For paints and coatings, including printed statement of VOC content.

C. Samples: For each type of paint system and in each color and gloss of topcoat.

D. Product List: For each product indicated.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
   b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.

C. Colors: As selected by Architect from manufacturer's full range.

1. 20 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:

1. Benjamin Moore, Moorecraft, Super Croft Latex
2. Sherwin Williams, Loxon.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior:

1. Benjamin Moore, EcoSpec, Interior Latex Primer/Sealer
2. Sherwin Williams, ProGreen 200.

B. Primer Sealer, Interior, Institutional Low Odor/VOC:

1. Benjamin Moore, EcoSpec WB, latex Primer
2. Sherwin Williams, Harmony Interior Latex Primer.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based:

1. Benjamin Moore, Super Spec, High Performance Acrylic MH Primer.
2. Sherwin Williams Pro Industrial, Pro-Cryl Universal Primer

B. Primer, Galvanized, Water Based:

1. Behr Paint, Premium Select, Interior/Exterior DTM Primer
2. SW Industrial & Marine, DTM Acrylic Primer.

C. Primer, Quick Dry, for Aluminum:

1. Sherwin Williams, Kem Kromic Universal Metal Primer.

2.6 WATER-BASED PAINTS

A. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):

1. Benjamin Moore, EcoSpec WB, Interior Flat Finish
2. Sherwin Williams, harmony Interior Latex Flat.

B. Latex, Interior, High Performance Architectural, (Gloss Level 3):

1. PPG, Manor Hall, 100% Acrylic latex
2. Sherwin Williams, Duration Home Interior Latex Satin.

C. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5):

1. Benjamin Moore, SuperSpec HP, DTM Acrylic Semi-Gloss
2. Sherwin Williams, Industrial & marine, SherCryl HPA Semi-Gloss.

2.7 DRY FOG/FALL COATINGS

A. Dry Fall, Water Based, for Galvanized Steel, Flat (Gloss Level 1):

1. Benjamin Moore, Super Spec, Sweep Up Spray latex Flat
2. PPG Speed Hide Super Tech B Interior Dry Fog.

2.8 FLOOR COATINGS

A. Stain, Interior, for Concrete Floors:

1. Benjamin Moore, Concrete Stain
2. Sherwin Williams, H & C, Silicone Acrylic Concrete Sealer.

B. Sealer, Water Based, for Concrete Floors:

1. PPG, Porter paints, Plex Seal W.B. Sealer
2. Sherwin Williams, H & C, Concrete and mason Waterproofing Sealer.

C. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):

1. Benjamin Moore, Moore’s, Latex Floor and Patio Enamel
2. Sherwin Williams, Industrial and Marine, Armor Seal Tread Plex WB Floor Coating

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces (Walls):

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 3).

B. Concrete Substrates, Traffic Surfaces (Janitor Room Floors):

1. Latex Floor Enamel System:
   a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3).
   b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3).
   c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3.
2. Concrete Stain System:
   a. First Coat: Stain, interior, for concrete floors.
   b. Topcoat: Stain, interior, for concrete floors,.
3. Water-Based Clear Sealer System (Electrical & Mechanical Room Floors):
   a. First Coat: Sealer, water based, for concrete floors.
   b. Topcoat: Sealer, water based, for concrete floors.

C. CMU Substrates (Walls):

1. High-Performance Architectural Latex System:
   a. Block Filler: Block filler, latex, interior/exterior.
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).

D. Steel Substrates:

1. Water-Based Dry-Fall System (Joists and Beams):
   a. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
   b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1).
2. High-Performance Architectural Latex System:
   a. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5).

E. Galvanized-Metal Substrates (Floor & Roof Decking):

1. Water-Based Dry-Fall System:
   a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1).
   b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1).
2. High-Performance Architectural Latex System (Bollards):
   a. Prime Coat: Primer, galvanized, water based.
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).

F. Aluminum (Not Anodized or Otherwise Coated) Substrates (Miscellaneous):

1. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, quick dry, for aluminum.
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).

G. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System (Ceilings):
   a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1).
2. High-Performance Architectural Latex System (Walls):

a. Prime Coat: Primer sealer, latex, interior.
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3.

END OF SECTION 099123

SECTION 099600 - HIGH-PERFORMANCE COATINGS

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 surface preparation and application of high-performance coating systems on the following substrates:
   1. Exterior Substrates:
      a. Steel.
      b. Galvanized metal.
   2. Interior Substrates:
      a. Concrete masonry units (CMU).
      b. Steel.
      c. Gypsum board.

B. Related Sections include the following:
   1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
   2. Division 09 painting Sections for special-use coatings and general field painting.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of finish-coat product indicated.

C. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 QUALITY ASSURANCE

A. Master Painters Institute (MPI) Standards:
   1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
   2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and coating systems indicated.

B. Mockups: Apply benchmark samples of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each type of coating and substrate.
      a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
   3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
   1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. Provide products of same manufacturer for each coat in a coating system.

B. Colors: As indicated on Finish Schedule.

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI#4.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Benjamin Moore & Co.; Moorcraft, Super Craft Latex Block Filler, 285-01.
      b. ICI Paints; 3010 Paints; Devoe Coatings, Bloxfil Acrylic Block Filler, 4000.
      c. PPG Architectural Finishes, Inc.; Interior/Exterior Latex Block Filler, 6-12.
      d. Sherwin-Williams Company (The); PrepRite, Int/Ext Block Filler, B25W25.(two coats) or Heavy Duty Block Filler B42W00046 (one coat.)

B. Epoxy Block Filler: MPI #116.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. ICI Paints; Devoe Coatings, Bar-Rust 231 or 236.
      b. PPG Architectural Finishes, Inc.; Aquapon, Epoxy Block Filler, 97-685.
      c. Sherwin-Williams: Kem Cati-Coat HS Epoxy Filler/Sealer, B42W00400/B42V00401.

2.3 INTERIOR PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Benjamin Moore & Co.; Moorcraft, Latex Undercoater & Primer Sealer, 253-00.
      b. Colorwheel: Contractor’s Choice: Gloss Prep Waterborne Undercoat, 8300.
      c. Duron Inc.; Interior Acrylic Drywall Primer, 04-124.
      d. ICI Paints; Prep-N-Prime, Interior Latex Wall Primer, 1000.

e. PPG Architectural Finishes, Inc.; Speedhide, Int. Latex Primer Sealer, 6-2.
f. Sherwin-Williams Company (The); PrepRite, 200 Latex Primer, B28W200

2.4 METAL PRIMERS

A. Galvanized Metal Primers
1. Benjamin Moore & Co.; Devran 203 or 205.
2. Aquapon Primer 97-145 or 97-846.

B. Inorganic Zinc Primer: MPI #19.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Inorganic Zinc Primer, M01/M02.
b. ICI Paints; Devoe Coatings, Catha-Cote 304, 304.
c. PPG Architectural Finishes, Inc.; Metalhide One-Pac, Inorganic Zinc Rich Primer, 97-676.
d. Sherwin-Williams Company (The); Industrial & Marine, Zinc Clad II Ethyl Silicate, B69V3/D11.
e. Tnemec: 90-97 Tneme-Zinc.

C. Cold-Curing Epoxy Primer: MPI #101.
1. Products: Subject to compliance with requirements, provide one of the following:
a. ICI Paints; Bar-Rust 235, Multi-Purpose Epoxy Coating, DC235K3501.
b. Sherwin-Williams Company (The); Industrial & Marine, Duraplate 235 Multi-Purpose Epoxy, B67W235.

2.5 EPOXY COATINGS

A. Epoxy, Cold-Cured, Gloss: MPI #77.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Polyamide Epoxy Coating, M36/M37.
b. ICI Paints; Devoe/Fuller, Guardcote, DP34UXX.
c. PPG Architectural Finishes, Inc.; Aquapon, Epoxy Cold Cured Gloss, 95-1.
d. Sherwin-Williams: Tile-Clad High Solids Epoxy Coating. B 62 Series.

B. High-Build Epoxy Marine Coating, Low Gloss: MPI #108.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Epoxy Mastic Coating, M45/M46.
b. ICI Paints; Devoe Coatings, Bar-Rust 236, 236.
c. PPG Architectural Finishes, Inc.; Aquapon, High Build Epoxy Marine Coating, 97-130/97-139.
d. Sherwin-Williams Company (The); Industrial & Marine, Macropoxy 646, B58W6 Series.
e. Tnemec: Series 66 High-build Epoxoline II.

C. Epoxy-Modified Latex, Interior, Gloss: MPI #115.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Waterborne Polyamide Epoxy Gloss, P42.
b. ICI Paints; Devoe Paints, Tru-Glaze-WB Waterborne Epoxy Gloss, 4428/4420.
c. PPG Architectural Finishes, Inc.; Pitt-Glaze Water-Borne Acrylic Epoxy, 16-598.
d. Sherwin-Williams Company; Industrial & Marine, Water Based Catalyzed Epoxy, B70W00200/B60V00015.

D. Epoxy-Modified Latex, Interior, Semi-Gloss: MPI #215.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Acrylic Epoxy Coating/Semi-Gloss Catalyst, P43/KP43.
b. ICI Paints; Devoe Paints, Tru-Glaze-WB Waterborne Epoxy Semi-Gloss Coating, 4426-4420.
c. PPG Architectural Finishes, Inc.; Pitt-Glaze Water-Borne Acrylic Epoxy, 16-599.
d. Sherwin-Williams Company; Pro Industrial, Pre-Catalyzed Waterbased Epoxy, K46 Series.

2.6 POLYURETHANE COATINGS

A. Polyurethane, Two-Component, Pigmented, Low Luster:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Benjamin Moore & Co.; Aliphatic Acrylic Urethane Gloss, DM74.
   b. ICI Paints; Devoe Coatings, Devthane Aliphatic Urethane Semi-gloss, 378H.
   c. PPG Architectural Finishes, Inc.; Pitthane, Urethane Aliphatic Pigmented Semi-Gloss, 95-849.
   d. Shewin-Williams: Corothane II Polyurethane.
   e. Tnemec: Series 73 Endura-Shield.

B. Polyurethane, Two-Component, Pigmented, Gloss: MPI #72.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Benjamin Moore & Co.; Aliphatic Acrylic Urethane Gloss, CM74/M75.
      b. ICI Paints; Devoe Coatings, Devthane Aliphatic Urethane, 369.
      c. PPG Architectural Finishes, Inc.; Pitthane, Urethane Aliphatic Pigmented Gloss, 95-850.

C. Two-Component, Aliphatic Polyurethane, Clear: MPI #78.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Benjamin Moore & Co.; Aliphatic Acrylic Urethane Clear, CM7400
      b. ICI Devoe (Canada); ICI Devoe, Devthane 379, 379KXXXX.
      c. PPG Architectural Finishes, Inc.; Pitthane, Polyurethane Aliphatic 2 Comp. Clear, 95-8000.
      d. Tnemec: Series 76 Endura Clear.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Masonry (Clay and CMU): 12 percent.
      b. Gypsum Board: 12 percent.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   4. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION, GENERAL

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
   1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.

D. CMU Substrates: Remove efflorescence and chalk, dust, dirt, release agents, grease and oils. Mechanically remove glaze, if necessary to ensure bonding. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust and loose mill scale.
   1. Clean using methods recommended in writing by coating manufacturer.
   2. Blast clean according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 PREPARATION OF CMU SUBSTRATES

A. Block Filler: Fill voids and depressions in block and mortar joints to full flush condition.
   1. Apply the surfacer (8 mils wet – 3.2 mils dry) using a 1-1/4 inch roller nap until voids appear to be filled. Immediately squeegee the entire surface using a 7 inch to 9 inch squeegee in a figure eight motion to push the filler into all voids and create a flush surface. Allow to dry according to manufacturer's recommendations, but not less than two hours or more than four hours. Sand to remove edges and irregularities. Recoat and repeat process as necessary to fill all voids flush with surface.
   2. Minimum Height of Squeegee Application:
      a. Food Service and Food Preparation Areas: 5 feet and 4 inches.
      b. Dishwashing Area: 8 feet.
      c. Toilet/Restroom Areas: 6 feet.

B. Prime/Sealer Coats: Before application of finish coats, apply a prime coat, as recommended by the manufacturer, to material required to be coated or finished, and which has not been prime coated by others.
   1. Fill voids and depressions in block and mortar joints to full flush condition.
   2. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

3.4 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions.
   1. Use applicators and techniques suited for coating and substrate indicated in accordance with manufacturer's directions and as specified.
      a. For epoxy coating, use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.5 FIELD QUALITY CONTROL

A. Block Filler: Notify the Architect of completion of block filler application, to schedule mandatory inspection. Do not apply finish coats over block filler until block filler application is approved by the Architect's Representative.

B. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
   1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance with specified requirements.

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

3.6 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.7 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates: Architecturally exposed structural steel and where indicated.
   1. Polyurethane, Pigmented Coating System: 5.3L (sim.)
      a. Prime Coat: Shop primed.
      b. Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
      c. Topcoat: Polyurethane, two-component, pigmented, low-luster.
      d. Topcoat: Polyurethane, two-component, clear, gloss, MPI #78.

B. Galvanized-Metal Substrates: Architecturally exposed structural steel, handrails and where indicated.
   1. Polyurethane, Pigmented Coating System: 5.3L (sim.)
      a. Prime Coat: Cold-curing epoxy primer, MPI #101.
      b. Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
      d. Topcoat: Polyurethane, two-component, clear, gloss, MPI #78.

3.8 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete & CMU Substrates:
   1. Epoxy Coating System: MPI # 4.2F:
      a. Prime Coat: Interior/exterior latex block filler, MPI #4.
      b. Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
      c. Topcoat: Epoxy, cold-cured, gloss, MPI #77.
   2. Epoxy Coating System: MPI # 4.2G: (For wet environments, per MPI)
      a. Prime Coat: Epoxy block filler, MPI #116.
      b. Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
      c. Topcoat: Epoxy, cold-cured, gloss, MPI #77.
   3. Water-Based Epoxy Coating System: MPI # 4.2J:
      a. Prime Coat: Latex block filler, MPI # 4.
      b. Intermediate Coat: Epoxy-modified latex, MPI # 115 (Gloss), MPI # 215 (Semi-Gloss).
      c. Topcoat: Epoxy-modified latex, MPI # 115 (Gloss), MPI # 215 (Semi-Gloss).

B. Steel Substrates (handrails and where indicated):
   1. Polyurethane, Pigmented, Over High-Build Epoxy Coating System:
      a. Prime Coat: Cold-curing epoxy primer, MPI #101.
      b. Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.

C. Gypsum Board Substrates:
   1. Epoxy Coating System: MPI # 9.2E:

a. Prime Coat: Latex Primer Sealer, MPI #50.
b. Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
c. Topcoat: Epoxy, cold-cured, gloss, MPI #77.

2. Water-Based Epoxy Coating System: MPI # 9.2F:
   a. Prime Coat: Latex Primer Sealer, MPI #50.
   b. Intermediate Coat: Epoxy-modified latex, MPI # 115 (Gloss), MPI # 215 (Semi-Gloss).
   c. Topcoat: Epoxy-modified latex, MPI # 115 (Gloss), MPI # 215 (Semi-Gloss).

END OF SECTION 099600

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).

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.

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 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Solid HDPE toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 SOLID HDPE UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Scranton Products.
2. ASI Global partitions
3. Hadrian Inc.
4. Accurate Partitions Corp.
5. Bradmar Partitions
6. Metpar Corp

B. Door, Panel, and Pilaster Construction: Solid HDPE panel material with 1/4 inch radius edges. Provide minimum 1 inch- thick doors, pilasters and panels, with aluminum heat-sinc fastened to bottom edges.

C. Pilaster Shoes and Sleeves (Caps): Fabricated from stainless-steel sheet, not less than 3 inches high, finished to match hardware.

D. Urinal-Screen Post: Manufacturer's standard wall mounted design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.

E. Brackets (Fittings): 54 inch long Type: Manufacturer's standard design; heavy-duty aluminum, bright dip anodized finish.

F. HDPE Panel Finish: Facing sheet of one color and pattern in each room.

1. Color and Pattern: See architectural drawings finish schedule.

G. Toilet-Enclosure Style: Floor mounted-Overhead braced.

H. Urinal-Screen Style: Wall Mounted.

I. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.

J. Pilaster Shoes: Stainless-steel sheet, not less than 3 inches high, finished to match hardware.

K. Brackets (Fittings):

2.2 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: heavy-duty extruded aluminum with bright dip anodized finish.
2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position .
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.3 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide shoes at posts to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Clearances: Maximum 1/2 inch between pilasters and panels; 1 inch between panels and walls.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Custodial accessories.

B. Owner-Furnished – Contractor Installed Material:

1. Soap dispensers.
2. Toilet Tissue Dispensers

1.2 ACTION SUBMITTALS

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

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. Excel Dryer, Inc.

B. Warm-Air Dryer:

1. Basis-of-Design Product: Xlerator; Model No. XL-SB.

2. Mounting: Surface mounted.
3. Operation: Electronic-sensor activated with timed power cut-off switch.
4. Cover Material and Finish: Stainless steel, Brush
5. Electrical Requirements: 110/120 volt, 12.5 amp, 50 Hz or 60 Hz, 1500 Watts.

C. Grab Bar:

1. Basis-of-Design Product: Bobrick B-6800 Series.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
   a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

D. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: Bobrick B4354.
2. Mounting: Partition mounted, dual access.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

E. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: Bobrick B270.
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

2.2 CUSTODIAL ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.

B. Shelf with Mop and Broom Holder:

1. Basis-of-Design Product: B-224x36.
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches (914 mm).
4. Hooks: Three.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

   a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
   b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel

2.3 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets for fire extinguishers.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

C. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3 mm thick.

2.2 FIRE PROTECTION CABINET (FEC)

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries Academy Series or comparable product by one of the following:
   a. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
   b. Larsen's Manufacturing Company.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Aluminum sheet.

D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where walls are of insufficient depth for semi-recessed cabinet installation.

F. Cabinet Trim Material: Aluminum sheet.

G. Door Material: Aluminum sheet.

H. Door Style: Vertical duo panel with frame.

I. Door Glazing: Clear float glass.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
   a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
      1) Location: Applied to cabinet glazing.
      2) Application Process: Pressure-sensitive vinyl letters.
      3) Lettering Color: Red.
      4) Orientation: Vertical.

L. Finishes: Clear anodized.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.

B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply vinyl lettering at locations indicated.

E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Refer to Division 10 Section “Fire Extinguisher Cabinets” for mounting fire extinguishers in cabinets.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure of hydrostatic test according to NFPA 10.
      b. Faulty operation of valves or release levers.
   2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

   1. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries Cosmic 5E or comparable product by one of the following:
      a. Ansul Incorporated; Tyco International Ltd.
      b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.

c. Larsen's Manufacturing Company.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated 2A-40BC nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

C. Computer Rooms/Labs - Carbon Dioxide Type: UL-rated 10-B:C, 10-lb nominal capacity, with carbon dioxide in manufacturer's standard enameled-metal container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 116623 - GYMNASIUM EQUIPMENT

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 gymnasium equipment:

1. Basketball equipment & controls.
2. Volleyball equipment.

B. Products furnished, but not installed under this Section, include the following:

1. Floor insert sleeves for inserts to be cast in concrete subfloors and footings.

C. Related Sections include the following:

1. Section 033000 "Cast-in-Place Concrete" for installation of floor insert sleeves to be cast in concrete slabs and footings.
2. Division 05 Section “Structural Steel” for overhead support of gymnasium equipment.
3. Section 116653 "Gymnasium Dividers."
4. Division 11 Section “Interior Scoreboards” for basketball/volleyball scoreboards.
5. Division 26 Sections for electrical service for motor operators, controls, and other powered devices for motorized gymnasium equipment.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Provide basketball backboards capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.4 SUBMITTALS

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

1. If applicable, include assembly, disassembly, and storage instructions for removable equipment.
2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: For gymnasium equipment. Include plans, elevations, sections, details, attachments to other work, and the following:

1. Method of field assembly for removable equipment, connections, installation details, mountings, floor inserts, attachments to other work, and operational clearances.
2. Transport and storage accessories for removable equipment.

C. Coordination Drawings: Court layout plans, drawn to scale, and coordinating floor inserts, game lines, and markers applied to finished flooring.

D. Qualification Data: For Installer.

E. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation including loads, point reactions, and locations for attachment of gymnasium equipment to structure.

F. Warranty: Special warranty specified in this Section.

G. Operation and Maintenance Data: For gymnasium equipment to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of gymnasium equipment including gymnasium divider curtains and controls specified in other Division 11 Sections, through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install gymnasium equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium equipment.

1.7 COORDINATION

A. Coordinate installation of floor inserts with structural floors and finish flooring installation and with court layout and game lines and markers on finish flooring.

B. Coordinate layout and installation of overhead-supported gymnasium equipment and suspension system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

C. Coordinate with Pre-engineered Metal Building Provide for design loads and structural steel requirements.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Basketball backboard failures including glass breakage.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AALCO Manufacturing.
2. Draper Inc. EZ Fold (Basis of Design for basketball equipment)
3. Institutional Products Inc.
4. Jaypro Sports, LLC.
5. Performance Sports Systems.
6. Porter Athletic Equipment Company. (Basis of Design for Volleyball equipment)
7. Schelde North America (for Volleyball equipment only)

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Profiles, and Tubes: ASTM B 221.
2. Cast Aluminum: ASTM B 179.
3. Flat Sheet: ASTM B 209.

B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: ASTM A 500 or ASTM A 513, cold formed.
3. Steel Sheet: ASTM A 1011/A 1011M.

C. Support Cable: Manufacturer's standard galvanized steel aircraft cable with a breaking strength of 7000 lb. Provide fittings complying with cable manufacturer's written instructions for size, number, and method of installation.

D. Support Chain and Fittings: Grade 80 hardened alloy steel chain rated for overhead lifting, ASTM A 391/A 391M, with commercial-quality, hot-dip galvanized steel connectors and hangars.

E. Castings and Hangers: Malleable iron, ASTM A 47/A 47M, grade required for structural loading.

F. Anchors, Fasteners, Fittings and Hardware: Manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.

G. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 with minimum strength recommended in writing by gymnasium equipment manufacturer.

2.3 BASKETBALL EQUIPMENT

A. General: Provide equipment complying with requirements in NFHS's "NFHS Basketball Rule Book."

B. Protruding fasteners or exposed bolt heads on front face of backboards are not permitted.

C. Overhead-Supported Backboard (total of 6; verify with drawings):

1. Stationary Type: Manufacturer's standard assembly.
2. Folding Type: Provide manufacturer's standard assembly for forward-folding, front-braced backboard, with hardware and fittings to permit folding.
   a. Basis of Design: Draper EZ Fold: TF-20-B
3. Framing: Steel pipe, tubing, and shapes. Design framing to minimize vibration during play.
   a. Center-Mast Frame: Welded with side sway bracing.
   b. Dual-Mast Frame: Welded with cross bracing.
   c. Finish: Manufacturer's standard primer for field finishing.

4. Goal Height Adjuster: Adjustable from 8 to 10 feet with gear-drive mechanism, locking in any position within adjustment range, with visible height scale attached to side of framing.
   a. Operation: Manual with detachable crank handle.

D. Backboard Electric Operator: Provide operating machine of size and capacity recommended by manufacturer for equipment specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

1. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
2. Operator Mounting: Wall-mounting board.
3. Motor Characteristics: Sufficient to start, accelerate, reverse, and operate connected loads at designated speeds within installed environment and with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1, and the following:
   a. Voltage: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
   b. Horsepower: As standard and recommended by manufacturer.
   c. Enclosure: Manufacturer's standard.
   d. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.

E. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop basketball equipment at fully retracted and fully lowered positions.

F. Keyed Controls:

1. Remote-Control Station(s): NEMA ICS 6, Type 1 enclosure for surface mounting, momentary-contact, three-position switch-operated control with up, down, and off functions.
   a. Group Key Switch Control Stations: One switch per two backboards.
   b. Keys: Provide two keys per station.
   c. Switches, Ganged: Single faceplate with multiple switch cut-outs for three switches operating six backboards.
   d. Control Station Enclosure: Provide prime-painted metal enclosure with key access with two sets of keys per enclosure.

G. Basketball Backboard:

1. Shape and Size:
   a. Rectangular, 72 by 42 inches width by height, with rounded corners.
2. Backboard Material: With predrilled holes or preset inserts for mounting goals, and as follows:
   a. Glass: Not less than 1/2-inch- thick, transparent tempered glass. Provide glass with impact-absorbing resilient rubber or PVC gasket around perimeter in a fully welded, painted steel frame, with steel subframe, reinforcement, and bracing, and with mounting slots for mounting backboard frame to backboard support framing.
      1) Standard Mount: Provide steel corner reinforcement with mounting slots for mounting backboard frame to backboard support framing at standard mounting centers.
      2) Direct Mount: Designed for mounting backboard frame to center mast of backboard framing to maximize relief of stresses on backboard frame and glass.
      3) Rim-Restraining Device: Complying with NCAA and NFHS rules and designed to ensure that basket remains attached if glass backboard breaks.
3. Target Area and Border Markings: Permanently etched in white color, marked in pattern and stripe width according to referenced rules.
4. Finish: Manufacturer's standard factory-applied, white background.

H. Goal Mounting Assembly: Compatible with goal, backboard, and support framing; with hole pattern that is manufacturer's standard for goal attachment.

1. Glass Backboard Goal Mounting Assembly: Goal support framing and reinforcement designed to transmit load from goal to backboard frame and to minimize stresses on glass backboard.
2. Direct Mount: Designed for mounting goal directly and independently to center mast of backboard support framing so no force, transmitted by ring, is directly applied to backboard and rigidity and stability of goal are maximized.

I. Basketball Goals: Complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.

1. Single-Rim Basket Ring Competition Goal: Materials, dimensions, and fabrication complying with referenced rules.
2. Type: Movable, breakaway design with manufacturer's standard breakaway mechanism including positive-lock, preset pressure release, set to release at 180- and 230-lb load, and automatic reset. Provide movable ring with rebound characteristics identical to those of fixed, nonmovable ring.
3. Net Attachment: No-tie loops for attaching net to rim without tying.
4. Finish: Manufacturer's standard powder-coat finish.

J. Basketball Nets: 12-loop-mesh net, between 15 and 18 inches long, sized to fit rim diameter, and as follows:

1. Cord: Made from white nylon.
2. Competition Cord: Antiwhip, made from white nylon cord not less than 120- or more than 144-gm thread.

K. Backboard Safety Pads: Designed for backboard thickness indicated and extending continuously along bottom and up sides of backboard and over goal mounting and backboard supports as required by referenced rules.

1. Attachment: Bolt-on.
2. Color: As selected by Architect from manufacturer's full range.

2.4 VOLLEYBALL EQUIPMENT

A. General: Provide equipment complying with requirements in NFHS's "NFHS Volleyball Rule Book."

B. Sets required: 1 **complete sets**.

C. Floor Insert: Solid-brass floor plate; and steel pipe sleeve, concealed by floor plate, with capped bottom end, sized with ID to fit post standards, not less than length required to securely anchor pipe sleeve below finished floor in concrete footing; with anchors designed for securing floor insert to floor substrate indicated; one per post standard.

1. Basis of Design: Porter Model No. 00870-100.
2. Floor Plate: Lockable swivel access cover, designed for use with floating wood floors and to be flush with adjacent flooring. Provide two tool(s) for unlocking access covers.

D. Post Standards: Removable, paired volleyball post standards as indicated. Adjustable, telescoping height. Designed for easy removal from permanently placed floor insert supports. Fabricated from extruded-aluminum pipe or tubing, with nonmarking plastic or rubber end cap or floor bumper to protect permanent flooring. Finished with manufacturer's standard factory-applied, baked powder-coating finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness or plated metal finish.

1. Basis of Design: Porter Model No.#1971.
2. Nominal Pipe or Tubing Diameter: 3 - 4inch OD at base, per manufacturer

3. Net Height Adjuster: Manufacturer's standard mechanism for height adjustment, complete with fittings; designed for positioning net at heights indicated.
4. Telescopic and Net Height Adjuster System: Provide Manufacturer's standard telescoping system with locking device, telescopic post, and fittings for holding net at selected height; designed for height adjustment of post standard to position net at heights indicated.
   a. Net Heights: Between for age 12 and under net height and boys'/men's volleyball net height, 84 and 95-5/8 inches or more.
5. Height Markers: Clearly marked at regulation play heights for girls/women, boys/men, sitting volleyball.

E. Net: 32 feet long and as follows; 1 per pair of paired post standards:

1. Width and Mesh: 36 inches with 4-1/2-inch- square mesh made of black polyester string.
   a. Hem Band Edges: White, 2-inch- wide top binding; black, 1-inch- wide bottom and side bindings; tie offs at top and bottom of each side end of net; and 1/4-inch- diameter rope, at least 42 feet long, threaded through top hem of binding.
2. Dowels: Not less than 1/2-inch- diameter fiberglass or 1-inch- diameter wood. Provide two dowels per net threaded through each side hem sleeve for straightening net side edges.
3. Net Antennas: 3/8-inch- diameter, high-tensile-strength, extruded fiberglass or plastic rods, 72 inches long, extending above top hem band of net, with alternating white and red bands according to competition rules. Provide two antennas per net.
   a. Clamps: Designed to secure antenna to top and bottom of net.

F. Net Tensioning System: Designed to adjust and hold tension of net. Fully enclosed, nonslip manufacturer's standard-type winch with cable length and fittings for connecting to net lines, positive-release mechanism, and manufacturer's standard handle. Mount net tensioner on post standard at side away from court. Provide end post with post top pulley. Provide opposing post with welded steel loops, hooks, pins, or other devices for net attachment and post top grooved line guide.

G. Bottom Net Lock Tightener: Provide manufacturer's standard quick-release-type tension strap, spring-loaded self-locking tensioner, turnbuckle, pulley, or other device and linkage fittings designed to quickly and easily tighten bottom line or net.

H. Safety Pads: Comply with NCAA and NFHS requirements. Provide pads consisting of not less than 1-1/4-inch- thick, multiple-impact-resistant manufacturer's standard foam filler covered by puncture- and tear-resistant, not less than 14-oz./sq. yd. PVC-coated polyester, treated with fungicide for mildew resistance, fabric cover; with fire-test-response characteristics indicated, and lined with fire-retardant liner. Provide pads with hook-and-loop closure or attachments for the following components:

1. Post Standards: Wraparound style, designed to totally enclose each standard to a height of not less than 72 inches; 1 per post.
2. Net Lines: Four per net.
3. Judges' Stands: Designed to totally enclose each unit.
4. Fabric Cover Flame-Resistance Ratings: Passes NFPA 701.
5. Fabric Color: As selected by Architect from manufacturer's full range.

I. Storage Cart: Manufacturer's standard wheeled unit designed for transporting and storing volleyball equipment and passing through 36-inch- wide or wider door openings. Fabricate units of welded steel tubing with heavy-duty casters, including not less than two swivel casters. Fabricate wheels from materials that will not damage or mark floors; number of units as required to provide transport and storage for specified equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.

1. Verify critical dimensions.
2. Examine supporting structure and subgrades, subfloors and footings below finished floor.
3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements have been clearly marked. Locate reinforcements and mark locations.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions and competition rules indicated for each type of gymnasium equipment. Complete equipment field assembly, where required.

B. Unless otherwise indicated, install gymnasium equipment after other finishing operations, including painting, have been completed.

C. Permanently Placed Gymnasium Equipment and Components: Rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated on Shop Drawings; in proper relation to adjacent construction; and aligned with court layout.

1. Floor Insert Location: Coordinate location with application of game lines and markers, and core drill floor for inserts after game lines have been applied.
2. Floor Insert Elevation: Coordinate installed heights of floor insert with installation and field finishing of finish flooring and type of floor plate.
3. Operating Gymnasium Equipment: Verify clearances for movable components of gymnasium equipment throughout entire range of operation and for access to operating components.

D. Floor Insert Setting: Position sleeve in oversized, recessed voids in concrete slabs and footings. Clean voids of debris. Fill void around sleeves with grout, mixed and placed to comply with grout manufacturer's written instructions. Protect portion of sleeve above subfloor and footing from splatter. Verify that sleeves are set plumb, aligned, and at correct height and spacing; hold in position during placement and finishing operations until grout is sufficiently cured. Set insert so top surface of completed unit is flush with finished flooring surface.

E. Wall Corner Safety Pads: Mount with bottom edge at 4 inches above finished floor.

F. Anchoring to In-Place Construction: Use anchors and fasteners where necessary for securing built-in and permanently placed gymnasium equipment to structural support and for properly transferring load to in-place construction.

G. Connections: Connect automatic operators to building electrical system.

H. Removable Gymnasium Equipment and Components: Assemble in place to verify that equipment and components are complete and in proper working order. Instruct Owner's designated personnel in properly handling, assembling, adjusting, disassembling, transporting, storing, and maintaining units. Disassemble removable gymnasium equipment after assembled configuration has been approved by Owner, and store units in location indicated on Drawings.

3.3 ADJUSTING

A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.4 CLEANING

A. After completing gymnasium equipment installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.

B. Replace gymnasium equipment and finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 116623

SECTION 116653 - GYMNASIUM DIVIDERS

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 gymnasium divider curtains.

B. Related Sections include the following:

1. Division 11 Section "Gymnasium Equipment" for remote controller to operate basketball backstops and gymnasium dividers.
2. Division 26 Sections for electrical service for motor operators, controls, and other powered devices for motorized gymnasium dividers.

1.3 SUBMITTALS

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

1. If applicable, include assembly, disassembly, and storage instructions for removable equipment.
2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation including loads, point reactions, and locations for attachment of gymnasium dividers to structure.

D. Samples for Initial Selection: For each type of gymnasium divider curtain fabric indicated.

E. Samples for Verification: For divider curtain fabric, not less than 12 inches square of open mesh, and of opaque fabric.

F. Product Certificates: For each type of gymnasium divider, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Operation and Maintenance Data: For gymnasium dividers to include in emergency, operation, and maintenance manuals.

I. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain gymnasium divider curtains and gymnasium equipment specified in another Division 11 Section, through one source, and where available, from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install gymnasium dividers until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify position for gymnasium dividers.

1.6 COORDINATION

A. Coordinate installation of overhead-supported gymnasium dividers and suspension system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of gymnasium dividers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, faulty operation of gymnasium dividers.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Profiles, and Tubes: ASTM B 221.
2. Cast Aluminum: ASTM B 179.
3. Flat Sheet: ASTM B 209.

B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: ASTM A 500 or ASTM A 513, cold formed.
3. Steel Sheet: ASTM A 1011/A 1011M.

C. Support Cable: Manufacturer's standard galvanized steel aircraft cable with a breaking strength of 7000 lb. Provide fittings complying with cable manufacturer's written instructions for size, number, and method of installation.

D. Support Chain and Fittings: Grade 80 hardened alloy steel chain rated for overhead lifting, ASTM A 391/A 391M, with commercial-quality, steel connectors and hangars.

E. Castings and Hangers: Malleable iron, ASTM A 47/A 47M, grade required for structural loading.

F. Anchors, Fasteners, Fittings and Hardware: Manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.

2.2 DIVIDER CURTAINS

A. Basis-of-Design Product: Subject to compliance with requirements, provide a product by one of the following:

1. AALCO Manufacturing.
2. ADP Lemco Inc.
3. American Athletic, Inc.
4. Draper Inc.(Basis of Design)
5. Institutional Products Inc.
6. Jaypro Sports, LLC.
7. Performance Sports Systems.
8. Porter Athletic Equipment. Co.

B. Divider Curtains: Electrically operated, fold up, and as follows:

1. Upper Curtain, Mesh: Woven fabric of 100 percent polyester yarn coated with PVC weighing not less than 6.5 oz./sq. yd.

   a. Mesh Color: As selected by Architect from manufacturer's full range.

2. Lower Curtain, Solid: Woven polyester coated with PVC, 18 oz./sq. yd, embossed, 8-foot height above floor.

   a. Fabric Color(s): As selected by Architect from manufacturer's full range.

3. Divider Curtain Flame-Resistance Ratings: Passes NFPA 701, inherently and permanently flame resistant.

   a. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.

C. Curtain Fabrication: Fused seams and the following:

1. Top Hem: Reinforce with triple thickness mesh for continuous pipe batten.
2. Bottom Hem for Fold-up Curtains: Floor-length curtains with hems 2 inches above finished floor and with manufacturer's standard pipe batten with felt padding in pocket.

D. Accessories:

1. Grommets: Manufacturer's standard size and spacing, for snaps or S-hooks.
2. Proof Coil Chain: Grade 30, No. 8, zinc plated, 3/16 inch, ASTM A 413/A 413M.
3. Curtain Battens: Fabricate battens from steel pipe with a minimum number of joints. As necessary for required lengths, connect pipe with drive-fit pipe sleeve not less than 18 inches long, and secure with 4 flush rivets, plug welds, threaded couplings, or another equally secure method. Shop-paint completed pipe battens with black paint.

   a. Steel Pipe: ASTM A 53/ A 53M, Grade A, standard weight (Schedule 40), black, 1-1/2-inch nominal diameter, unless otherwise indicated.

4. Curtain Battens: 1-5/16 inch continuous aluminum tubes extending the full length of the fabric.

E. Divider Curtain Operator: Upward folding, cable suspended.

F. Divider Curtain Electric Operator: Provide operating machine of size and capacity recommended by manufacturer for equipment specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

1. Operator Type: Electric motor, manufacturer's standard drive, with chain and sprocket secondary drive.
2. Motor Characteristics: Sufficient to start, accelerate, reverse, and operate connected loads at designated speeds within installed environment and with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1, and the following:
3. Voltage: 120 V - NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected..
4. Horsepower: Manufacturer's recommended.
5. Enclosure: Manufacturer's standard.
6. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
7. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
8. Phase: One.
9. Remote-Control Station(s): NEMA ICS 6, Type 1 enclosure for surface mounting, momentary-contact, three-position switch-operated control.

    a. Keys: Provide two key(s) per station.

G. Motor Control: Programmable gymnasium control center, as specified in Division 11 Section "Gymnasium Equipment."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.

1. Verify critical dimensions.
2. Examine supporting structure.
3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements have been clearly marked. Locate reinforcements and mark locations.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions. Complete field assembly, where required.

B. Unless otherwise indicated, install gymnasium dividers after other finishing operations, including painting, have been completed.

C. Gymnasium Dividers and Components: Rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated on Shop Drawings; in proper relation to adjacent construction; and aligned with court layout.

1. Verify clearances for movable components of gymnasium dividers throughout entire range of operation and for access to operating components.

D. Anchoring to In-Place Construction: Use anchors and fasteners where necessary for securing gymnasium dividers to structural support and for properly transferring load to in-place construction.

E. Connections: Connect automatic operators to building electrical system.

3.3 ADJUSTING

A. Adjust movable components of gymnasium dividers to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.4 CLEANING

A. After completing gymnasium divider installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.

B. Replace gymnasium divider components and finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gymnasium dividers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 116653

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

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. Resilient-tile entrance mats.
   2. Recessed frames.

1.3 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor mats and frames.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components, profiles, and finishes for floor mats and frames.

B. Shop Drawings:

   1. Items penetrating floor mats and frames, including door control devices.
   2. Divisions between mat sections.
   3. Perimeter floor moldings.
   4. Custom Graphics: Scale drawing indicating colors.

C. Samples: For the following products, in manufacturer's standard sizes:

   1. Floor Mat: Assembled sections of floor mat.
   2. Tread Rail: Sample of each type and color.
   3. Frame Members: Sample of each type and color.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient-Tile Entrance Mats: Full-size tile units equal to 2 percent of amount installed, but no fewer than 10 units.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Structural Performance: Provide mat tiles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Uniform floor load of 300 lbf/sq. ft. (14.36 kN/sq. m).
2. Wheel load of 350 lb (100 kg) per wheel.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.2 RESILIENT-TILE ENTRANCE MATS

1. Manufacturers: Basis-of-Design Product: Subject to compliance with requirements, provide Milliken OBEX Entry System ARX prior11C (WOS-1) & TERGO11C (WOS-2) styles or an architect approved product.

B. Modular Tile Matting System: 100% Econyl® regenerated polyamide BCF; Twisted and heat set dual fibres - multi and monofilament 15/32-inch- (12mm-) thick, square tile.

1. Colors, and Patterns: As selected by Architect from full range of industry colors and patterns.
2. Tile Size: 7.87 inches (200 mm).

2.3 FRAMES

A. Recessed Frames: Manufacturer's standard extrusion.

1. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.

a. Color: Mill finish.

2.4 CONCRETE FILL AND GROUT MATERIALS

A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.5 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.

1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

2.6 ALUMINUM FINISHES

A. Mill finish.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.

1. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
3. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

SECTION 220100

PLUMBING

PART 1- GENERAL

1.1 DESCRIPTION

A. Work included: Provide plumbing system as shown on the Drawings, specified herein, and needed for a complete and proper installation including, but not necessarily limited to:
1. Domestic hot and cold water piping systems.
2. Drain, waste and vent systems.
3. Plumbing fixtures and trim as shown on the Drawings.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Codes and regulations:
1. In addition to complying with the specified requirements, comply with:
   a. Local plumbing code having jurisdiction.
   b. International Plumbing Code (IPC).
   c. American National Standard Accessible and Usable Buildings and Facilities, ICC/ANSI A117.1-2006.
2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Engineer.
3. Work shall meet the Plumbing Inspector's approval.

C. Permits, licenses and fees: Plumbing Contractor shall obtain and pay for all permits, licenses, fees and service charges required for execution of this work.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 1.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Product data sheets for all plumbing related fixtures, fittings and equipment, including the manufacturer's specification sheet for each component and any engineering performance data as applicable. The Plumbing Contractor is responsible to ensure that all fixture installations meet the local code and owner requirements for the given application.
   4. Shop drawings and other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Drawings.

C. Seismic restraints manufacturer (only if required for the project as indicated in the Code Compliance Sesimic Requirements Table on the drawings):
   1. Provide installation instructions and shop drawings for all seismic restraints.
   2. Include calculations to determine restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition.
      a. Certify and stamp seismic calculations to be by an engineer in the employ of the seismic equipment manufacturer with a minimum five (5) years of experience and licensed in the project’s jurisdiction.
   3. Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors and minimum distances of anchors from concrete edges.
   4. Provide certification that equipment is for suitable seismic performance.
   5. Stamp drawings by a manufacturer’s professional engineer registered in the state of South Carolina

D. Penetration of building assemblies:
   1. Provide shop drawings for all penetration of building assemblies.
   2. Provide installation instructions and details for assemblies.

E. Manuals: Upon completion of the work of this Section, deliver to the Engineer two (2) copies of an operation and maintenance manual compiled in accordance with the provisions of Section 01730 of these Specifications.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 1.

B. Protect piping materials from severe impact blows, gouging or cutting by metal surfaces or rocks.

1.5 PLUMBING SYSTEM DESIGN REQUIREMENTS

A. Domestic Water Supply Protection:

1. Provide all potable water supply protection devices as required for the application and degree of hazard for any potential connections which will not provide the adequate air gap in accordance with the International Plumbing Code (IPC) Section 608 and in collaboration with the intentions of use by the Owner. For instance, a hose bibb, sill cock or wall hydrant with a hose connection shall be protected by the proper vacuum breaker device.

B. Hand Wash Sink – Tempered Water:

1. Per the requirements of the IPC, tempered water (85F-105F) is to be provided at each hand washing sink.
2. Accomplish with either a code-compliant mixing valve as shown in the Fixture Schedule on the drawings.

C. Americans with Disabilities Act (ADA) Requirements:

1. Ensure compliance to all ADA-compliance standards as required by the “Authority Having Jurisdiction”.

D. Seismic restraints:

1. Provide seismic restraints as scheduled, specified, or required by applicable code.
2. A seismic restraint system is required for:
   a. All equipment (to include water heaters) and any piping of 3"-diameter or greater if the Seismic Design Category (SDC) rating is D or higher and the component Importance Factor (Ip) is 1.0.
   b. Any pipe or equipment with an Ip of 1.5 (such as natural gas) must be provided with seismic restraint regardless of the SDC except where other exemptions apply.
      1) Any natural gas water heater must have a seismic restraint.
3. Plumbing Contractor must get the site SDC rating and Importance Factor rating for all plumbing components from the General Contractor in writing.

4. It is the responsibility of the Plumbing Contractor to determine when seismic restraints are required and obtain the design in accordance with applicable codes and the Contract Documents.

E. Penetration of building assemblies:

1. Where any component of the plumbing system (pipe, pipe support, etc.) penetrates any building assembly (wall, floor, ceiling, roof, etc.), a commercial fire protection system for a through-penetration with the correct UL rating classification must be selected and a certified submittal installation detail for each system submitted to the Engineer for approval.
2. The selection of a through-penetration system is based on the type of assembly (wall, floor, or combination), assembly construction type (wood frame, concrete, masonry, etc.), the penetrating item type (metallic pipe, non-metallic pipe, etc.), and the fire rating of the building assembly.
3. The Plumbing Contractor is responsible for procuring the system(s) selections and details.
4. Details of these fire protection assemblies are not provided in these drawings as the building assembly components and fire ratings, penetrating item material types and other specific (and vital) factors related to system selection are subject to change and or contractor preferences.
5. Plumbing Contractor must have a system submittal and sample of the firestopping products (sealants, putties, strips, etc.) available at the job site for review by the Code Official.

PART 2- PRODUCTS

2.1 PIPE SCHEDULE

A. Materials:

1. All materials and equipment shall be new and free from flaws and defects of any nature.
2. All pipe shall conform to the latest edition of the "International Plumbing Code" or local governing plumbing codes and the latest ASTM standard specifications.
3. PVC (polyvinyl chloride) piping shall comply with the requirements of ASTM for the type specified.
4. Copper pipe shall comply with the requirements of ASTM for the type specified.
5. All pipe and fittings are to be manufactured in the United States.

B. Drain, waste and vent system:

1. All above-grade and below-grade drain/waste/vent piping shall be Schedule 40 PVC, ASTM D 2665 with glue-joint fittings. The vent design as shown in the drawings DWV isometric detail is based on the assumed relative best terminal locations. However, terminal locations must be field confirmed by the Plumbing Contractor with the Owner Representative. Any vent arrangement modifications which are required either by terminal re-location (vs. design), potential field interferences (vs. design) or other preferences by the Plumbing Contractor must be in compliance with the Plumbing Code. Roof penetration requirements for terminals must be confirmed with the Owner Representative by the Plumbing Contractor.

C. Water system (domestic piping):

1. Water supply pipe below the building slab shall be ASTM B 88 soft (annealed) copper tubing, type K, with no fittings allowed. All distribution pipe in the building (above grade) shall be ASTM B88 hard (drawn) copper tubing, type L with solder joint fittings. All tubing must be rated and marked for water service use. Placement of all water distribution piping should be coordinated with the General Contractor and other trade disciplines as alternate locations from that shown on the drawings may be preferable or necessary--it is the responsibility of the Plumbing Contractor to coordinate this effort.

D. Cold Water Pipe Insulation:

1. Provide insulation on all cold domestic water service or distribution piping located below the slab, in semi-conditioned areas (such as above the suspended ceiling), or in visually-exposed areas such as passing through hallways or rooms.
   a. Provide nominal 1/2" closed cell elastomeric foam products rated for the service.
   b. The conductivity of the insulation must not exceed 0.27 Btu per inch/h-ft^2-^{o}F.
2. Elastomeric insulation applied to under-slab pipe to be seamless.
3. Provide documentation that all insulation has a fire rating and duty as required for the application.
4. Provide Armacell Armaflex AP, Nomaco FlexTherm insulation or approved equal.
5. Confirm that where pipe that passes through visually-exposed areas, the manufacturer allows that insulation can be painted (painting shall be by others).

E. Hot Water Pipe Insulation:

1. Provide insulation on all hot water piping.
   a. Provide closed cell elastomeric foam products rated for the service.
   b. The conductivity of the insulation must not exceed 0.27 Btu per inch/h-ft^2-^{o}F in accordance with the International Energy Conservation Code Section 504.5.
   c. Thickness:
      1) Non-re-circulating system piping: ½" thick insulation.
2. Provide documentation that all insulation has a fire rating and duty as required for the application.
3. Provide Armacell Armaflex AP, Nomaco FlexTherm insulation or Engineer approved equal.
4. Confirm that where pipe that passes through visually-exposed areas, the manufacturer allows that insulation can be painted (painting shall be by others).

2.2 SUPPLY WATER UNIONS

A. Provide at all connections to fixtures and equipment.

B. For copper lines, provide cast brass.

2.3 VALVES

A. Pressure reducing valves:
   1. Provide top-entry type pressure reducing valves manufactured by Wilkins (Zurn trademark), Apollo or Engineer approved equal.
      a. An integral bypass check valve is not required if a thermal expansion tank is installed in the system (see IPC Section 607.3.1).
   2. Shut-off valves:
      a. Provide full-ported ball or gate type shut-off valves where indicated on the Drawings, specified herein, and as required by IPC Section 606.2.
      b. Comply with Section 02751.
   3. Vacuum relief valve:
      a. Provide on all bottom-fed hot water heaters with the valve and supply leg tee placed above the top level of the tank.
      b. Provide vacuum relief valve manufactured by Watts, Wilkins, or Engineer approved equal.

2.4 PENETRATION OF BUILDING ASSEMBLIES

A. Provide penetration of building assemblies as manufactured by 3M Fire Protection Products and Systems or Specified Technologies Inc.

2.5 FLASHING

A. Where piping passes through roof, flash with means as prescribed by the Architect and/or the General Contractor.

2.6 SHOCK ABSORBERS

A. Provide Zurn, Sioux Chief or Engineer approved equal.

2.7 PIPE AND EQUIPMENT SUPPORTS

A. Pipe hangers:
   1. Provide pipe hangers and connections which meet the Manufacturers' Standardization Society SP-69.

B. Seismic restraints: Provide seismic restraints where required by applicable code as detailed in the previous sections and on the drawings.
   1. Provide commercial type seismic restraints designed and specified by a professional engineer specializing in this field.
   2. Provide support and restraint system products by Mason Industries, Inc., ISAT or Engineer approved equal.

2.8 CLEANOUTS

A. General:
   1. Provide Sioux Chief, Josam, J.R. Smith or Engineer approved equal.
   2. Cleanouts shall be the same size diameter as lines in which they are installed up to 4", and not less than 4" for larger pipe.

B. Exterior: Provide Sioux Chief, J.R. Smith, Josam, or Engineer approved equal.

C. Floors:
   1. Provide Sioux Chief, J.R. Smith, Josam, or Engineer approved equal with round nickel-bronze top.
   2. Provide "flush-with-floor" type cleanouts, with adjustable watertight covers and integral anchoring flange with clamping collar where waterproofing membrane is used.

D. Finished walls: Provide Sioux Chief, J.R.Smith, Josam, or Engineer approved equal with round chrome plated or stainless steel access plate and screw.

E. Provide cleanout plugs of extra heavy bronze.

2.9 FIXTURES AND EQUIPMENT

A. Provide plumbing fixtures, trim, and equipment as shown on the Drawings and specified herein.
   1. All fixtures, equipment, and materials to be new and free from flaws and defects of any nature.
   2. Provide as specified and detailed on the Drawings or approved equal. Acceptable fixture manufacturers are:
      a. American Standard.
      b. Kohler.
      c. Eljer.
      d. Crane.
      e. Toto.
      f. Elkay.
      g. Symmons.
      h. Moen.
      i. Zurn.
      j. Engineer approved equal.
   3. Provide ANSI 117.1 compliant fixtures and equipment for handicapped accessibility as required.

2.10 ELECTRIC WATER HEATER

A. Water heater manufactured by Rheem-Ruud or engineer approved equal.

B. Water heater(s) shall have the UL seal of certification and be factory equipped with a CSA/ASME rated temperature and pressure relief valve.

C. Tank shall have a coating of high temperature porcelain enamel and furnished with magnesium anode rods rigidly supported.

D. Water heater(s) shall meet or exceed the energy factor requirements of ASHRAE.

E. Tank(s) shall have a working pressure of 150 psi, and shall be completely assembled.

F. Tank shall be insulated with 2-1/2” polyurethane foam insulation.

G. 3/4" inlet and outlet water connections.

H. Water heater(s) shall be covered by a three year limited warranty against tank leaks.

2.11 SEWAGE BACKFLOW PREVENTION

A. Where indicated on the Drawings or required by regulations or codes, provide a backwater valve according to the requirements of the International Plumbing Code (IPC).

2.12 MISCELLANEOUS PARTS AND ACCESSORIES

A. Use standard commercial grade suitable for the type of installation or system involved, and conforming to the applicable standards and specifications.

PART 3- EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 GENERAL CONDITIONS

A. Coordination:
1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
2. Coordinate the installation of plumbing items with the schedule for work of other trades to prevent unnecessary delays in the total Work.

B. Verify locations of lines as shown on the Drawings are acceptable and not in interference with other trades or existing elements.

C. Verify all clearances, dimensions, inverts, and sizes of piping and equipment with the contract documents and field conditions before fabrication of any materials or work is to be performed. Provide modifications as necessary at no additional cost to the Owner.

D. ADA Requirements:
1. Properly install all ADA fixtures and associated appurtenances which must comply with applicable codes.
2. Verify the location, elevation and suitability of all ADA elements prior to installation.

E. Install all required shut-off valves in accordance with IPC.
1. Other than the location of the main shut-off valve, no other shut-offs are shown on the Drawings, but are required and must be installed.

3.3 PLUMBING SYSTEM LAYOUT

A. Drawings are intended to be diagrammatic and do not include all offsets, fittings and specialties required. Drawings do not include any location dimensions and should not be scaled for installation purposes. All dimensional information required for installation must be collected from the actual field conditions.

B. Before construction of project begins, check locations and inverts of existing and proposed pipes, sewers and mains.

C. Review other drawings for the project, checking grades, elevations, locations of structural elements, walls and partitions.

D. Report to Engineer any conflicts or unsatisfactory conditions before start of construction.

E. Follow the general layout shown on the Drawings in all cases except where other work may interfere, use minimum number of fittings.

F. Lay out pipes to fall within partition, wall or roof cavities, and to not require furring other than as shown on the Drawings.

G. No extra charge for work resulting from failure to follow these instructions will be approved after start of construction.

3.4 INSTALLATION OF PIPING AND EQUIPMENT

A. General:

1. Proceed as rapidly as the building construction will permit.
2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.
3. Cut pipe accurately, and work into place without springing or forcing, properly clearing windows, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.
4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
5. Install horizontal soil, waste and drain piping at a uniform slope of not less than 1/4" per foot for pipe 3" and smaller, and not less than 1/8" per foot for larger pipe.
6. Provide sufficient swing joint, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.

7. Support piping independently at pumps, coils, tanks, and similar locations, so that weight of pipe will not be supported by the equipment.
8. Securely bolt all equipment, isolators, hangers, and similar items in place.
9. Support each item independently from other pipes. Do not use wire for hanging or strapping pipes.
10. Provide complete dielectric isolation between ferrous and non-ferrous metals, EPCO, Mayco, or equal.
11. Provide union and shutoff valves suitably located to facilitate maintenance and removal of equipment and apparatus.
12. Piping within the buildings shall be run concealed, unless otherwise approved.
13. Drains and associated drain piping shall be provided at all low points.

B. Cold Water and Hot Water Pipe Insulation:
1. Do not place water lines of any type areas other than the insulated envelope of the building space or below grade.
2. Insulation should not be applied until after all required pressure tests are complete (except for under-slab pipe).
3. Provide “Cold Water” identification label covers where lines are insulated.
   a. Install every twenty (20) feet on center.
4. Miter and seal all joints with an adhesive as required by the insulation manufacturer.

C. Sewage backflow prevention:
1. Verify the actual location of the upstream sewer manhole cover in relation to the flood level rims of the building fixtures and, if necessary, install a backwater valve.

D. Waste Vent Piping:
1. The vent design as shown in the domestic waste vent isometric detail is based on the assumed relative best terminal locations.
   a. Terminal locations must be field confirmed with the Engineer and Owner.
2. Any vent arrangement modifications which are required either by terminal re-location (vs. design), potential field interferences (vs. design) or other preferences by the Plumbing Contractor must be in compliance with Section 916 of the IPC and confirmed with the Engineer and Owner.
3. Roof penetration requirements for terminals must be confirmed with the Engineer and Owner.

E. Equipment access: Install piping, equipment and accessories to permit access for maintenance. Relocate items as necessary to provide such access, without additional cost to the Owner.

F. Penetration of building assemblies:
   1. Install in strict accordance with certified submittals and manufacturer's approved instructions.

3.5 PIPE JOINTS

A. Copper tubing:
   1. Cut square, remove burrs, and clean inside of female filling to a bright finish.
      a. Apply solder flux with brush to tubing.
      b. Remove internal parts of solder-end valves prior to soldering.
   2. Provide dielectric unions at points of connection of copper tubing to ferrous piping and equipment.
   3. For joining copper tubing, use:
      a. Water piping 3" and smaller: 95-5 solder.
      b. Water piping larger than 3": "Sil-fos" brazing;
      c. Underground: "Sil-fos" brazing only as absolutely necessary.

B. Screwed piping:
   1. Deburr cuts:
      a. Do not ream exceeding internal diameter of the pipe.
      b. Thread to requirements of ANSI B2.1.
   2. Use teflon tape on male thread prior to joining other services.
   3. Use litharge and glycerin on joint prior to cleaning for air and oil piping.

C. PVC piping:
   1. Ensure all smooth edges prior to joining. Be-burr as required.
   2. Join by primer and glue as recommended by pipe manuf.

D. Leaky joints:
   1. Remake with new material.
   2. Remove leaking section and/or fitting as directed.
   3. Do not use thread cement or sealant to tighten joint.

3.6 FINISH PIPE OPENINGS

A. Finish and escutcheons:
   1. Smooth up rough edges around sleeves with plaster or spackling compound.

2. Provide escutcheons on all pipes exposed to view where passing through walls, floors, partitions, ceilings, and similar locations.
   a. Size the escutcheons to fit pipe and covering.
   b. Hold escutcheons in place with setscrew.

3.7 CLEANOUTS

A. Secure the Engineer's approval of locations for cleanouts in finished areas prior to installation.

B. Provide cleanouts of same nominal size as the pipes they serve; except where cleanouts are required in pipes 4" and larger, provide 4" cleanouts.

C. Make cleanouts accessible. After pressure tests are made and approved, thoroughly graphite the cleanout threads.

3.8 VALVES

A. Provide valves in water system. Locate and arrange so as to give complete regulation of apparatus, equipment and fixtures.

B. Provide valves in at least the following locations:
   1. In branches and/or headers of water piping serving a group of fixtures.
   2. On both sides of apparatus and equipment.
   3. For shutoff of risers and branch mains.
   4. For flushing and sterilizing the system.
   5. Where shown on the Drawings.

C. Locate valves for easy accessibility and maintenance.

D. Where certain shut-off valves to required fixtures may otherwise be concealed in wall cavities, etc. (such as for sill cocks or hose bibbs), the Plumbing Contractor must coordinate with the General Contractor to locate the valves and label valves where access or specific access panels are provided in the building.

3.9 PIPE SUPPORTS

A. Space hangers and support for horizontal steel pipes according to International Plumbing Code Section.

B. Provide sway bracing on hangers longer than 18".

C. Support vertical piping with riser clamps secured to the piping and resting on the building structure. Provide at each floor unless otherwise noted.

D. Arrange pipe supports to prevent excessive deflection, and to avoid excessive bending stress.

E. Seismic Restraints:
   1. Install in accordance with applicable codes and manufacturer's recommendations.
   2. If seismic restraints are required, provide and execute a special inspection and quality assurance plan in accordance with the IBC.
      a. The plan must include inspection by a manufacturer's representative and a letter from the manufacturer certifying the installation is in compliance.
   3. Provide label from equipment manufacturer certifying all seismic restraints provided are suitable for seismic performance.

3.10 WATER HAMMER ARRESTERS

A. Provide water hammer arresters on hot water lines and cold water lines.
   1. Install in upright position on hot water lines and cold water lines.
   2. Arresters shall be Zurn, Sioux Chief or Engineer approved equal.
   3. Access panels must be provided in walls or ceiling for inspection and maintenance of arresters. Panels shall be provided by the General Contractor with locations coordinated by the Plumbing Contractor.

3.11 PLUMBING FIXTURE INSTALLATION

A. Installation:
   1. Set fixtures level and in proper alignment with respect to walls and floors, and with fixtures equally spaced.
   2. Provide supplies in proper alignment with fixtures and with each other.
   3. Provide flush valves in alignment with the fixture, without vertical or horizontal offsets.

B. Grout wall and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.

C. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

3.12 TESTING

A. Water system:
   1. Clean and flush line of dirt and foreign material.
   2. Perform pressure tests prior to installation of fixtures.

3. Test pump, pipe connection, pressure gauges, measuring devices and all other necessary appurtenances to conduct tests shall be provided by the Contractor.
4. Tests shall be conducted on each line or valved section of line.
5. Test pressures shall be 150 psi based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge.
6. Replace or remake joints showing leakage.
   a. Remove cracked pipe, defective pipe, and cracked or defective joints, fittings and valves. Replace with sound material and repeat the test until results are satisfactory.
   b. Make repair and replacement without additional cost to the Owner.

B. Drainage system:
1. Test the entire drainage and sanitary system as dictated by local codes.
2. Plug all necessary openings appended to the system.
3. Fill the system or section of system being tested with water to the level of the top of highest vent stack.
4. Not less than 10 feet of water pressure should be maintained for one hour, unless otherwise required.
5. Should any test disclose excessive leakage, locate and repair the joint, joints or pipe until accepted.
6. This work and any additional testing required by the Engineer shall be done at no additional costs to the Owner.

3.13 STERILIZATION OF WATER SYSTEMS

A. Disinfect hot and cold water systems.
1. Upon completion of testing, sterilize all water lines to meet requirements of the South Carolina Department of Health and Environmental Control.
2. Newly laid valves or other appurtenances shall be operated several times while line is filled with chlorinating agent.
3. Should initial treatment fail to meet results specified, repeat procedures until satisfactory results are obtained, at no additional cost to the Owner.
4. All pipe taps, feeders, chemicals, etc., for sterilization shall be provided by the Contractor.

B. Procedure:
1. Flush systems to extent possible with available pressure and outlets, prior to sterilization.
2. Apply chlorine as liquid chlorine or chlorine compound such as calcium hypochlorite with known chlorine content.

3. Apply through corporation cock in top of main, at beginning of system being sterilized.
4. Use proper feeder and flow regulator to introduce chlorinating agent.
5. Application rate shall be not less than 50 ppm.
6. Retain chlorinated water in system not less than 24 hours.
7. At end of retention period, at least 10 ppm of chlorine shall remain in the water at the extreme end of section.
8. Flush line thoroughly.

C. Acceptance:

1. Provide three separate samples, taken at 24-hour intervals, free of coliform bacteria.
   a. Contractor to take first and second samples, deliver to South Carolina Department of Health and Environmental Control (SCDHEC) laboratory for testing.
   b. Notify SCDHEC to take third sample.

3.14 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 230100

HEATING, VENTILATING AND AIR CONDITIONING

PART 1- GENERAL

1.1 DESCRIPTION

A. Work included: Provide heating, ventilating, and air conditioning systems where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to.

1. Gas/Electric Package Units
2. Unitary Split Air Conditioning Systems
3. Metal ductwork system with grilles, diffusers, registers, and hardware.
4. Fabric ductwork systems.
5. Toilet room exhaust systems including, but not necessarily limited to: fans, motors, ductwork, controls and related items.
6. Gas piping system.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Division 26 - Electrical.

1.2 SCOPE

A. These specifications together with the accompanying mechanical drawings are intended to provide for the complete installation of new mechanical systems for the building renovation/construction.

B. The Heating, Ventilation, and Air Conditioning (HVAC or Mechanical) Contractor:

1. Provide heating, air conditioning and ventilating equipment and materials as specified hereinafter and as indicated and scheduled on the Drawings.
2. Provide all equipment, materials, labor and services necessary to provide complete and operating mechanical systems for the building.

3. Pay all fees, and secure all licenses and permits that are required and necessary in order to perform the work set forth in these specifications. Shall comply with all federal, state and local codes as well as requirements of the International Building, Mechanical, Plumbing and Energy Codes – currently-adopted Editions of South Carolina, ADA, EPA, NFPA and all other authorities having jurisdiction over this work.
4. Provide heating, air conditioning and ventilating controls system as specified hereinafter and as indicated and scheduled on the Drawings.
   a. Install, adjust, calibrate, and place in satisfactory operation the entire control system.
   b. Provide installation by trained technicians.
5. Provide excavating and backfilling necessary for this work and promptly remove from the premises all excess earth, debris and trash for which responsible.
6. Inform the General Contractor well in advance of the sizes and locations of all chases, openings, lintels, sleeves, etc., required for the installation of the mechanical equipment.
   a. Failure to do so will result in the HVAC Contractor bearing the cost of this phase of the work.
7. Perform all work included under this Section by skilled and capable workmen under competent supervision, employing the latest and best practices of the various trades involved.
8. Visit the job site prior to submitting a bid for this work, in order to become familiar with all existing conditions, and to verify all items related to this contract.
   a. No extra payments will be allowed on account of extra work made necessary failure to do so.
9. Responsible for determining that all products submitted for approval meet given space limitations and maintain all required clearances for proper access and service.
10. Coordinate any changes in electrical requirements with the Contractor at no added cost to the Owner.

C. General Contractor will:
1. Flash all roof curbs furnished by the HVAC Contractor.
2. Do all cutting, patching and construction of chases that is necessary for the installation of the work covered under this contract.
3. Provide all framed openings in the walls, floors and roof for ductwork penetrations, louver openings, fan openings, etc., as applicable.

4. Provide all housekeeping pads for outdoor equipment. The HVAC Contractor is responsible to provide dimensions for the pad based on the certified drawings of all equipment and necessary of-sets as required by the Certified Seismic Anchor Design provided by the HVAC Contractor.

D. Refer to the Drawings and specifications for a complete description of any and all alternates as they pertain to the mechanical work.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1. Perform all work by skilled mechanics, under competent supervision, employing latest and best practices of the trade.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Codes and regulations:

1. All work shall be performed in strict accordance and complete detail with the currently adopted codes of the public body of jurisdiction. For the State of South Carolina this includes, but is not limited to, the following:
   a. International Building Code.
   b. International Mechanical Code.
   c. International Energy Conservation Code.
   d. International Fuel Gas Code.
   e. All other relevant OSHA, NFPA, ASTM, etc. standards apply.
2. No element of these drawings or specifications should be interpreted to supersede or negate any code or standard requirement.

D. Provide materials and equipment new and free from flaws and defects of any nature.

E. Materials specified are considered as standards of quality, which however, implies no right on the part of the Contractor to substitute other materials and methods without written authority from the Engineer.

F. The phrase "or equal" means that material or equipment will be acceptable only when, in the judgment of the Engineer, they are composed of parts of equal quality, or equal workmanship and finish, designed and constructed to perform or accomplish the desired result as efficiently as the indicated brand, pattern, grade, class, make or model.
   1. Obtain written approval from the Engineer prior to purchase and installation.

G. Install work in accordance with recommendations of ASHRAE Guide and equipment manufacturer.
   1. In the event there is any conflict or doubt, consult Engineer for clarification and approval.

H. Insulation: Install all insulation in a workmanlike manner by qualified insulation mechanics either by a licensed Insulation Subcontractor or qualified mechanics in the direct employ of the Mechanical Contractor. Install all insulation in strict accordance with the manufacturer's recommendations, using approved type laggings, adhesives, mastics, and other materials as applicable.

I. Remove any item of equipment installed on this project which was not specified or approved for substitution and replace with the item specified, without any cost to the Owner.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Project General Section related to submittals.

B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit.
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
   4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Submit for review and approval the following items of equipment and materials, as a minimum:
   1. All HVAC equipment.
   2. Air distribution devices.

3. Ductwork materials.
4. Ductwork insulation.
   a. Include installation instructions.
5. Name of Test and Balancing Contractor.
6. Controls and Control Devices (such as smoke alarms, thermostats, etc.)
7. Equipment Connection/Anchor Details
8. Seismic Restraint Submittals and Sealed Calculation Data Sheets
9. Building Assembly Penetration Details

D. Vibration and seismic control products manufacturer:
1. Provide piping and equipment isolation systems and seismic restraints as scheduled, specified, or required with installation instructions and shop drawings for all seismic materials.
2. Include calculations to determine restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition.
   a. Certify and stamp seismic calculations to be by an engineer in the employ of the seismic equipment manufacturer with a minimum five (5) years of experience and licensed in the project's jurisdiction.
   b. Provide calculations for all floor or roof mounted equipment and all suspended or wall mounted equipment 20lbs or greater.
3. Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors and minimum distances of anchors from concrete edges.
4. Stamp drawings by a manufacturer's professional engineer registered in the state of South Carolina.

E. Penetration of building assemblies:
1. Provide shop drawings for all penetration of building assemblies.
2. Provide installation instructions and details for assemblies.

F. Provide operation and maintenance manuals to include the following:
1. "As-Built" control drawings.
2. Control Supplier's certificate, if employed.
3. Air balance reports.

G. Samples:
1. When so requested by the Engineer, promptly provide samples of items scheduled to be installed in the final structure.
2. When specifically so requested by the Contractor and approved by the Engineer, approved samples will be returned to the Contractor for installation on the Work.

H. Manuals: Upon completion of this portion of the Work and as a condition of its acceptance, deliver to the Contractor two copies of an operation and maintenance manual. Include within each manual.
   1. Copy of the approved Record Documents for this portion of the Work.
   2. Copies of all warranties and guaranties.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of the Project Product Handling Section of the General Project Specifications.

1.6 DRAWINGS

A. Drawings are diagrammatic and do not indicate all offsets, fittings, and accessories. Coordinate work with other trades, examine other drawings, investigate conditions to be encountered and arrange work accordingly and provide all fittings, offsets, etc. required to avoid interferences at no additional cost to the Owner.

B. Drawings show general arrangement of ducts, but do not necessarily show all offsets, etc. required to avoid interferences. Where shape of duct is varied, alter dimensions to provide equal static pressure drop per unit of length.

C. In case of doubt as to the Drawings or Specifications, call to the Engineer's attention all discrepancies, errors or omissions encountered.
   1. Do not proceed in uncertainty.

1.7 PERMITS, LICENSES AND FEES

A. HVAC Contractor shall obtain and pay for all permits, licenses, fees and service charges required for execution of this work.

1.8 WARRANTY

A. Comply with provisions of the Project General Specifications.

B. Guarantee mechanical systems to operate quietly, safely, and efficiently.

1.9 SPARE PARTS

A. Provide the following spare parts: Two (2) year supply of air filters for each item of equipment requiring a filter.

1.10 TECHNICAL SERVICES

A. Provide the services of a competent engineer or mechanic to thoroughly train and instruct the Owner's personnel in the proper operation and maintenance of all mechanical items of equipment, complying with at least the following:
   1. Start-up and training.

1.11 DESIGN REQUIREMENTS

A. Penetration of building assemblies:
   1. Where any component of the HVAC system (duct, pipe, cables, etc.) penetrates any building assembly (wall, floor, ceiling, roof, etc.), a manufactured fire protection system for a through-penetration with the correct UL rating classification must be selected and a certified submittal installation detail for each system submitted to the Engineer.
   2. The selection of a through-penetration system is based on the type of assembly (wall, floor, or combination), assembly construction type (wood frame, concrete, masonry, etc.), the penetrating item type (metallic pipe, non-metallic pipe, cable, duct, etc.), and the fire rating of the building assembly.
   3. The HVAC Contractor is responsible for procuring the system(s) selections and details.
   4. Details of these fire protection assemblies are not provided in these drawings as the building assembly components and fire ratings, penetrating item material types and other specific (and vital) factors related to system selection are subject to change and or contractor preferences.
   5. HVAC Contractor must have a system submittal and sample of the firestopping products (sealants, putties, strips, etc.) available at the job site for review by the Code Official.

B. Ductwork:
   1. Details of construction and materials not specified herein must be in accordance with recommendations of latest ASHRAE Guide or Duct Manual published by Sheet Metal and Air Conditioning Contractors National Association, "SMACNA HVAC Duct Construction Standards - Metal and Flexible" for +/- 2 w.c. pressure conditions.
   2. Flexible Connectors: SMACNA HVAC Duct Construction Standards- Metal and Flexible

C. Smoke Detectors:
   1. Section 606 of the 2006 IMC

PART 2- PRODUCTS

2.1 METAL DUCTWORK

A. General:

1. Unless otherwise specified, construct all visually unexposed ductwork shown on the Drawings of galvanized steel with gauges, seams, joints and reinforcing for ductwork in accordance with ASHRAE Guide and SMACNA Manual for low pressure ductwork.
2. Duct to be air tight, smooth on inside and neatly finished on the outside.
3. All duct dimensions shown on the drawings are for inside, clear/open areas:
   a. Follow duct dimensions indicated on the Drawings as closely as possible.
   b. Provide offsets, vary shape or alter run if required to meet structural or other interferences.
   c. Where shape of duct varies, alter dimensions to provide equal static pressure drop per unit length.
4. Cover or otherwise protect all fan and duct openings from dirt and debris during construction.
   a. Clean systems prior to final inspection.
5. Provide reinforcing and supports for all ductwork per SMACNA Standards.
6. Support metal ductwork with approved galvanized steel type straps, rods, or angles of adequate size secured to building construction as required.
7. Mechanical items of equipment and ductwork cannot be supported from “X” bracing or bridging between joists, beams, or trusses.
8. Install single-row vane type aluminum turning vanes at all square and 45 degree elbows in all supply and return ductwork.

B. Fittings:

1. Provide fittings with smooth transitions at all elbows, connections and in branch take-offs.
2. Inside radius of bends not be less than the width of the duct.

C. Where equipment is provided with vibration isolation or seismic restraint, all attached ductwork must be connected to the equipment using flexible connectors as recommended by the manufacturer and required by the "SMACNA HVAC Duct Construction Standards- Metal and Flexible".

D. Where ducts go through walls and concrete slabs, furnish and install aluminum angles around perimeter of duct on both sides of opening.

1. Anchor angles securely to ducts and walls or slabs.

E. Provide neoprene coated flexible connectors in metal ducts where they join fans and air handling units.

F. All ductwork connections (splices, Y's, T's, plenum connections, boots, air handler/furnace duct connections, etc.) must be sealed.
   1. Tapes are not allowed for use as a duct sealant.

G. Duct Supports:
   1. Install ductwork with approved galvanized steel strap, angle or band hangers per "SMACNA HVAC Duct Construction Standards- Metal and Flexible", Chapter 4: "Hangers and Supports".
   2. Per ASCE 7-05 "Seismic Design Requirements for Nonstructural Components", no seismic bracing is required for duct of less than 6 ft^2 cross section, or for ductwork of any size suspended by hangers 12" or less in length for any Seismic Design Category with a typical component Importance Factor (Ip) of 1.0.
   3. Any ductwork in any SDC which has an Ip of 1.5 (component functions as a life-safety device or is located in a Use Group III structure) must have a seismic restraint system.
      a. This system is required to be provided by the HVAC Contractor in like manner to those detailed for the Equipment Support Section.
         1) The HVAC Contractor must receive the SDC and Ip data in writing from the General Contractor for all component types in all area and then use this information to comply with the requirements of this specification.

2.2 METAL DUCTWORK INSULATION

A. General
   1. Provide "fiberglass" insulation, as specified herein, as manufactured by OWENS-CORNING CO., JOHNS MANVILLE CO., or Engineer approved equal.
   2. Provide laggings, adhesives, and mastics for the various insulating materials, as specified herein, or similar products as manufactured by LION OIL CO., INSULMASTIC CO., BENJAMIN FOSTER CO., or Engineer approved equal.
   3. Duct liner board as manufactured by Owens Corning (Quiet R Duct Liner Board) or CertainTeed (Ultra Duct Board), or Engineer approved equal.

B. Interior (Inside Building) Duct Insulation (for duct not visually exposed):

1. Provide fiberglass insulation wrap with reinforced foil draft vapor barrier meeting UL-181 and ASHRAE 90.1 on the exterior of all supply and return duct and duct connecting metal surfaces (i.e., plenum boxes, diffuser boots, diffuser back plates, damper handles, etc.)
2. Install duct wrap to achieve the required environment R-value based on the requirements of the 2009 International Energy Conservation Code Section 503.2.7.
   a. The HVAC Contractor is responsible to confirm these requirements with the code and the code official's interpretation prior to installation

C. Return Duct Plenum Lining:
1. Install a 1/2”-thick acoustical-type glass fiber textile duct liner in all return duct plenum boxes (boxes only and not ductwork) which connect directly or in close proximity to occupied spaces.
   a. Provide a the liner manufactured from a material which is specifically rated for this service and shall meet the requirements of NFPA 90A and 90B, ASTM C411, ASTM C1071, ASTM C1104, ASTM C1338, ASTM G21, ASTM G22 and provide a thermal resistance of 0.25 Btu-in2/hr-ft2-F.

D. Flexible Duct:
1. Provide an insulated type with an aluminum foil core, steel spiral reinforcement, environment-required insulating value, required internal pressure rating, and metalized protective barrier.
   a. The HVAC Contractor is responsible to confirm all R-value and internal pressure requirements.
   b. The duct shall meet UL-181/ETL Class I and NFPA 90A and 90B.
   c. Flex duct is allowed for concealed take-off branches only of 8-foot length or less.

E. Oversize pipe hangers and brackets for all insulated piping so that hangers will extend completely around the pipe insulation and the protector saddles specified elsewhere.
1. Where required to prevent pipe hangers from crushing the insulation, install a short section of cellular glass insulation at each pipe hanger location. Vapor seal joints between different insulation types with vapor barrier mastic.

2.3 FABRIC DUCTWORK

A. Gymnasium Visually-Exposed Fabric Ductwork

1. MANUFACTURER:
   a. Subject to compliance with requirements, choose one of the following:
      1) DuctSox® Corporation or equivalent.
2. TEXTILE AIR DISPERSION SYSTEM:
   a. 1 Row Suspension: Air diffusers shall be constructed with one, row suspension system.
      1) Tension Cable
3. One Row Cable Suspension System
   a. Systems shall be installed 1-1/2" above top-dead-center. Textile system attachment to cable shall be made using Gliders spaced every 24 inches. Available for systems less than 32" diameter. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
4. TEXTILE
   a. Verona
      1) Textile Construction: Filament/filament twill polyester, fire retardant in accordance with UL 2518.
      2) Air Permeability: 2 (+2/-1) CFM/ft^2 per ASTM D737, Frazier
      3) Weight: 6.8 oz. /yd^2 per ASTM D3776
      4) Warranty: 10 years
   b. Textile Color
      1) Standard: blue, white, tan, red, green, silver, black as selected by Owner. General Contractor and HVAC Contractor to confirm.
5. TEXTILE SYSTEM FABRICATION REQUIREMENTS:
   a. Textile system to be constructed in modular lengths (zippered).
   b. Integrated air dispersion shall be specified and approved by manufacturer. (select only those that apply)
   c. Linear Vents: Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface. Size of vent openings and location of linear vents to be specified and approved by manufacturer.

1) Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener – supplied by contractor.
2) Inlet connection includes zipper for easy removal / maintenance.
3) Lengths to include required intermediate zippers as specified by manufacturer.
4) System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
5) End cap includes zipper for easy maintenance.
6) Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications and other pertinent information.

6. DESIGN PARAMETERS:
   a. Textile air diffusers shall be designed from 0.25” water gage minimum to 3.1” maximum, with 0.5” as the standard.
   b. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).
   c. System overall design; diameter, length, airflow, operating static pressure and dispersion shall be designed or approved by the manufacturer.

2.4 AIR DISTRIBUTION EQUIPMENT AND DEVICES

A. Furnish and install air distribution equipment for the buildings as indicated on the Drawings, as specified on the schedule on the Drawings, and as described below.

B. Provide air distribution devices from PRICE CO., models, types, and finishes as specified, or approved equals by METAL AIRE CO., KRUEGER MFG. CO., CARNES CO., TITUS, or Engineer approved equal.

C. Provide turning vanes by BARBER-COLMAN CO, DUCTMATE INDUSTRIES or Engineer approved equal.

D. Paint interior of all exposed ductwork located behind the air distribution equipment, using two coats of flat black paint.

E. Metal back pans of all supply diffusers and sidewall register boots shall be insulated as specified hereinafter to reduce possibility of condensation.

F. All sidewall supply and return grilles shall by painted by others as directed by the Architect. The HVAC Contractor must ensure that the grilles as specified or equal alternates are acceptable for painting per the manufacturer.

2.5 EQUIPMENT SUPPORTS

A. General:

1. All equipment must be installed and supported according to the manufacturer's instructions, field application requirements, and may require a seismic restraint/isolation system designed and specified by a professional engineer specializing in this field.
   a. Seismic support is not required for equipment when the site SDC (Seismic Design Category) is C or less and the Importance Factor, Ip, is 1.0. It is not required for SDC of D, E, F when the Ip is 1.0 where BOTH flexible connections are used between all connections and the equipment, AND the components are within 4-feet of the ground and weigh less than 400-lb. Where the Ip is 1.5 in any SDC, seismic support is required. It is the responsibility of the HVAC Contractor to confirm the SDC and Ip values at the time of bid and also at the time of purchase.
   b. When seismic restraint/isolation is required, the equipment unit must also be seismically certified as tested and labeled by the manufacturer.
2. All equipment which requires a seismic restraint/isolation system are identified on the drawing equipment schedules.
   a. If required, it shall be the responsibility of the HVAC Contractor to obtain the installation support design, equipment manufacturers certification documents, provide engineer-sealed installation submittals for approval, and install in accordance with all documents.
   b. Provide seismic restraint/isolation system products manufactured by Mason Industries, Inc.
   c. According to the manufacturer's recommendations, vibration isolation for equipment should be integrated into the seismic restraint/isolation system.
   d. When seismic restraint/isolation and/or vibration isolators are installed, flexible connections must be installed between the equipment and all connections (i.e., ductwork, pipe, conduit, etc.).

3. If a restraint/isolation system is required, a special inspection plan (quality assurance plan) in accordance with IBC Section 1707.8 must also be specified along with the support details; this plan should simply state that all installed restraint systems shall be inspected by the manufacturer's representative and shall be documented with a letter on the representative's letterhead which states the installation is in compliance.
4. If the equipment does not require a seismic restraint system, provide a complete set of equipment connection/anchor details as provided by the manufacturer or a third party commercial support system.
5. The roof-located heat pump unit (HP-1) requires a noise control system as shown in the equipment schedules and related details on the drawings. This system shall be provided by BRD Noise and Vibration Control, Inc. or an engineer-approved equivalent.
6. The roof-top package units (RTU-1, -2, -3, -4) require a noise control system as shown in the equipment schedules and related details on the drawings. These systems shall be provided by BRD Noise and Vibration Control, Inc. or an engineer-approved equivalent.

B. Properly support ductwork and equipment from the roof, wall or floor construction with brackets, threaded rods or strap hangers.

C. Securely attach brackets, hanger rods or strap hangers to structural components of the building.

D. Provide all supplementary steel, framing members, hanger rods, vibration isolators, inserts, etc., to properly support all ductwork.

E. Do not support mechanical items of equipment and ductwork from "X" bracing or bridging between joists or trusses.

F. Coordinate equipment configuration and associated seismic requirements (i.e., depth of pad and offset from edge of pad to anchor bolts as prescribed by seismic details) of all fiber reinforced concrete pads outside building as required to support outdoor HVAC equipment to the General Contractor. The final design of all housekeeping pads will fall under the project Site/Civil design and construction of these pads will be the responsibility of others.
1. Provide seismic anchors as required according to the details of the certified design.

G. All equipment installed outside of the building structure must meet the manufacturer's requirements and must be anchored in a manner to provide the required wind resistance per the International Mechanical Code Section 301.12 and any necessary seismic restraint as described above.

2.6 FILTERS

A. Provide accessible filter housings at all air delivery for the installation of 1” filter media for units of 5-ton nominal capacity or less and 2” filter media for units greater than 5-ton.
   1. Can be integral to equipment.

B. Install filters prior to any system start-up.

C. The use of area-located return air filter/grille assemblies does not eliminate the requirement for a filter housing at the central air delivery equipment.

2.7 REFRIGERANT PIPING

A. All refrigerant piping shall be Type "L" ACR cleaned and capped hard drawn copper piping with soldered wrought copper fittings, using silver solder, "Sil-Fos", or "Phos-Copper".
   1. Provide long radius elbows at all elbows.

B. All refrigerant piping shall be capped with copper caps soldered or brazed to each end of the piping during construction to reduce the possibility of introducing dirt, moisture or debris into the refrigerant systems.
   1. Duct tape is not acceptable as a means to cap piping.

C. HVAC Contractor shall consult the equipment manufacturer for sizing of the refrigerant piping once exact routing has been determined. HVAC Contractor shall furnish equipment manufacturer with all pertinent information such as length of piping, number of elbows, elevations of equipment, etc., necessary for proper sizing of piping and installation of equipment.

D. Insulation:
   1. Provide a closed cell, fiber-free elastomeric foam product in accordance with the International Energy Conservation Code Section 503.2.8.
   2. Must meet all IBC flame spread and UL material requirements
   3. Provide Armacell Armaflex AP, Nomaco FlexTherm or Engineer approved equal which is integral to the purchased line sets.
   4. Provide manufacturer recommended jackets on any exposed insulation, i.e., room exposed (to include mechanical rooms or outdoors,) to protect against UV deterioration. Nominally jackets should be weather-tight aluminum unless the HVAC Contractor states an alternate exclusion in his proposal.
   5. Insulate all elbows and fittings with mitered segments of pipe insulation sealed with adhesive specified above.

6. Do not stretch insulation under tension at joints and seams.

E. Provide isolation type hangers/fasteners when attaching refrigerant piping to concealed building structural components.

2.8 CONDENSATE PIPING AND PANS

A. Overflow pans shall be aluminum or galvanized steel. Condensate piping located inside the building, above ceilings, in walls, and exposed above grade shall be PVC.

B. Each drain line shall be full size of the drain connection on the unit (minimum) and shall have a trap as required the manufacturer.

C. Provide cleanouts with removable threaded plugs in piping.

D. Insulation:
1. Provide 1/2" closed cell, fiber-free foam insulation.
   a. Insulate all elbows and fittings with mitered segments of pipe insulation sealed with adhesive specified above.
   b. Do not stretch insulation under tension at joints and seams.
2. Armaflex AP, Nomaco FlexTherm or Engineer approved equal.

E. Provide galvanized steel pipe sleeves for piping wherever it passes through masonry partitions, walls, and floors.
1. Seal openings between sleeves and pipes using 3M Brand fire protection products specifically approved for the particular usage, and installed in strict accordance with the manufacturer's recommendations.

F. Install floor and ceiling plates around piping wherever it passes through walls, floors, ceilings, partitions, and equipment cabinets in exposed locations.

2.9 NATURAL GAS PIPING INSTALLATION

A. Above-grade natural gas piping shall be schedule 40 black steel (ASTM A 53) per the International Fuel Gas Code, and shall have threaded ends for pipe sizes up to 3”-diameter.

B. All exterior natural gas piping shall have a minimum of two coats of paint as recommended by the pipe manufacturer to inhibit corrosion (color to be coordinated with the Owner) and shall be supported and anchored onto the building structure as directed by the General Contractor with consideration of wind and seismic requirements and the specific interconnection requirements of the building as approved by the Architect and Structural Engineer of Record.

C. All natural gas piping shall be provided with a commercial seismic restraint and support system, unless exempted (note that natural gas pipe exemptions include all pipe suspended 12" or less such as pipe attached directly to the building and for any pipe 1" or smaller), according to the same guidelines as detailed in the "Seismic" Section above. Also, a special inspection plan (quality assurance plan) in accordance with the IBC must be specified along with the support details; this plan should simply state that all installed restraint systems shall be inspected by the manufacturer's representative and shall be documented with a letter on the representative's letterhead which states the installation is in compliance.

D. All underground natural gas piping shall be provided by the Site Civil design up to the meter (to be installed by the natural gas Provider/Company). All above-ground piping after the meter devices shall be the responsibility of the Mechanical Contractor.

E. All regulators necessary for equipment shall be installed per the manufacturer's instructions. A regulator shall be provided by the Mechanical Contractor at all 4 package units. Regulators shall be selected by the Mechanical Contractor for the service duty and pressure requirements of the application.

F. Shut-Off Valves: All gas piping shut-off valves must be installed as per International Fuel Gas Code. All gas valves shall be full-port ball valves rated for natural gas and outdoor or indoor use similar to products manufactured by Apollo or equivalent.

G. Pressure testing of the natural gas piping shall be performed according to the requirements of the local code authority.

2.10 SMOKE DETECTOR INTERLOCK

A. Smoke detectors are required for systems as shown on the equipment schedules on the Drawings.

B. Provide smoke detector interlocks with the equipment and functions complying with International Mechanical Code.

C. HVAC Contractor must coordinate requirements of the smoke detector alarm electronic signal output with the requirements of the Building Fire and Smoke Alarm System as coordinated by the Electrical.

2.11 EXHAUST FANS

A. Provide in accordance with the schedule on the Drawings- i.e., fans are to conform to all aspects of the manufacturer's specification for the unit shown in the drawing schedules to include materials of construction, finish, operation, performance, standard features and all options noted, etc. It is the HVAC Contractor's responsibility to ensure that any proposed alternate meets all elements of the manufacturer's specifications for the design-basis unit unless an exception is noted in the proposal and approved by the Engineer.

B. Approved manufacturers:
   1. GREENHECK.
   2. COOK.
   3. Engineer approved equal.

2.12 UNITARY SPLIT AIR CONDITIONING SYSTEMS

A. Provide in accordance with the schedule on the Drawings- i.e., Unitary Split Air Conditioning Systems are to conform to all aspects of the manufacturer's specification for the unit shown in the drawing schedules to include materials of construction, finish, operation, performance, standard features and all options noted, etc. It is the HVAC Contractor's responsibility to ensure that any proposed alternate meets all elements of the manufacturer's specifications for the design-basis unit unless an exception is noted in the proposal and approved by the Engineer.

B. Approved manufacturers:
   1. TRANE
   2. JOHNSON CONTROLS.
   3. LENNOX.
   4. Engineer approved equal.

2.13 GAS/ELECTRIC PACKAGE UNIT

A. General: The units shall be dedicated downflow airflow. The operating range shall be between 115°F and 0°F in cooling as standard from the factory for all units. Cooling performance shall be rated in accordance with AHRI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation and control sequence, before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be UL listed and labeled, classified in accordance to UL 1995/C 22.2, 236-05 3rd Edition.

B. Casing: Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. In order to ensure a water and air tight seal, service panels shall have lifting handles and no more than three screws to remove. All exposed vertical panels and top covers in the indoor air section shall be insulated with a 1/2 inch, 1 pound density foil-faced, fire-resistant, permanent, odorless, glass fiber material. The base of the downflow unit shall be insulated with 1/2 inch, 1 pound density foil-faced, closed-cell material. The downflow unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 11/8 inch high supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting.

C. Compressors: All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of nameplate voltage. Internal overloads shall be provided with the scroll compressors. All models shall have crankcase heaters, phase monitors and low and high pressure control as standard.

D. Crankcase Heaters: These band heaters provide improved compressor reliability by warming the oil to prevent migration during off-cycles or low ambient conditions. These are standard on all Voyager models.

E. Refrigerant Circuits: Each refrigerant circuit shall have independent fixed orifice or thermostatic expansion devices, service pressure ports, and refrigerant line filter driers factory installed as standard. An area shall be provided for replacement suction line driers.

F. Evaporator and Condenser Coils: Microchannel coils will be burst tested by the manufacturer. Internally finned, 5/16¿ copper tubes mechanically bonded to a configured aluminum plate fin shall be standard for evaPorator coils. Microchannel condenser coils shall be standard on all units. Coils shall be leak tested to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 225 psig and pressure tested to 450 psig. Sloped condensate drain pans are standard.

G. Gas Heating Section: The heating section shall have a drum and tube heat exchanger design using corrosion resistant steel components. A forced combustion blower shall supply premixed fuel to a single burner ignited by a pilotless hot surface ignition system. In order to provide reliable operation, a negative pressure gas valve shall be used on standard furnaces and a pressure switch on furnaces with modulating heat that requires blower operation to initiate gas flow. On an initial call for heat, the combustion blower shall purge the heat exchanger 45 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat. Units shall be suitable for use with natural gas or propane (field installed kit) and shall also comply with California requirements for low NOx emissions. The 12½ tons shall have two stage heating.

H. Outdoor Fans: The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor(s) shall be permanently lubricated and shall have built-in thermal overload protection.

I. Indoor Fan: Units above shall have belt driven, FC centrifugal fans with adjustable motor sheaves. Units with standard motors shall have an adjustable idler-arm assembly for quick-adjustment of fan belts and motor sheaves. All motors shall be thermally protected. Oversized motors shall be available for high static application. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

J. Controls: Unit shall be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. ReliaTel controls shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized control shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

K. High Pressure Cutout: This option is offered for units that do not have High Pressure cutout as standard.

L. Defrost Controls: Adaptive demand defrost shall be provided to permit defrost wherever coil icing conditions begin to significantly reduce unit capacity.

M. Dehumidification: The dehumidification (hot gas reheat) option shall provide increased dehumidification. The option shall consist of a hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited. Low pressure switches and thermostatic expansion valves TXV are standard. Frostat , ReliaTel options module, and 2" pleated filters are required but not standard. They must be ordered and configured separately.

N. Discharge Line Thermostat: A bi-metal element discharge line thermostat is installed as a standard option on the discharge line of each system. This standard option provides extra protection to the compressors against high discharge temperatures in case of loss of charge, extremely high ambient and other conditions which could drive the discharge temperature higher. Discharge line thermostat is wired in series with high pressure control. When the discharge temperature rises above the protection limit, the bi-metal disc in the thermostat switches to the off position, opening the 24 VAC circuit. When the temperature on the discharge line cools down, the bi-metal disc closes the contactor circuit, providing power to the compressor. When the thermostat opens the fourth time, the ReliaTel control must be manually reset to resume operation on that stage.

O. Hail Guards: Tool-less, hail protection quality coil guards are available for condenser coil protection.

P. Through the Base Electrical with Disconnect Switch: Three-pole, molded case, disconnect switch with provisions for through the base electrical connections are available. The disconnect switch will be installed in the unit in a water tight RT-PRC028-EN 121 enclosure with access through a swinging door. Factory wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized. Note: The disconnect switch will be sized per NEC and UL guidelines but will not be used in place of unit overcurrent protection.

Q. Hinged Access Doors: Sheet metal hinges are available on the Filter/Evaporator Access Door and the Compressor/Control Access Door. This option is available on all downflow models.

R. Two-Inch Pleated Filters: Two inch pleated media filters shall be available on all models.

S. Return Air Smoke Detector: With this option installed, if smoke is detected, all unit operation will be shut down. Reset will be manual at the unit. Return Air Smoke Detectors require minimum allowable airflow when used with certain models. See the Installation, Operation, and Maintenance (IOM) manual for the models affected and the minimum allowable airflow required. This option is available on all downflow models.

T. Comparative Enthalpy: Reference Enthalpy is used to measure and communicate outdoor humidity. The unit receives and uses this information to provide improved comfort cooling while using the economizer. Comparative Enthalpy measures and communicates humidity for both outdoor and return air conditions, and return air temperature. The unit receives and uses this information to maximize use of economizer cooling, and to provide maximum occupant comfort control. Reference or Comparative Enthalpy option shall be available when a factory or field installed Downflow Economizer is ordered. This option is available on all downflow models.

U. Comparative Enthalpy-Factory Installed: This option will be factory installed to measure and communicate humidity for both outdoor and return air conditions, and return air temperature. The unit will receive and use this information to maximize use of economizer cooling, and to provide maximum occupant comfort control.

V. Accessory - Wall Mounted Humidity Sensor: Field-installed, wall-mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. The humidity sensor can be set for humidity levels between 40% and 60% relative humidity by adjusting the ReliaTel Options Module.

W. Accessory - Programmable Zone Temperature Sensor Configured as a Constant Volume Unit: The electronic programmable sensor is Auto or Manual changeover with seven day programming. Auto or Manual selection of Fan Auto, Fan On. Programmable sensor has System Off, Auto, Heat, Cool, and Service /LCD indicators as standard. Night setback sensor has up to four programs per day which can be individually configured to occupied or unoccupied.

X. Accessory - Digital Display Zone Sensor: The Digital LCD (Liquid Crystal Display) zone sensor has the look and functionality of standard zone sensors. This sensor includes a digital display of set point adjustment and space temperature in F (Fahrenheit) or C (Celsius). Includes FAN and SYSTEM buttons (supports the service functions of the standard sensor). E-squared memory stores last programmed set points. Requires 24 VAC (Volts AC). This sensor should be utilized with ReliaTel controls.

Y. Accessory - CO2 Sensing: The CO2 sensor has the ability to monitor space occupancy levels within the building by measuring the parts per million of CO2 (Carbon Dioxide) in the air. As the CO2 levels increase, the outside air damper modulates to meet the CO2 space ventilation requirements.

Z. Hinged Access Doors: Sheet metal hinges are available on the Filter/Evaporator Access Door and the Compressor/Control Access Door. This option is available on all downflow models.

AA. Approved alternates:
1. TRANE.
2. JOHNSON CONTROLS.
3. LENNOX.
4. Engineer approved equal.
5. No alternate will be accepted that does not meet all requirements detailed in this specification and in the schedule of the Drawings. It is of particular note that no other alternate that meets the critical features (see Item B above) could be identified at the time of design. However, if a preferred alternate is identified by the HVAC Contractor, it can be offered in writing to the Engineer for approval prior to the submittal of the HVAC Contractor's bid—units that do not comply with all of the critical features shall not be offered for consideration.

2.14 PENETRATION OF BUILDING ASSEMBLIES

A. Provide penetration of building assemblies as manufactured by 3M Fire Protection Products and Systems, Specified Technologies, Inc. or Engineered approved equal.

2.15 FLOOR AND CEILING PLATES

A. Furnish and install chrome plated floor and ceiling plates wherever piping passes through building walls, floors, ceilings, and equipment cabinets.

B. Provide floor and ceiling plates as manufactured by Crane Co., No. 10-BC and No. 13-BC or similar products as manufactured by Grinnell Co., Beacon and Cadwell Co., or Engineer approved equal.

2.16 PIPE HANGERS AND SUPPORTS

A. All pipe hangers shall be securely attached to the building construction, using steel hanger rods (zinc-plated indoors and hot-dipped galvanized outdoors) of sizes as recommended by the pipe hanger manufacturer.

B. Install piping without undue stress or strain on joints and equipment.

C. Securely anchor hangers to building structure.

D. Install pipe hangers around the insulation where pipes are insulated. Install hanger with galvanized steel sheet metal saddles to protect the pipe insulation to keep the insulation from crushing.

E. Use neoprene, rubber or vinyl padding applied to hangers for piping that is subject to electrolysis.

F. Support horizontal piping at sufficiently close intervals to keep pipe in alignment, meet the 2006 International Plumbing Code and seismic restraint standards, and prevent sagging.

G. Provide pipe hangers as manufactured by MICHIGAN, ANVIL/GRINNELL, FEE AND MASON CO., PHD, or Engineer approved equal. Figure numbers and names listed below are for identifying the type product desired:

1. Refrigerant piping located outside the building at the split system outdoor condensing unit shall be supported from concrete pads using hot-dipped galvanized steel angle stanchions spaced as specified above for horizontal refrigerant piping.

2.17 PIPE SLEEVES

A. Wherever refrigerant, condensate drain, and gas pipes pass through masonry screen walls, building exterior walls, floors, and interior partitions, furnish and install galvanized steel pipe sleeves of sufficient size to allow bare pipes, or pipes plus insulation if applicable, to pass through easily.

2.18 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3- EXECUTION

3.1 3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section. The heating and ventilating Contractor is responsible for coordinating any changes due to mechanical equipment substitutions with the electrical Contractor and bears any additional cost due to such change.

3.3 PREPARATION

A. Penetration of Building Assemblies:
1. Install the system products in strict accordance with the certified submittals and manufacturer's recommendations.

B. Holes in concrete:
1. Provide sleeves, accurately dimensioned and shaped to permit passage of items of this Section.
2. Deliver all such sleeves, with accurate setting drawings and setting information, to the trades providing the openings or surfaces through which such items must penetrate, and in a timely manner to assure inclusion in the Work.

C. Flashing: Where items of this Section penetrate the roof or outer walls under this Section, the General Contractor shall provide all base flashing and counterflashing required at such penetration to insure waterproof integrity of opening.

3.4 INSTALLATION

A. Ductwork:
1. Before sealing, all mechanical fasteners to the ductwork must be installed in accordance with the "SMACNA Duct Construction Standard".
a. Seals must be accomplished by painting a latex, water-based mastic (compliant to all requirements of the IBC, 2006 IMC Section 603.9 and U.L. given location and use) onto the joint 1" beyond the opening seam.

1) For 1/4”-1/2” open-face seams, a fiberglass mesh tape must be applied between two coats of mastic (note that the mesh tape must be rated for duct seal service).
2) An opening greater than 1/2” must have a sheet metal cover and a mesh/mastic top coating.
3) Mastics used on visible, outdoor ductwork must be rated for outdoor use with an adequate UV protection and must be a color to match the aluminum ductwork. Generally speaking it is recommended that for outdoor ductwork installations that Ductmate-type flanged reinforcement systems be utilized which employ gaskets at each joint for the maximum leakage prevention; however, the seal of each gasketed joint is still required.

B. Smoke Detector Interlock:
1. Install in location complying with Section 606 of the 2006 IMC.
2. Install all detectors in the return air lines upstream of any outside air feeds such that any return air smoke is not diluted.
   a. In some cases there may be multiple return air lines that combine at a central point with outside air; in this case, multiple detectors would be required on each undiluted return air line
   b. Verify the interlock wiring requirements of the system(s) with the Electrical Engineer and General Contractor in the case that there is a required interconnection with the building automatic fire detection system. It is the responsibility of the HVAC Contractor to verify all equipment smoke interlock requirements and provide the required interface provisions.

C. Condensate Piping and Pans:
1. Route condensate piping as indicated on the Drawings or to an approved location per the International Mechanical Code Section 307.2 as accepted by the code official and approved by the General Contractor prior to installation.
   a. Approved disposal into the sanitary sewer can only be made through indirect connections as defined by the 2006 International Plumbing Code. .
2. Maintain a minimum 1" per 10'-0" pitch on condensate piping.
3. Insulation:
   a. Provide the specified insulation on all condensate pipe which passes through an area where condensation can form and create water damage.

b. HVAC Contractor must confirm areas for this insulation with the General Contractor and Engineer before any installation begins.

4. Line connections to equipment to be installed per manufacturer's instructions.
5. Install condensate traps for the coil condensate drain lines in strict accordance to the recommendations of the manufacturer based on the specific unit types.
6. Provide secondary overflow pans with a 3/4" drain line shall be provided at air handling units as per the 2006 International Mechanical Code Section 307.2.3 Item 1 or, if preferred, a secondary pan can be provided with a high level switch and without a drain line as per Item 3.
   a. HVAC Contractor is responsible to verify the specific Owner and General Contractor preferences and requirements of the local code authority.

D. Refrigerant Piping:
1. Piping shall be installed plumb and level as applicable.
2. All elbows in piping to be made with long radius elbows.
3. As much as possible "line sets" are to be utilized which are continuous (i.e., no fittings between the associated outdoor and indoor units)
4. Install all fittings, traps, oil loops, accumulators, expansion valves, solenoid valves, etc., as recommended by the unit manufacturer for this specific equipment/piping installation.
5. Conceal all lines in wall cavities where possible.
   a. No concealed fittings are permitted.
6. If insulation is not integral to the line set, it must be installed in accordance with the manufacturer's instructions and use of the prescribed adhesives.

E. Equipment supports:
1. Coordinate all anchor location and clearance dimensions with General Contractor.

F. Insulation:
1. Interior (Inside Building) Duct Insulation:
   a. Install and seal in strict accordance to the manufacturers recommendations using staples, pressure-sensitive tapes, mastics, etc. which comply with the required code and material rating for the area of installation.

b. Insulation panels as provided for specific commercial fittings such as diffusers can be used in place of wrap so long as they are sealed to the adjoining insulation barrier.

2. Flexible duct:
   a. Flex duct must be installed with a commercial sheet metal 45-deg. take-off connection to the duct trunk.
   b. Provide a coating of mastic painted on the connector area of overlap, the flex duct liner shall be put in place, another coating of mastic shall be painted over the joint, and then a code-compliant screw clamp or draw cord (i.e., tie) shall be placed on top.
      1) Do not place the clamp over the flex duct insulation.

3.5 AS-BUILT DRAWINGS

A. The HVAC Contractor shall maintain on the job site one complete set of the mechanical drawings.

B. Indicate all changes authorized by the Engineer as to the locations, sizes, etc., of piping, ductwork and other mechanical equipment in red pencil as the work progresses.

C. Deliver the “Red-lined” set of As-Built" drawings to the Engineer.

3.6 ELECTRICAL AND CONTROLS WORK

A. The Electrical Contractor will provide the following for the mechanical equipment:
   1. A source of power as required for each electric motor and for each electrical heating and cooling item of equipment installed under the mechanical contract, including final wiring connections to motor terminals or to terminals in a control panel mounted on each respective unit.
   2. Circuit breaker protection as required for each electric motor and for each electrical heating and cooling item of equipment installed under the mechanical contract.
   3. Wiring to each electric motor and each electrical heating and cooling item of equipment (where applicable) through a magnetic starter or a magnetic contactor.
   4. A 120 volt GFCI receptacle at outdoor condensing unit for service of equipment.
   5. 120 volt control wiring of exhaust fans through starters, wall switches and/or thermostats.
   6. Local disconnects for mechanical equipment and magnetic starters for fans.

B. The Mechanical Contractor shall provide all electrical data requirements for the equipment to the Electrical Design from the certified submittals to confirm all requirements prior to the purchase of any equipment.

C. The HVAC Contractor shall provide all labor, materials and equipment required for the complete control of the systems as specified. The HVAC Contractor shall be responsible for all low-voltage (24-V) control wiring, low-voltage control interlock wiring between electrically-operated equipment, and between equipment and field-installed control devices required for the complete installation.

1. All low-voltage control wiring must meet requirements of the NEC, local code requirements, and, in general, should be installed at a minimum in electrical metallic tubing (EMT) in all concealed spaces.
2. Any specification requirements for the installation of wiring as provided in the electrical design shall supersede the requirements stated herein.
3. The power wiring and connections for all mechanical equipment shall be provided by the Electrical Contractor. However, the HVAC Contractor MUST communicate the voltage and current requirements of all equipment based on manufacturer certified documents to the Electrical Contractor and Electrical Engineer of Record before purchase (even if this information is the same as shown on these drawings).

D. The installation, programming, etc. of the control systems to include all wiring and devices shall be performed by qualified control technicians either in the direct employ of the Mechanical Contractor or as subcontracted by the Mechanical Contractor. All aspects of the control installation, start-up and successful operation of the systems shall be the responsibility of the Mechanical Contractor; therefore, it will be the responsibility of the Mechanical Contractor to either prove that he possesses the necessary qualifications to perform the controls work or to prove the qualifications of his Subcontractor.

E. All thermostat/environment control devices shall be 24 VAC, digital, programmable type which will have a 7-day time-of-day temperature programming capability for control of heat/cool, fan operation, damper position modes, auto switch-over from heat to cool, power failure retention capability, capability to control multistage equipment to include heat pumps with auxiliary heat, and (if auxiliary is provided) an outside air temperature lock-out feature that prevents auxiliary heat from being activated if the outdoor air temperature is above 40F (or the setpoint as required by the code official). The thermostat/environment control device must be a type which is compatible for use with the installed equipment (i.e., some systems require specific, proprietary controls and the HVAC Contractor is responsible to verify and install as required).

F. Refer to "SECTION 260500 ELECTRICAL" of the specifications to determine the exact extent of electrical work provided for the mechanical equipment.
   1. Verify the current characteristics before ordering any equipment for this project.
   2. Failure to confirm voltage requirements for mechanical equipment shall result in the HVAC Contractor bearing any cost associated with changes stemming from incorrect voltages on this project.

G. Seal all openings around electrical conduit located in partitions, walls and floors using 3M Brand fire protection products specifically approved for the particular usage and fire rating (where applicable) and install in strict accordance with the manufacturer's recommendations.

H. Comply with the latest edition of the National Electrical Code and meet all local requirements.

I. All electrical equipment shall bear UL labels where applicable.

3.7 PERFORMANCE TESTS

A. Mechanical Contractor to test and balance the air systems (note that this is preliminary, "rough" balance prior to the final calibration by the sub-contracted Test and Balance Firm).

B. Clean all equipment and nameplates, and lubricate all motors and bearings.

C. Provide temporary air filters in all equipment upon initial start-up.
   1. Replace and clean the filters regularly until project is accepted.

2. Prior to final inspection and acceptance, install one clean set of air filters furnished by the various equipment manufacturers inside the respective mechanical items of equipment.
3. All extra sets of air filters shall be delivered to the Owner prior to final acceptance of the project.

D. Check all safety relief valves, high limit controls, freeze protection controls and all other safety devices for proper functioning.

3.8 TESTING, BALANCING, AND ADJUSTING OF MECHANICAL SYSTEMS

A. Perform all testing, balancing, and adjusting of the air systems as shown on the Drawings and per the manufacturer's recommendations.

B. Meet all manufacturer equipment requirements.
1. Provide the minimum airflow required to the coils as required by the manufacturer.

C. A complete system test and balance must be performed by a certified testing and balance firm and executed in the manner and with the calibrated instruments as dictated by the AABC National Standard for Total System Balance.
1. Perform all work and data shall be provided in strict accordance with related items of the current AABC Short Form "Testing, Adjusting and Balancing for HVAC" Section 230593 (which can be accessed on www.aabc.com/resources/downloads.aspx at the pick item "AABC Short Form TAB Specification").

D. Submit record copies of all start-up reports and testing and balancing reports to the Owner, Engineer, and Code Official at the completion of the project.
1. A copy of all start-up reports and testing and balancing reports must be included in each copy of the Operation and Maintenance manual.

3.9 LEAK TESTING AND DEHYDRATING

A. Leak test, dehydrate, and evacuate each refrigerant piping system as specifically recommended by the equipment manufacturer. Repair all leaks, and replace all defective piping materials found during tests. Fully charge each refrigerant piping system with refrigerant as required, and guarantee full charges of refrigerant for a period of one year. Thoroughly check each system for refrigerant leaks after the system has been placed in operating condition.

3.10 TRAINING OWNER'S PERSONNEL

A. The contractor shall furnish the services of a competent engineer or mechanic to thoroughly train and instruct the Owner's personnel in the proper operation and maintenance of all mechanical items of equipment installed under this contract.

B. The contractor shall obtain and deliver to the Engineer copies of the following statement signed by the Owner's Maintenance Superintendent or his authorized representative:

C. "This is to certify that our personnel have been thoroughly trained and instructed in the proper operating and maintenance procedures for all mechanical equipment installed under this contract for the new and existing buildings."
Signed: _____
Title: _____
Date: _____

3.11 PROJECT COMPLETION

A. Correct defects in workmanship, materials, equipment and operation of system for a period of one year from date of acceptance. Equipment and materials, repaired and replaced, are guaranteed for one year following date of correction.

B. Remove any item not specified or given approval and replace it with specified item.

C. Provide an accompanying note of exception for any item submitted for approval that does not conform to these specifications.

D. The system as installed shall comply with code requirements.

3.12 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

COM*check* Software Version 3.9.2

Mechanical Compliance Certificate

90.1 (2007) Standard

Section 1: Project Information

Project Type: **New Construction**
Project Title : Staunton Bridge Community Center Addition

Construction Site:
Staunton Bridge Road
Greenville, SC

Owner/Agent:

Designer/Contractor:
William Bartlett
W. G. Bartlett Engineering Services, LLC
144 Paris Glen Way
Greenville, SC 29609
864-354-3976

Section 2: General Information

Building Location (for weather data): **Greenville, South Carolina**
Climate Zone: **3a**

Section 3: Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone) : Heating: 1 each - Central Furnace, Gas, Capacity = 250 kBtu/h Proposed Efficiency = 81.00% Ec, Required Efficiency = 80.00% Ec Cooling: 1 each - Rooftop Package Unit, Capacity = 150 kBtu/h, Air-Cooled Condenser Proposed Efficiency = 11.00 EER, Required Efficiency = 10.80 EER Fan System: RTU Fan -- Compliance (Motor nameplate HP method) : Passes Fans: RTU Fan Supply, Constant Volume, 5000 CFM, 3 motor nameplate hp
1	RTU-2 (Single Zone) : Heating: 1 each - Central Furnace, Gas, Capacity = 250 kBtu/h Proposed Efficiency = 81.00% Ec, Required Efficiency = 80.00% Ec Cooling: 1 each - Rooftop Package Unit, Capacity = 150 kBtu/h, Air-Cooled Condenser Proposed Efficiency = 11.00 EER, Required Efficiency = 10.80 EER Fan System: RTU Fan -- Compliance (Motor nameplate HP method) : Passes Fans: RTU Fan Supply, Constant Volume, 5000 CFM, 3 motor nameplate hp
1	AC-1 (Single Zone) : Split System Heat Pump Heating Mode: Capacity = 22 kBtu/h, Proposed Efficiency = 7.70 HSPFRequired Efficiency = 7.70 HSPF Cooling Mode: Capacity = 21 kBtu/h, Proposed Efficiency = 13.00 SEERRequired Efficiency = 13.00 SEER Fan System: Unspecified
1	WH-1: Electric Storage Water Heater, Capacity: 50 gallons Proposed Efficiency: 0.97 EF, Required Efficiency: 0.86 EF

Section 5: Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2007) Standard requirements in COM*check* Version 3.9.2 and to comply with the mandatory requirements in the Requirements Checklist.

William G. Bartlett, P. E.	William G. Bartlett	3-11-2016
Name - Title	Signature	Date

Section 6: Post Construction Compliance Statement

- ❑ HVAC record drawings of the actual installation and performance data for each equipment provided to the owner within 90 days after system acceptance.
- ❑ HVAC O&M documents for all mechanical equipment and system provided to the owner within 90 days after system acceptance.
- ❑ Written HVAC balancing report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name	Signature	Date

COM*check* Software Version 3.9.2

Inspection Checklist

Requirements: 0.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

90.1 (2007) Standard	Plan Review	Complies?	Comments/Assumptions
4.2.2, 6.4.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
4.2.2, 7.4.1 [PR3][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.7.2.4 [PR5][1]	Detailed instructions for HVAC systems commissioning included on the plans or specifications for projects >=50,000 ft2.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Footing / Foundation Inspection	Complies?	Comments/Assumptions
6.4.3.8 [FO9][3]	Freeze protection and snow/ice melting system sensors for future connection to controls.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
7.4.3 [PL1][2]	Service hot-water piping systems insulated. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for WH-1.*
7.4.4.1 [PL2][3]	Temperature controls installed on service water heating systems (<=120ºF to maximum temperature for intended use).	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for WH-1.*
7.4.6 [PL4][3]	Heat traps installed on non-circulating storage water tanks.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for WH-1.*

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.1.4, 6.4.1.5 [ME1][2]	HVAC equipment efficiency verified. Non-NAECA HVAC equipment labeled as meeting 90.1.	Efficiency:_____	Efficiency:_____	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.4.3.4.1 [ME3][3]	Stair and elevator shaft vents have motorized dampers that automatically close.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.4.5 [ME5][3]	Ventilation fans >0.75 hp have automatic controls to shut off fan when not required.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.9 [ME6][1]	Demand control ventilation provided for spaces >500 ft2 and >40 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.4.1.1 [ME7][3]	Insulation exposed to weather protected from damage. Insulation outside of the conditioned space and associated with cooling systems is vapor retardant.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.4.1.2 [ME8][2]	HVAC ducts and plenums insulated.	R-_____	R-_____	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.4.1.3 [ME9][2]	HVAC piping insulation thickness.	_____ in.	_____ in.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.4.2.1 [ME10][2]	Ducts and plenums sealed based on static pressure and location.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-1.*
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-2.*
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for AC-1.*
6.5.2.3 [ME19][3]	Dehumidification controls provided to prevent reheating, recooling, mixing of hot and cold airstreams or concurrent heating and cooling of the same airstream.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.5.4.1 [ME25][3]	HVAC pumping systems >10 hp designed for variable fluid flow.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.5.6.1 [ME30][1]	Exhaust air energy recovery on systems >=5,000 cfm and 70% of design supply air.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.7.1 [ME32][2]	Kitchen hoods >5,000 cfm have make up air >=50% of exhaust air volume.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.5.7.2 [ME33][1]	Fume hoods exhaust systems >=15,000 cfm have VAV hood exhaust and supply systems, direct make-up air or heat recovery.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.5.8.1 [ME34][3]	Unenclosed spaces that are heated use only radiant heat.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 50% >240 kBtu/h – 25%			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-1.*
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 50% >240 kBtu/h – 25%			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-2.*
7.4.2 [ME36][2]	Service water heating equipment meets efficiency requirements.			☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for WH-1.*

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
10.4.1 [EL9][2]	Electric motors meet requirements where applicable.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

90.1 (2007) Standard	Final Inspection	Complies?	Comments/Assumptions
6.4.3.1.1 [FI2][2]	Heating and cooling to each zone is controlled by a thermostat control.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.1.2, 6.4.3.2, 6.4.3.3, 6.4.3.3.1, 6.4.3.3.2 [FI3][2]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.3.3 [FI4][2]	Systems with air capacity >10,000 cfm include optimum start controls.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-1.*
6.4.3.3.3 [FI4][2]	Systems with air capacity >10,000 cfm include optimum start controls.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for RTU-2.*
6.4.3.7 [FI6][3]	When humidification and dehumidification are provided to a zone, simultaneous operation is prohibited.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.7.2.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.7.2.2 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.7.2.3 [FI9][1]	An air and/or hydronic system balancing report is provided for HVAC systems serving zones >5,000 ft2 of conditioned area.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.7.2.4 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
7.4.4.3 [FI11][3]	Public lavatory faucet water temperature <=110°F.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values for WH-1.*
6.4.3.2 [FI20][1]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.3.1 [FI21][1]	HVAC systems equipped with at least one automatic shutdown control.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	
6.4.3.3.2 [FI22][1]	Setback controls allow automatic restart and temporary operation as required for maintenance.	☐Complies ☐Does Not Comply ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

SECTION 260500 — GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. The provisions of The Supplement to Advertisement, The Instructions to Bidders, Supplement to Instruction to Bidders, General Conditions, Supplementary Conditions and all other sections of Division 1 of these Specifications shall govern the work under this Division or Section the same as if incorporated herein.

1.2 SCOPE

A. The Electrical Contractor shall provide and install complete electrical systems including all conductors, raceways, fittings, protective devices, wiring devices, fixtures, supports, and all miscellaneous hardware necessary. All of the above equipment shall be completely installed and left in proper operating condition. All electrically powered equipment whether furnished by others or by the Contractor shall be wired by the Contractor.

B. Complete Power distribution and utilization system shall be installed, including service entrance, panelboards, utilization devices and equipment as indicated on drawings. The Contractor shall coordinate and comply with utility requirements for service and metering and pay all cost for difference in the standard service and service specified.

C. The Electrical Contractor shall furnish and install power, wiring and/or disconnects as shown on drawings for wiring systems for mechanical systems specified in Division 15. Temperature control wiring, equipment control and interlock wiring are not included in this division unless specifically noted in these specifications or shown on the plans. All motor disconnects, starters, combination motor controllers and motor control centers shall be furnished under this division of specifications unless noted otherwise.

1.3 REQUIREMENTS

A. Field verification of scale on electrical plans is directed since actual locations, distances and levels will be governed by actual field conditions.

B. In case of conflicts or discrepancies between plans, plans and specifications and/or actual field conditions, Contractor shall notify the Engineer before work is continued. Coordinate with other trades to avoid conflicts.

C. Permits, Inspections and Tests - The Contractor shall procure and pay for all permits, fees, inspections, and licenses required. Perform all tests to ensure all systems are in good operating condition.

D. Review of Material; Specific reference in the specification to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, with or without the words "or equal", shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

E. Bidders shall base bids on the material specified or on equals receiving approval 10 working days prior to Bid Opening. Any increase in the cost of work resulting from substitution of any product specified is part of this contract and shall be accomplished in an approved manner at no extra cost to the Owner.

F. Substitutions. No substitution will be considered unless written request for approval has been received by the Engineer at least 10 days prior to the date of receipt of bids. Each such request shall include the name

of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute would require shall be included; failure to do so does not alleviate the Contractor of his responsibility to make any and all necessary changes required for installation of the approved substitution. The burden of proof of the merit of the proposed substitute is upon the proposer. The Engineer's decision of approval or disapproval of a proposed substitution shall be final.

G. All materials shall be new and of current manufacturer. Where more than one of a type of device is used, all shall be by the same manufacturer. All materials shall conform to the grade, quality and standards of those specified.

H. Shop drawings shall be submitted in accordance with the General Conditions. Forward all shop drawings at one time. Each item shall bear project name and identifying symbol from plans. Shop Drawings required are as follows:

1. Lighting Fixtures
2. Wiring Devices
3. Panelboards
4. Disconnect Switches
5. Motor Starters
6. Contactors
7. Time Clocks
8. Fire Alarm System Equipment

I. Interferences - The drawings are generally diagrammatic in nature, and accordingly the Contractor shall coordinate his work with that of all other trades to avoid interferences. The Contractor shall examine the complete set of drawings and specifications for the job before installation of electrical work, coordinating locations and routings with other trades to avoid interferences. Work installed by the Contractor which does interfere with another trade shall be removed and reinstalled at the Contractor's expense when directed by the Architect.

J. Workmanship shall be of the highest quality and all work shall be done by workmen skilled in the trades involved.

K. The Contractor shall guarantee all work under this contract for one year and shall be responsible for the maintenance of all electrical equipment furnished and installed under this contract, excluding lamp replacement, for a period of one year from the date of substantial completion.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 APPLICABLE CODES AND STANDARDS

Note: The materials and installation shall conform to the minimum requirements and latest outstanding issues and revisions of the following codes, standards, and regulations wherein they apply:

NFPA No. 70, National Electrical Code, (2011 edition).

IBC (2012), IECC (2009), IFC (2012)

American National Standard, National Electrical Safety Code, (2012).

Applicable Publications of NEMA, ANSI, IEEE and IPCEA.

Underwriter's Laboratories, Inc. Standards

City, State and Local Codes and Regulations having jurisdiction.

OSHA requirements.

ADA requirements.

END OF SECTION 260500

SECTION 260501 — BASIC MATERIALS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 SCOPE

A. Contractor Furnished. Unless otherwise noted on the drawings, equipment list, or specifications, the Contractor shall furnish and install all materials, devices, and apparatus necessary for the complete electrical system. All materials and equipment shall be of types and manufacturer specified wherever practical. Should materials or equipment so specified be unobtainable, the Contractor shall submit the description and manufacturer's literature, reason for the substitution request and shall secure the approval of the Engineers before substitution of other material or equipment. This specification establishes performance requirements and the quality of equipment acceptable for use and shall in no way be construed to limit procurement from other manufacturers.

B. Equal or Equivalent. The term "or equal" and similar terms as used on the drawings or specifications shall be interpreted to mean "equal or equivalent" in the opinion of the Engineers.

C. Manufacturer's Prints. Where the Contractor furnishes equipment other than standard construction items, he shall furnish manufacturer's prints and reproducibles of all such equipment to the Engineers.

D. U.L. Listing. All equipment and materials shall be new and conform to the requirements of this specification. All equipment and materials shall be listed by the Underwriter's Laboratories, Inc., and shall bear their label whenever standards have been established and label service is regularly furnished. All equipment and materials shall be of the best grade of their respective kind for the purpose.

PART 2 - PRODUCTS AND EXECUTION

2.1 PANELBOARDS

A. Contractor Furnished. The contractor shall furnish all lighting, service, and power distribution panelboards required. All panelboards shall be of deadfront construction and shall incorporate all switching and protective devices of the type, quantity, number of poles, rating and type specified or shown on the drawings. The drawings and schedules indicate the ampere rating of mains, main breaker or disconnect, main lugs, voltage rating, phases, neutral and type of devices and enclosures. Enclosures for panelboards may be flush or surface type as designated on the drawings.

B. Boxes. Boxes shall be constructed of code gauge galvanized sheet steel and provided with not less than 7" wiring gutters at the sides and 5" at top and bottom. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment (loop feeds), the box shall be sized to include this wiring space. This wiring space shall be in addition to the minimum gutter space specified above and the limiting width may be increased accordingly. Knockout type boxes may be used on flush mounted installations where conduits are routed concealed. Surface mounted boxes shall be furnished without factory stamped knockouts and the contractor shall punch the box for the conduit group desired. Conduit hubs shall be T&B Series 370 "Bullet" hubs or approved equal.

C. Doors. Hinged doors covering all switching device handles shall be included in all panel trims, except that panelboards having individual metal clad externally operable deadfront units may be supplied

without such doors. Doors shall have flush or semi-flush type, corrosive resistant, cylinder lock and catch, except that doors over 48" in height shall have a vault handle and 3-point latch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike for all panelboards supplied. Trims shall be fabricated of code gauge sheet steel. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screw-driver without the need for special tools. Trims shall be properly cleaned and finished with a gray paint over a rust inhibiting primer coating. The finish coat shall be the type that will permit adherence of field applied paint.

D. Directory. A directory holder with glass or heavy plastic plate and metal frame shall be mounted inside of each door with a neatly typed directory properly identifying each circuit as shown on panel schedule drawings.

E. Nameplate. The contractor shall furnish and install an engraved, laminated plastic nameplate on the trim. The nameplate shall identify the panel by power source designation, panel designation, voltage rating and phase. Nameplate shall be black engraved letters on white background.

F. Bus Bars. Bus bars and other conductive parts shall be copper and sized in accordance with Underwriter's Laboratories standards, full size insulated neutral bars shall be included. Bussing shall be braced equal to or greater than the highest rated practice governing short circuit stresses in panelboards. Phase bussing shall be full height without reduction. Cross connectors shall be copper.

G. Neutral Bus. Neutral bussing on 3-phase panels shall have a suitable lug for each outgoing feeder requiring a neutral connection.

H. Ground Bus. All panels shall be furnished with a bare equipment ground bus. The ground bus shall be of copper and 1/4" x 2" minimum size, properly bonded to the housing. Suitable lugs shall be provided for termination of each equipment ground conductor.

I. Phase Sequence. Bus bar connections to the branch circuit shall be the "distributed phase" or "phase sequence" type. Single-phase, three-wire panelboard bussing shall be such that any two adjacent single-pole units are connected to the opposite polarities in such a manner that two-pole units can be installed at any location. Three-phase, four wire bussing shall be such that any three adjacent single-pole units are individually connected to each of the three different phases in such a manner that two or three-pole units can be installed in any location.

J. Circuit Numbering. Panelboard circuit numbering shall be such that starting at the top, odd numbers shall be used in sequence down the left-hand side and even numbers shall be used in sequence down the right-hand side.

K. Terminals. Terminals for feeder conductors to the panelboard mains and neutral shall be U.L. listed as suitable for type of conductor specified and shall be T&B 54000 Series where possible. Terminals for branch circuit wiring, both breaker and neutral, shall be U.L. listed as suitable for the type of conductor specified.

L. 120/208V Panels. All lighting/service panels rated 120/208 volt, shall be equal to Square D Company, Type NQOD equipped with bolt-on branch breakers of the type and rating specified on the drawings.

M. Panels and Panelboards are designed around Square D equipment. Acceptable alternate manufacturers are Cutler-Hammer, Siemens, and General Electric Company. All alternate or substitution requests shall meet all performance requirements of specified equipment, as well as space and dimension requirements noted on drawings.

2.2 CIRCUIT BREAKERS

A. Contractor Furnished. The contractor will provide breakers unless specifically designated to be "Owner Furnished" on the drawings, equipment list, or within the specifications.

B. As Specified. Breakers shall be of the type, rating, number of poles, size, and interrupting capacity, specified or required for the environment, location, application, and load served.

C. Molded Case Circuit Breakers. Molded case circuit breakers shall be circuit interrupting devices which will operate both manually for normal switching functions and automatically under overload and short circuit conditions. Circuit breakers shall provide circuit protection when applied within rating.

D. Operating and Switching Mechanism. The operating mechanism shall be entirely trip-free so that the contacts cannot be held closed against an abnormal over-current or short circuit condition. The switching mechanism shall be quick-make, quick-break type.

E. Overload and Short Circuit Protection. The operating handle of the circuit breaker shall open and close all poles of a multi-pole breaker simultaneously. The breakers shall meet applicable NEMA and U.L. specifications. Each circuit breaker shall have a trip unit to provide overload and short circuit protection. The trip unit for each pole shall have elements providing inverse time delay under overload conditions and instantaneous magnetic tripping for short circuit protection. The trip element shall operate a common trip bar which shall operate all poles in case of an overload or short circuit through any one pole. Automatic tripping shall be clearly indicated by handle position.

F. Rating. The molded case circuit breakers shall be rated for fault duty as specified on the plans. Series ratings are not allowed. The Contractor shall verify available fault current with the Utility Company for the actual installation and forward to the Engineer.

2.3 SAFETY SWITCHES

A. Contractor Furnished. The contractor shall provide all safety disconnect switches required. The switches shall be of the type, voltage, ampere, and horsepower rating, number of poles, fusible or nonfusible, as specified or required for the environment, location, application, and load served.

B. Description. All safety switches shall be NEMA premium heavy duty, horsepower rated, industrial type, and shall be Underwriters' Laboratories listed. Fusible switches shall be complete with fuses of the type and rating specified (refer to paragraph "Fuses") and as indicated on the drawings or within these specifications. All switches shall have switch blades that are fully visible in the OFF position when the door is open and shall be of dead front construction with arc suppressors. The mechanism shall be quick-make, quick-break type. The door shall be interlocked (defeatable type) with the handle or mechanism to prevent unauthorized opening of the door in ON position. Pad-locking provisions shall be provided for padlocking in the OFF position with one or more locks or lockable hasps. Grounded switches in a common enclosure shall be mounted in enclosure types specified elsewhere. Individually mounted switches shall be mounted in enclosures suitable for the location and environment as specified on the drawings.

C. Nameplate. All switches shall be provided with an engraved laminated phenolic nameplate showing the power source (Unit No. or other), and title of equipment served. Nameplates to be black letters on white background.

D. Manufacturer and Enclosures. All switches furnished shall have enclosures as specified on the drawings. Acceptable manufacturers shall be Square D, General Electric, Siemens, and Cutler-Hammer.

2.4 FUSES

A. Contractor Furnished. The contractor shall furnish and install fuses in all fusible devices and equipment that are furnished by the contractor.

B. Manufacturer and Listing. The following fuse types shall be used for the applications listed. The following are trade names of the Bussman Manufacturing Division, however, equivalent products by Chase Shawmut Division shall be acceptable.

Application	Trade Names	Class	Voltage (Type)
Motors, Transformers & Miscellaneous Equipment 0-600 Amps	Fusetron	K-5 K-5	240 (FRN) 600 (FRS)

2.5 MISCELLANEOUS CONTROL DEVICES

A. Furnished by Others. Miscellaneous control devices such as duct switches, air flow switches, thermostats and temperature control devices, and similar equipment shall normally be furnished under another division. Any such device that is to be furnished under this division shall be specifically designated on the drawings.

B. Enclosures. All devices furnished shall be suitable for the control requirements and shall have voltage rating and adequate capacity for the application. They shall be housed in enclosures suitable for the location and environment as indicated on the drawings.

2.6 RECEPTACLES – OUTLETS

A. Contractor Furnished. The contractor shall furnish and install all convenience (and power type) receptacles and outlets shown on the drawings. Suitable boxes, covers and matching plugs as specified shall be provided and the installation shall conform to typical details, drawings, and as described elsewhere in this specification. See electrical symbol drawings for additional descriptive data. Contractor shall install ivory devices where called for on plans except in paneled rooms or areas with cabinetry or millwork where brown devices and plates shall be installed.

B. Single Manufacturer. Receptacles of similar usage and rating shall be those of a single manufacturer.

C. Usage and Manufacturer. General use and convenience outlets shall be as specified by symbol on the drawings and as listed on the symbols drawing.

D. Ground Fault Protection. Note that all convenience receptacles to be installed as ground fault interrupting type are so noted on drawings.

E. Isolated Ground Receptacles. Where noted on plans, isolated ground receptacles shall be installed with an insulated, green, #12, copper ground wire unbroken back to breaker panel. Where several isolated ground receptacles are shown on one circuit, they may share the dedicated ground back to the breaker panel.

2.7 BOXES

A. Contractor Furnished. The contractor shall furnish and install all electrical boxes required for the proper installation of the electrical systems. Boxes shall be of the NEMA type suitable for the location. Boxes shall be installed as specified on the drawings and as described under "Wiring Methods", and other applicable sections of this specification for wiring devices such as switches, receptacles, and similar

devices. In order to maintain fire ratings, boxes installed "back-to-back" in fire walls shall not be located in the same space between studs, but shall have a stud located between them.

B. Concealed. Fixture, outlet, and switch boxes installed concealed in walls or ceiling areas shall be galvanized or cadmium plated sheet steel of not less than the minimum size as recommended in the National Electrical Code and shall be furnished with appropriate covers as specified in other applicable sections of these specifications or on the drawings. All boxes shall be accessible for maintenance purposes.

C. Exact locations of all floor boxes shall be coordinated in the field with the architect unless specific dimensions are shown on the drawings. Also, see Section 16500 of these specifications.

D. Surface Mounted. Fixture, outlet, and switch boxes installed surface mounted in plant, shop, operating, and unfinished areas shall be threaded, cast alloy iron or malleable iron. Iron type shall have a cadmium/zinc electroplate, or galvanized finish with appropriate lacquer. Boxes shall be of the approved type for the outlets, switches, and fixtures served and shall be made of the material and finish compatible with the conduit system and location. Surface mounted boxes shall be only as noted on the plans.

E. Splice and Tap Boxes. Splice and tap boxes for power circuits shall be used only where designated on the drawings and shall be of the type and size indicated. Otherwise all power wiring shall be continuous, splice and tap free, between equipment. On lighting and convenience receptacle circuitry, wiring may be spliced and boxes shall be provided for concealed or surface mounting as previously specified or may be JIC oil-tight of size and type indicated on the drawings or minimum size as specified in the National Electrical Code.

F. Pull Boxes. Pull boxes for interior, or outdoor exposed power wiring shall be provided where shown or required to facilitate the installation of the wiring. Pull boxes shall not be located in finished rooms and shall be accessible for maintenance use. For conduit sizes 3/4 and 1 inch, conduit fittings of the "C", "LB", "TB" and similar types may be used for "Pulling In." Unless designated otherwise, all pull boxes shall be the straight-through type and changes in direction shall not be made in the box. The boxes shall be of the minimum size and type as required by the National Electric Code or as sized on the drawings.

G. Exterior and Underground. For exterior exposed work, pull boxes shall be of NEMA 3R construction and shall be threaded hub type with gasketed cover.

2.8 COVERS AND DEVICE PLATES

A. Contractor Furnished. The contractor shall furnish and install the appropriate cover on all boxes, conduit fittings, panels, cabinets, switches, receptacles, and similar wiring devices and other equipment that is Contractor furnished. Conduit outlet fitting covers shall be the type specified under "Conduit Fittings."

2.9 ENCLOSURES

A. Enclosures and housings for all Contractor furnished electrical equipment and devices shall be suitable for the location and environmental conditions and shall be of NEMA type as shown on symbol sheet drawing.

END OF SECTION 260501

SECTION 260519 — CONDUCTORS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 SCOPE

A. This specification covers the requirements for all wire and cable to be used in the installation of the electrical systems for the project, including all power, lighting, control and instrumentation systems.

B. Wire and cable will normally be furnished by the Contractor for installation. Drawings will indicate where cable is not to be furnished.

C. All cable is to be "Contractor-furnished", the Contractor shall submit for approval by the Owner any deviations anticipated or proposed with respect to the cable manufacturer, cable type, or specification contained herein.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All wire and cable shall be Underwriters' Laboratories (UL) listed. In addition to other standard labeling, all wire and cable shall be marked UL on the outer surface indicating Underwriters' Laboratories, Inc. certification.

B. Grounding conductors, where insulated, shall be colored solid green. Conductors intended as a neutral shall be colored solid white.

C. For all circuits 600 volt and less, wires and cables shall have code grade, 600 volt type THWN-THHN, 75 degrees C., wet or dry locations, moisture and heat resistant thermoplastic insulation. Insulation thickness shall be per National Electrical Code, Table 310-13.

D. Conductor sizes are expressed in American Wire Gage (AWG) or in circular mils. Conductors shall be annealed copper wire, minimum size #12 AWG, except that #14 AWG may be used for control. All conductors shall be stranded except that solid conductors may be used for #12 AWG lighting and receptacle branch circuits.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Separation of Usage. Lighting and power wiring shall be routed in conduits, or other raceways as shown on the drawings. Lighting and power wiring shall not be routed in a common raceway except where shown on drawings. Push-button wiring shall be routed in separate raceways even though related to a particular motor circuit.

B. Pulling. Where mechanical assistance is used for pulling conductors, patented wire pulling compounds having inert qualities that do not harm the wire insulation or covering shall be applied to the conductors

as they are pulled into raceways. Interior of all raceways shall be free from grease, filings or foreign matter before conductors are pulled in.

3.2 IDENTIFICATION

A. Wire, Cable, Raceways, and Conduits.

B. Circuit identification numbers shall be placed on each end of the conductor involved by using self-laminating marker tags, T&B Company E-Z Code Type WSL or equal. Circuit numbers shall be as shown on the plan and panel schedule drawings.

C. Phase Identification. Phase sequence throughout the installation shall be standardized wherever practical in all electrical power equipment as follows:

	Phase A	Phase B	Phase C
Position Occupied	Front	Center	Rear
	Top	Center	Bottom
	Left	Center	Right
Color Code: 208/120V, 3-phase	Black	Red	Blue

3.3 SPLICES AND TERMINATIONS

A. Lighting Conductors. Splices in lighting conductors shall be made with splicing caps with metal inserts only, such as 3M Company's "Scotchlock" spring connectors. The splices shall be firmly and neatly taped to prevent entry of moisture.

B. Power Conductors shall be continuous from outlet to outlet. No power cable shall be spliced except on explicit instructions of the Owner’s Representative.

3.4 LUGS

A. All lugs shall be furnished and installed by the Contractor where required.

B. Lugs for copper power wiring, Sizes No. 12 and No. 10 AWG, shall be T&B "Sta-Kon" uninsulated ring type lugs. Lugs for copper power wiring from No. 10 AWG to size 1/0 AWG shall be T&B 1-hole Type 54100 Series. Size 2/0 AWG and larger lugs shall be 2-hole type 54200 series (except where 1-hole is required to match motor lead lugs). Sizes above 1/0 are to be applied using hydraulic pump tool.

C. Where motor leads are furnished without lugs, T&B 54500 Series 2-way connectors (splicing sleeves) shall be used. Splice sleeves may be desirable where limited space for termination exists.

D. The proper lugs will normally be furnished with equipment in all Owner-furnished equipment. All other lugs shall be furnished and installed by the Contractor. No mechanical type lugs shall be used except in panelboards. If any mechanical type lugs are furnished with Owner-furnished equipment, the Contractor shall replace them with proper compression type lugs where practical.

3.5 TAPING

A. All voids, sharp corners and bolt projections shall be made smooth by filling with Okonite or Scotch Fill before applying the laps of tape required for insulation. All loose strands of wire shall be removed before taping. Duxseal will not be permitted.

B. Joints and other sections of wiring requiring tape shall be half lap and at least two layers. Taping shall be neatly done and shall form a permanent insulation equal in mechanical and electrical strength to the insulation of the conductor. Taping shall be as follows:

1. 600 Volt insulation - A minimum of 1-1/2 lap layer varnished cambric and 2-1/2 lap layers of 3M No. 33 vinyl plastic electrical tape.

C. All taping, splicing and termination materials shall be furnished by the Contractor.

END OF SECTION 260519

SECTION 260526 — GROUNDING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 WORK INCLUDES

A. As Required By the NEC. In general, fixtures, outlets, the enclosing cases, mounting frames, etc., of all switches, circuit breakers, control panels, motors and any other electrically operated or electrical equipment, conduit, trays, and other raceways shall be effectively and permanently grounded with a separate copper grounding conductor of cross-section as required by the National Electrical Code and drawings. It shall be of capacity sufficient to insure continuity and continued effectiveness of the ground connections to carry fault currents. Ground conductors must be as short and straight as possible, protected from mechanical injury and if practicable without splice or joint. The grounding conductor shall be run from a ground established at the source of supply to the equipment to be grounded. Ground wires from below grade shall be protected by galvanized conduit and the conductor shall be brazed to conduit sleeve on each end. All grounding conductors shall be copper.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Power Conductors Supplying Equipment. A copper grounding conductor must be run inside the conduit or raceway, enclosing the power conductors supplying the equipment, or in case of a multi-conductor power cable, must be located within the sheath.

B. Connect at Source. Ground conductors in power cable or ground wire in conduits shall always be connected directly to station ground at the source end, and to motor frame or equipment enclosure and/or equipment ground bar.

C. System Neutral. The equipment grounding conductor in all circuits shall be connected to the frame and ground lug in the panelboards and not the neutral bus. Equipment ground connections to a system neutral are not permitted.

D. Fuses. In all cases of grounded circuits, fuses must be omitted from the grounded neutral conductor throughout the entire installation.

E. Equipment Frames. Frames of all electrical apparatus will be connected to the grounding system. Neutrals of service transformers shall be connected to the grounding system.

F. Metallic Raceways. All metallic conduits and wiring channels must be connected at each end to the grounding conductor with a good electrical contact.

G. Identification. The grounding conductor shall be stranded and covered with a green jacket.

H. In all cases the white wire should be used for the current-carrying neutral only and never as a grounding conductor, or other purpose.

I. Ground Rods. Where specified on drawings, grounding connections to earth shall be made with 5/8" diameter (minimum) copper-clad steel exten-type ground rods a minimum of 8 feet long, or depth as indicated.

END OF SECTION 260526

SECTION 260539 — ELECTRICAL RACEWAYS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 SCOPE

A. Contractor Furnished. The contractor shall provide all conduit, fittings, and supports required and not otherwise shown on plans as furnished by others.

B. The types of electrical raceways required for the project include the following:

1. Electrical Metallic Tubing
2. Intermediate Metal Conduit
3. Flexible Metal Conduit
4. Liquid-Tight Flexible Metal Conduit
5. Rigid Galvanized Conduit
6. PVC Rigid Conduit

C. The minimum raceway size shall be 3/4".

D. Product Delivery, Storage, and Handling. Contractor is to provide color-coded end-cap thread protectors and handle conduit and tubing carefully to prevent damage. Store pipe and tubing inside whenever possible. When necessary to store outdoors, elevate well above grade and enclose with durable, watertight wrapping.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Electrical Metallic Tubing. Galvanized, thin wall tubing, fittings shall be hex-nut, expansion gland type, zinc plated, and U.L. listed as "raintight." No crimp, spring, or set-screw type fittings will be accepted.

B. Intermediate Metal Conduit. Galvanized steel tubing, with zinc coated interior.

C. Flexible Metal Conduit. Galvanized single steel strip, flexible, interlocked.

D. Liquid-Tight Flexible Metal Conduit. Galvanized single steel strip, flexible, interlocked, double wrapped, with liquid-tight PVC jacket.

E. Rigid Galvanized Conduit. Rigid steel, hot-dipped galvanized conduit.

F. PVC Rigid Conduit: U.L. listed Schedule 40 heavy wall rigid conduit.

G. Conduit, tubing and duct accessories including straps, hangers, expansion and deflection fittings as recommended by conduit, tubing, and duct manufacturers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Electrical Metallic Tubing. Branch circuits run in hollow dry walls and above ceilings. Not to be exposed.

B. Flexible Metal Conduit. Connection of motors and for other electrical equipment where subject to movement and vibration and located in a dry, interior location. Flexible conduit is not to exceed 60" in length for any one application.

C. Liquid-tight Flexible Metal Conduit. Connection of motors and for other electrical equipment where subject to movement and vibration, and also subjected to one or more of the following conditions: Exterior location; moist or humid atmosphere where condensate can be expected to accumulate; corrosive atmosphere; subjected to water spray; subjected to dripping oil, grease or water. Flexible conduit is not to exceed 60" in length for any one application.

D. Intermediate Metal Conduit. All conduits of 2" nominal trade size or more and/or where exposed. Not to be stubbed up at floor level.

E. Rigid Galvanized. Where specified on plans for certain underground or exposed runs, or where stubbed up at floor level.

F. Rigid PVC. Where specified on plans for certain underground runs, UL approved Schedule 40 heavy wall rigid PVC conduit shall be used. Not to be stubbed up at floor level. All PVC underground runs shall transition to rigid galvanized before stubbing up through floor slab or grade.

3.2 INSTALLATION

A. Install conduit and tubing in accordance with NEC and National Electrical Contractors Association's "Standard of Installation", and with recognized industry practices. Where NECA and NEC standards differ, use the more stringent requirement.

B. Complete the installation of raceways before starting installation of wires.

C. Wherever possible, install horizontal raceway runs above water and steam piping.

D. Care shall be taken to keep the interior of conduits clean, and each conduit run shall be thoroughly cleaned and dried before any cable is pulled through.

E. Unless indicated otherwise on drawings, all exposed conduits shall be run parallel with or perpendicular to building structural members.

F. Conduits entering sheet metal enclosures shall be made up with double locknut and insulating bushing. Locknut shall be of the type which will bite into the metal of the box.

G. Conduits entering threaded openings in equipment enclosures, boxes, etc., shall have at least five full threads engaged. In outdoor and underground locations, threaded joints shall be made up with a thin application of conducting joint compound. The inside of the fitting shall be thoroughly cleaned of any excess compound.

H. Power operated bending machines shall be used on conduits 1-1/4" and larger. Heating with torches will not be permitted.

I. All conduit runs shall be continuous from outlet to outlet with all joints and connections pulled tight to insure an electrically continuous and mechanically secure raceway system.

J. All raceways in "finished areas" such as offices, corridors, etc., shall be concealed.

3.3 CONDUIT AND TRAY OPENINGS

A. Contractor's Responsibility. The Contractor shall be responsible for all sleeves and openings through walls and floors necessary for passage of electrical conduits and raceways. Where contractor must provide openings and/or drill concrete floors and/or walls, he shall be responsible for the repair of these openings. Structural members and reinforcing shall not be cut, burned or damaged in any way. All openings in walls and floors, and under switchgear and panels where electrical cables and conduits are installed, shall be closed up by the Contractor to prevent dust, dirt and water from entering.

B. Sealing. The Contractor shall be responsible for sealing all wall and floor openings and all floor and wall sleeve openings utilized by the contractor whether furnished by Others or by the Contractor.

C. Sleeves and openings shall be sealed with materials that will withstand fire and heat to the same rating as the wall, floor, or ceiling through which the conduit or tray passes and shall not be less than a 30-minute barrier.

END OF SECTION 260539

SECTION 265100 — LIGHTING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 WORK INCLUDED

A. Contractor Furnished. The Contractor shall furnish, install and wire all lighting fixtures and the complete lighting system as shown on the drawings. The contractor shall furnish all appropriate mounting hardware as required for installation of the fixtures in the various ceiling types. The contractor shall coordinate the various ceiling types with the architect's reflected ceiling plan and construction details. All fixtures shall be the type and manufacturer specified, with UL label. Recessed incandescent downlights shall have thermal protection.

B. Typical Details, Drawings and Symbols. The Contractor shall install lighting fixtures complete with lamps and as shown on drawings. Refer to symbol drawings for additional descriptive and installation data. The Contractor shall check the location of all fixtures in relation to the structure and the work of other crafts and shall obtain approval of the Owner's representative to relocate fixtures, if required, to avoid interferences.

PART 2 - PRODUCTS

2.1 WIRING DEVICES

A. Wiring Devices. All wall switches for lighting shall be those of a single manufacturer and shall be as specified by the symbol on the drawings and as listed on the symbols drawings.

2.2 LIGHTING FIXTURES

A. All lighting fixtures shall be as specified on the fixture schedule on the drawings.

B. Fluorescent fixtures shall be furnished with electronic start, high power factor, integral ballasts and T-8 lamps. All recessed troffers designated as "Spec Grade" shall have a minimum depth of 4-1/2". Applicable to Alternate No. 1.

C. All outdoor fixtures shall be UL listed for wet locations unless mounted recessed in building overhangs, in such cases fixtures which are UL listed for damp locations may be permitted if specifically noted on the drawings.

D. Substitutions: The following manufacturers shall be considered pre-approved for the types of fixtures specified on the drawings when proper fixture grade is submitted. If proper grade fixture is not submitted during the shop drawing phase and submittal is rejected, fixtures must be furnished as specified on the drawings.

<u>Fluorescent Troffers (Alternate No. 1)</u>
Day-Brite
Lithonia
Metalux
H. E. Williams

Emergency and Exit Lighting
Lithonia
Emergilite
Sure Lites
Dualite
Chloride

PART 3 - EXECUTION

3.1 FIXTURE OUTLETS

A. Fixture outlets shall be installed in the locations shown on the drawings. The Contractor shall study the general building plans in relation to the spaces surrounding each outlet in order that his work may fit the other work required, as well as the work of other trades. When necessary, the Contractor shall relocate outlets so that when fixtures or other fittings are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment.

3.2 LIGHTING SWITCHES

A. Lighting Switches. The Contractor shall furnish and install all lighting switches shown on the drawings. The switches shall be installed in the ungrounded lines and shall be mounted in the appropriate boxes for flush or surface mounting as specified under "Boxes". The appropriate coverplates as specified under "covers" shall be installed. Switch mounting shall be as described on the symbol drawings and as described elsewhere in this specification.

B. Local Switches. Local switches shall be located on the strike side of the doors, keeping approximately 3" away from the door trim or corner, wherever possible. Switch handles shall be set to operate vertically; wall receptacles shall be set with the long dimension vertical where possible. Switches suitable for use in mullions of glass partitions shall be used where noted on plans.

C. Neutral Conductor. The neutral conductor of lighting systems shall be of the same size as the phase conductors. On three and four wire systems the load shall be divided as evenly as possible on each "outside" or phase conductor. Neutral conductors shall be identified throughout by using a white or gray (as specified in "Color Code" section) insulated wire. A green ground wire shall be run in raceway to ground all lighting fixtures, receptacles, boxes and wiring devices.

3.3 FINAL INSPECTIONS

A. At the conclusion of the job, the Contractor shall see to it that all fixtures are cleaned, lamped and in good operating condition. Upon final inspection all covers shall be installed.

END OF SECTION 265100

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 topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. 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. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

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 SOIL MATERIALS

A. 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. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

2.2 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.

2.3 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. Metal Posts and Rails: As indicated. Round cold-formed, electric-resistance-welded, steel pipe or tubing, with minimum yield strength of 45,000 psi and with outside dimension, minimum wall thickness, and weight complying with ASTM F 761 for the following fence height and strength and stiffness requirements:

1. Fence Height: 4 feet.
2. Duty Rating: Medium.
3. Tube or Pipe Diameter and Thickness: According to ASTM F 761.

C. Wood Posts and Rails: As indicated. 2 inch x 4 inch framing lumber. Minimum post length 6 feet.

D. PVC Rails: As indicated. 1” diameter Schedule 40 with solvent cement joints.

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 inchesin 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.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

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.

C. Excavate for and remove underground utilities indicated to be removed.

D. Fill depressions caused by utility removal 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.

3.5 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 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. Limit height of topsoil stockpiles to 10 feet..
2. Do not stockpile topsoil within tree protection zones.
3. Dispose of excess topsoil as specified for surplus soil material in disposal article below.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-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.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
1. Do not burn or chip demolished or waste materials on Owner’s property.
2. 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 EAS Professionals and is dated February 3, 2016.

1. Copies of the geotechnical report shall be provided upon request.
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, and lawns and grasses.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Base course for asphalt paving.
5. Subsurface drainage backfill for utility trenches.
6. Excavating and backfilling trenches and pits for buried utilities.

1.3 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[(or a choker course, where applicable)].

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. Drainage Course: Course supporting a slab-on-grade that also minimizes upward capillary flow of pore water.

F. 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 feetin 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.

G. Fill: Soil materials used to raise existing grades.

H. Filter aggregate: Aggregate backfill material that acts as a filter medium in subdrainage systems.

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

J. 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.

K. 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.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 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 698 for each on-site and borrow soil material proposed for fill and backfill.

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.

1.5 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.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify 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.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

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.

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.

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. 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.

E. Drainage 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.

F. 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^2; 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^2; 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 inchesdeep; 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 by Architect, based on the recommendations of the Geotechnical Testing Agency. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

1. 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][based on a mutually acceptable price].
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. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. 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 Architect, based on the recommendations of the Geotechnical Testing Agency, determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material 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. 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. Corrugated Steel Pipe (ASTM A 760)
c. Gravity Flow Polyvinyl Chloride Pipe (ASTM D 3034)
d. Gravity Flow Ductile Iron Pipe (ASTM A 746)
e. Elliptical Concrete Pipe (ASTM C 507)
f. Concrete Box Culvert (ASTM C 1433)

B. 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.

C. 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.

D. 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.

E. 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.

F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

G. Place and compact final backfill of satisfactory soil, in accordance with requirements for Backfill as indicated above, to final subgrade elevation.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

I. Place backfill on subgrades free of mud, frost, snow, or ice.

J. 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 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.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

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 698:

1. Under structures, building slabs, steps, and pavements, compact each layer of backfill or fill soil material at 98 percent.
2. Under walkways, compact each layer of backfill or fill soil material at 95 percent.
3. Under lawn or unpaved areas, compact each layer of backfill or fill soil material at 90 percent.
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.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. 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.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 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.

3.18 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.

3.19 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. Immediately prior to placing drainage course, 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 and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Make arrangements for observation of consolidation efforts by Geotechnical Testing Agency.
2. Where indicated, install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
3. Place drainage course 6 inches or less in consolidated thickness in a single layer.
4. Place drainage course that exceeds 6 inches in consolidated thickness in layers of equal thickness, with no consolidated layer more than 6 inches thick or less than 3 inches thick.
5. Consolidate each layer of drainage course with vibratory roller or plate compactor until aggregate appears to be completely consolidated and no additional settlement or consolidation is apparent during a final pass.
6. Protect drainage course from displacement by traffic until subsequent layer or pavement course is installed. Where drainage course is displaced, re-consolidate before placement of subsequent layers or slab-on-grade.

D. Shoulders: Where installation is not bordered by concrete foundation walls or alternate confinement system, place shoulders along edges of drainage course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each drainage course layer to not less than 95 percent of maximum dry density according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Geotechnical Testing Agency: Contractual responsibilities for testing are identified in Division 1 Section "Quality Requirements". Responsible party will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. 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.

C. 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.

D. Geotechnical Testing Agency will test compaction of soils and base course in place according to ASTM D 1556 or ASTM D 2922 as applicable.

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.

E. 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.

3.21 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.

3.22 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

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 paving.
2. Pavement-marking.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Material Test Reports: For each paving material.

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 to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
b. Review condition of subgrade and preparatory work.
c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

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 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. 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.

C. Asphalt Surface Course: [Type B] [Type C] [Type D] 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the [subgrade][base course] has been installed in accordance with the requirements of Division 31 Section “Earth Moving”, and that its 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.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared [subgrade][base course] is ready to receive paving.

3.3 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.

3.4 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.

3.5 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.

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.

3.6 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.

3.7 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 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.

3.8 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.
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.

E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 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.

1. Do not allow milled materials to accumulate on-site.

3.10 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.
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.

1.3 SUBMITTALS

A. 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.

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 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.

D. Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Products:

a. Burke by Edeco; True Etch Surface Retarder.
b. ChemMasters; Exposee.
c. Conspec Marketing & Manufacturing Co., Inc.; Delay S.
d. Euclid Chemical Company (The); Surface Retarder S.
e. Kaufman Products, Inc.; Expose.
f. Metalcrete Industries; Surftard.
g. Nox-Crete Products Group, Kinsman Corporation; Crete-Nox TA.
h. Scofield, L. M. Company; Lithotex.
i. Sika Corporation, Inc.; Rugasol-S.

2.6 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.

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, unleveled 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.

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. Installer Qualifications: A qualified unit paving installer meeting the following qualifications.

1. Experience: Five years' experience in unit paving installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Installer shall maintain supervisor on Project site full-time when work is in progress.

B. 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.

C. Regulatory Requirements: Comply with the requirements of the Americans with Disabilities Act and related regulations and guidelines.

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 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 321410

SECTION 329200 - TURF AND GRASSES

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. Hydroseeding.
2. Sodding.
3. Planting soil and amendments.
4. Erosion-control materials (turf related only)
5. Maintenance.

1.3 SUBMITTALS

A. Material Test Reports: Soil analysis report for existing in-place surface soil and imported or manufactured topsoil.

B. 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.

C. Sod Installation Schedule: Provide schedule of installation dates for sod. Do not install dormant sod without prior approval of Architect.

D. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
1. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
3. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
4. Pesticide Applicator: State licensed, commercial.

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.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.
   a. Based on 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.

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. Initial Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. 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.
   1. Seed: as indicated on plan 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.

B. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
   2. Provide lime in form of ground dolomitic limestone.

C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

D. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

E. Aluminum Sulfate: Commercial grade, unadulterated.

F. Perlite: Horticultural perlite, soil amendment grade.

G. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

H. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

I. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

J. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Provide organic soil amendments in quantities and proportions recommended by soil analysis report.

B. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

A. Provide fertilizers in quantities and proportions recommended by soil analysis report.

B. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

C. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

D. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

E. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.6 PLANTING SOILS

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.
3. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.
   a. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
   b. Mix imported topsoil or manufactured topsoil with soil amendments and fertilizers in the quantities recommended in the soil analysis report to produce planting soil.

2.7 MULCHES

A. Fiber Mulch: Biodegradable, 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.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.8 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.

2.9 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 steel wire staples, 6 inches long.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Propex Geosynthetics, Landlok S1.
      b. East Coast Erosion Blankets, ECS-1.
      c. North American Green, S75.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Profile Products,LLC, Flexterra and CocoFlex.
      b. Mat, Inc., Flex Guard.

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 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 superphosphate fertilizer directly to subgrade before loosening.
   2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
      a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
      b. Mix lime with dry soil before mixing fertilizer.
   3. Spread planting soil to the depth indicated or to a min. depth of 8 inches, but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
      a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
      b. 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 superphosphate 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 steel 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

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.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Utilize irrigation system to keep turf uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
   2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. 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.

D. 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, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 6 by 6 inches.
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 6 weeks on seeded grass pavements.
b. For a minimum of 3 weeks on sodded grass pavements.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

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 [add utility name here].
   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.

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. Polyvinyl chloride pipe.
   3. Tees, elbows, reducers and similar fittings.
   4. Special fittings for expansion and deflection.
   5. Joint restraint.

6. Valves and valve boxes.
7. Tapping sleeve assemblies.
8. Fire hydrants.
9. Flushing (blowoff) hydrants and boxes.
10. Yard hydrants.
11. Fire department connections.
12. Backflow preventers.
13. Pressure reducing valves
14. Relief valves
15. Service connection piping and fittings
16. Corrosion-protection piping encasement.
17. Protective enclosures.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

C. Field quality-control test reports.

D. Bacteriological test reports.

E. Record Drawings: Include the following, as required by authorities having jurisdiction, for use by Owner's surveyor in preparing record drawings:
1. Location of water mains from centerline of road or curb. Contractor shall coordinate with Owners surveyor to allow for location of water main prior to backfilling.
2. Location of fire hydrants, valves, tees, elbows, reducers, and other fittings.
3. Location and elevation of any other below ground appurtenances.
4. Designation, size and length of water lines between fittings.
5. Location and depth below finished grade of service connections.

F. Minutes of preinstallation conference.

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 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 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 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 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.

2.4 RESTRAINTED 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.

2.5 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.

2.6 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.

2.7 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.

2.8 SERVICE CONNECTIONS (NPS 3 AND SMALLER)

A. PVC Pipe: Schedule 40 in accordance with ASTM D 1785, with solvent cement joints in accordance with ASTM D 2564 and fitting in accordance with ASTM D 2466.
   1. 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. 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.

2.9 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.

2.10 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. 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. 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.
   2. PE tubing with molded PE compression band fittings and heat-fusion joints.

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 Schedule 40 PVC according to ASTM D 2774, ASTM F 645 and the standards of the operating utility.

E. Install fire-service-main piping according to NFPA 24 and standards of authorities having jurisdiction
   1. For DIP, install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

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. Under Railroad Tracks: With at least 48 inches cover over top.
   3. 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. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194 and standards of authorities having jurisdiction.
   3. Schedule 40 PVC Piping: in accordance with ASTM D 2564 and standards of authorities having jurisdiction.
   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. Fire-Service-Main Piping: According to NFPA 24 and the standards of jurisdictions having authority.

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.

B. Corporation and Curb Stops: Install according to the manufacturer’s written instructions and to the standards of the operating utility with head pointed up and with service 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 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.

3.11 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 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."

3.12 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.

3.13 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.
      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 [add utility name here].
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. Cleanout caps and covers.
4. Nonpressure-type pipe couplings.

B. Field quality-control test reports.

C. Record Drawings: Include the following, as required by authorities having jurisdiction, for use by Owner's surveyor in preparing record drawings:
   1. Designation, size and length of sewer lines between manholes or cleanouts.
   2. Location and depth below finished grade of service connections to sewer main.
   3. Location and elevation of any other below ground appurtenances.

D. Minutes of preinstallation conference.

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.

2.3 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 inchesdeep.

2.4 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and stainless steel tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless steel shear ring and stainless steel-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Dallas Specialty & Mfg. Co.
b. Fernco Inc.
c. Logan Clay Products Company (The).
d. Mission Rubber Company; a division of MCP Industries, Inc.
e. NDS Inc.
f. Plastic Oddities, Inc.

D. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

1. Manufacturers:

a. Fernco Inc.
b. Logan Clay Products Company (The).
c. Mission Rubber Company; a division of MCP Industries, Inc.

2.5 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. 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 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 inchesdeep. Set with tops 1 inch above surrounding earth grade
5. Set cleanout frames and covers in pavement with tops flush with pavement surface.

3.7 SERVICE CONNECTION INSTALLATION

A. Extend sanitary sewer-service piping and connect to building sanitary sewer system at 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.

3.8 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, 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.

C. Protect piping and manholes to prevent concrete or debris from entering while making connections. Remove debris or other extraneous material that may accumulate.

3.9 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."

3.10 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. 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 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.

2) 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.

C. 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.

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.

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.
   4. Manholes.

1.3 DEFINITIONS

A. CMP: Corrugated Metal Pipe (Steel)

B. DIP: Ductile iron pipe

C. Drainage Structures: catch basins, curb inlets, junction boxes, weir inlets, pond outlet structures.

D. HDPE: High density polyethylene pipe

E. LLDPE: Linear low-density, polyethylene plastic.

F. NPS: Nominal pipe size

G. PE: Polyethylene plastic.

H. PP: Polypropylene plastic.

I. PVC: Polyvinyl chloride plastic.

J. SRCP: Reinforced Concrete Pipe (sealant joints)

K. 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. Drainage structure frames and grates
   3. Outlet protection

B. Shop Drawings: Include plans, elevations, sections, details, and frames and covers for the following:

   1. Manholes.
   2. 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.

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.

C. Corrugated HDPE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for integral bell and spigot joints.

1. Water-tight Couplings: 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^2; ASTM D-4491

2.5 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. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
7. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
8. 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.
9. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
10. Flat Slab Adapters For Transition to Square Drainage Structures: Precast reinforced concrete in accordance with Section 719 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

a. Configuration: as indicated on South Carolina Department of Transportation Standard Drawing 719-425.

11. 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 "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

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.

2.7 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. 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.

2.8 PIPE INLETS AND OUTLETS

A. 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)

PART 3 - EXECUTION

3.1 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.

3.2 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 according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 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.

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.

3.4 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTM C 891.

C. 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.

3.5 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. Construct inlet and outlet head walls, aprons, and sides of reinforced concrete, as indicated.

1. Comply with the requirements of Sections 701, and 702 of the South Carolina Department of Transportation Standard Specifications for Highway Construction for measuring, mixing, transporting, and placing concrete.

B. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

C. Construct riprap of broken stone, as indicated.

D. 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.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.

C. Leaks and loss in test pressure, if applicable, constitute defects that must be repaired.

D. 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 waterbodys.

END OF SECTION 334100

GREENVILLE COUNTY
STAUNTON BRIDGE CC ADDITION

GREENVILLE, SC

PROJECT # 3702-155430

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GENERAL

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C3	EXISTING CONDITIONS AND DEMOLITION PLAN
C4	EROSION AND SEDIMENT CONTROL PLAN
C5	EROSION AND SEDIMENT CONTROL DETAILS
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C7	LAYOUT PLAN
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A-401	ENLARGED BATHROOM PLANS
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FIRE PROTECTION

F-001	FIRE PROTECTION SPECIFICATIONS
F-101	FIRE PROTECTION PLAN

MATERIAL LEGEND

(NOT ALL MATERIALS APPLICABLE)

PLAN AND SECTION

EARTH
POROUS FILL (STONE OR GRAVEL)
ROCK
LIGHTWEIGHT CONCRETE (OR CONCRETE FILL)
STRUCTURAL CONCRETE (CAST IN PLACE, ETC.)
BRICK (COMMON OR FACE)
CONC. MASONRY UNITS (C.M.U.)
PLASTER, CEMENT, SAND, GROUT
STEEL, IRON
ALUMINUM
WOOD (FINISH)
WOOD (ROUGH)
WOOD BLOCKING
PLYWOOD
SPRAY-ON FIREPROOFING
BATT/LOOSE FILL INSULATION
EXTRUDED POLYSTYRENE
ACOUSTICAL TILE
GYPSUM WALLBOARD
CARPET AND PAD

ELEVATION

BRICK
CERAMIC TILE
CONCRETE / PLASTER / STUCCO
GLASS
SHINGLES/SIDING

GRAPHIC SYMBOL LEGEND

COLUMN GRID REFERENCE

DRAWING TITLE
DRAWING LOCATION ON SHEET GRID
DRAWING NAME
1/8" = 1'-0"
DRAWING SCALE

DRAWING LOCATION ON SHEET GRID
DRAWING NAME
NTS
DRAWING SCALE
SHEET NUMBER WHERE DETAIL IS DRAWN
SHEET NUMBER WHERE DETAIL IS REFERENCED

DETAIL/PLAN KEY
DETAIL LOCATION ON SHEET GRID
TERMINATION OF SECTION
SHEET IDENTIFIER FOR LOCATION OF DETAIL

REVISION INDICATION
REVISION NUMBER

AREA REVISED

CENTERLINE

TYPICAL DIMENSION INDICATOR
9 1/2"

DOOR NUMBER
201A

FLOOR ELEVATION
1ST FLOOR
0'-0"

GLASS TYPE

SUBSYSTEM

ROOM NAME & NUMBER
ROOM NAME
2201
150 SF

ENLARGED DETAIL INDICATOR
DETAIL LOCATION ON SHEET GRID
SHEET IDENTIFIER FOR LOCATION OF DETAIL

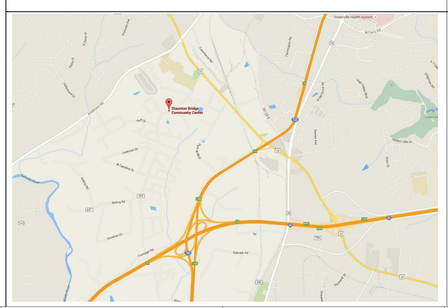
SECTION KEYS
DIRECTION OF SECTION
BUILDING SECTION LOCATION ON SHEET GRID
SHEET IDENTIFIER FOR LOCATION OF SECTION
DIRECTION OF SECTION
WALL SECTION LOCATION ON SHEET GRID
TERMINATION OF SECTION
SHEET IDENTIFIER FOR LOCATION OF SECTION

ELEVATION KEY
ELEVATION LOCATION ON SHEET GRID
SHEET IDENTIFIER FOR LOCATION OF ELEVATION
DIRECTION OF ELEVATION

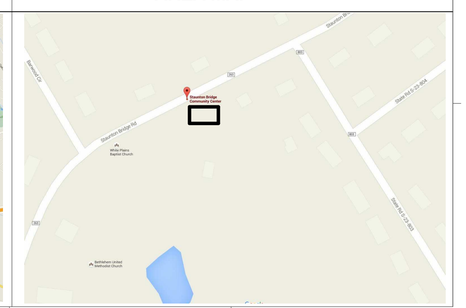
ABBREVIATIONS

A/C	AIR CONDITION(ING)	EQ	EQUAL	MAINT	MAINTENANCE	SC	SOLID CORE
ADMIN	ADMINISTRATION	EQUIP	EQUIPMENT	MATL	MATERIAL	SD	STORM DRAIN
AFF	ABOVE FINISHED FLOOR	EWC	ELECTRIC WATER COOLER	MAX	MAXIMUM	SECT	SECTION
ALT	ALTERNATE	EXIST	EXISTING	MECH	MECHANICAL	SF	SQUARE FEET
ALUM	ALUMINUM	EXP JT	EXPANSION JOINT	MEZZ	MEZZANINE	SIM	SIMILAR
APPROX	APPROXIMATE(LY)	EXT	EXTERIOR	MFG	MANUFACTURING	SPEC	SPECIFICATION
ARCH	ARCHITECT(URAL)	F/F	FACE TO FACE	MFR	MANUFACTURER	SPKR	SPEAKER
AUTO	AUTOMATIC	FD	FLOOR DRAIN	MIN	MINIMUM	SQ	SQUARE
AUX	AUXILIARY	FE	FIRE EXTINGUISHER	MISC	MISCELLANEOUS	SS	STAINLESS STEEL
AV	AUDIOVISUAL	FEC	FIRE EXTINGUISHER CABINET	MO	MASONRY OPENING	STD	STANDARD
BITUM	BITUMINOUS	FF EL	FINISH FLOOR ELEVATION	MR	MOISTURE RESISTANT	STOR	STORAGE
BL	BUILDING LINE	FHC	FIRE HOSE CABINET	MTD	MOUNTED	SUSP	SUSPENDED
BLDG	BUILDING	FIN FLR	FINISHED FLOOR	MTG	MOUNTING	SYS	SYSTEM
BN	BULL NOSE	FLR	FLOOR, FILLER	MTL	METAL	T	TREAD
BOS	BOTTOM OF STEEL	FOC	FACE OF CURB	N	NORTH	TEL	TELEPHONE
BOT	BOTTOM	FOF	FACE OF FINISH	NIC	NOT IN CONTRACT	TEMP	TEMPORARY
CAB	CABINET	FOM	FACE OF MASONRY	NOM	NOMINAL	TFF	TOP OF FINISH FLOOR
CJ	CONTROL JOINT	FOS	FACE OF SLAB	NON COMB	NON-COMBUSTIBLE	THK	THICKNESS
CL	CENTER LINE	FOW	FACE OF WALL	NTS	NOT TO SCALE	THRU	THROUGH
CLG	CEILING	FT	FOOT, FEET	OC	ON CENTER	TO	TOP OF
CLG HT	CEILING HEIGHT	FTG	FOOTING	OD	OUTSIDE DIAMETER	TOB	TOP OF BEAM
CLO	CLOSET	FURN	FURNISH, FURNITURE	OPP	OPPOSITE	TOC	TOP OF CONCRETE, CURB
CLR	CLEAR(ANCE)	GA	GAGE	OPT	OPTION(AL)	TOF	TOP OF FOOTING
CMU	CONCRETE MASONRY UNIT	GALV	GALVANIZED	PCF	POUNDS PER CUBIC FEET	TOJ	TOP OF JOIST
COL	COLUMN	GC	GENERAL CONTRACTOR	PLAM	PLASTIC LAMINATE	TOM	TOP OF MASONRY
CONC	CONCRETE	GYP BD	GYPSUM BOARD	PLF	POUNDS PER LINEAR FEET	TOP	TOP OF PARAPET
CONF	CONFERENCE	GYP PLAS	GYPSUM PLASTER	PLYWD	PLYWOOD	TOS	TOP OF SLAB
CONT	CONTINUE. CONTINUOUS	HC	HANDICAP	PNL	PANEL	TOW	TOP OF WALL
CORR	CORRIDOR	HD	HEAVY DUTY	PR	PAIR	TRTD	TREATED
CU FT	CUBIC FOOT	HDWD	HARDWOOD	PREFAB	PREFABRICATED	TV	TELEVISION
CU YD	CUBIC YARD	HDWR	HARDWARE	PREFIN	PREFINISH	TYP	TYPICAL
DEMO	DEMOLISH	HM	HOLLOW METAL	PRKG	PARKING	UL	UNDERWRITERS LABORATORIES
DEPT	DEPARTMENT	HORIZ	HORIZONTAL	PSF	POUNDS PER SQUARE FOOT		
DET	DETAIL	HT	HEIGHT	PSI	POUNDS PER SQUARE INCH	UNO	UNLESS NOTED OTHERWISE
DF	DRINKING FOUNTAIN	HVAC	HEATING, VENTILATION & AIR CONDITIONING	PT	PAINT, POST-TENSIONED, PRE-TREATED	VERT	VERTICAL
DIA	DIAMETER					VEST	VESTIBULE
DIAG	DIAGONAL	ID	INSIDE DIAMETER	PVC	POLYVINYL CHLORIDE (PLASTIC)	VIF	VERIFY IN FIELD
DIM	DIMENSION	INCL	INCLUDE(D), (ING)			W	WEST, WIDE
DIV	DIVISION	INFO	INFORMATION	QTR	QUARTER	W/	WITH
DS	DOWNSPOUT	INSUL	INSULATION	QTY	QUANTITY	W/O	WITHOUT
E	EAST	INT	INTERIOR	R	RADIUS, RISER	W/W	WALL TO WALL
EA	EACH	JAN CLO	JANITOR CLOSET	RCP	REFLECTED CEILING PLAN	WC	WATER CLOSET
EIFS	EXTERIOR INSULATION & FINISH SYSTEM	KIT	KITCHEN	RD	ROOF DRAIN	WD	WOOD
		KO	KNOCKOUT	REF	REFRIGERATOR, REFERENCE	WP	WORKING POINT, WATERPROOFING
EJ	EXPANSION JOINT	LAB	LABORATORY	REQD	REQUIRED		
EL	ELEVATION	LAM	LAMINATE	RL	ROOF LEADER	WR	WATER REPELLENT
ELEC	ELECTRIC(AL)	LAU	LAUNDRY	RM	ROOM	WT	WEIGHT
ELEV	ELEVATOR	LAV	LAVATORY	RO	ROUGH OPENING	WWF	WELDED WIRE FABRIC
ENCL	ENCLOSE(D)	LF	LINEAR FEET	ROW	RIGHT OF WAY	YD	YARD
EOS	EDGE OF SLAB	LVR	LOUVER	S	SOUTH		

VICINITY MAP



AREA MAP



Greenville County

STAUNTON BRIDGE CC ADDITION

Greenville County Rec
PARKS • RECREATION • TOURISM

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
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STATE OF SOUTH CAROLINA
LS3P ASSOCIATES LTD.
Greenville, SC
B74003
REGISTERED ARCHITECT

STATE OF SOUTH CAROLINA
PRESCOTT D. MAY
JR. SOUTH CAROLINA
3205
REGISTERED ARCHITECT
3.15.2016

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: DO
CHECKED BY: PDM/WSW

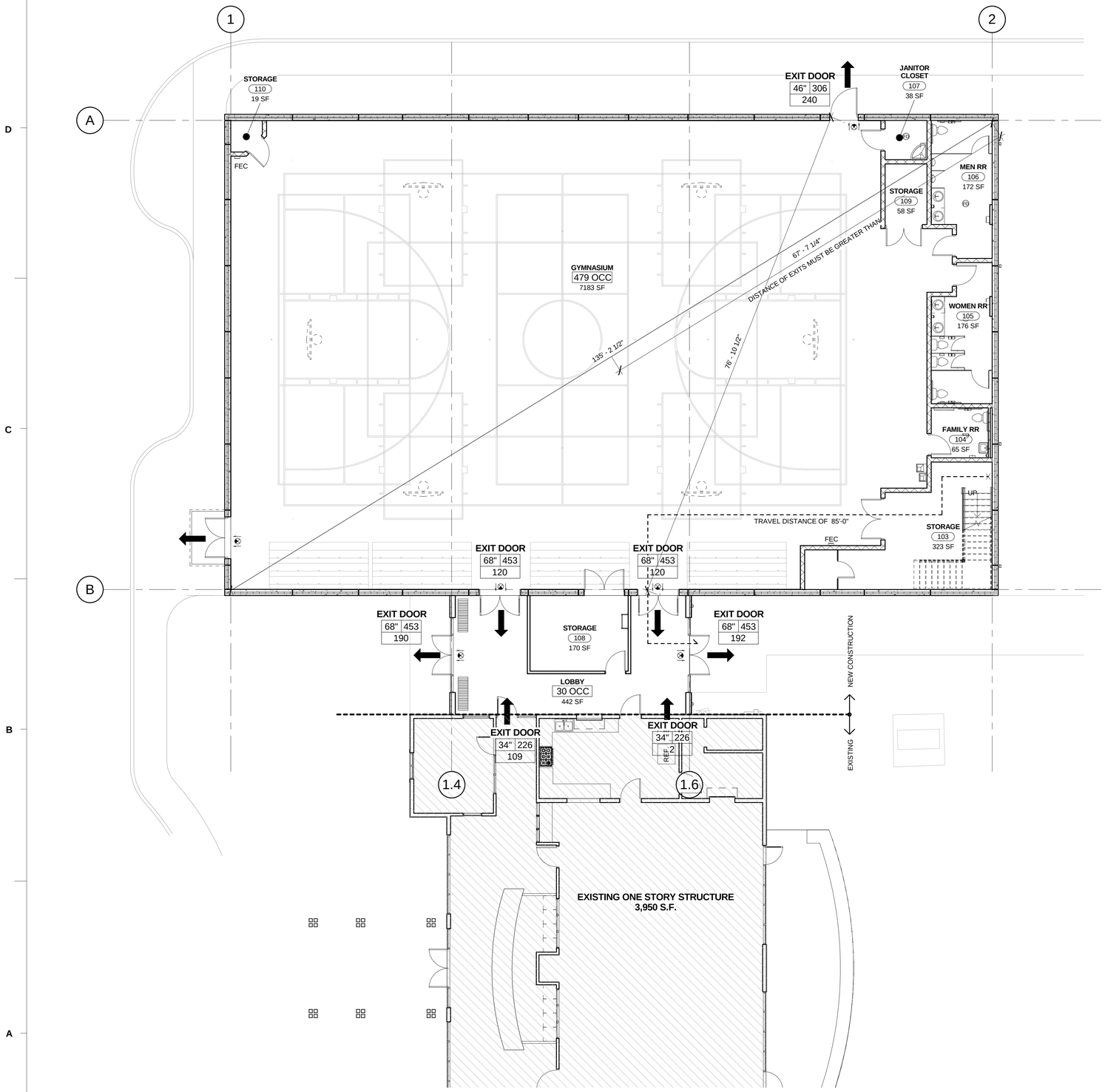
PROJECT INFORMATION SHEET

G-001

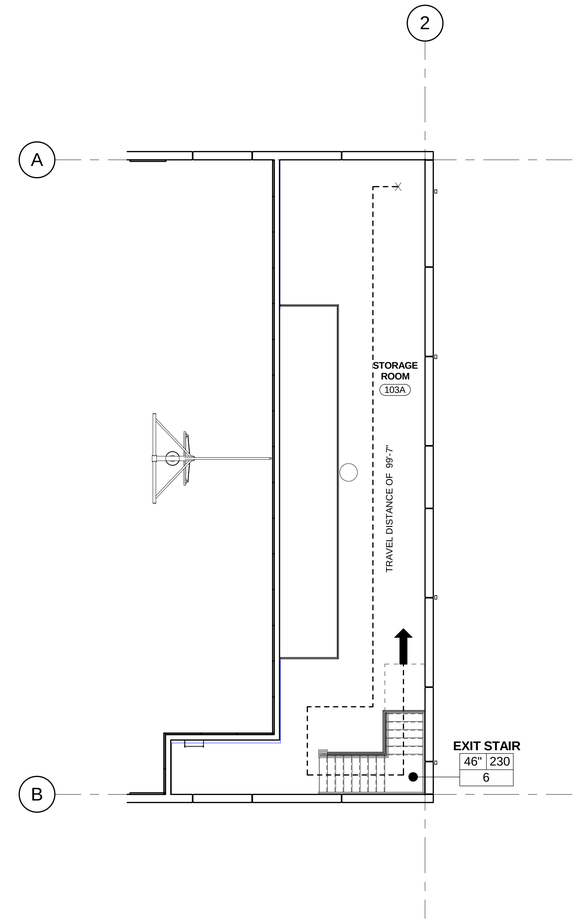
[redacted]

PERMIT & CONSTRUCTION SET

C:\Users\deanoang\Documents\StauntonBridgeCC-Addition_2015_deanoang.rvt
3/15/2016 10:41:58 AM



1 1ST FLOOR LIFE SAFETY PLAN
1/8" = 1'-0"



2 STORAGE PLATFORM LIFE SAFETY PLAN
1/8" = 1'-0"

LIFE SAFETY PLAN LEGEND

EGRESS TRAVEL PATH:
DISTANCE NOTED IS ACTUAL.
ALLOWABLE DISTANCE IS 300'-0"

ROOM NAME
1 OCC — OCCUPANCY LOAD
150 SF — ROOM AREA
OCC Type / SF per OCC — OCCUPANCY LOAD FACTOR AND METHOD
OCCUPANCY GROUP

EXIT DOOR
34" 170 — EXIT CAPACITY (DOOR EGRESS WIDTH / .15)
111 — ANTICIPATED LOAD
EGRESS WIDTH

EXIT STAIR
48" 160 — EXIT CAPACITY (STAIR EGRESS WIDTH / .2)
137 — ANTICIPATED LOAD
EGRESS WIDTH

FEC — FIRE EXTINGUISHER CABINET WITH FIRE EXTINGUISHER

EXIT SIGN

Greenville County

STAUNTON BRIDGE CC ADDITION

Greenville County Rec
PARKS • RECREATION • TOURISM

LS3P

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GREENVILLE, SOUTH CAROLINA 29601
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STATE OF SOUTH CAROLINA
PRESCOTT D. WILLIAMS
VIRGINIA
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REGISTERED ARCHITECT
3-15-2016

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: DO
CHECKED BY: PDM/WSW

FIRST FLOOR LIFE SAFETY PLAN

G-002

C:\Users\deanoang\Documents\StauntonBridgeCC-Addition_2015_deanoang.rvt
3/15/2016 11:03:18 AM

PERMIT & CONSTRUCTION SET

Greenville County Rec
Staunton Bridge Road Community Center Expansion

Greenville, South Carolina

Code Review
March 2016

Codes In Use
2012 International Building Code
2012 International Fire Code
2012 International Plumbing Code
2012 International Mechanical Code
2012 International Fuel Gas Code
2009 International Energy Conservation Code
2011 National Electrical Code
2009 ICC ANSI 117.1

Description of Work

A new multi-purpose gymnasium with accompany supporting spaces is being proposed as an addition to the existing Staunton Bridge Community Center. The new facility will house one main basketball court, four side basketball courts, one volleyball court, and three pickle ball courts. Additional bathroom facilities for both men and women will also be provided along with one separate family restroom that will be unisex. Additional storage room will also be provided to support the new multi-purpose gymnasium. The storage room will housed on the second floor above the restrooms and be accessible by employees only. The existing community center is fully equipped with an automatic sprinkler system and the new addition will also be equipped with an automatic sprinkler system.

Occupancy Classification

Existing Community Center Building Classification (3,950 sqft)
- Construction Type: V-B
- Primary Occupancy: Group (A-2); Food Service Space with Large Assembly Spaces
- Accessory Occupancy: Storage (S-1); Moderate-hazard Material & Sporting

New Gymnasium Addition (9,089 sqft)
- Construction Type: V-B
- Primary Occupancy: Group (A-3); Gymnasium without fixed seating
- Secondary Occupancy: Storage (S-1); Moderate-hazard Material & Sporting Eqpt.

Overall Building (13,039 sqft)
Non-separated mixed use with the building being full sprinkled.
- Primary Occupancy: Group (A-3); Gymnasium without fixed seating
- Secondary Occupancy: Group (A-2); Food Service Space with Large Assembly Spaces
- Third Occupancy: Storage (S-1); Moderate-hazard Material & Sporting Eqpt.

Chapter 5 – Height and Area Modifications

Building Area
- Existing Building Square Feet (sqft):
  - First Floor 3,950 sqft
- New Addition Square Feet (sqft):
  - Frist Floor 9,089 sqft
  - Second Floor (Storage only) 951 sqft

New Total Building Area: 13,990 sqft

Assembly	Allowable	Actual
Building Height	40'	30'-0"
Number of Stories	2	1
Height Increase	NA	NA
Area (A_t - IBC Table 503)	6,000 sqft.	
Total Area (w/modifications)	28,500 sqft	13,990 sqft

*1 IBC Equation 5-1
$A_a = A_t + [A_t \times I_f] + [A_t \times I_s]$
$= 6{,}000 + [(6{,}000 \times .75)] + [(6{,}000 \times 3)]$
$= 6{,}000 + [4{,}500] + [18{,}000]$
$A_a = 28{,}500$ sqft

*2 IBC Equation 5-2
$I_f = [{}^{(}/_{P} - .25]\ {}^{W}/_{30}$
$= [1 - .25] \times 1$
$= [.75] \times 1$
$I_f = .75$

Chapter 6 – Types of Construction

IBC - Table 601 ***Fire-Resistance Requirements For Building Elements (hours)***

Building Element	Type I A	Type I B	Type II A[d]	Type II B	Type III A[d]	Type III B	Type IV HT	Type V A[d]	Type V B
Structural Frame[a] Including Columns, Girders, Trusses	3[b]	2[b]	1	0	1	0	HT	1	0
Bearing Walls Exterior[f]	3	2	1	0	2	2	2	1	0
Interior	3[b]	2[b]	1	0	1	0	1/HT	1	0
Nonbearing Walls Exterior Interior[e]	See Table 602								
Floor Construction (Including Supporting Beams & Joists)	2	2	1	0	1	0	See section 602.4.6	1	0
Roof Construction (Including Supporting Beams & Joists)	$1\frac{1}{2}$[c]	1[c, d]	1[c, d]	0[c, d]	1[c, d]	0[c, d]	HT	1[c, d]	0

IBC - Table 602 ***Fire-Resistance Requirements For Exterior Walls Based On Separation Distance***

Fire Separation Distance (ft)	Type of Construction	Group H	Group F-1, M, S-1	Group A, B, E, F-2, I, R[b], S-2, U
X <5[c]	All	3	2	1
X ≥5 <10	I-A	3	2	1
	Others	2	1	1
X ≥10 <30	I-A, I-B	2	1	1[d]
	II-B, V-B	1	0	0
	Others	1	1	1[d]
X ≥30	All	0	0	0

Chapter 7 - Fire Resistance

IBC - Table 704.8 ***Maximum Area of Exterior Openings***

Classification of Opening	Fire Separation Distance (feet): 0 to 3[a,h]	Greater than 3 to 5[h,f]	Greater than 5 to 10[b,d,f]	Greater than 10 to 15[b,c,d,f]	Greater than 15 to 20[c,f]	Greater than 20 to 25[c,f]	Greater than 25 to 30[c,f]	Greater than 30
Unprotected	Not Permitted[g]	Not Permitted[b,g]	10%[i]	15%[j]	25%[j]	45%[j]	70%[j]	No Limit[b]
Protected	Not Permitted	15%	25%	45%	75%	No Limit[b]	No Limit[b]	No Limit[b]

704.8 Footnote (g) allows unlimited unprotected openings

Chapter 8 - Finish Classifications

IBC - Table 803.9 ***Interior Wall And Ceiling Finish Requirements By Occupancy*** **(partial table)**

Group	Sprinklered: Vertical Exits and Exit Passageways[a,b]	Exit Access Corridors and Other Exitways	Rooms and Enclosed Spaces
A-2*	B	B	C

**A-2 will govern for all spaces because it is the most restrictive.*

Chapter 9 – Fire Protection

Section 903.2.1.3 Group A-3 & Section 903.2.9 Group S-1
An automatic sprinkler system shall be provided for the spaces.

Chapter 10 - Egress Components

Occupancy Calculation for Gymnasium Addition:

	Occupancy Type	Area per occup.	Area	Occupants
Gymnasium	Assembly (A-3)	15 net	7,184 sf	479
Storage Rooms	Storage (S-1)	300 gross	1551 sf	6

Total Number of Occupants 485 Occupants

Section 1005.3.1 Stairways; Exception
Means of Egress capacity factor will be 0.2" inch per occupant due to the fact that the building is equipped with an automatic sprinkler system.

Section 1005.3.2 Other Egress Components; Exception
Means of Egress capacity factor will be 0.15" inch per occupant due to the fact that the building is equipped with an automatic sprinkler system.

Section 1009.3 Stairways; Exception 1.
Exit access stairways that serve or atmospherically communicate between only two stories are not required to be enclosed.

Table 1014.3 Common Path of Egress Travel (Automatic Sprinkler System)
Common path of travel shall not exceed 75' feet.

Table 1016.2 Exit Access Travel Distance (Automatic Sprinkler System)
Exit access travel distance shall not exceed 250' feet.

Tabel 1021.2(2) Stories with One Exit or Access to One Exit (Automatic Sprinkler System)
Second story for S-1 will have less than 29 occupants and the max exit access travel distance will be less than 100 feet ("b" exceptions).

Chapter 11 – Accessibility

Section 1104.2 Egress Through Intervening Spaces:
1. Exception: Means of egress are not prohibited through adjoining or intervening space and along as the spaces are the same or lesser hazard occupancy group (Both spaces are S-1 Storage Occupancies)

Section 1104.3.1 Employee Work Area; Exception 1:
Common use circulation paths, located within employee work areas that are less than 1,000 square feet in size shall not be required to be accessible routes.

Chapter 17 – Special Inspections – Will be Required

Chapter 29 - Plumbing Requirements

From IBC - Table 2902.1 ***Minimum Number of Plumbing Facilities***

Occupants *1 485 = 242M/243W	Fixture	Required: Male (A-3) 242 occ.	Required: Female (A-3) 243 occ.	Provided: Male	Provided: Female	Provided: *Unisex Family Restroom
Assembly (A-3)	Water Closet/Urinals	1 per 125 Min. = 2	1 per 65 Min. = 4	3	3	1
	Lavatories	1 per 200 Min. = 2	1 per 200 Min. = 2	2	2	1
	Showers	0	0			
	Drinking Fountains	1 per 500				2
	Service Sink	1 service sink				1

**The Family Restroom Room will be counted towards the female plumbing fixture count requirements.*

Greenville County

STAUNTON BRIDGE CC ADDITION

Greenville County Rec — PARKS • RECREATION • TOURISM

LS3P

110 WEST NORTH STREET SUITE 300
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TEL. 864.235.0405 FAX 864.233.4027

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STATE OF SOUTH CAROLINA — PRESCOTT D. WILLIAMS — 3205 — REGISTERED ARCHITECT — 3.15.2016

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: DO
CHECKED BY: PDM/WSW

CODE REVIEW

G-003

PERMIT & CONSTRUCTION SET

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STAUNTON BRIDGE COMMUNITY CENTER ADDITION

GREENVILLE COUNTY, SOUTH CAROLINA

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SHEET INDEX

C1 - COVER SHEET
C2 - NOTES AND LEGEND
C3 - EXISTING CONDITIONS AND DEMOLITION PLAN
C4 - EROSION AND SEDIMENT CONTROL PLAN
C5 - EROSION AND SEDIMENT CONTROL DETAILS
C6 - SITE PLAN
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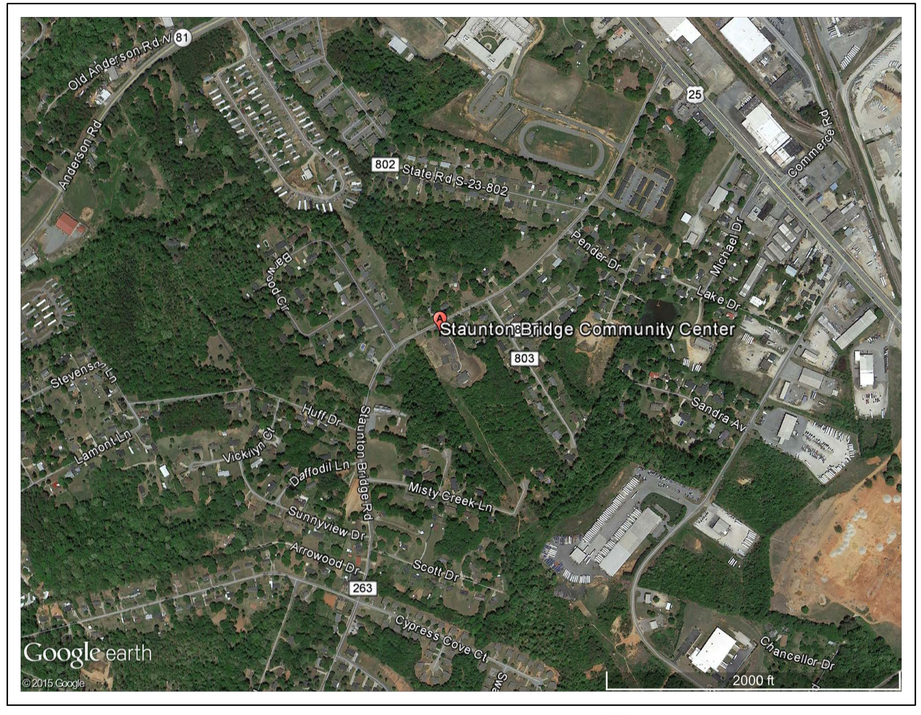
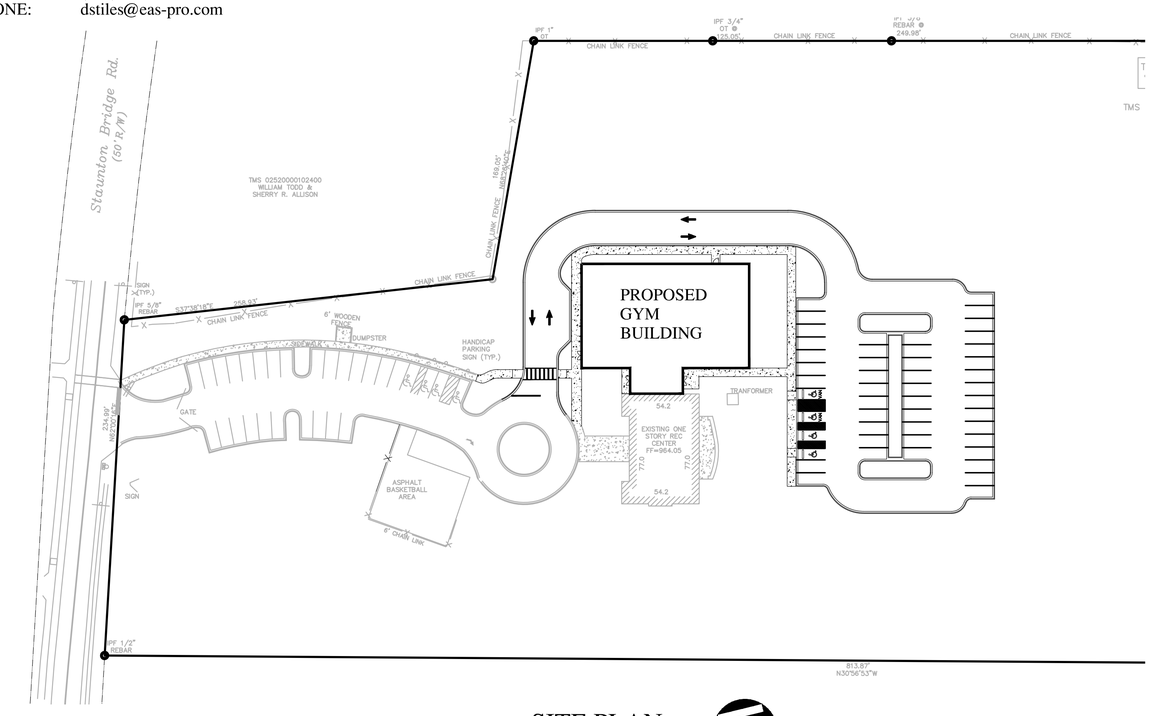
C9 - UTILITY PLAN
C10 - SITE DETAILS
C11 - DRAINAGE DETAILS
C12 - UTILITY DETAILS
C13 - SEEDING SCHEDULE AND SPECS
C14 - STORM WATER MANAGEMENT POND RETROFIT DETAILS



LOCATION MAP
SCALE = NTS

NORTH



SITE PLAN
SCALE 1" = 50'

NORTH

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE
CC ADDITION

SW SEAMONWHITESIDE

LS3P

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SOUTH CAROLINA
SEAMON, WHITESIDE & ASSOCIATES, INC.
No. C00472
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
No. 20165
JOSEPH W. BRYANT, JR.

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

COVER SHEET

C1

PERMIT & CONSTRUCTION SET

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SCDHEC STANDARD NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.

2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.
   - WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.
   - WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH–DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.

3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.

4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE SEDIMENT BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

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

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C REG. 72–300 ET SEQ. AND SCR100000.

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

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

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

11. A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.

12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND–DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.).

16. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:
   - WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;
   - WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND
   - SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC'S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE–CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON–SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON–LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON–SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

DEMOLITION NOTES

1. THE CONTRACTOR SHALL VERIFY ALL ITEMS TO BE DEMOLISHED AND REMOVED FROM THE PROJECT SITE. THE VERIFICATION PROCESS SHALL INCLUDE VISITING AND WALKING THE SITE. ALL ITEMS REQUIRING DEMOLITION/REMOVAL, WHETHER SHOWN ON THIS PLAN OR NOT, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. THERE SHALL BE NO BURNING ON THE SITE.

3. ALL EXISTING STRUCTURES (IF ENCOUNTERED) AND RELATED FOOTINGS, FOUNDATIONS, STEPS, ETC. ARE TO BE REMOVED FROM THE SITE AND DISPOSED OF ACCORDING TO APPLICABLE CODES.

4. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE REMOVAL AND/OR RELOCATION OF ALL UTILITIES (ABOVE AND BELOW GROUND LEVEL) AS NECESSARY TO FACILITATE CONSTRUCTION. SEE THE SPECIFICATIONS FOR SPECIFIC DIRECTION.

5. EXISTING SEPTIC TANKS, GREASE TRAPS AND/OR UNDERGROUND TANKS, IF ENCOUNTERED, ARE TO BE REMOVED FROM THE SITE AND DISPOSED OF ACCORDING TO APPLICABLE CODES. THE LOCATION OF ANY TANKS SHALL BE RECORDED AND THE ENGINEER SHALL BE NOTIFIED AT ONCE.

6. WELLS, IF ENCOUNTERED, SHALL BE ACCURATELY LOCATED BY THE CONTRACTOR, PROTECTED, UNLESS DIRECTED OTHERWISE ON THESE PLANS AND SURROUNDING GRADES MAINTAINED SUCH THAT SURFACE RUNOFF CANNOT ENTER THE WELL OPENING. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT ONCE.

7. THE CONTRACTOR SHALL CONSULT THE OWNER REGARDING SALVAGE. ANY ITEMS NOT RETAINED BY THE OWNER SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DEMOLISH AND/OR LEGALLY DISPOSE OF.

8. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO DEMOLITION AND REMAIN IN PLACE UNTIL FINAL STABILIZATION AND COMPLETION OF CONSTRUCTION ACTIVITIES.

9. IF ANY HAZARDOUS MATERIAL IS ENCOUNTERED DURING DEMOLITION, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER AND APPROPRIATE AGENCIES FOR PROPER REMOVAL AND DISPOSAL.

10. DEMOLITION SHALL MEET ALL APPLICABLE STATE, LOCAL AND FEDERAL REGULATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING APPLICABLE PERMITS.

11. CONTRACTOR IS RESPONSIBLE TO LOCATE ALL UTILITIES AND CONFIRM LOCATION, AND DEPTH IF NECESSARY BY MEAN OF NON DESTRUCTIVE INVESTIGATION (IE. POT HOLING WITH VAC OR WATER). ANY UTILITIES LOCATED BY CONTRACTOR THAT ARE DAMAGED ARE THE RESPONSIBILITY OF THE CONTRACTOR.

SURVEY AS–BUILT, PREPARED BY A SC REGISTERED LAND SURVEYOR, OF ONSITE PONDS, STORM DRAINAGE SYSTEM, PERMANENT SWALES, AND BUILDING SLAB LOCATION AND FINISHED FLOOR ELEVATION WILL BE REQUIRED AS PART OF THE CLOSEOUT PROCESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE THE AS–BUILT SURVEY TO THE ENGINEER AT THE COMPLETION OF CONSTRUCTION

I HAVE PLACED MY SIGNATURE AND SEAL ON THE DESIGN DOCUMENTS SUBMITTED SIGNIFYING THAT I ACCEPT RESPONSIBILITY FOR THE DESIGN OF THE SYSTEM. FURTHER, I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THE DESIGN IS CONSISTENT WITH THE REQUIREMENTS OF TITLE 48, CHAPTER 14 OF THE CODE OF LAWS OF SC, 1976 AS AMENDED, PURSUANT TO REGULATION 72–300 ET SEQ. (IF APPLICABLE), AND IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF SCR100000.

GENERAL NOTES

1. ALL ELEVATIONS ARE BASED ON THE TOPOGRAPHIC SURVEY PROVIDED BY EAS PROFESSIONALS DATED NOVEMBER 24, 2015.
2. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR HIS REPRESENTATIVES. EXISTING UTILITIES SHOWN DO NOT INCLUDE ALL UTILITIES THAT MAY EXIST.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING ALL EXISTING UNDERGROUND UTILITIES LOCATED WITHIN THIS SITE AND AROUND THE PERIMETER OF THIS SITE WHERE SUCH UTILITIES MIGHT BE OCCASIONED BY ANY ACTIVITY INVOLVED WITH THESE PLANS. ALL UTILITY LOCATION WORK SHALL BE DONE PRIOR TO CONSTRUCTION ACTIVITY, THE CONTRACTOR AGREES TO BE RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY UNDERGROUND UTILITIES THAT MAY EXIST.
4. THE CONTRACTOR SHALL VERIFY THE EXISTING TOPOGRAPHY AND EXISTING UTILITY LOCATIONS AND ELEVATIONS PRIOR TO BEGINNING WORK. SHOULD THE CONTRACTOR FIND ANY DISCREPANCIES ON THE DRAWING PRIOR TO BEGINNING WORK OR DURING CONSTRUCTION, HE SHALL NOTIFY THE ENGINEER IMMEDIATELY.
5. ALL CONTRACTORS MUST HAVE APPROPRIATE BUSINESS LICENSE PRIOR TO BEGINNING WORK.
6. THE PROPERTY IS LOCATED IN GREENVILLE COUNTY, SOUTH CAROLINA.
7. THE PARCEL NUMBER IS 0252000102402. THE TOTAL DISTURBED AREA IS ±3.60 ACRES.
8. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. AN AUTOCAD FILE OF THIS DRAWING CAN BE PROVIDED TO THE CONTRACTOR FOR CONSTRUCTION LAYOUT PURPOSES. SW+ PROVIDES NO WARRANTY REGARDING USE OF ELECTRONIC FILES. ALL MEASUREMENTS ARE CALCULATED AND NOT SURVEYED UNLESS NOTED OTHERWISE.
9. ALL DIMENSIONS ARE TO FACE OF CURB OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
10. THE CONTRACTOR IS RESPONSIBLE FOR SITE SAFETY.
11. THIS PROPERTY IS LOCATED IN ZONE X AS SCALED FROM FEMA FIRM 45045C0390D.
12. CLEARING OUTSIDE OF WHAT IS DEPICTED ON THESE PLANS TO BE CLEARED IS PROHIBITED. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR LAND DISTURBANCES BEYOND THE LIMITS OF DISTURBANCE INDICATED ON THE CONSTRUCTION DOCUMENTS AT THE CONTRACTOR'S EXPENSE.
13. THE OWNER SHALL BE RESPONSIBLE FOR ANY SOIL OR MATERIAL TESTING REQUIRED TO MEET SPECIFICATIONS.
14. PROVIDE SILT FENCE ALONG THE TOE OF ANY SLOPES OR LOCATIONS WHERE SEDIMENT SHALL DISCHARGE FROM THE SITE. SEE EROSION CONTROL PLAN FOR SPECIFIC LOCATIONS.
15. TREE PROTECTIVE BARRICADES (WHERE NOTED ON PLAN) SHALL BE PLACED AROUND ALL TREES TO REMAIN DURING ALL PHASES OF CONSTRUCTION UNTIL DEVELOPMENT ACTIVITIES ARE COMPLETE.
16. THE RECEIVING WATER IS THE SALUDA RIVER.
17. THE EXISTING SOILS ARE CECIL SANDY LOAMS (CeB AND CeD) AND MADISON SANDY LOAMS (McE).
18. THE COMPUTER MODEL HYDRAFLOW WAS USED TO DETERMINE THE STORMWATER RUNOFF FOR EACH WATERSHED.
19. THE OWNER IS GREENVILLE COUNTY. THE NATURE OF CONSTRUCTION IS A COMMUNITY CENTER.
20. TEMPORARY DIVERSION DITCHES ARE TO BE USED AS NEEDED DURING CONSTRUCTION. THE GRADING CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING POSITIVE DRAINAGE IN ALL INSTANCES.
21. ALL SLOPES TO BE STABILIZED BEFORE GREENVILLE COUNTY AND SCDHEC FINAL ACCEPTANCE.

DRAWING LEGEND

OBJECTS AND SYMBOLS	EXISTING	NEW
Adjoining Property Line		N/A
Centerline		(Same as Existing)
Easement		
Setback		(Same as Existing)
Sanitary Sewer (Gravity)	ES ES	S S
Sanitary Sewer (Force Main)	EFM	FM FM
Water Line	EW EW	W W
Curb & Gutter (Straight)		
Curb & Gutter (Roll)		
Storm Drain	ED ED	D D
Roof Drain	ERD	RD RD
Subsurface Drainage	EUD	UD UD
Silt Fence, Standard	ESF	SF SF
Silt Fence, Reinforced	ERSF	
Phase Line	N/A	
Watershed Limit	N/A	
Flood Zone		N/A
Conduit	EC EC	C C
Natural Gas	EG EG	G G
Overhead Electrical	EP EP	P P
Underground Electrical	EUP	UP UP
Underground Telephone	ET ET	T T
Underground Cable	ETV	TV TV
Underground Fiber Optic	EFO	FO FO
Fence		
Elevation Contour	22	22
Revision Cloud (Encloses Revision)	N/A	

OBJECTS AND SYMBOLS	EXISTING	NEW
Benchmark		N/A
Sanitary Sewer Manhole	S	
Sanitary Sewer Manhole ID #	N/A	
Sanitary Sewer Cleanout	C	
Double Sanitary Sewer Service (Residential Only)		
Single Sanitary Sewer Service (Residential Only)		
TYPE 1 Storm Drainage Structure		
TYPE 16 Storm Drainage Structure		
TYPE 17 Storm Drainage Structure (Right)		
TYPE 17 Storm Drainage Structure (Left)		
TYPE 18 Storm Drainage Structure		
Catch Basin		
Isolation Box		
Storm Drainage Junction Structure		
Yard Inlet		
Storm Drainage Structure ID #	N/A	
Telephone Box	T	N/A
Telephone Manhole	T	N/A
Electrical Box		N/A
Electrical Manhole	E	N/A
Power Pole		
Light Pole		
Fire Hydrant Assembly		
Water Blowoff		
Water Line Bends, Angle Varies	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	x.xx	x.xx
Watershed Area	N/A	X.XX Ac
Detail ID #	N/A	Sheet #1 SD #1
Keynote	N/A	
Parking Count ID #	N/A	#
Lot #	N/A	#
Revision ID #	N/A	1

CONTRACTOR IS RESPONSIBLE FOR PREPARATION & MAINTENANCE OF TRAFFIC CONTROL PLAN & DEVICES

ANY FILL DIRT OR WASTE DIRT MUST BE FROM OR TO A PERMITTED SITE

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SW SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA SEAMON, WHITESIDE & ASSOCIATES, INC. No. C00472 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 28155 JOSEPH W. BRYANT, JR.

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

NOTES AND LEGEND

C2

PERMIT & CONSTRUCTION SET

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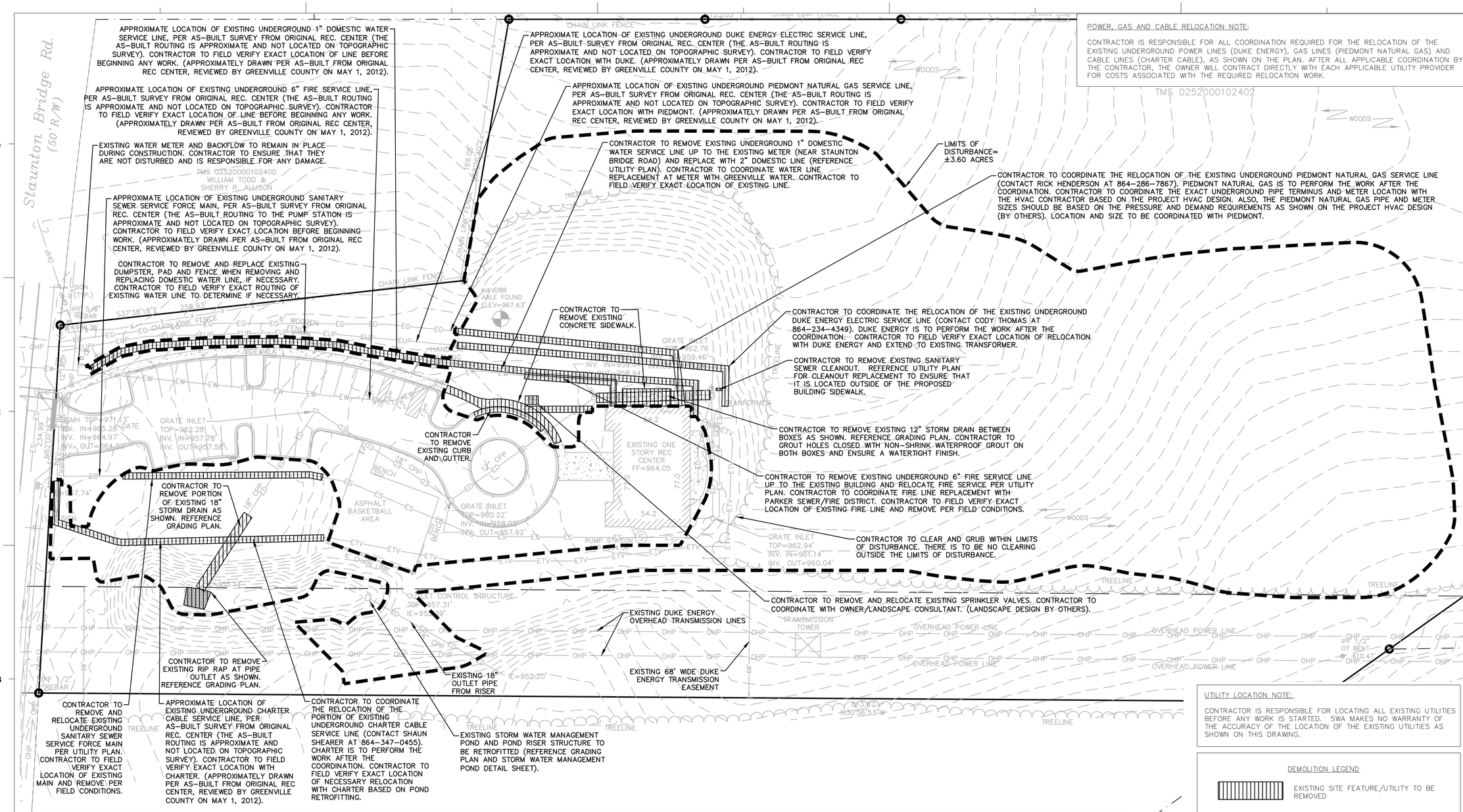


APPROXIMATE LOCATION OF EXISTING UNDERGROUND 1" DOMESTIC WATER SERVICE LINE, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF LINE BEFORE BEGINNING ANY WORK. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

APPROXIMATE LOCATION OF EXISTING UNDERGROUND 6" FIRE SERVICE LINE, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF LINE BEFORE BEGINNING ANY WORK. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

EXISTING WATER METER AND BACKFLOW TO REMAIN IN PLACE DURING CONSTRUCTION. CONTRACTOR TO ENSURE THAT THEY ARE NOT DISTURBED AND IS RESPONSIBLE FOR ANY DAMAGE.

APPROXIMATE LOCATION OF EXISTING UNDERGROUND SANITARY SEWER SERVICE FORCE MAIN, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING TO THE PUMP STATION IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION BEFORE BEGINNING WORK. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

CONTRACTOR TO REMOVE AND REPLACE EXISTING DUMPSTER, PAD AND FENCE WHEN REMOVING AND REPLACING DOMESTIC WATER LINE, IF NECESSARY. CONTRACTOR TO FIELD VERIFY EXACT ROUTING OF EXISTING WATER LINE TO DETERMINE IF NECESSARY.

APPROXIMATE LOCATION OF EXISTING UNDERGROUND DUKE ENERGY ELECTRIC SERVICE LINE, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION WITH DUKE. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

APPROXIMATE LOCATION OF EXISTING UNDERGROUND PIEDMONT NATURAL GAS SERVICE LINE, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION WITH PIEDMONT. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

CONTRACTOR TO REMOVE EXISTING UNDERGROUND 1" DOMESTIC WATER SERVICE LINE UP TO THE EXISTING METER (NEAR STAUNTON BRIDGE ROAD) AND REPLACE WITH 2" DOMESTIC LINE (REFERENCE UTILITY PLAN). CONTRACTOR TO COORDINATE WATER LINE REPLACEMENT AT METER WITH GREENVILLE WATER. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING LINE.

LIMITS OF DISTURBANCE= ±3.60 ACRES

CONTRACTOR TO COORDINATE THE RELOCATION OF THE EXISTING UNDERGROUND PIEDMONT NATURAL GAS SERVICE LINE (CONTACT RICK HENDERSON AT 864-286-7867). PIEDMONT NATURAL GAS IS TO PERFORM THE WORK AFTER THE COORDINATION. CONTRACTOR TO COORDINATE THE EXACT UNDERGROUND PIPE TERMINUS AND METER LOCATION WITH THE HVAC CONTRACTOR BASED ON THE PROJECT HVAC DESIGN. ALSO, THE PIEDMONT NATURAL GAS PIPE AND METER SIZES SHOULD BE BASED ON THE PRESSURE AND DEMAND REQUIREMENTS AS SHOWN ON THE PROJECT HVAC DESIGN (BY OTHERS). LOCATION AND SIZE TO BE COORDINATED WITH PIEDMONT.

CONTRACTOR TO REMOVE EXISTING CONCRETE SIDEWALK.

CONTRACTOR TO COORDINATE THE RELOCATION OF THE EXISTING UNDERGROUND DUKE ENERGY ELECTRIC SERVICE LINE (CONTACT CODY THOMAS AT 864-234-4349). DUKE ENERGY IS TO PERFORM THE WORK AFTER THE COORDINATION. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF RELOCATION WITH DUKE ENERGY AND EXTEND TO EXISTING TRANSFORMER.

CONTRACTOR TO REMOVE EXISTING SANITARY SEWER CLEANOUT. REFERENCE UTILITY PLAN FOR CLEANOUT REPLACEMENT TO ENSURE THAT IT IS LOCATED OUTSIDE OF THE PROPOSED BUILDING SIDEWALK.

CONTRACTOR TO REMOVE EXISTING CURB AND GUTTER.

CONTRACTOR TO REMOVE EXISTING 12" STORM DRAIN BETWEEN BOXES AS SHOWN. REFERENCE GRADING PLAN. CONTRACTOR TO GROUT HOLES CLOSED WITH NON-SHRINK WATERPROOF GROUT ON BOTH BOXES AND ENSURE A WATERTIGHT FINISH.

CONTRACTOR TO REMOVE EXISTING UNDERGROUND 6" FIRE SERVICE LINE UP TO THE EXISTING BUILDING AND RELOCATE FIRE SERVICE PER UTILITY PLAN. CONTRACTOR TO COORDINATE FIRE LINE REPLACEMENT WITH PARKER SEWER/FIRE DISTRICT. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING FIRE LINE AND REMOVE PER FIELD CONDITIONS.

CONTRACTOR TO REMOVE PORTION OF EXISTING 18" STORM DRAIN AS SHOWN. REFERENCE GRADING PLAN.

CONTRACTOR TO CLEAR AND GRUB WITHIN LIMITS OF DISTURBANCE. THERE IS TO BE NO CLEARING OUTSIDE THE LIMITS OF DISTURBANCE.

CONTRACTOR TO REMOVE AND RELOCATE EXISTING SPRINKLER VALVES. CONTRACTOR TO COORDINATE WITH OWNER/LANDSCAPE CONSULTANT. (LANDSCAPE DESIGN BY OTHERS).

EXISTING DUKE ENERGY OVERHEAD TRANSMISSION LINES

EXISTING 68' WIDE DUKE ENERGY TRANSMISSION EASEMENT

EXISTING 18" OUTLET PIPE FROM RISER

CONTRACTOR TO REMOVE EXISTING RIP RAP AT PIPE OUTLET AS SHOWN. REFERENCE GRADING PLAN.

CONTRACTOR TO REMOVE AND RELOCATE EXISTING UNDERGROUND SANITARY SEWER SERVICE FORCE MAIN PER UTILITY PLAN. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING MAIN AND REMOVE PER FIELD CONDITIONS.

APPROXIMATE LOCATION OF EXISTING UNDERGROUND CHARTER CABLE SERVICE LINE, PER AS-BUILT SURVEY FROM ORIGINAL REC. CENTER (THE AS-BUILT ROUTING IS APPROXIMATE AND NOT LOCATED ON TOPOGRAPHIC SURVEY). CONTRACTOR TO FIELD VERIFY EXACT LOCATION WITH CHARTER. (APPROXIMATELY DRAWN PER AS-BUILT FROM ORIGINAL REC CENTER, REVIEWED BY GREENVILLE COUNTY ON MAY 1, 2012).

CONTRACTOR TO COORDINATE THE RELOCATION OF THE PORTION OF EXISTING UNDERGROUND CHARTER CABLE SERVICE LINE (CONTACT SHAUN SHEARER AT 864-347-0455). CHARTER IS TO PERFORM THE WORK AFTER THE COORDINATION. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF NECESSARY RELOCATION WITH CHARTER BASED ON POND RETROFITTING.

EXISTING STORM WATER MANAGEMENT POND AND POND RISER STRUCTURE TO BE RETROFITTED (REFERENCE GRADING PLAN AND STORM WATER MANAGEMENT POND DETAIL SHEET).

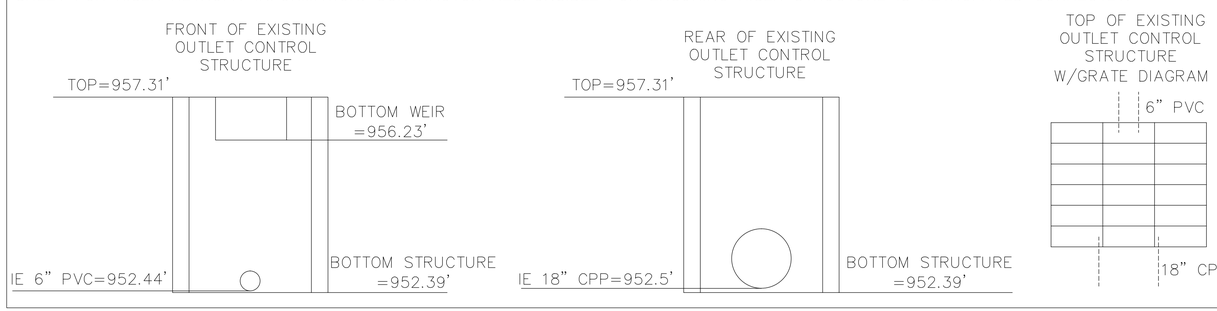
POWER, GAS AND CABLE RELOCATION NOTE:

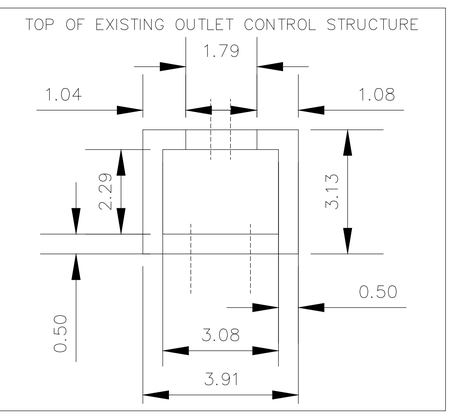
CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION REQUIRED FOR THE RELOCATION OF THE EXISTING UNDERGROUND POWER LINES (DUKE ENERGY), GAS LINES (PIEDMONT NATURAL GAS) AND CABLE LINES (CHARTER CABLE), AS SHOWN ON THE PLAN. AFTER ALL APPLICABLE COORDINATION BY THE CONTRACTOR, THE OWNER WILL CONTRACT DIRECTLY WITH EACH APPLICABLE UTILITY PROVIDER FOR COSTS ASSOCIATED WITH THE REQUIRED RELOCATION WORK.

EXISTING STORM WATER MANAGEMENT POND RISER STRUCTURE DETAIL (PER SURVEY)

NOT TO SCALE

NOTE: THE EXISTING RISER STRUCTURE WILL BE RETROFITTED FOR THIS PROJECT. REFERENCE STORM WATER MANAGEMENT POND DETAIL SHEET FOR RISER RETROFIT INFORMATION. CONTRACTOR RESPONSIBLE FOR ENSURING RISER STRUCTURE IS RETROFITTED CORRECTLY.





UTILITY LOCATION NOTE:

CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES BEFORE ANY WORK IS STARTED. SWA MAKES NO WARRANTY OF THE ACCURACY OF THE LOCATION OF THE EXISTING UTILITIES AS SHOWN ON THIS DRAWING.

DEMOLITION LEGEND

EXISTING SITE FEATURE/UTILITY TO BE REMOVED

UTILITY DEMOLITION NOTE:

CONTRACTOR TO COORDINATE WITH APPROPRIATE UTILITY COMPANY BEFORE DEMOLITION OF ANY UTILITY LINES.

DEMOLITION NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF DAMAGED ITEMS NOT TO BE DEMOLISHED DURING CONSTRUCTION ACTIVITIES.
2. DO NOT DISTURB EXISTING UTILITIES TO REMAIN IN SERVICE.
3. ALL DEMOLITION DEBRIS IS TO BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE CITY, COUNTY, STATE, AND FEDERAL REGULATIONS.

NORTH

0' 30' 60' 90'
GRAPHIC SCALE: 1" = 30'

Know what's below. Call before you dig.

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SWA SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

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0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
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CHECKED BY: JB

EXISTING CONDITIONS AND DEMOLITION PLAN

C3

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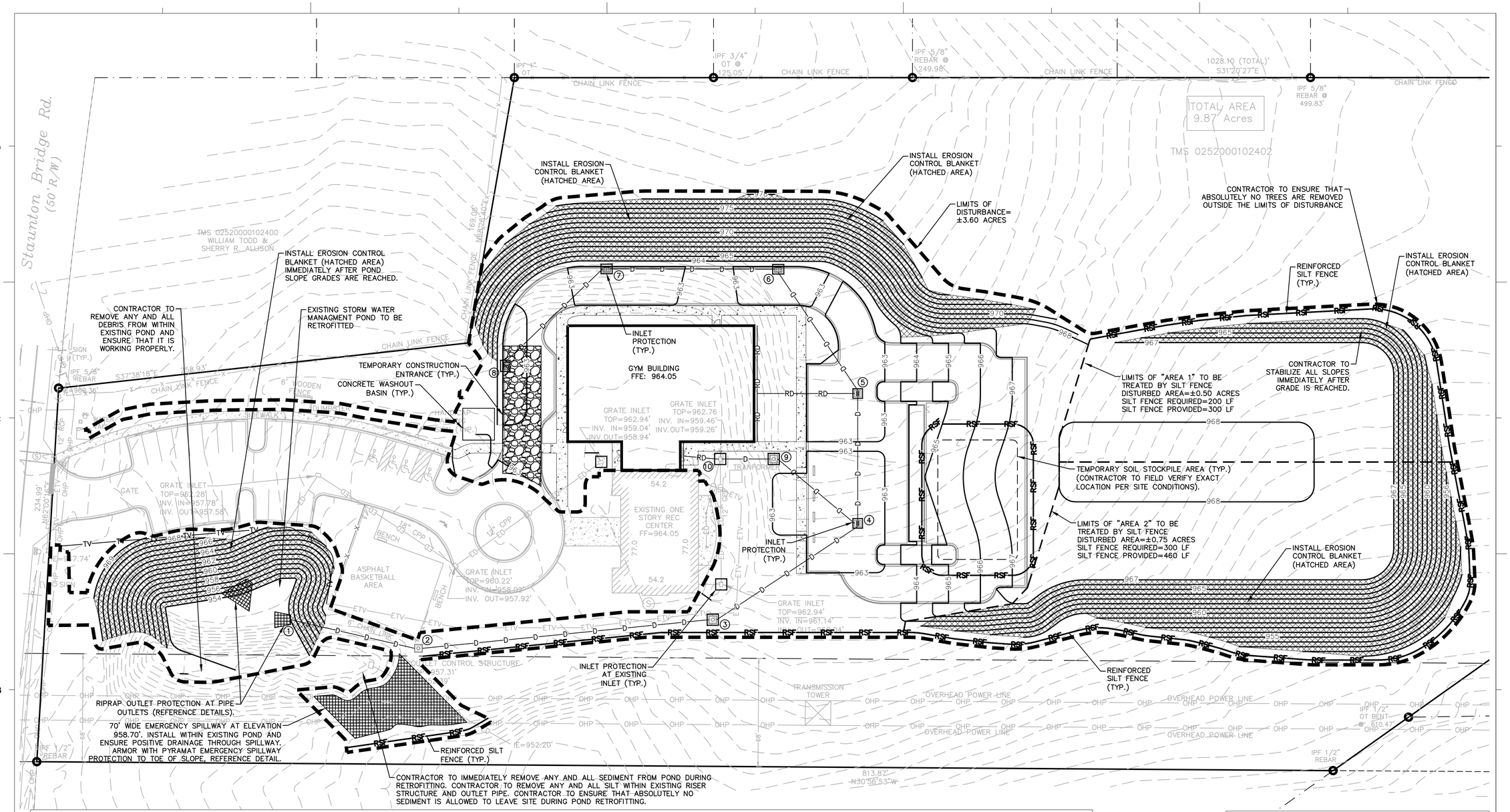

EROSION AND SEDIMENT CONTROL SEQUENCE OF CONSTRUCTION:

1. OBTAIN ALL NECESSARY PERMITS AND APPROVAL FROM GREENVILLE COUNTY/SCDHEC. AFTER RECEIVING PLAN AND PERMIT APPROVAL, SCHEDULE AN ONSITE PRE-CONSTRUCTION MEETING WITH THE ENGINEER, OWNER, CONTRACTOR, AND GREENVILLE COUNTY/SCDHEC INSPECTOR BEFORE ANY MOBILIZATION OR WORK IS PERFORMED.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT BASIN. CONTRACTOR TO COORDINATE LOCATION OF THE CONCRETE WASHOUT BASIN, AS NECESSARY.
3. INSTALL REINFORCED SILT FENCE, AS SHOWN. CLEAR AND GRUB VEGETATION AS NEEDED TO INSTALL SILT FENCE. DO NOT REMOVE VEGETATION OR TREES OUTSIDE OF THE LIMITS OF DISTURBANCE.
4. AFTER INSTALLATION OF REINFORCED SILT FENCE, CONTRACTOR IS TO COORDINATE WITH GREENVILLE COUNTY/SCDHEC INSPECTOR TO VERIFY PROPER PHASE SEQUENCE HAS BEEN ACCOMPLISHED. CONTRACTOR IS NOT TO CONTINUE WORK UNTIL PHASE SEQUENCE COORDINATION HAS BEEN VERIFIED BY GREENVILLE COUNTY.
5. BEGIN DEMOLITION ACTIVITIES PER THE DEMOLITION PLAN. CONTRACTOR TO REMOVE ALL DEMOLITION ITEMS FROM THE SITE PER ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
6. INSTALL TOPSOIL STOCKPILE AREA, PER DETAIL. CONTRACTOR TO COORDINATE EXACT LOCATION AS SITE CONDITIONS ALLOW.
7. BEFORE SITE MASS GRADING BEGINS, CONTRACTOR IS TO RETROFIT THE EXISTING STORM WATER MANAGEMENT POND, PER THE GRADING PLAN. THE EXISTING POND RISER STRUCTURE IS TO BE RETROFITTED AS REQUIRED. ALL POND SLOPES ARE TO BE STABILIZED IMMEDIATELY AFTER REACHING FINAL GRADE. REMOVE SEDIMENT IMMEDIATELY.
8. BEGIN MASS GRADING OPERATIONS FOR THE PROJECT SITE. THE CONTRACTOR IS TO MAINTAIN ALL REINFORCED SILT FENCE DURING ALL MASS GRADING OPERATIONS.
9. AS GRADING ALLOWS, INSTALL STORM DRAIN SYSTEM. INSTALL INLET PROTECTION AT EACH INLET IMMEDIATELY AFTER INSTALLATION. CONTRACTOR TO ENSURE THAT RUNOFF IS DIRECTED TOWARDS THE STORM DRAIN INLETS, PER THE PLAN. CONTRACTOR TO ENSURE SEDIMENT IS NOT ALLOWED TO ENTER THE STORM DRAIN PIPES. IF SEDIMENT IS ENCOUNTERED, CONTRACTOR IS TO REMOVE IMMEDIATELY. INSTALL RIPRAP OUTLET PROTECTION AT EACH STORM DRAIN OUTLET INTO POND.
10. INSTALL REMAINING SITE UTILITIES AS GRADING ALLOWS, PER THE UTILITY PLAN.
11. CONTINUE GRADING SITE AS NEEDED TO ACHIEVE FINAL GRADES FOR BUILDING PAD, PARKING LOT, AND DRIVEWAYS. INSTALL TEMPORARY SEEDING ON ALL DENUDED AREAS.
12. CURB AND GUTTER THE DRIVEWAYS AND PARKING LOT, PER THE PLAN. BEGIN PAVING OPERATIONS.
13. INSTALL PERMANENT SEEDING ON THE SITE. INSTALL LANDSCAPING PER LANDSCAPE PLAN (BY OTHERS, COORDINATE WITH THE OWNER).
14. CONTACT ENGINEER TO BEING CLOSE OUT PROCEDURES FOR THE PROJECT NO LATER THAN 30 DAYS BEFORE PROJECT COMPLETION. SET UP INITIAL CLOSE OUT INSPECTION WITH THE ENGINEER AND GREENVILLE COUNTY/SCDHEC INSPECTOR.
15. COMPLETE CORRECTION LIST FROM INITIAL CLOSE OUT INSPECTION. SCHEDULE FINAL CLOSE OUT INSPECTION.
16. REMOVE (FLUSH) ALL SEDIMENT FROM STORM DRAIN PIPES AND STRUCTURES, AS NECESSARY.
17. REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES ONCE SITE IS COMPLETELY STABILIZED, PER INSPECTOR APPROVAL.
18. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF THE RETROFITTED STORM WATER MANAGEMENT POND TO THE ENGINEER TO ENSURE THE INSTALLATION MEETS THE ORIGINAL DESIGN.
19. PERFORM GENERAL CLEANUP OF THE SITE.
20. SUBMIT NOTICE OF TERMINATION TO SCDHEC AFTER SITE STABILIZATION HAS BEEN OBTAINED.

PYRAMAT OUTLET AND EMERGENCY SPILLWAY PROTECTION NOTE:

CONTRACTOR IS RESPONSIBLE FOR ENSURING THE REQUIRED VEGETATIVE (GRASS) COVER THROUGH THE PYRAMAT PROTECTION HAS GROWN BEFORE THE LAND DISTURBANCE PERMIT CAN BE CLOSED (REFERENCE PYRAMAT MANUFACTURER SPECIFICATIONS FOR PLANTING INFORMATION).

NOTE: CONTRACTOR TO TOP DRESS FINAL 4" TO FINISH GRADE WITH CLEAN SCREENED TOPSOIL PRIOR TO PERMANENT SEEDING IN ALL VEGETATED AREAS.

EROSION CONTROL BLANKET LEGEND:

INSTALL EROSION CONTROL BLANKET ON SLOPES

SURFACE TRACKING NOTE:

CONTRACTOR TO TRACK ALL SLOPES AFTER INSTALLATION. REFERENCE SURFACE TRACKING DETAIL.

DRAINAGE NOTE:

CONTRACTOR TO ENSURE POSITIVE DRAINAGE IN ALL AREAS (INCLUDING AROUND EXISTING COMMUNITY CENTER BUILDING AND PARKING).

NORTH

GRAPHIC SCALE: 1" = 30'

Know what's below. Call before you dig.

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

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EROSION AND SEDIMENT CONTROL PLAN

C4

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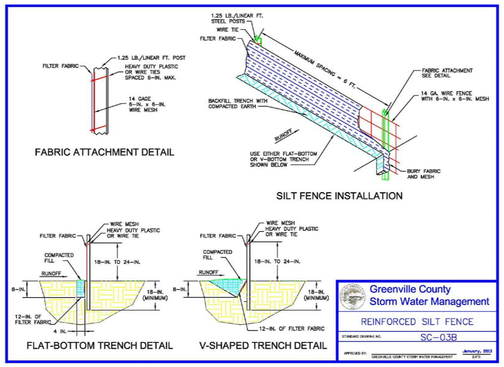

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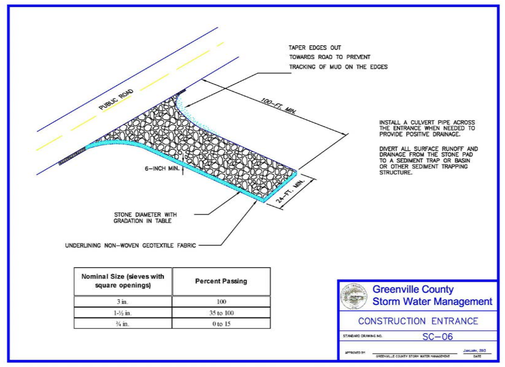
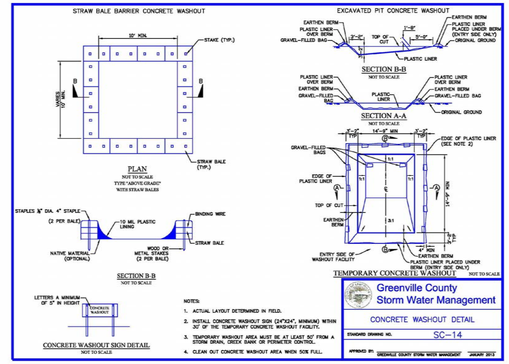
1 REINFORCED SILT FENCE



Nominal Size (sieves with square openings)	Percent Passing
3 in.	100
1-½ in.	35 to 100
¾ in.	0 to 15

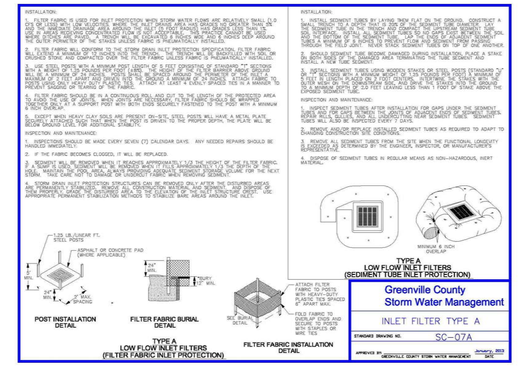
(NOT TO SCALE)

2 TEMPORARY CONSTRUCTION ENTRANCE



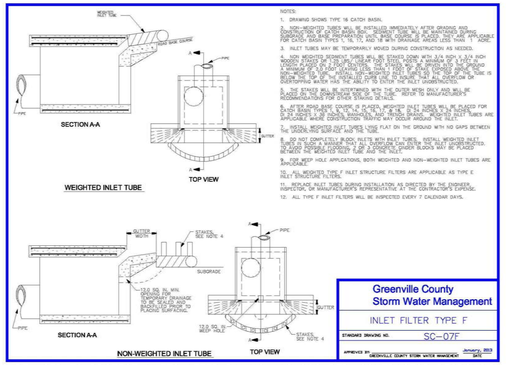
(NOT TO SCALE)

3 CONCRETE WASHOUT BASIN DETAIL



(NOT TO SCALE)

4 INLET FILTER TYPE A (FOR BEFORE PAVING)



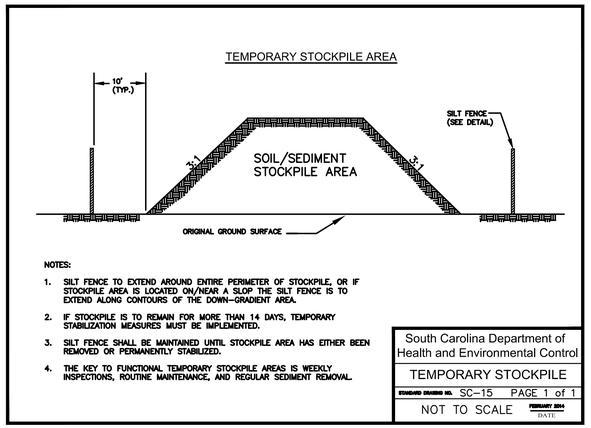
TO BE USED TO PROTECT INLETS AFTER PAVING HAS OCCURED. CONTRACTOR RESPONSIBLE FOR INSTALLATION AT PROPER TIME DURING CONSTRUCTION.

(NOT TO SCALE)

5 INLET FILTER TYPE F (FOR AFTER PAVING)

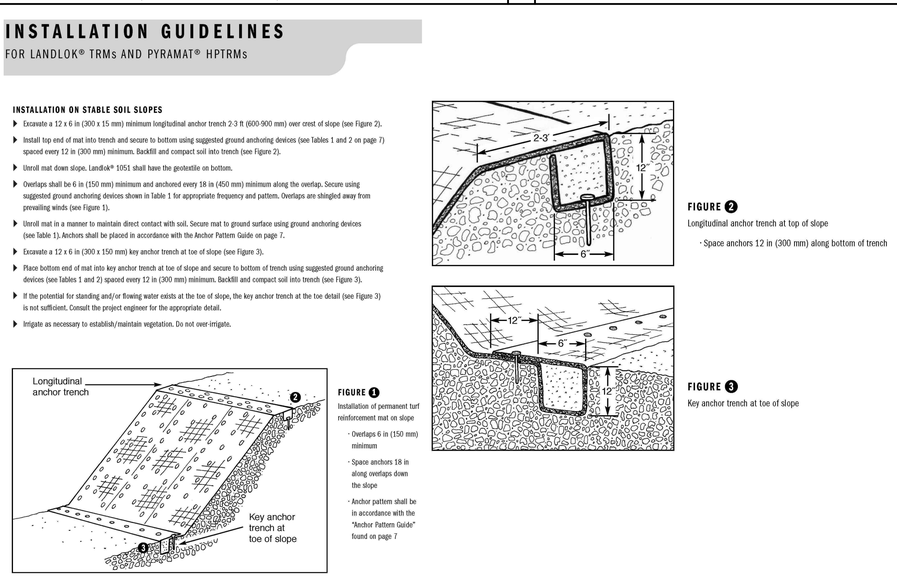
(NOT TO SCALE)

6 TRACKING DETAIL



(NOT TO SCALE)

7 TEMPORARY SOIL STOCKPILE

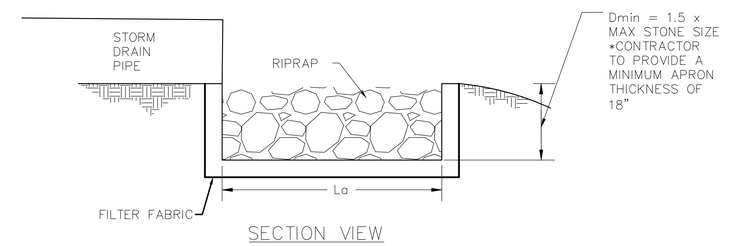


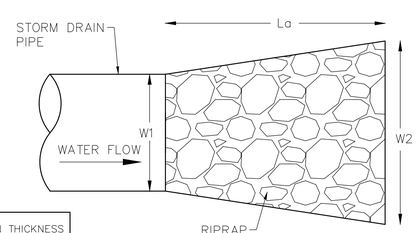
(NOT TO SCALE)

8 TYPICAL PYRAMAT INSTALLATION (FOR EMERGENCY SPILLWAY)

NOTES:

1. THE APRON SHALL BE CONSTRUCTED WITH NO SLOPE ALONG ITS LENGTH (0.0% GRADE). THE INVERT ELEVATION OF THE DOWNSTREAM END OF THE APRON SHALL BE NEARLY EQUAL TO THE ELEVATION OF THE INVERT OF THE RECEIVING CHANNEL. THERE SHALL BE NO OVERFALL AT THE END OF THE APRON.
2. IF THE PIPE DISCHARGES INTO A WELL-DEFINED CHANNEL, THE SIDE SLOPES OF THE CHANNEL SHALL NOT BE STEEPER THAN 2:1.
3. THE APRON SHALL BE LOCATED SO THAT THERE ARE NO BENDS IN THE HORIZONTAL ALIGNMENT.
4. GEOTEXTILES SHALL BE USED AS A SEPARATOR BETWEEN THE GRADED STONE, THE SOIL BASE, AND THE ABUTMENTS. THE GEOTEXTILE SHALL BE SPECIFIED IN ACCORDANCE WITH AASHTO M288-96 SECTION 7.5 PERMANENT EROSION CONTROL RECOMMENDATIONS. THE GEOTEXTILE SHALL BE PLACED IMMEDIATELY ADJACENT TO THE SUBGRADE WITHOUT ANY VOIDS.
5. ENSURE THAT THE SUBGRADE FOR THE FILTER FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING UNDISTURBED MATERIAL.
6. GEOTEXTILE MUST MEET DESIGN REQUIREMENTS AND BE PROPERLY PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION. REPAIR ANY DAMAGE BY REMOVING THE RIVER ROCK AND PLACING ANOTHER PIECE OF FILTER FABRIC OVER THE DAMAGED AREA. ALL CONNECTING JOINTS SHALL OVERLAP A MINIMUM OF 1 FT. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER FABRIC.
7. IMMEDIATELY AFTER CONSTRUCTION, STABILIZE ALL DISTURBED AREAS WITH VEGEATION.





RIPRAP APRON DIMENSIONS

OUTFALL	PIPE SIZE (IN)	APRON LENGTH (La)	APRON WIDTH (W1)	APRON WIDTH (W2)	AVERAGE STONE DIAMETER (d50)	APRON THICKNESS (Dmin)
DISCHARGE AT 1 (INVERT DOWN INTO RETROFITTED POND)	24"	10'	6'	10'	6"	18"
DISCHARGE AT EXISTING PIPE (CUT PER DEMO PLAN) INTO RETROFITTED POND)	18"	16'	4.5'	20.5'	6"	18"

(NOT TO SCALE)

9 RIPRAP OUTLET PROTECTION AT OUTLETS INTO POND

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GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SEAMONWHITESIDE

LS3P

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SOUTH CAROLINA SEAMON, WHITESIDE & ASSOCIATES, INC. No. C00472 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 26165 JOSEPH W. BRYANT, JR.

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EROSION AND SEDIMENT CONTROL DETAILS

C5

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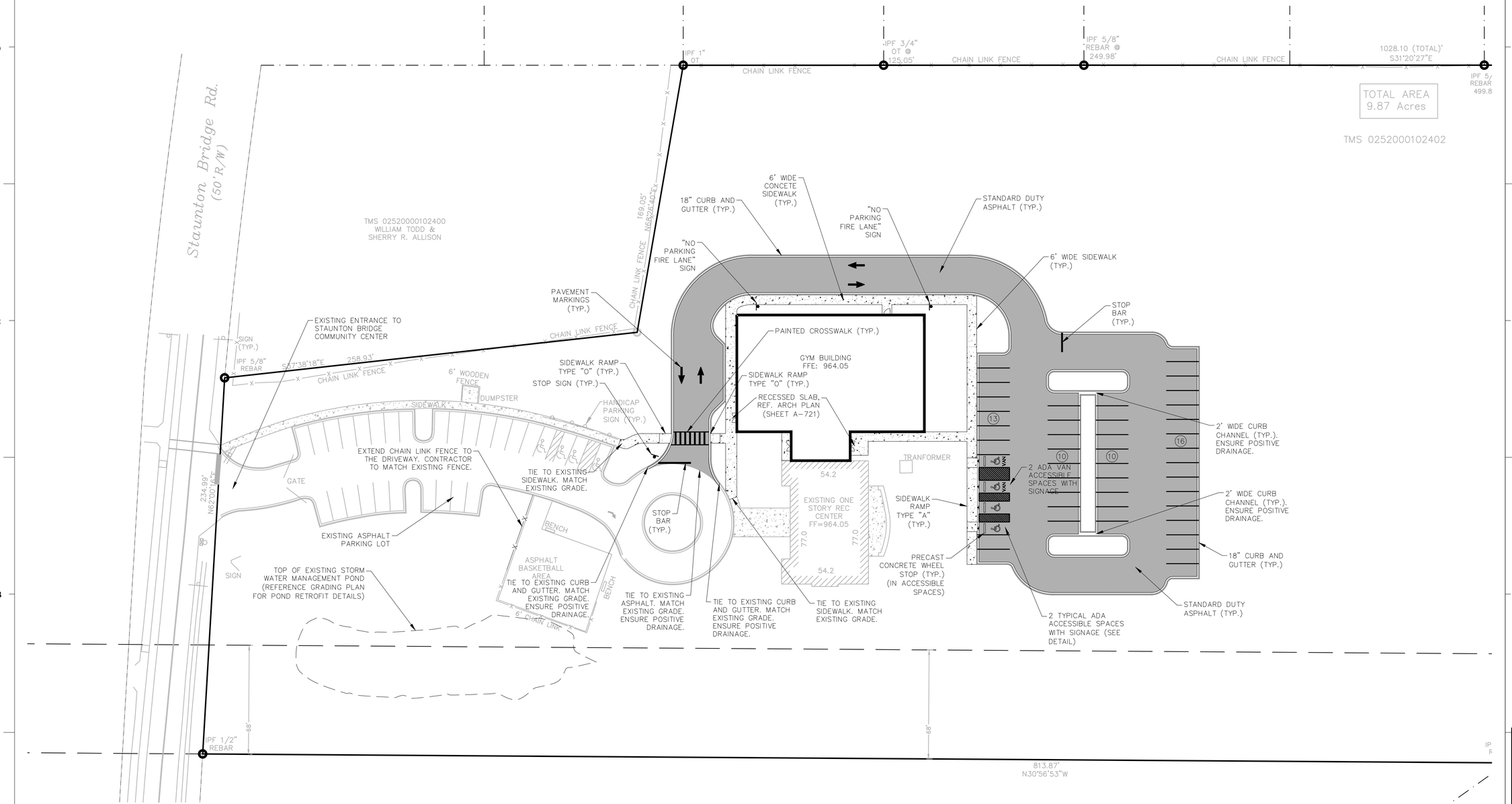

PROPOSED PARKING TABLE

STANDARD SPACES PROPOSED:	45 SPACES
ACCESSIBLE SPACES PROPOSED:	4 SPACES
TOTAL SPACES PROPOSED:	49 SPACES

NOTES: THIS ONLY ACCOUNTS FOR THE PROPOSED PARKING LOCATED TO THE EAST (BEHIND) OF THE PROPOSED GYM BUILDING. THIS TABLE DOES NOT INCLUDE THE EXISTING PARKING IN FRONT OF THE EXISTING COMMUNITY CENTER.

CONTRACTOR TO ENSURE THAT CURB AND GUTTERS ARE NOT PAINTED WITH STRIPING PAINT.

PARKING SPACE LEGEND

NUMBER OF PROPOSED PARKING SPACES IN A ROW (10)

PAVEMENT LEGEND

STANDARD DUTY ASPHALT PAVEMENT

CONCRETE SIDEWALK

NORTH

0' 30' 60' 90'

GRAPHIC SCALE: 1" = 30'

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STAUNTON BRIDGE CC ADDITION

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SITE PLAN

C6

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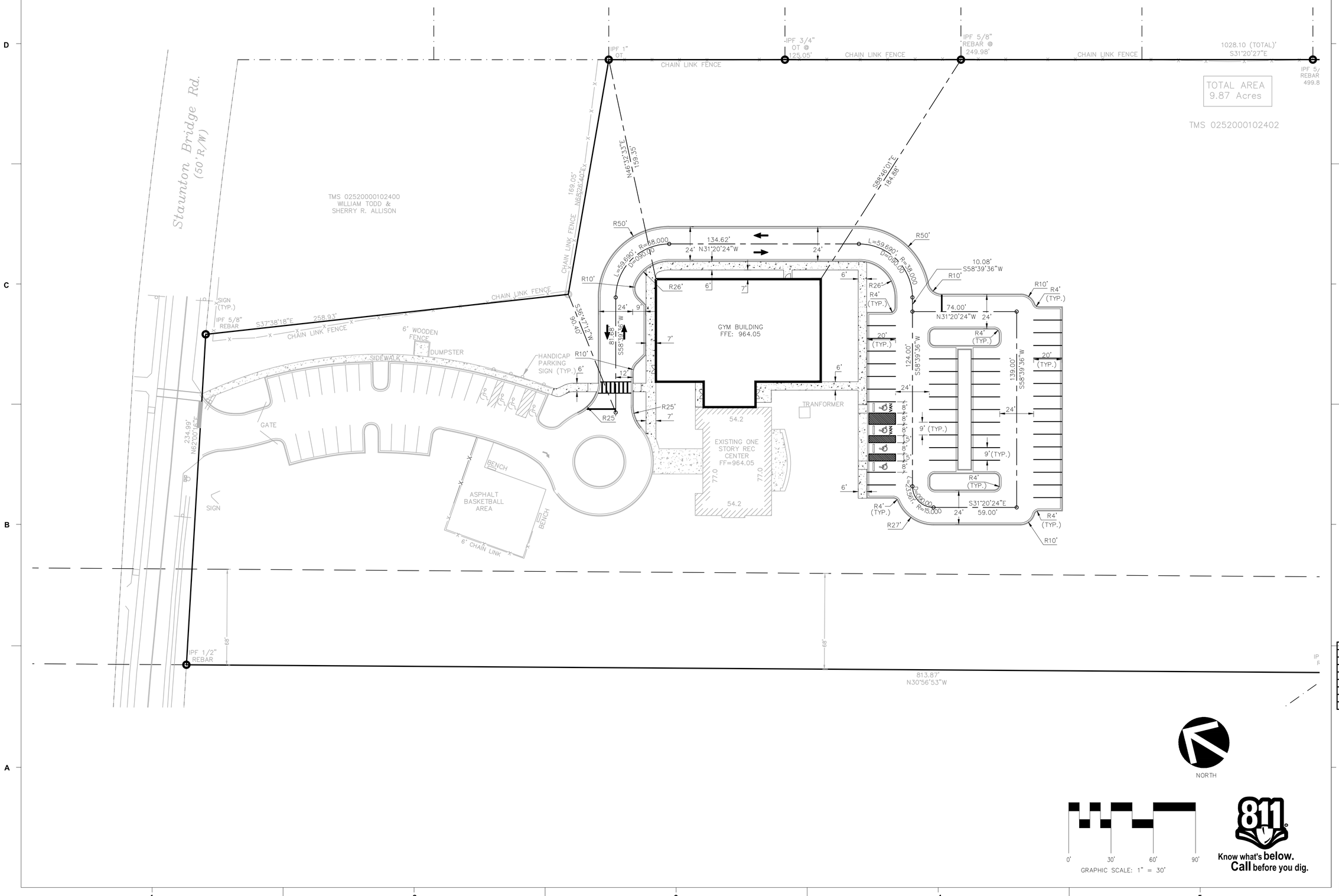

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STAUNTON BRIDGE CC ADDITION

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SOUTH CAROLINA
SEAMON, WHITESIDE & ASSOCIATES, INC.
No. C00472
CERTIFICATE OF AUTHORIZATION

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LICENSED PROFESSIONAL ENGINEER
No. 20155
JOSEPH W. BRYANT, JR.

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811 Know what's below. Call before you dig.

LAYOUT PLAN

C7

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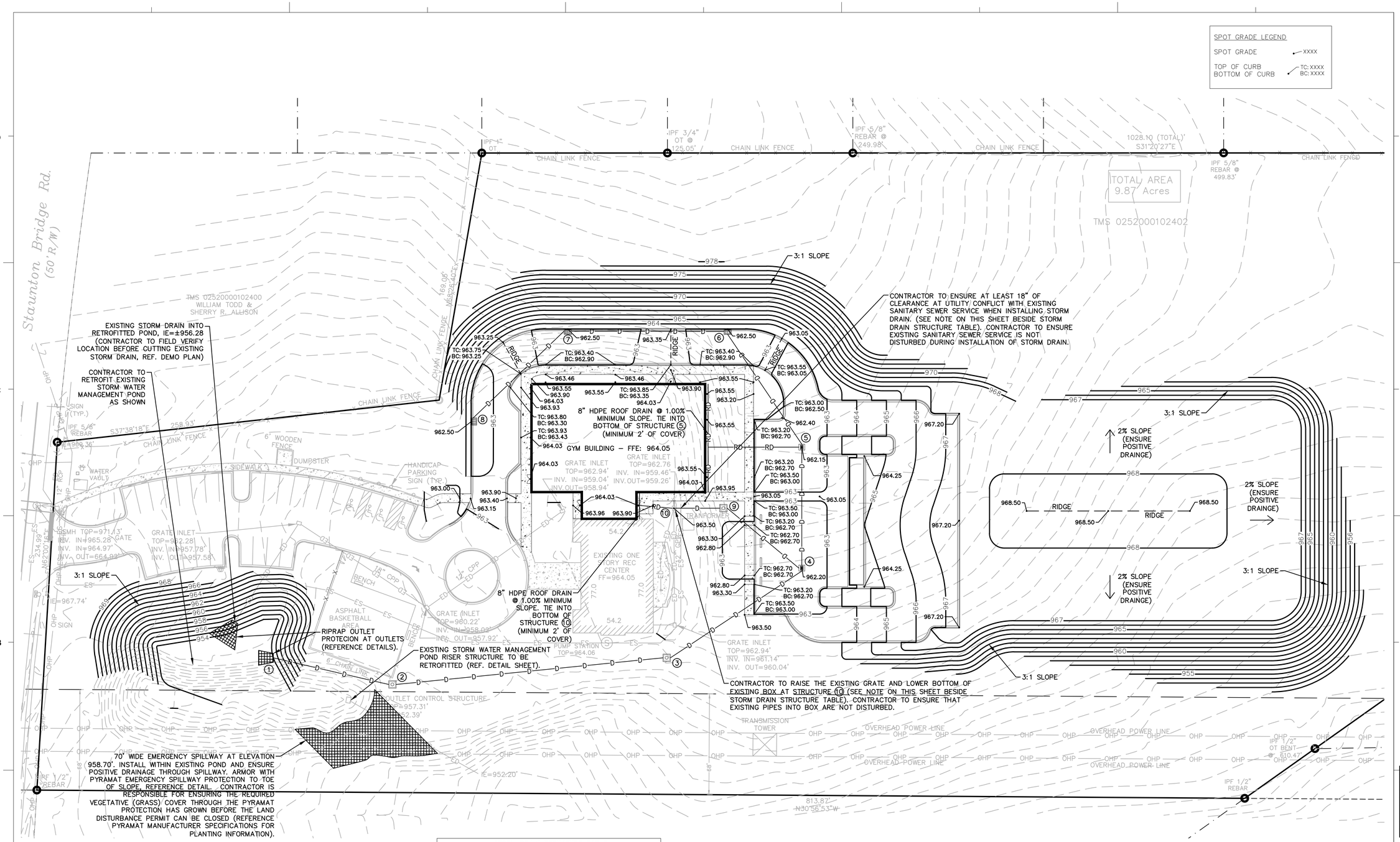

STORM DRAIN SCHEDULE						
STRUCTURES	SIZE	LENGTH	TYPE	SLOPE	I.E. DOWN	I.E. UP
1 TO 2	24"	80'	HDPE	0.59%	954.00	954.47
2 TO 3	24"	181'	HDPE	0.70%	954.57	955.84
3 TO 4	24"	106'	HDPE	0.70%	955.94	956.68
4 TO 5	24"	78'	HDPE	0.70%	956.78	957.33
5 TO 6	18"	89'	HDPE	0.70%	957.43	958.05
6 TO 7	18"	103'	HDPE	0.70%	958.15	958.87
7 TO 8	18"	85'	HDPE	0.62%	958.97	959.50
4 TO 9	15"	63'	HDPE	0.50%	956.78	957.10
9 TO 10	12"	30'	HDPE	0.50%	957.20	957.35

STORM DRAIN STRUCTURE TABLE		
STRUCTURE	TYPE	GRATE INLET ELEVATION
1	POND OUTLET	----
2	JUNCTION BOX	961.00
3	JUNCTION BOX	963.00
4	CATCH BASIN	962.20
5	CATCH BASIN	962.15
6	CURB INLET	962.50
7	CURB INLET	962.50
8	CURB INLET	962.50
9	JUNCTION BOX	963.80
10	EXISTING GRATE INLET	***963.50

**CONTRACTOR TO RAISE THE TOP OF STRUCTURE 10 TO ELEVATION 963.50 (EXISTING GRATE INLET) PER BUILDING ADDITION (ENSURE POSITIVE DRAINAGE TO THE GRATE IN ALL DIRECTIONS). CONTRACTOR TO ALSO LOWER THE BOTTOM OF STRUCTURE 10 TO ELEVATION 957.35. CONTRACTOR TO ENSURE THAT LOWERING THE BOTTOM OF THIS BOX PROVIDES AT LEAST 18" OF CLEARANCE BETWEEN THE TOP OF 12" HDPE STORM DRAIN (BETWEEN STRUCTURES 9 AND 10) AND THE BOTTOM OF THE EXISTING SANITARY SEWER SERVICE NEAR STRUCTURE 10. CONTRACTOR TO NOTIFY THE ENGINEER WITH ANY DISCREPANCIES.

NOTE: ALL STORM DRAINAGE IS TO BE FITTED WITH WATERTIGHT JOINTS.

ROOF DRAIN NOTE:
PROVIDE MANUFACTURED ADAPTER, BY GUTTER SYSTEM PROVIDER, TO CONNECT DOWNSPOUT TO UNDERGROUND ROOF DRAIN PIPE. PROVIDE MANUFACTURERS DATA SHEET FOR APPROVAL BEFORE INSTALLATION.

SEE ARCH ROOF PLAN (SHEET A-151), BY OTHERS, FOR DOWNSPOUT AND SCUPPER LOCATIONS. TIE INTO UNDERGROUND ROOF DRAINS SHOWN ON THIS PLAN, AS SHOWN.

NORTH

0' 30' 60' 90'
GRAPHIC SCALE: 1" = 30'

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GREENVILLE COUNTY RECREATION DISTRICT

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GRADING AND DRAINAGE PLAN

C8

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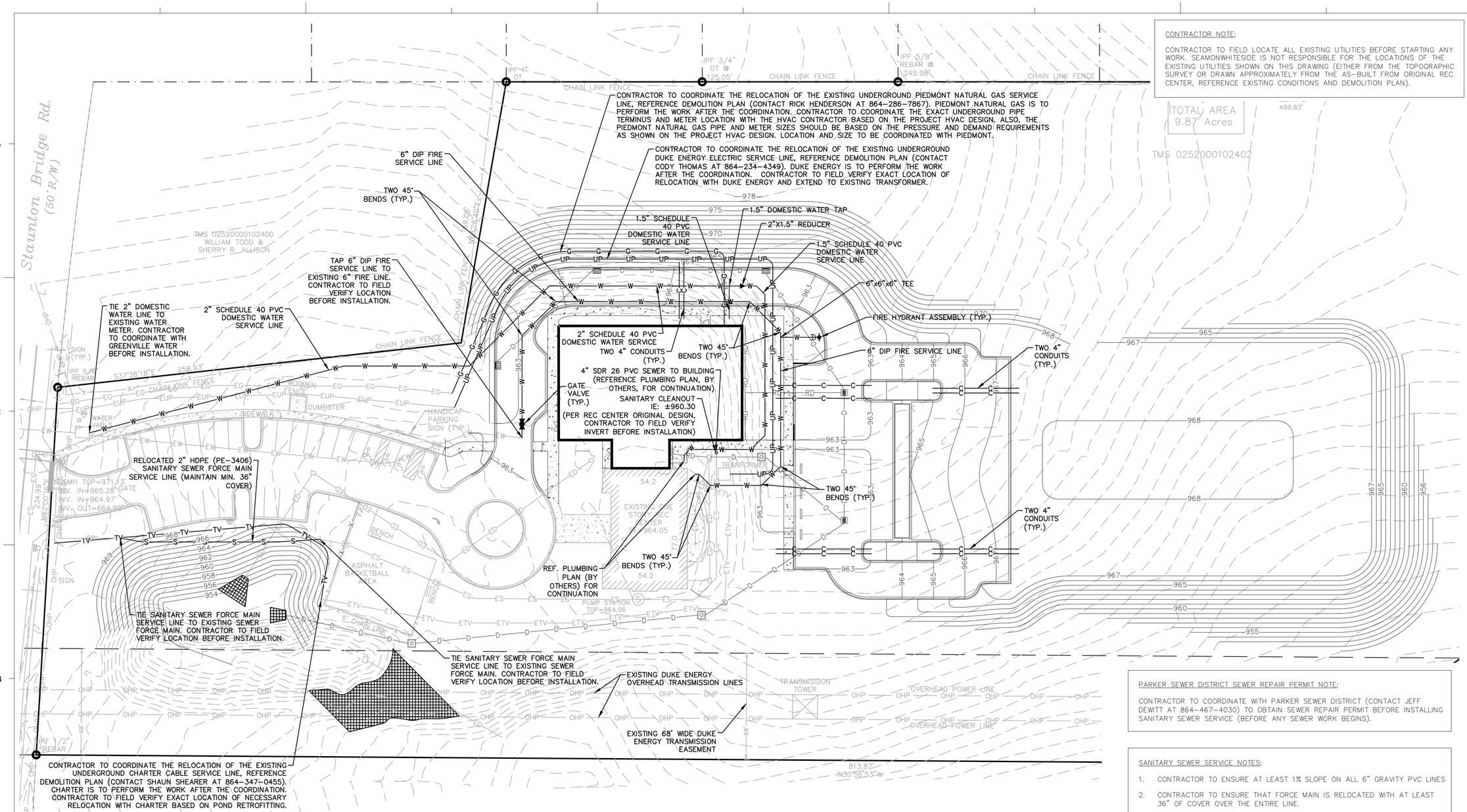

CONTRACTOR NOTE:

CONTRACTOR TO FIELD LOCATE ALL EXISTING UTILITIES BEFORE STARTING ANY WORK. SEAMONWHITESIDE IS NOT RESPONSIBLE FOR THE LOCATIONS OF THE EXISTING UTILITIES SHOWN ON THIS DRAWING (EITHER FROM THE TOPOGRAPHIC SURVEY OR DRAWN APPROXIMATELY FROM THE AS-BUILT FROM ORIGINAL REC CENTER, REFERENCE EXISTING CONDITIONS AND DEMOLITION PLAN).

PARKER SEWER DISTRICT SEWER REPAIR PERMIT NOTE:

CONTRACTOR TO COORDINATE WITH PARKER SEWER DISTRICT (CONTACT JEFF DEWITT AT 864-467-4030) TO OBTAIN SEWER REPAIR PERMIT BEFORE INSTALLING SANITARY SEWER SERVICE (BEFORE ANY SEWER WORK BEGINS).

SANITARY SEWER SERVICE NOTES:

1. CONTRACTOR TO ENSURE AT LEAST 1% SLOPE ON ALL 6" GRAVITY PVC LINES
2. CONTRACTOR TO ENSURE THAT FORCE MAIN IS RELOCATED WITH AT LEAST 36" OF COVER OVER THE ENTIRE LINE.
3. CONTRACTOR TO ENSURE THERE IS AT LEAST 18" OF VERTICAL SEPARATION BETWEEN SANITARY SEWER AND WATER LINE CONFLICTS.

PARKER FIRE DEPARTMENT NOTES:

1. WHEN INSTALLING THE FIRE LINE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE FOLLOWING WITH THE PARKER FIRE DEPARTMENT (CONTACT DEPUTY FIRE MARSHAL JASON NURMI AT 864-467-4006):

- PARKER FIRE DEPARTMENT MUST PERFORM A PRESSURE TEST FOR TWO HOURS AT 200 PSI
- PARKER FIRE DEPARTMENT MUST WITNESS A FLOW TEST
- PARKER FIRE DEPARTMENT MUST INSPECT ALL MATERIALS (THRUST BLOCKS, RODS, ETC.) INSTALLED UNDERGROUND BEFORE IT IS BACKFILLED.

DUKE ENERGY TRANSMISSION RIGHT OF WAY NOTES (FOR ALL WORK WITHIN THE EXISTING DUKE ENERGY TRANSMISSION EASEMENT):

1. THIS PLAN APPROVAL, BY DUKE ENERGY ASSET PROTECTION, SHALL EXPIRE ONE (1) YEAR FROM THE DATE OF THIS LETTER (DECEMBER 30, 2015). IF THE PROJECT HAS NOT COMMENCED BY DECEMBER 30, 2016, AN ADDITIONAL PLAN REVIEW WILL BE REQUIRED BY DUKE ENERGY ASSET PROTECTION AT THAT TIME.

2. CONTRACTORS OPERATING ANY AND ALL EQUIPMENT SHOULD BE INSTRUCTED NOT TO OPERATE WITHIN 25' OF THE POLES, TOWERS, OR OTHER ELECTRICAL STRUCTURES INCLUDING GUY ANCHORS. ALL SLOPES SHALL BE 4:1 OR LESS. NO SPOIL DIRT IS TO BE PLACED WITHIN THE RIGHTS OF WAY LIMITS UNLESS PREVIOUSLY APPROVED BY DUKE ENERGY.

3. ANY PROPOSED EASEMENTS MUST NOT CROSS CLOSER THAN 25' TO DUKE ENERGY'S ELECTRICAL STRUCTURES INCLUDING, BUT NOT LIMITED TO POLES, TOWERS AND GUY ANCHORS.

4. ALL UNDERGROUND FACILITIES, SUCH AS, BUT NOT LIMITED TO, STORM WATER PIPES AND DOMESTIC WATER LINE PIPES, MUST BE CAPABLE OF A HEAVY EQUIPMENT LOAD BEARING WEIGHT OF 80,000 LBS. DUKE ENERGY WILL NOT BE RESPONSIBLE FOR DAMAGES TO THESE INSTALLED FACILITIES.

5. ANY DAMAGE TO THE TRANSMISSION LINE OR ITS ASSOCIATED STRUCTURES, RELATED TO THIS PROJECT, AND/OR CLAIMS DUE TO THE DAMAGE, IS THE RESPONSIBILITY OF THE DEVELOPER/OWNER.

6. DUKE ENERGY DOES NOT OBJECT TO LOW GROWING SHRUBS AND GRASSES WITHIN THE "WIRE ZONE". TREE SPECIES ARE NOT ALLOWED WITHIN THE "WIRE ZONE". TREES THAT ARE APPROVED IN THE BORDER ZONE MAY NOT EXCEED, AT MATURITY, 15'. ANY VEGETATION THAT EXCEEDS 15' IN HEIGHT IS SUBJECT TO REMOVAL BY DUKE ENERGY. ADDITIONALLY, IRRIGATION SYSTEMS AND SIGNS ARE NOT PERMITTED.

7. LIGHTING WITHIN THE RIGHTS OF WAY LIMITS MUST BE APPROVED BY DUKE ENERGY BEFORE INSTALLING. DUE TO ENGINEERING STANDARDS, LIGHTING IS NOT ALLOWED IN THE "WIRE ZONE". WHERE LIGHTING IS APPROVED (BORDER ZONE), THE TOTAL HEIGHT MAY NOT EXCEED 15'.

8. IF THERE ARE DESIGN CHANGES TO ANY DRAWINGS THAT INVOLVE THE RIGHTS OF WAY, DUKE ENERGY REQUIRES A REVIEW OF THE CHANGES FOR COMPLIANCE.

9. PROPER CLEARANCES MUST BE MAINTAINED AT ALL TIMES. IF ANY TRANSMISSION LINE MODIFICATION BY DUKE ENERGY IS REQUIRED TO MAINTAIN PROPER CLEARANCES, THE COST WILL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER. ANY SUCH LINE MODIFICATIONS MUST BE APPROVED AND SCHEDULED, THROUGH DUKE ENERGY WELL IN ADVANCE OF THE PROJECT START DATE.

10. ALL CURRENT AND FUTURE PROPERTY OWNERS ARE REQUIRED TO ADHERE TO THE MOST CURRENT VERSION OF THE DUKE ENERGY RIGHTS OF WAY GUIDELINES AND RESTRICTIONS.

11. DUKE ENERGY HEAVY EQUIPMENT ACCESS MUST NOT BE RESTRICTED DURING CONSTRUCTION OF THIS PROJECT DUE TO GRADING OR OTHER ACTIVITY.

12. CONTACT STEVE PRYOR, ASSET PROTECTION ASSOCIATE, (PHONE: 864-948-5610) PRIOR TO THE START OF THIS PROJECT TO ATTEND ANY PRE-CONSTRUCTION MEETINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT MR. PRYOR IS CONTACTED BEFORE CONSTRUCTION BEGINS.

POWER, GAS AND CABLE RELOCATION NOTE:

CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION REQUIRED FOR THE RELOCATION OF THE EXISTING UNDERGROUND POWER LINES (DUKE ENERGY), GAS LINES (PIEDMONT NATURAL GAS) AND CABLE LINES (CHARTER CABLE), AS SHOWN ON THE PLAN. AFTER ALL APPLICABLE COORDINATION BY THE CONTRACTOR, THE OWNER WILL CONTRACT DIRECTLY WITH EACH APPLICABLE UTILITY PROVIDER FOR COSTS ASSOCIATED WITH THE REQUIRED RELOCATION WORK.

WATER LINE NOTES:

1. INSTALL THRUST BLOCKS AT ALL WATERLINE BENDS/TEES
2. CONTRACTOR TO MAINTAIN A MINIMUM OF 3 FEET OF COVER OVER ALL WATER LINES.
3. CONTRACTOR IS RESPONSIBLE FOR COORDINATING AND PERFORMING ALL WATER TESTING THAT IS REQUIRED BY GREENVILLE WATER AND SCDHEC BEFORE LINES ARE PUT INTO OPERATION.

NORTH

GRAPHIC SCALE: 1" = 30'

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STAUNTON BRIDGE CC ADDITION

SEAMONWHITESIDE

LS3P

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TEL. 864.235.0405 FAX 864.233.4027

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UTILITY PLAN

C9

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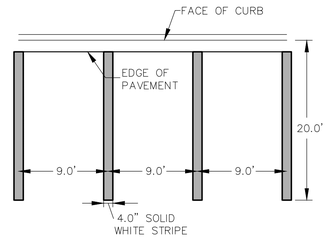

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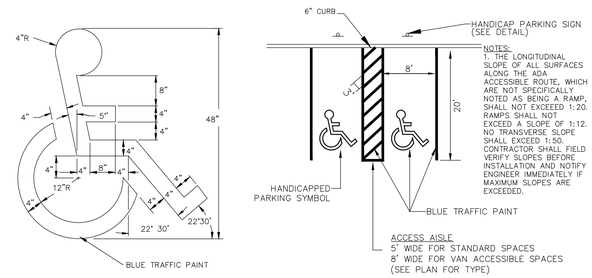
*ALL PROPOSED STRIPING TO BE TRAFFIC PAINT

1 TYPICAL PARKING STRIPING

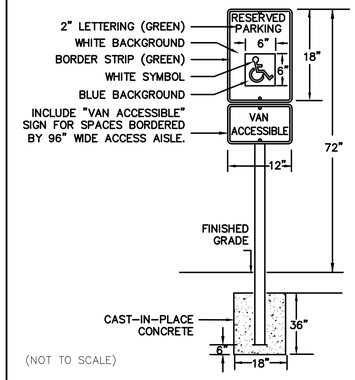


NOTES:
1. THE LONGITUDINAL SLOPE OF ALL SURFACES ALONG THE ADA ACCESSIBLE ROUTE, WHICH ARE NOT SPECIFICALLY NOTED AS BEING A RAMP, SHALL NOT EXCEEED 1:20. RAMPS SHALL NOT EXCEED A SLOPE OF 1:12. NO TRANSVERSE SLOPE SHALL EXCEED 1:50. CONTRACTOR SHALL FIELD VERIFY SLOPES BEFORE INSTALLATION AND NOTIFY ENGINEER IMMEDIATELY IF MAXIMUM SLOPES ARE EXCEEDED.

ACCESS AISLE
5' WIDE FOR STANDARD SPACES
8' WIDE FOR VAN ACCESSIBLE SPACES
(SEE PLAN FOR TYPE)

(NOT TO SCALE)

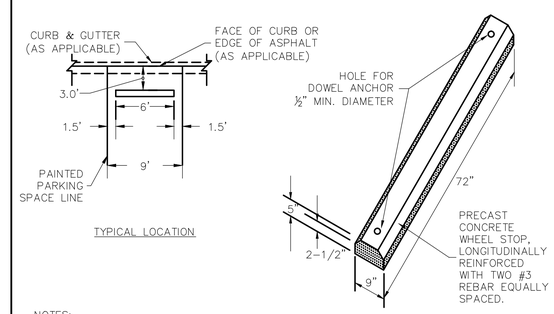
2 ADA PARKING STRIPING



NOTES:
1. SIGN SHALL BE 0.080" THICK ALUMINUM WITH APPLIED REFLECTIVE SHEETING IN ACCORDANCE WITH SCDOT STANDARD SPECIFICATIONS.
2. POST SHALL 2⅜" ø OR SQUARE GALVANIZED STEEL TUBE. FINISH TO BE DETERMINED.
3. CONTRACTOR TO WALL MOUNT SIGN WHERE SPECIFIED.

(NOT TO SCALE)

3 ADA PARKING SIGN

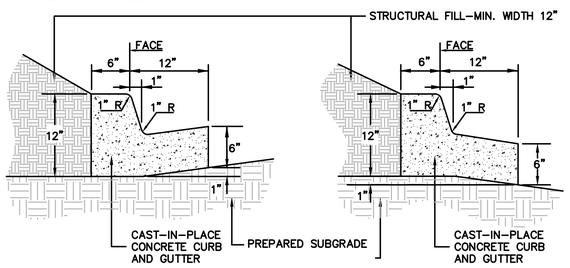


NOTES:
1. ANCHOR WITH 24" LONG GALVANIZED STEEL DOWELS DRIVEN INTO ANCHOR HOLES. DOWEL DIAMETER SHALL BE ⅛" SMALLER THAN ANCHOR HOLE.

(NOT TO SCALE)

4 PRECAST CONCRETE WHEEL STOP

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 30' INTERVALS. WHERE CURB IS ADJACENT TO CONCRETE WALK, JOINTS SHALL COINCIDE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

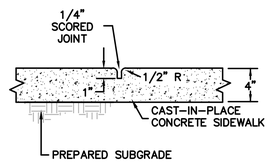


TYPICAL DOWNSLOPE SECTION

(NOT TO SCALE)

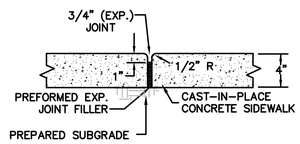
ALTERNATE UPSLOPE SECTION

5 18" STRAIGHT CURB AND GUTTER



CONTROL JOINT
(SEE NOTE #4)

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 30'. WHERE CURB IS ADJACENT TO CONCRETE WALK, JOINTS SHALL COINCIDE. SEE SPECIFICATIONS FOR ADDITIONAL INFO.



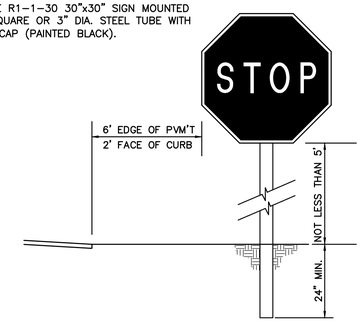
EXPANSION JOINT
(SEE NOTE #4)

(NOT TO SCALE)

6 CONCRETE SIDEWALK SECTION

BACKGROUND: RED – REFLECTORIZED
LEGEND AND BORDER: WHITE – REFLECTORIZED

USE TYPE R1-1-30 30"x30" SIGN MOUNTED ON 3" SQUARE OR 3" DIA. STEEL TUBE WITH WELDED CAP (PAINTED BLACK).



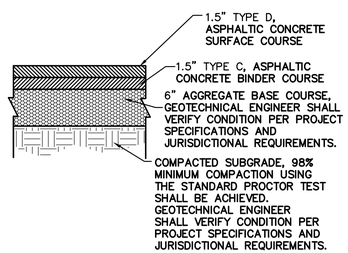
(NOT TO SCALE)

7 STOP SIGN

PAVING NOTES

SUBGRADE, BASE COURSE AND PAVEMENT CONSTRUCTION METHODS SHALL MEET THE MINIMUM REQUIREMENTS OF THE SCDOT "STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION", LATEST EDITION.

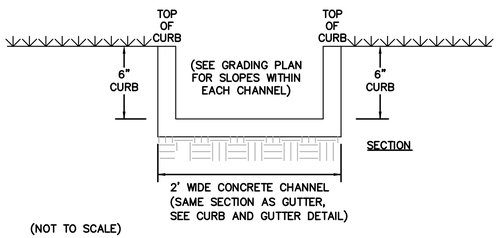
SWA, INC. MAKES NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE PERFORMANCE OF THE DEPICTED PAVEMENT SECTION DESIGN. REFER TO THE GEOTECHNICAL ENGINEER AND REPORT (SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION – PROPOSED STAUNTON BRIDGE COMMUNITY CENTER ADDITION (DATED FEBRUARY 3, 2016) AND THE ADDENDUM TO THE REPORT OF SUBSURFACE EXPLORATION (DATED FEBRUARY 22, 2016), BY EAS PROFESSIONALS, INC. FOR PAVEMENT DESIGN SECTIONS AND SPECIFICATIONS.



(NOT TO SCALE)

8 STANDARD DUTY ASPHALT PAVEMENT SECTION

NOTES:
1. CURB CHANNEL IS TO ALLOW STORM WATER DRAINAGE BETWEEN CURBED ISLANDS IN PARKING LOT.
2. CURB CHANNEL TO BE CONSTRUCTED TO THE SAME SPECIFICATIONS AS CONCRETE GUTTER.
3. SEE SITE PLAN FOR CHANNEL LOCATIONS AND PROPOSED ISLAND INFORMATION.



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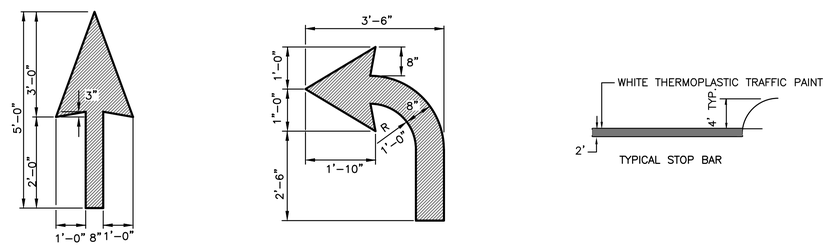
9 2' WIDE CURB CHANNEL

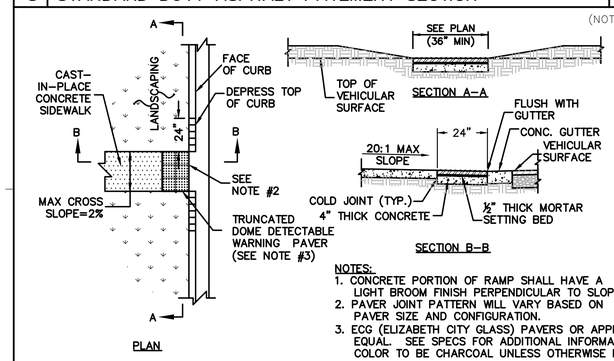


(NOT TO SCALE)

LOCATE AS DIRECTED BY ENGINEER OR ON PLANS

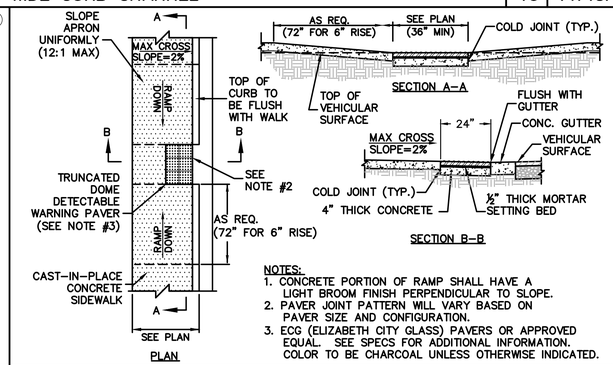
10 TYPICAL PAVEMENT MARKINGS

(NOT TO SCALE)



NOTES:
1. CONCRETE PORTION OF RAMP SHALL HAVE A LIGHT BROOM FINISH PERPENDICULAR TO SLOPE.
2. PAVER JOINT PATTERN WILL VARY BASED ON PAVER SIZE AND CONFIGURATION.
3. ECG (ELIZABETH CITY GLASS) PAVERS OR APPROVED EQUAL. SEE SPECS FOR ADDITIONAL INFORMATION. COLOR TO BE CHARCOAL UNLESS OTHERWISE INDICATED.

11 SIDEWALK RAMP – TYPE "O"



NOTES:
1. CONCRETE PORTION OF RAMP SHALL HAVE A LIGHT BROOM FINISH PERPENDICULAR TO SLOPE.
2. PAVER JOINT PATTERN WILL VARY BASED ON PAVER SIZE AND CONFIGURATION.
3. ECG (ELIZABETH CITY GLASS) PAVERS OR APPROVED EQUAL. SEE SPECS FOR ADDITIONAL INFORMATION. COLOR TO BE CHARCOAL UNLESS OTHERWISE INDICATED.

12 SIDEWALK RAMP – TYPE "A"

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SW SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA SEAMON, WHITESIDE & ASSOCIATES, INC. No. C00472 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 28155 JOSEPH W. BRYANT, JR.

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

SITE DETAILS

C10

[redacted]

PERMIT & CONSTRUCTION SET

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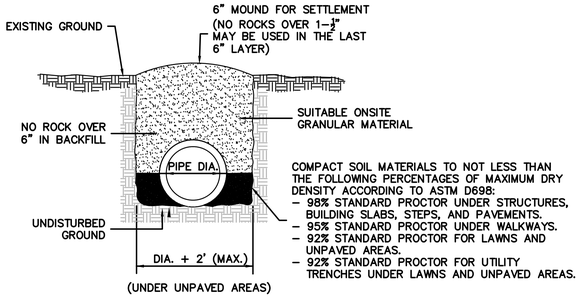
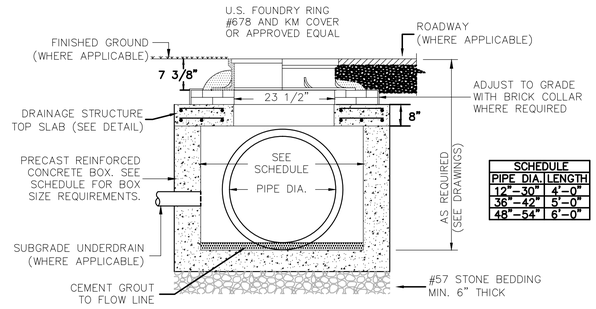


COMPACT SOIL MATERIALS TO NOT LESS THAN THE FOLLOWING PERCENTAGES OF MAXIMUM DRY DENSITY ACCORDING TO ASTM D698:
- 98% STANDARD PROCTOR UNDER STRUCTURES, BUILDING SLABS, STEPS, AND PAVEMENTS.
- 95% STANDARD PROCTOR UNDER WALKWAYS.
- 92% STANDARD PROCTOR FOR LAWNS AND UNPAVED AREAS.
- 92% STANDARD PROCTOR FOR UTILITY TRENCHES UNDER LAWNS AND UNPAVED AREAS.

NOTE:
1. ALL RCP PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C506.
2. ALL HDPE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D 2321.
3. IN-PLACE MATERIAL TESTING IS REQUIRED PRIOR TO FINAL APPROVAL. THE TESTING FREQUENCY SHALL BE THREE (3) EQUAL INCREMENTS BETWEEN JUNCTIONS FOR PIPE SECTIONS LONGER THAN 48 LF, AND ONCE FOR PIPE SECTIONS LESS THAN 48 LF.

(NOT TO SCALE)

1 | STORM DRAINAGE PIPE TRENCH

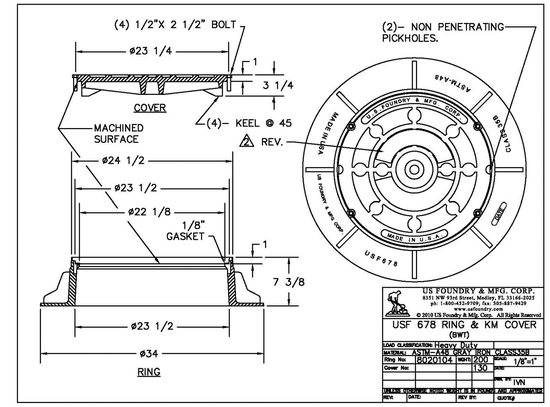


SCHEDULE	
PIPE DIA.	LENGTH
12"-30"	4'-0"
36"-42"	5'-0"
48"-54"	6'-0"

NOTES:
1. SEE REFERENCED SPECIFICATION SECTIONS FOR GENERAL, PRODUCT, AND EXECUTION REQUIREMENTS.
2. BRICK COLLAR SHALL BE COATED WITH 1/2" THICK MORTAR INSIDE AND OUTSIDE.

(NOT TO SCALE)

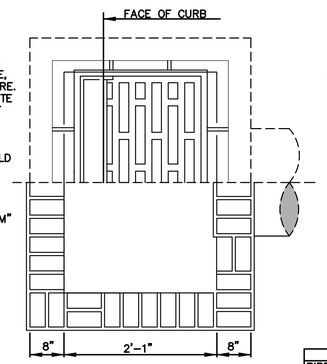
2 | JUNCTION BOX



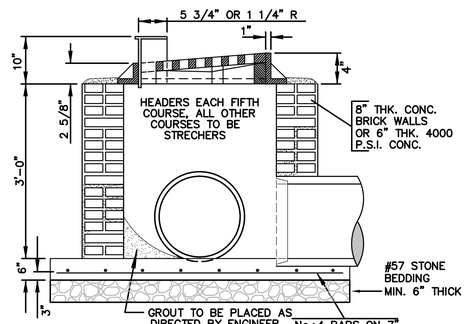
(NOT TO SCALE)

3 | JUNCTION BOX FRAME AND COVER

NOTES:
1. WHERE STRUCTURE DEPTH EXCEEDS 5'-0" FROM INVERT TO FINISHED GRADE, STEPS ARE TO BE PLACED IN STRUCTURE.
2. CASTING FOR THE FRAME AND GRATE TO BE US FOUNDRY & MFG. COPR. USF 5125 FRAME, HOOD & 6174 GRATE OR EQUAL.
3. CONCRETE SHALL BE 4000 P.S.I.
4. AN ACCEPTABLE ALTERNATIVE WOULD BE THE SCDOT TYPE 16 CATCH BASIN.
5. CATCH BASINS TO BE SCDOT STANDARDS.
6. CATCH BASINS TO BE MARKED WITH "DUMP NO WASTE – DRAINS TO STREAM" OR EQUIVALENT



PLAN & SECTION

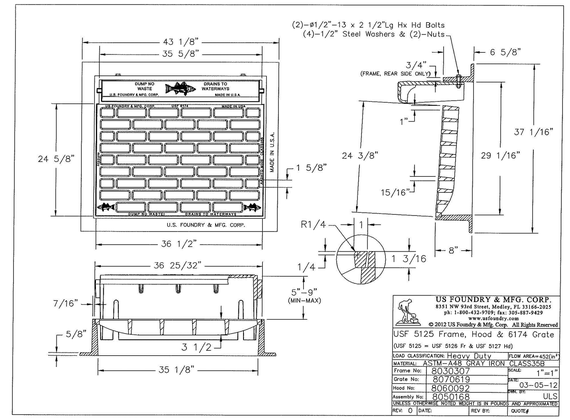


SCHEDULE	
PIPE DIA.	LENGTH
12"-30"	4'-0"
36"-42"	5'-0"
48"-54"	6'-0"

SECTION

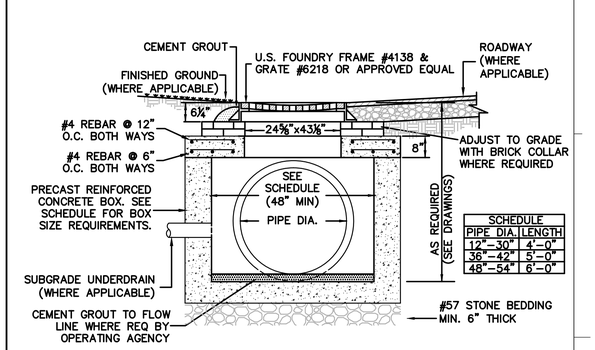
(NOT TO SCALE)

4 | CURB INLET



(NOT TO SCALE)

5 | FRAME, HOOD AND GRATE FOR CURB INLET

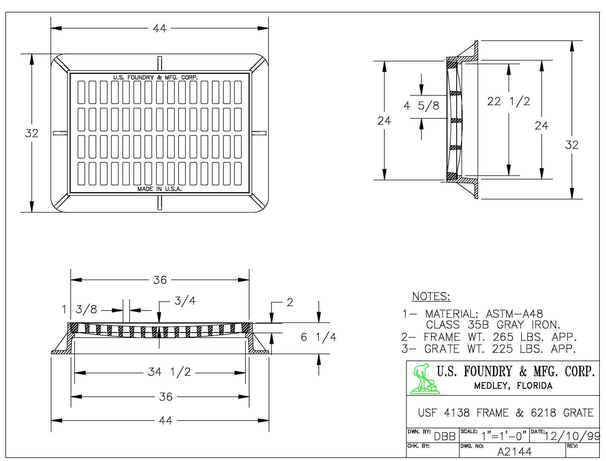


SCHEDULE	
PIPE DIA.	LENGTH
12"-30"	4'-0"
36"-42"	5'-0"
48"-54"	6'-0"

NOTES:
1. BRICK COLLAR SHALL BE COATED WITH 1/2" THICK MORTAR INSIDE AND OUTSIDE.

(NOT TO SCALE)

6 | CATCH BASIN



NOTES:
1- MATERIAL: ASTM-A48 CLASS 35B GRAY IRON.
2- FRAME WT. 265 LBS. APP.
3- GRATE WT. 225 LBS. APP.

U.S. FOUNDRY & MFG. CORP.
MEDLEY, FLORIDA
USF 4138 FRAME & 6218 GRATE
DWN. BY: DBB SCALE: 1"=1'-0" DATE: 12/10/99
CHK. BY: DWG. NO: A2144 REV#:

(NOT TO SCALE)

7 | FRAME AND GRATE FOR CATCH BASIN

EAS PROFESSIONALS

Recommended compaction criteria:

Location or Area	Standard Proctor Density, % ASTM D698 AASHTO T 99	Modified Proctor Density, % ASTM D1557 AASHTO T 180	Minimum Testing Frequency 1 lift per
Structures and Walkways	95	92	15,000 sf with max spacing of 150 feet
Retaining Walls	95	92	1,000 sf with max spacing of 100 feet
Trenches	95	92	100 lf on both sides of pipe and a min of one per reach of trench
Storm Drainage Manholes, Catch Basins and Storm Inlets	95	92	Structure (each successive test shall be 90 deg from previous)
Lawn or Unimproved Areas	92	90	20,000 sf with max spacing of 200 feet
Building and Pavement Subgrades (Top 18 inches)	100	95	10,000 sf with max spacing of 100 feet
Building and Pavement Subgrades (Below Top 18 inches)	95	92	15,000 sf with max spacing of 150 feet
Out-Parcels (Below Top 18 inches)	95	92	20,000 sf with max spacing of 200 feet

NOTES:
COMPACTION CRITERIA PER THE SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION–PROPOSED STAUNTON BRIDGE COMMUNITY CENTER ADDITION (DATED FEBRUARY 3, 2016), PREPARED BY EAS PROFESSIONALS, INC.

SWA, INC. MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE PERFORMANCE OF THE DEPICTED COMPACTION CRITERIA. REFERENCE THE GEOTECHNICAL REPORT.

CONTRACTOR TO COORDINATE WITH ONSITE GEOTECHNICAL ENGINEER.

8 | SITE COMPACTION CRITERIA (PER GEOTECHNICAL REPORT BY EAS PROFESSIONALS)

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SWA SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

DRAINAGE DETAILS

C11

PERMIT & CONSTRUCTION SET

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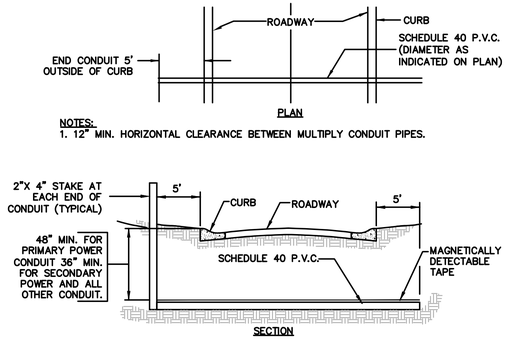
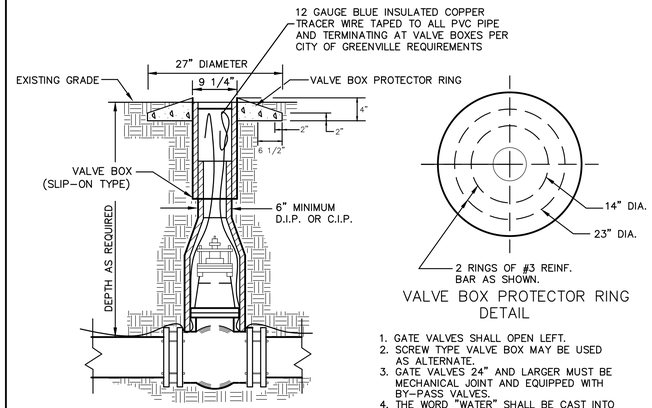


NOTES:
1. 12" MIN. HORIZONTAL CLEARANCE BETWEEN MULTIPLY CONDUIT PIPES.

(NOT TO SCALE)

1 CONDUIT ROADWAY CROSSING



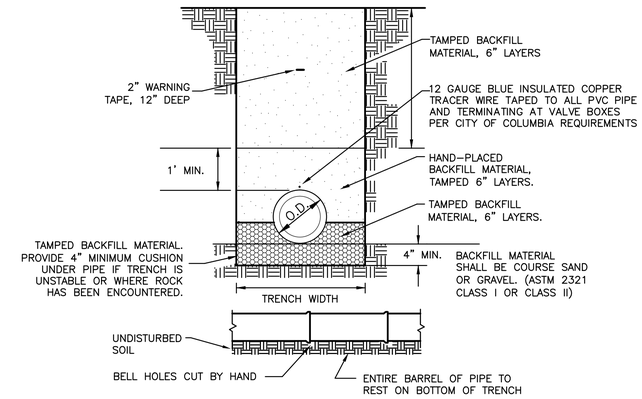
VALVE BOX PROTECTOR RING DETAIL

1. GATE VALVES SHALL OPEN LEFT.
2. SCREW TYPE VALVE BOX MAY BE USED AS ALTERNATE.
3. GATE VALVES 24" AND LARGER MUST BE MECHANICAL JOINT AND EQUIPPED WITH BY-PASS VALVES.
4. THE WORD "WATER" SHALL BE CAST INTO THE VALVE BOX COVER.
5. GATE VALVES SHALL NOT BE LOCATED WITHIN CURBS OR GUTTERS.

(NOT TO SCALE)

2 TYPICAL GATE VALVE BOX AND PROTECTOR RING

THIS PIPE IS TO BE BEDDED IN COMPACTED 6" LAYERS TO THE SPRING LINE FIRST, THEN BACKFILLED WITH HAND-PLACED MATERIAL COMPACTED IN 6" LAYERS TO A DEPTH OF 1' MINIMUM ABOVE THE PIPE.



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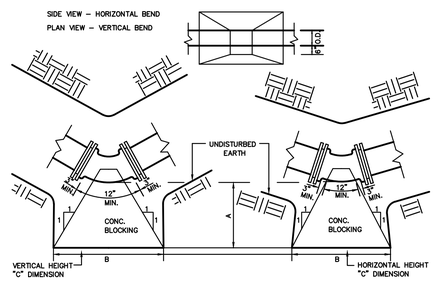
3 POTABLE WATER PIPE BEDDING

CONCRETE BLOCKING DMENSIONS					
PIPE SIZE	A	B	C	MBA *2 (SQ. FT.)	*1
(■ DENOTES BRANCH SIZE)			TEES		
■ 6"	2'-0"	2'-0"	1'-4"	2.7	0.13
■ 8"	2'-0"	2'-6"	1'-10"	4.6	0.20
■ 10"	2'-6"	3'-6"	2'-0"	7.0	0.39
■ 12"	2'-6"	4'-6"	2'-3"	10.1	0.54
			90° BENDS		
6"	2'-0"	2'-9"	1'-3"	3.4	0.16
8"	2'-0"	3'-3"	2'-0"	6.5	0.28
10"	2'-6"	4'-0"	2'-6"	10.0	0.53
12"	2'-6"	5'-0"	2'-9"	13.8	0.73
			45° BENDS		
6"	2'-0"	2'-0"	1'-0"	2.0	0.11
8"	2'-0"	2'-6"	1'-5"	3.5	0.17
10"	2'-0"	3'-6"	1'-6"	5.2	0.29
12"	2'-6"	4'-6"	1'-8"	7.5	0.40
			22.5° BENDS		
6"	2'-0"	1'-0"	1'-0"	1.0	0.08
8"	2'-0"	1'-9"	1'-0"	1.7	0.11
10"	2'-6"	2'-3"	1'-3"	2.8	0.19
12"	2'-6"	2'-6"	1'-6"	3.7	0.24
			11.25° BENDS		
6"	2'-0"	1'-0"	0'-6"	0.5	0.06
8"	2'-0"	1'-3"	0'-9"	0.9	0.08
10"	2'-6"	1'-6"	1'-0"	1.5	0.14
12"	2'-6"	2'-0"	1'-0"	2.0	0.17

*1 ESTIMATED C.Y. CONC. FOR TEES AND BENDS

*2 MINIMUM BEARING AREA (MBA) IS BASED ON SOIL BEARING CAPACITY OF 2000 PSF.

NOTES:
WHEN INSTALLING C900 PVC PIPE, ALL FITTINGS AND VALVES ARE TO BE INSTALLED WITH RETAINING GLANDS IN LIEU OF THRUST BLOCKS (MEGALUG BY EBAA IRON OR APPROVED EQUAL)

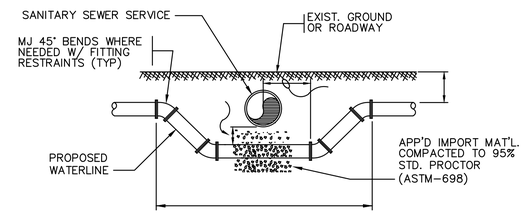


HORIZONTAL BLOCKING DETAIL VERTICAL BLOCKING DETAIL

(NOT TO SCALE)

4 THRUST BLOCKING AND SCHEDULE

ALTERNATE:
DEPRESS WATER LINE WHENEVER POSSIBLE TO ACCOMPLISH CLEARANCE W/O USING FITTINGS.



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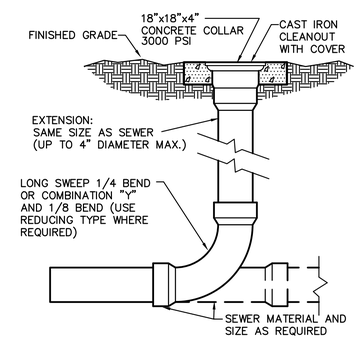
5 TYPICAL WATER/SEWER CROSSING DETAIL



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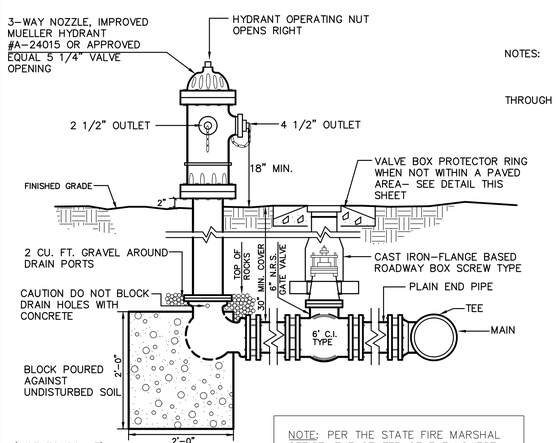
6 SEWER CLEANOUT

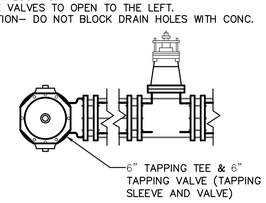


(NOT TO SCALE)

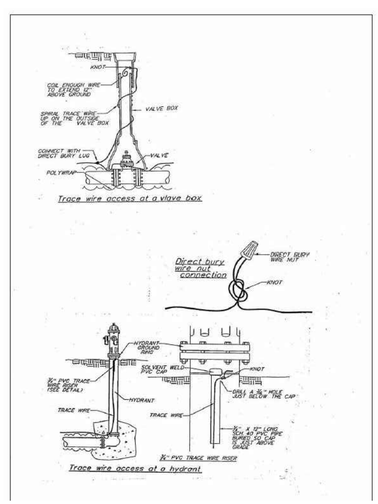
TYPICAL FIRE HYDRANT

NOTE: PER THE STATE FIRE MARSHAL OFFICE, THE CENTER OF THE LOWEST HYDRANT OUTLET SHALL BE A MINIMUM OF 18" ABOVE THE GROUND.

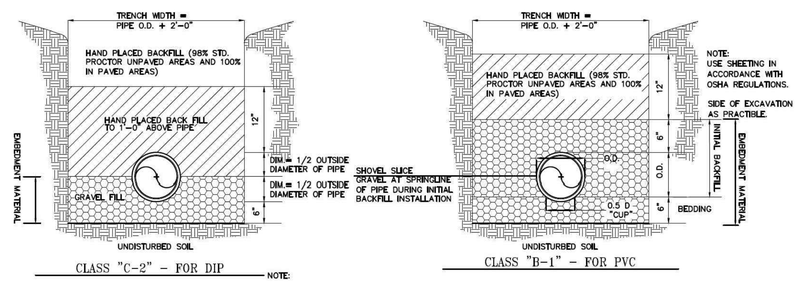
NOTES:
1. ALL JOINTS TO BE MECHANICAL.
2. HYDRANTS SHALL BE NO LESS THAN 3' NOR MORE THAN 6' FROM THE CURB OR THE EDGE OF A HARD SURFACE STREET OR ACCESS ROAD, EXCEPT THAT ALONG RURAL ROADS THROUGH UNDEVELOPED AREAS THE MAXIMUM DISTANCE MAY BE INCREASED TO 10'.
3. HYDRANT MUST BE LOCATED SO AS TO BE UNOBSTRUCTED FOR 15' EITHER SIDE AS MEASURED ALONG THE CURB OR THE OF A HARD SURFACE STREET OR ACCESS ROAD. THIS AREA MUST BE FREE OF GROWTH AND OTHER OBSTRUCTIONS WHICH WOULD HINDER ACCESS TO THE HYDRANT.
4. MINIMUM DISTANCE BETWEEN VALVE AND HYDRANT SHALL BE 3'.
5. BENDS MAY BE USED IN HYDRANT LEAD TO FACILITATE HYDRANT LOCATION.
6. GATE VALVES TO OPEN TO THE LEFT.
7. CAUTION– DO NOT BLOCK DRAIN HOLES WITH CONC.



7 TYPICAL FIRE HYDRANT ASSEMBLY



8 TRACER WIRE



NOTE:
1. EMBEDMENT STONE SHALL CONFORM TO NO. 57 WASHED STONE
2. REFER TO ASTM D2321 STANDARDS.
3. MAINTAIN GROUNDWATER LEVEL AT LEAST 1' BELOW THE BOTTOM OF THE STONE BEDDING AT ALL TIMES.

CLASS IB MATERIAL (ASTM D 2321)
CLASS II OR III MATERIAL(ASTM D 2321)

DETAIL OF PIPE EMBEDMENT FOR GRAVITY SEWER

9 SANITARY SEWER PIPE BEDDING

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SW SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

UTILTY DETAILS

C12

[redacted]

PERMIT & CONSTRUCTION SET

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1.0 Stabilization Introduction

This ***Stabilization Specification*** is developed to improve the success of seeding/stabilization efforts in Greenville County, South Carolina. It includes appropriate seed mixes and application rates for different seeding locations/applications and the appropriate planting dates. Following the recommendations of this *Specification* should reduce the number of times a site has to be re-seeded and the time it takes to achieve acceptable temporary and permanent stabilization. This *Specification* also includes recommendations for proper lime, fertilizer, biological growth stimulant, and soil amendment use to achieve site stabilization.

Construction General Permit Stabilization Requirement (Section 3.2.6 A.I.(a))

Initiate soil stabilization measures as soon as practicable whenever land-disturbing activities have been temporarily or permanently ceased, but in no case more than 14 days after land-disturbing activity in that portion of the construction site has temporarily or permanently ceased, except:

(i). Where snow cover or frozen ground conditions preclude stabilization by the 14th day, stabilization measures must be initiated as soon as practicable.

(ii). Where construction activity on a portion of the construction site is temporarily ceased, and earth-disturbing activities will be resumed within 14 days, temporary stabilization measures do not have to be initiated on that portion of the construction site.

1.1 Temporary Stabilization

Temporary stabilization is defined as a condition where exposed soils or disturbed areas are provided a temporary vegetative and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

The purpose of temporary stabilization is to reduce erosion and sedimentation by stabilizing disturbed areas that would otherwise lay bare for long periods of time before they are worked or stabilized. Temporary stabilization is also used where permanent cover is not necessary or appropriate.

Use temporary stabilization on exposed soil surfaces such as denuded areas, soil stockpiles, dikes, dams, banks of sediment basins, banks of sediment traps, and temporary road banks. Temporary stabilization has the potential to prevent or limit costly maintenance operations on other sediment control structures. Sediment clean-out requirements for sediment basins, sediment, traps and silt fence can be reduced if the drainage is stabilized where grading and construction operation are not taking place.

Initiate temporary stabilization by mulch or temporary stabilization by seeding within 7 calendar days where land disturbing activities have temporarily ceased on the Project and will not resume for a period exceeding 14 calendar days. Where land disturbing activities on a portion of the Project are temporarily ceased, and the land disturbing activities are resumed within 14 days, temporary stabilization measures are not required to be initiated on that portion of the Project.

Temporary stabilization by seeding is required if the Project will not be worked for a period longer than 60 days.

Initiate temporary stabilization measures as soon as practicable for areas where initiating temporary stabilization measures within 7 days is infeasible (e.g., where snow cover, frozen ground, or drought conditions preclude stabilization).

Do not use temporary stabilization by seeding when the ground is frozen and/or when the 10-day forecasted low temperature remains below 35 degrees Fahrenheit.

1.1.1 Acceptance of Temporary Stabilization

Before acceptance of temporary stabilization by the *regulatory agency* and the *Design Engineer or Landscape Architect*, temporary stabilization is required that is sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent seeding is to commence. A satisfactory

stand of temporary stabilization meeting the requirements of this *Specification* is required regardless of the time of the year the work is performed.

1.2 Permanent Stabilization

1.2.1 Final Stabilization

Final Stabilization

1. *Means that all land-disturbing activities at the construction site have been completed and that on all areas not covered by permanent structures, either*
   a. *A uniform (e.g., evenly distributed, without large bare areas) vegetative cover with a density of 70 percent of the natural background vegetative cover has been established excluding areas where no natural background vegetative cover is possible (e.g., on a beach), or*
   b. *Equivalent permanent stabilization measures (such as the use of landscaping mulch, riprap, pavement, and gravel) have been implemented to provide effective cover for exposed portions of the construction site not stabilized with vegetation.*
2. *For individual lots in residential construction, final stabilization means that either:*
   a. *The homebuilder has completed final stabilization as specified above; or*
   b. *The homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for, and benefits of, final stabilization.*
3. *For construction Projects on land used for agricultural purposes (e.g., pipelines across crop or range land, staging areas for highway construction, etc.), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to "Surface Waters of the State," and areas which are not being returned to their preconstruction agricultural use must meet the final stabilization criteria (1) or (2) above.*

1.2.2 Permanent Seeding

Initiate permanent seeding within 7 calendar days where land disturbing activities have permanently ceased on the Project. Where land disturbing activities are resumed within 14 days, stabilization measures are not required to be initiated on that portion of the Project. Initiate permanent seeding measures as soon as practicable for areas where initiating permanent seeding measures within 7 days is infeasible (e.g., where snow cover, frozen ground, or drought conditions preclude stabilization).

When performing permanent seeding for permanent detention ponds, ensure that the detention pond is cleaned of any deposited sediment and graded to the required permanent detention basin configuration. Ensure the seedbed for the permanent seeding is established in accordance with this *Specification*.

1.2.3 Acceptance of Permanent Seeding

Before acceptance of permanent seeding by the *regulatory agency* and the *Design Engineer or Landscape Architect*, a uniform permanent perennial vegetative cover with a density of 70% of each square yard of the seeded area is required. A well-developed root system must be established to sufficiently survive dry periods and winter weather and be capable of reestablishment in the spring.

Final stabilization of the site requires that it be covered by a 70 percent coverage rate. This does not mean that 30 percent of the site can remain bare. The coverage is defined as looking at a square yard of coverage, in which 70 percent of that square yard is covered with vegetation.

1.3 Permanent Ground Cover Plants

Initiate permanent ground cover plant applications within 7 calendar days where land disturbing activities have permanently ceased on the Project. Initiate permanent ground cover plant applications measures as soon as practicable for areas where initiating permanent ground cover plant applications within 7 days is infeasible (e.g., where snow cover, frozen ground, or drought conditions preclude stabilization). The use of native species is preferred when selecting vegetation.

1.3.1 Acceptance of Permanent Cover

Before acceptance of permanent cover by the *regulatory agency* and the *Design Engineer or Landscape Architect*, a uniform perennial vegetative cover with a density of 70% of each square yard of the area is required. A well-developed root system must be established to sufficiently survive dry periods and winter weather and be capable of reestablishment in the spring.

1.4 Sod

Initiate Sod applications within 7 calendar days where land disturbing activities have permanently ceased on the Project. Initiate Sod applications measures as soon as practicable for areas where initiating Sod applications within 7 days is infeasible (e.g., where snow cover, frozen ground, or drought conditions preclude stabilization). Use Sod on slopes less than 2H:1V.

1.4.1 Acceptance of Sod

The *Design Engineer or Landscape Architect* will inspect Sod applications for acceptance. Acceptance is contingent on establishing a satisfactory stand of perennial grass. Sod application areas are acceptable when all requirements including maintenance are met and a healthy, evenly colored, viable stand of grass is established. A satisfactory stand of grass must have a root system that is sufficient to survive dry periods and winter weather and is capable of re-establishing in the spring.

2.0 Seed

2.1 Seed Schedule

The *Design Engineer or Landscape Architect* will select a seeding plan utilizing the seeding schedules included in Appendix I or II for all temporary cover by seeding and permanent seeding applications.

2.2 Simplified Seeding Schedule

The *Design Engineer or Landscape Architect* will use the exact Simplified Seeding Schedule as listed in Appendix I for the specific seeding application/location and applicable planting date. Non Slope Areas are defined as areas flatter than a 4H:1V or areas with a grade less than 25%.

2.3. Detailed Seeding Schedule

The *Design Engineer or Landscape Architect* will use the Detailed Seeding Schedule as listed in Appendix II for the specific seeding application/location and applicable planting date. For details on mixes consult the Greenville Soil and Water Conservation District (864-467-2755, 108)

2.3.1 Non Slope Areas (areas flatter than a 4H:1V / areas with a grade less than 25%)

In accordance with Appendix II, specify a minimum of two (2) perennial seed types for all permanent seeding for Non Slope Areas based on the specific application and the availability of the seed. A minimum of one (1) of the seed types specified must be a turf-type species. When specifying two (2) perennial seed types, specify the primary

turf type species at the recommended rate shown and the additional perennial seed may be specified at a rate less than the recommended rate shown.

The *Design Engineer or Landscape Architect* must also specify a minimum of one (1) acceptable annual nurse crop species, or a mix of two (2) or more annual nurse crops species with one species specified at a minimum Nurse Crop rate of approximately 75% of the recommended rate shown and the other species specified at a Nurse Crop rate that does not exceed approximately 50% of the recommended rate shown.

In accordance with Appendix II, specify a minimum of one (1) annual seed type for all temporary cover by seeding for Non Slope Areas based on the specific application and the availability of the seed. Specify the annual seed type at the Temporary Cover rate shown.

2.3.2 Slopes

In accordance with Appendix II, specify a minimum of three (3) perennial seed types for all permanent seeding for Slope Areas based on the specific application and the availability of the seed. A minimum of one (1) of the seed types specified must be a turf-type species. When utilizing three (3) perennial seed types, specify the primary turf type species at the recommended rate shown and specify the additional perennial seeds at a rate less than the recommended rate shown.

The *Design Engineer or Landscape Architect* must also specify a minimum of one (1) acceptable annual nurse crop species, or a mix of two (2) or more annual nurse crops species with one species specified at a minimum rate of approximately 75% of the recommended rate shown and the other species specified at a rate that does not exceed approximately 50% of the recommended rate shown.

In accordance with Appendix II, specify a minimum of two (2) annual seed type for all temporary cover by seeding for Slope Areas based on the specific application and the availability of the seed.

2.3.3 Road Medians / Shoulders and Non Slope Utility Applications

In accordance with Appendix II, specify a minimum of one (1) perennial turf-type species and one (1) acceptable annual nurse crop species for road medians, road shoulders and Non Slope Utility applications. If a mix of two (2) or more annual nurse crops species is selected, specify one species at a minimum rate of approximately 75% of the recommended rate shown and specify the other species at a rate that does not exceed approximately 50% of the recommended rate shown.

2.4 Seed

Use seed that conforms to all state laws and all requirements and regulations of the South Carolina Department of Agriculture (SCDA). Seeds containing species designated by the State Crop Pest Commission as a plant pest (i.e., noxious weeds) are not permitted. Use seed that is individually packaged or bagged and tagged. Each tag must clearly state:

- Net weight
- Botanical name
- Common name
- Variety
- Grower name
- Grower lot number
- Percent purity
- Percent germination
- Percent other crop seed
- Percent inert matter
- Percent weed seed (if weed seed is present, provide a list of species by botanical name)
- Origin

When mixtures of different types of seed are called for in the seeding schedule, pre-blended mixtures that are individually packaged or bagged and tagged with the tag specifying the botanical and common name of each species contained in the blend, and the percentages of each species are preferred.

When pre-blended seed mixtures are not used, each species is weighed and mixed in the proper proportions on-site in the presence of the *Design Engineer or Landscape Architect* or *INSPECTOR* to verify the application.

When purchasing seed, it is important to observe the expiration date to avoid buying more than can be used before seed expiration.

3.0 Seeding Amendments

The soil pH value is a measure of soil acidity or alkalinity. Soil pH directly affects nutrient availability to the grass. The pH scale ranges from 0 to 14, with 7 as neutral. Numbers less than 7 indicate acidity while numbers greater than 7 indicate alkalinity.

The soil pH value directly affects nutrient availability to grasses and grass tends to grow best in slightly acidic soils (pH 5.8 to 6.5). Soil pH values above or below this range may result in less vigorous growth and nutrient deficiencies.

Nutrients for healthy grass growth are divided into three categories: primary, secondary and micronutrients. Nitrogen (N), phosphorus (P) and potassium (K) are primary nutrients which are needed in fairly large quantities compared to the other plant nutrients. Calcium (Ca), magnesium (Mg) and sulfur (S) are secondary nutrients which are required by the plant in lesser quantities but are no less essential for good plant growth than the primary nutrients. Zinc (Zn) and manganese (Mn) are micronutrients, which are required by the plant in very small amounts. Most secondary and micronutrient deficiencies are easily corrected by keeping the soil at the optimum pH value.

The major impact that extremes in pH have on plant growth is related to the availability of plant nutrients or the soil concentration of plant-toxic minerals. In highly acid soils, aluminum and manganese can become more available and more toxic to the plant. At low pH values, calcium, phosphorus and magnesium are less available to the plant. At pH values of 6.5 and above, phosphorus and most of the micronutrients become less available.

Reaching and maintaining a proper pH level is the most important step in establishing and maintaining a healthy stand of grass.

3.1 Lime

3.1.1 Agricultural Granular Lime

Use solid agricultural granular lime for all permanent seeding applications and Sodding applications that is agricultural grade, standard ground limestone. Ensure that each bag has a tag or label, or in the case of bulk sales, a delivery slip showing brand or trade name, calcium carbonate equivalent, percent by weight passing prescribed U. S. Standard Sieves, and other pertinent information to identify lime as being agricultural grade, standard ground limestone.

3.1.2 Applying Granular Lime

A soil analysis is recommended prior to agricultural granular lime applications. The soil analysis determines the need and rate of granular lime application for a given application area.

Following advance seedbed preparation, uniformly spread solid agricultural granular lime over the designated areas. Solid agricultural granular lime may be applied by approved mechanical spreaders or by hydraulic methods as a mixture of lime and seed. Thoroughly mix agricultural granular lime with the soil to a depth of approximately two (2) inches. Mixing is not required when spreading lime with hydraulic methods.

Apply all agricultural granular lime at a rate that is within **±10%** of the weight recommendation of the soil analysis. Do not apply more than 2,500 lbs/acre of agricultural lime in a single application.

Agricultural granular lime is not required for temporary seeding applications unless a soil analysis is requested by the regulatory agency and indicates a pH below 5.0.

3.1.3 Fast Acting Lime

Use fast acting liquid forms and/or dry forms of lime for all temporary seeding and permanent seeding applications that meet all of the requirements of agricultural grade granular lime specified herein, except percent by weight passing U.S. Standard Sieves.

3.1.4 Applying Fast Acting Lime

Fast acting liquid and dry lime provides an immediate pH adjustment. Apply fast acting liquid lime at a rate of 5 gallons per acre or per the manufacturer's recommendations. Apply fast acting dry lime at a rate of 100 pounds per acre or per the manufacturer's recommendations. Fast acting lime may be applied by approved mechanical spreaders or by hydraulic methods as a mixture with the seed.

3.2 Fertilizer

3.2.1 Granular Fertilizer

Use granular fertilizer for all permanent seeding applications and all Sodding applications. The proper fertilizer mixture is dependent on the existing soil conditions and it is recommended that a soil analysis be performed if the soil conditions are uncertain in the area of fertilizer application.

In a mixed fertilizer such as 10-10-10, the first number represents the percent of nitrogen required, the second number represents the percent of phosphorus, and the third number represents the percent of water soluble potassium in the fertilizer. **Use fertilizer that incorporates a minimum of 50% water insoluble (slow release) nitrogen. Animal by-product or municipal waste fertilizers are not acceptable under this *Specification*.**

Unless a soil analysis is performed to determine otherwise, a good rule of thumb granular fertilizer to apply in the Upstate of South Carolina is 10-10-10. In no case should a 20-20-20 fertilizer be used due to the potential burning of the seedbed.

3.2.2 Applying Granular Fertilizer

Fertilizer may be applied by approved mechanical spreaders or by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied with combination seed and fertilizer drills, no further incorporation is necessary. Apply the fertilizer and seed together when hydraulic methods of seeding are used.

Apply all fertilizer at a rate that is within **±10%** of the weight recommendation of the soil analysis. Apply fertilizer that is within **±2** percentage points of the recommendation of the soil analysis.

The required application of nitrogen includes a minimum of 50% water insoluble (slow release) nitrogen under this *Specification*.

3.3 Compost Soil Amendment

For seedbeds that have little or no topsoil, are highly acidic, or are lacking sufficient nutrients to sustain a health stand of grass, furnish, place, and mix certified weed free compost to a minimum depth of 3 inches into the seedbed in order to ensure a good stand of grass. Provide compost when seedbeds are excessively nutrient deficient to the extent of requiring costly fertilizer additions and or have excessively low pH values (lower than 5.0) based on the results of a soil test. Compost requirements are described in Section 4.3.

3.4 Biological Growth Stimulants

Provide biological growth stimulants for all permanent seeding, Sodding, and temporary seeding applications. Use biological growth stimulants that provide an immediate seedbed adjustment to help stimulate seed germination, improve the availability of nutrients to the grass, increase the number and depth of root development, and generate robust plant growth which is more tolerant of changes in environmental conditions.

Use biological growth stimulants that:

- Contain components to improve nutrient and water uptake by the plant,
- Contain plant growth hormones which act as a stimulant to improve vegetative growth and intake of micro nutrients and can reduce damage from disease and insect infestation, and
- Contain components that increases biological activity in the soil to improve stress tolerance/drought resistance, reduces sodium uptake in sandy soils, provides more phosphorus availability, and increases cation exchange capacity resulting in earlier germination and better root establishment.

Provide biological growth stimulants that contain compounds such as:

- Humic acid (humates),
- Humectants,
- Cold water processed seaweed/kelp extract,
- Beneficial microbes,
- Cytokinins,
- Cibberllins,
- Auxins (growth hormones), and
- Endo-mycorrhizae.

Animal by-products or municipal waste products are not acceptable biological growth stimulants under this *Specification*. Liquid fertilizers are not acceptable as biological growth stimulants under this *Specification*.

Provide biological growth stimulants composed of non-toxic materials. Provide Biological Growth Stimulants that have no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth. Furnish biological growth stimulants where all components are pre-packaged by the manufacturer to assure material performance and compliance with the minimum requirements in Table 1.

Table 1: Minimum Biological Growth Stimulant Requirements

BGS Property	Test Method	Required Value
Physical		
Acute Toxicity	ASTM 7101 EPA Method 2021or EPA Method 2002	Non Toxic
Performance		
Seed Germination	ASTM D7322[1]	200% minimum
Plant Height	ASTM D7322[1]	200% minimum
Plant Mass	ASTM D7322[1]	110% minimum

[1] ASTM test methods developed for RECPs that have been modified for comparison to control between 14 and 21 days.

3.4.1 Applying Biological Growth Stimulants

When using biological growth stimulants, it is important to strictly follow the manufacturer's recommendations to avoid damage or burning of the seedbed. Use approved hydraulic methods to apply biological growth stimulants.

Liquid fertilizer is not a biological growth stimulant and can cause burning of the seedbed if applied as such.

4.0 Erosion Prevention Practices

4.1 Mulch

Mulch is required for all permanent seeding, temporary seeding, and temporary cover applications except for road shoulder work that has a disturbed width less than six (6) feet and where seeding is compacted using a culti-packer or light roller. Compaction is not necessary if seeds are planted by mechanical seed drills that perform a compaction procedure.

Only use mulch that is certified weed free. *Wood chip mulch is not acceptable for seeding applications.*

Do not use Mulch in areas where concentrated flow is expected.

Use Mulch for temporary seeding and temporary cover applications when the application area will require additional grading prior to permanent seeding. Do not use Erosion Control Blankets (ECB) or Turf Reinforcement Matting (TRM) in this situation.

Apply mulch according to Table 2.

TABLE 2: MULCH APPLICATIONS

Mulch	Applicable Slopes (H:V)[1]	Minimum Application Rate (lbs/acre -dry)[2]
Wood Chip	≤ 4:1	500 CY/acre
Straw or Hay with Tackifier	≤ 4:1	2,000
HECP Type 1	≤ 4:1	2,000
HECP Type 2	4:1< S ≤ 3:1	2,500
HECP Type 3	3:1< S ≤ 2:1	3,000
HECP Type 4	2:1< S ≤ 1:1	3,500
	>1:1	4,000 (temp cover only)[3]
Compost Mulch	≤ 2:1	200 CY/acre

1 The maximum allowable continuous slope length for all mulch applications is 50 feet. Slope interruption devices or TRMs are required for continuous slope length longer than 50 feet.

2 Strictly comply with the manufacturer's mixing recommendations for the actual slope steepness and the actual continuous slope length of the application.

3 HECP Type 4 may be used for permanent cover applications on slopes 1:1 or greater at a minimum rate of 4,500 pounds per acre.

4.2 Wood Chips

Wood chip mulch is not acceptable for seeding applications. Apply wood chips to a minimum depth of 3 to 4 inches using a blower, chop handler, or by hand. If wood chip mulch is used for temporary cover by mulch, it must be removed prior to performing permanent seeding.

4.2 Straw or Hay Mulch with Tackifier

Use straw or hay mulch material that consists of certified weed free straw or hay. Use straw that consists of stalks of wheat, rye, barley, oats, or other approved straw. Use hay that consists of Timothy, Peavine, Alfalfa, Coastal

Bermuda, or other grasses from approved sources. Use materials that are reasonably dry and reasonably free from mature seed-bearing stalks, roots, or bulblets of Johnson grass, Nutgrass, Sandburg, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed, and Cocklebur. Comply with all state and federal domestic plant quarantine regulations. Do not use Straw Mulch in areas adjacent to sidewalks, guardrails, curbs, curb and gutters, or concrete medians. Do not use straw or hay mulch with tackifiers for permanent seeding or temporary cover applications on slopes steeper than 4H:1V. Anchor straw mulch material using one of the following tacking agents:

4.2.1 Organic or Chemical Tackifier

These tackifiers consist of guar gum, plantago, polysaccharides, polymer synthetic resin, polypectate or other material that will give adhesive properties when sprayed on straw mulches. Applications should be heavier at edges, in valleys, and at crests of banks and other areas where the straw mulch may be moved by wind or water. All other areas must have a uniform application of the tackifier. Apply tackifiers at the manufacturer's recommended rate.

4.2.2 Hydraulic Straw Tackifiers

Apply hydraulic erosion control tackifiers at the manufacturer's recommended rate for straw binding.

4.2.3 Emulsified Asphalt

Dilute Emulsified Asphalt at the manufacturing plant with an equal amount of water and uniformly apply it over the straw mulch material as a film. Apply the film at approximately 0.20 gallon of dilution per square yard to sufficiently bond together the straw mulch and prevent wind erosion without creating a heavy coating of asphalt material.

Emulsified Asphalt is **not** applicable for use in urban areas or along sidewalks, curb and gutters, bridges, and water bodies.

4.2.4 Applying Straw or Hay Mulch

Uniformly apply straw or hay mulch material at the rate of 2,000 pounds per acre. Straw mulch may be spread either by hand, by appropriate mechanical spreaders, or by blowers. Apply straw mulch to allow sunlight penetration, air circulation, partial shading of the ground, and conservation of soil moisture. Secure newly laid straw mulch with an approved tackifier. Replace all straw mulch displaced during the tackifier application process.

4.3 Compost Mulch

Compost is the product resulting from the controlled biological decomposition of organic material occurring under aerobic conditions that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for its particular application. Ensure compost possesses no objectionable odors or substances toxic to plants and does not resemble the raw material from which it was derived. Provide compost only from a compost producer that participates in the United States Composting Council's (USCC) Seal of Testing Assurance (STA) program.

Compost mulch may include, but is not limited to, the following:

- Leaf and yard trimmings
- Food scraps
- Treated biosolids
- Manure
- Agricultural residuals
- Forest residuals
- Tree wood
- Bark
- Paper

Ensure compost does not contain any visible refuse, other physical contaminants, or any substance considered harmful to plant growth. Do not use materials that have been treated with chemical preservatives as a compost mulch. ***Do not use mixed municipal solid waste compost.***

4.3.1 Applying Compost Mulch

Avoid very coarse compost with particles larger than 3 inches if the application is seeded, as it will make vegetation establishment more difficult.

Ensure that the areas to receive compost are uniform and conform to the finished grade and cross-section shown on the Plans. Slightly roughen (scarify) slopes and remove large clods, rocks, stumps, roots larger than two (2) inches in diameter and debris on slopes where vegetation is to be established. Where it is practical, track (compact) perpendicular to contours on the slope using a bulldozer before applying the compost.

Place no more than a two (2) inch depth and no less than a one (1) inch depth of compost for areas that will receive seeding, planting, or landscaping as shown on the Plans. Modify compost application rates based on specific site conditions including soil characteristics, severity of slope grade, and slope length.

Uniformly apply compost using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Alternatively, apply compost using a pneumatic (blower) unit or other unit that propels the product directly at the soil surface, thereby preventing water from moving between the soil-compost interface. Where applicable, apply the compost layer a minimum of three (3) feet over the top of the slope.

On highly unstable soils, use compost in conjunction with appropriate structural measures.

Incorporate seed directly with the compost when using a pneumatic unit. Apply the seed and compost mixture using a pneumatic blower device equipped with a calibrated seed injection system capable of uniformly and simultaneously applying compost and seed. Ensure the pneumatic blower is properly calibrated to provide the specified amounts of seed from the seeding plan. An alternative seeding application includes blending seed into the compost evenly prior to pneumatic compost application.

When not incorporating seed directly into the compost, perform temporary cover by seeding or permanent cover using hydraulic methods for seed application utilizing a HECP Type 1 as a tracer at a minimum rate of 1000 pounds/acre.

4.4 Hydraulic Erosion Control Products (HECPs)

Use Hydraulic Erosion Control Product (HECPs) as an allowable mulch for temporary cover by mulch, temporary cover by seeding or permanent cover by seeding applications as outlined In this *Specification*. Do not use HECPs as a channel liner or for areas receiving concentrated flow. Refer to the current *Specification for* HECPs for HECP description, materials, and construction requirements.

4.5 Erosion Control Blanket (ECB) and Turf Reinforcement Matting (TRM)

Consider the use of Temporary Erosion Control Blankets (ECB) and/or Turf Reinforcement Matting (TRM) for permanent seeding application areas with steep slopes or areas where there is a significant erosion problem or potential for erosion. Use ECB and TRM in areas where concentrated flow is expected.

Do not use ECB and TRM for temporary seeding applications when the application areas will require additional grading or modifications prior to permanent seeding.

Utilize Table 3 to determine appropriate applications of ECB and TRM.

Non Slope Areas

Spring / Summer Non Slope Areas (during establishment, mow when Millet reaches 18-inches in height)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
✓	Common Bermudagrass[1] (hulled = hull absent)	*Cynodon dactylon*	50	1.15				●	●	●	●						Long-lived, warm season perennial, grows 4-6 inches tall. High heat tolerance, salt tolerant, high nitrogen requirement.
✓	White Clover	*Trifolium repens*	5	0.11			●	●				●					Grows to 1 foot tall. Full sun, low drought tolerance. Good erosion control cover.
✓	Browntop Millet	*Panicum ramosum*	10	0.23				●	●	●	●	●					Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance, high salt tolerance.

Fall / Winter Non Slope Areas (during establishment, mow when Rye reaches 6 to 8-inches in height)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
✓	Tall Fescue (KY-31)	*Festuca arundinacea*	50	1.15	●	●	●	●					●	●	●	●	Bunch-type grass, grows 2-4 feet tall. Full sun to part shade. Good heat and drought tolerance as well as shade tolerance. Tolerant to marginal, acidic, and poorly drained soils and in areas of low fertility.
✓	Common Bermudagrass[1] (unhulled = hull present)	*Cynodon dactylon*	15	0.34	●	●	●					●	●	●	●	●	Long-lived, warm season perennial, grows 4-6 inches tall. High heat tolerance, salt tolerant, high nitrogen requirement.
✓	White Clover	*Trifolium repens*	5	0.11		●	●	●					●	●	●		Grows to 1 foot tall. Full sun, low drought tolerance, low salt tolerance. Good erosion control cover.
✓	Crimson Clover[2]	*Trifolium incarnatum*	20	0.46	●	●	●	●					●	●	●	●	Upright winter legume, grows from 1-3 feet tall. Full sun, low drought tolerance, no salt tolerance.
✓	Rye Grain[3]	*Secale cereale*	15	0.34	●	●	●	●					●	●	●	●	Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance, high salt tolerance.

[1] Common Bermudagrass: Do not use Giant Bermudagrass(NK-37).
[2] Only use pre-inoculated legumes or use an appropriate inoculant with the seed at planting.
[3] Mow Rye Grain (no lower than 3 inches) once it reaches a height of 6-8 inches to reduce competitiveness with permanent vegetation.
[4] If the Common Name of the seed listed in the Tables is not available, use seed with the listed Botanical Name.

Spring / Summer Road Median & Shoulders (during establishment, mow when Millet reaches 18-inches in height)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
✓	Common Bermudagrass[1] (hulled = hull absent)	*Cynodon dactylon*	25	0.57				●	●	●	●						Long-lived, warm season perennial, grows 4-6 inches tall. High heat tolerance, salt tolerant, high nitrogen requirement.
✓	Browntop Millet	*Panicum ramosum*	10	0.23				●	●	●	●	●					Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance, high salt tolerance.

Fall / Winter Road Median & Shoulders (during establishment, mow when Rye reaches 6 to 8-inches in height)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
✓	Tall Fescue (KY-31)	*Festuca aruninacea*	50	1.15	●	●	●	●					●	●	●	●	Bunch-type grass, grows 2-4 feet tall. Full sun to part shade. Good heat and drought tolerance as well as shade tolerance. Tolerant to marginal, acidic, and poorly drained soils and in areas of low fertility.
✓	Common Bermudagrass[1] (unhulled = hull present)	*Cynodon dactylon*	15	0.34	●	●	●						●	●	●	●	Long-lived, warm season perennial, spreads by rhizomes/stolons seed, grows 4-6 inches tall. High heat tolerance, salt tolerant, high nitrogen requirement.
✓	Crimson Clover[2]	*Trfolium incarnatum*	20	0.46	●	●	●					●	●	●	●	●	Upright winter legume, grows from 1-3 feet tall. Full sun, low drought tolerance, no salt tolerance.
✓	Rye Grain[3]	*Secale cereale*	15	0.34	●	●	●					●	●	●	●	●	Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance, high salt tolerance.

[1] Common Bermudagrass: Do not use Giant Bermudagrass(NK-37).
[2] Only use pre-inoculated legumes or use an appropriate inoculant with the seed at planting.
[3] Mow Rye Grain (no lower than 3 inches) once it reaches a height of 6-8 inches to reduce competitiveness with permanent vegetation.
[4] If the Common Name of the seed listed in the Tables is not available, use seed with the listed Botanical Name.

Slopes & Buffers

Spring / Summer Slopes (during establishment, mow when Millet reaches 18-inches in height. After establishment, only mow at end of winter season)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
Pick 1	Tall Fescue (KY-31)	*Festuca aruninacea*	50	1.15			●	●									Bunch-type grass, grows 2-4 feet tall. Full sun to part shade. Good heat and drought tolerance as well as shade tolerance. Tolerant to marginal, acidic, and poorly drained soils and in areas of low fertility.
Pick 1	Bahiagrass	*Paspalum notatum*	30	0.69			●	●	●	●	●						Warm season perennial, spreads by rhizomes, grows 1-2 feet tall, deep root system. Shade tolerant, salt tolerant, drought tolerant. Low maintenance, tough grass surviving conditions that destroy most turf grasses. Adapts to most soil conditions and extremely tolerant to wear and traffic.
Pick 1	Common Bermudagrass[1] (hulled = hull absent)	*Cynodon dactylon*	15	0.34				●	●	●	●						Long-lived, warm season perennial, grows 4-6 inches tall. High heat tolerance, high nitrogen requirement.
✓	White Clover	*Trifolium repens*	5	0.11			●	●				●					Warm season bunch grass, deep root system, grows 3-6 feet tall. Full sun, high drought tolerance.
✓	Weeping Lovegrass	*Erograstis curvula*	5	0.11			●	●	●	●	●	●					Warm season bunch grass, grows 3 feet tall. Full sun, high drought tolerance. Plant at 10%-20% of mix.
✓	Hairy Vetch[2]	*Vicia villosa*	10	0.23				●									Cool season biennial or annual legume. Viney, trailing or climbing growth. Wide range of soil types, best adapted to loamy and sandy soils.
✓	Browntop Millet	*Panicum ramosum*	10	0.23				●	●	●	●	●					Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance.

Fall / Winter Slopes (during establishment, mow when Rye reaches 6 to 8-inches in height. After establishment, only mow at end of winter season)

	Common Name[4]	Botanical Name	Planting Rate (lbs/acre)	Planting Rate (lbs/1000sf)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Characteristics
✓	Tall Fescue (KY-31)	*Festuca aruninacea*	50	1.15	●	●	●						●	●	●	●	Bunch-type grass, grows 2-4 feet tall. Full sun to part shade. Good heat and drought tolerance as well as shade tolerance. Tolerant to marginal, acidic, and poorly drained soils and in areas of low fertility.
✓	Common Bermudagrass[1] (unhulled = hull present)	*Cynodon dactylon*	15	0.34	●	●	●						●	●	●	●	Long-lived, warm season perennial, grows 4-6 inches tall. High heat tolerance, high nitrogen requirement.
✓	White Clover[2]	*Trifolium repens*	5	0.11		●	●						●	●	●		Grows to 1 foot tall. Full sun, low drought tolerance, low salt tolerance. Good erosion control cover.
✓	Weeping Lovegrass	*Erograstis curvula*	5	0.11	●	●	●						●	●	●	●	Warm season bunch grass, grows 3 feet tall. Full sun, high drought tolerance.
Pick 1	Crimson Clover[2]	*Trfolium incarnatum*	20	0.46	●	●	●						●	●	●	●	Upright winter legume, grows from 1-3 feet tall. Full sun, low drought tolerance, no salt tolerance.
Pick 1	Hairy Vetch[2]	*Vicia villosa*	10	0.23	●	●	●						●	●	●	●	Cool season biennial or annual legume. Viney, trailing or climbing growth. Wide range of soil types, best adapted to loamy and sandy soils.
✓	Rye Grain[3]	*Secale cereale*	15	0.34	●	●	●						●	●	●	●	Bunch type grain, grows 2-5 feet tall. Full sun, moderate drought tolerance, high salt tolerance.

[1] Common Bermudagrass: Do not use Giant Bermudagrass(NK-37).
[2] Only use pre-inoculated legumes or use an appropriate inoculant with the seed at planting.
[3] Mow Rye Grain (no lower than 3 inches) once it reaches a height of 6-8 inches to reduce competitiveness with permanent vegetation.
[4] If the Common Name of the seed listed in the Tables is not available, use seed with the listed Botanical Name.

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA SEAMON, WHITESIDE & ASSOCIATES, INC. No. C00472 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26155 JOSEPH W. BRYANT JR.

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

SEEDING SCHEDULE AND SPECS

C13

PERMIT & CONSTRUCTION SET

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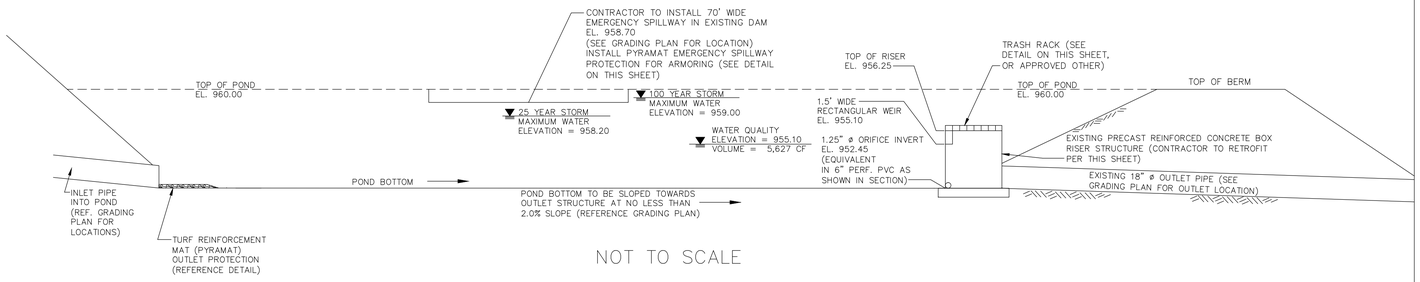


NOT TO SCALE

EXISTING RISER STRUCTURE NOTES:

1. CONTRACTOR TO RETROFIT THE EXISTING CONCRETE RISER STRUCTURE PER THIS SHEET. CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE RISER STRUCTURE IS RETROFITTED PER THE DESIGN. CONTRACTOR IS RESPONSIBLE FOR PROVIDING AN AS-BUILT SURVEY OF THE RETROFITTED POND TO ENGINEER WITH ALL RETROFITTED RISER STRUCTURE INFORMATION INCLUDED TO ENSURE THAT THE DESIGN IS MET.

2. CONTRACTOR TO GROUT EXISTING ORIFICE AND WEIR CLOSED WITH NON-SHRINK WATERPROOF GROUT BEFORE RETROFITTING RISER STRUCTURE. REFERENCE EXISTING RISER STRUCTURE DETAIL ON SHEET C3 FOR EXISTING RISER STRUCTURE INFORMATION (PER SURVEY). CONTRACTOR IS TO FIELD VERIFY THE EXISTING RISER STRUCTURE INFORMATION SHOWN ON THE SURVEY AND NOTIFY THE ENGINEER WITH ANY DISCREPANCIES BEFORE BEGINNING RETROFIT WORK.

3. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING RISER STRUCTURE AND OUTLET DURING THE RETROFITTING PROCESS.

**RETROFITTED STORM WATER MANAGEMENT POND STAGE/STORAGE TABLE

STAGE (FT)	ELEVATION (FT)	CONTOUR AREA (SF)	INCR. STORAGE (CF)	TOTAL STORAGE (CF)
0.00	952.39	14	0	0
0.61	953.00	100	31	31
1.61	954.00	3,995	1,576	1,606
2.61	955.00	5,497	4,726	6,332
3.61	956.00	6,723	6,099	12,431
4.61	957.00	8,010	7,356	19,787
5.61	958.00	9,355	8,673	28,460
6.61	959.00	10,762	10,049	38,510
7.61	960.00	12,289	11,516	50,026

**NOTE: ALL VALUES SHOWN ABOVE REFLECT THE RETROFITTED POND. CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE RETROFITTED POND MEETS THE REQUIRED VOLUME. CONTRACTOR IS RESPONSIBLE FOR PROVIDING AN AS-BUILT SURVEY OF THE RETROFITTED POND TO ENGINEER TO ENSURE THAT THE DESIGN IS MET.

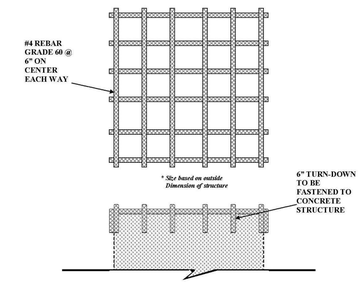
1 RETROFITTED STORM WATER MANAGEMENT POND SECTION

MST -INC- CONCRETE PRODUCTS

Telephone: 864-539-2894 Fax: 864-639-1348

1588 EIGHTEEN MILE CREEK ROAD CENTRAL, SOUTH CAROLINA 29630

STANDARD REBAR TRASH RACK
(FOR SQUARE STRUCTURES)



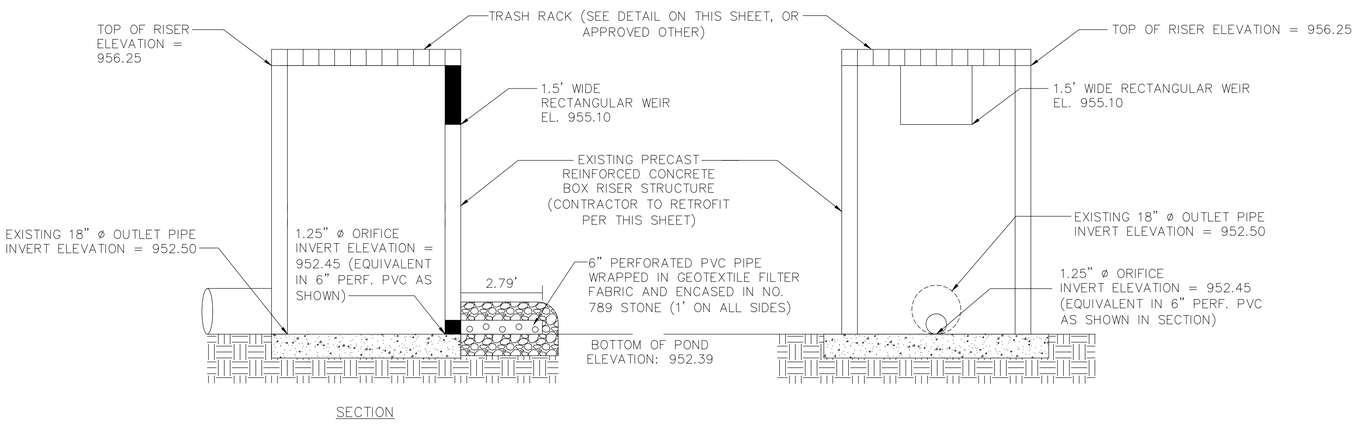
NPCA CERTIFIED PLANT

NOTE:
CONTRACTOR TO INSTALL AFTER RISER HAS BEEN RETROFITTED PER THE PLAN.

*OR APPROVED EQUAL

NOT TO SCALE

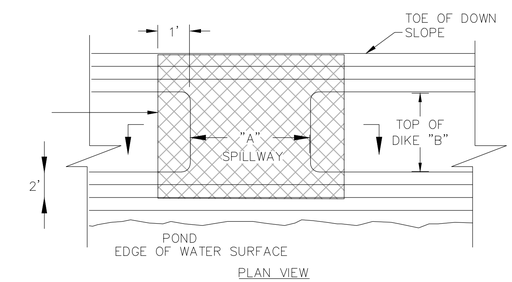
2 TRASH RACK FOR RETROFITTED RISER



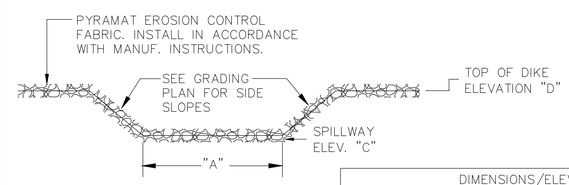
SECTION

NOT TO SCALE

3 RETROFITTED STORM WATER MANAGEMENT POND RISER STRUCTURE



PLAN VIEW



SECTION

DIMENSIONS/ELEVATIONS	"A"	"B"	"C"	"D"
POND EMERGENCY SPILLWAY	70'	VARIES (SEE PLAN)	958.70'	960.00'

(SEE GRADING PLAN FOR EMERGENCY SPILLWAY LOCATION)

NOT TO SCALE

4 PYRAMAT EMERGENCY SPILLWAY PROTECTION DETAIL

Greenville Rec
GREENVILLE COUNTY RECREATION DISTRICT

STAUNTON BRIDGE CC ADDITION

SW SEAMONWHITESIDE

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA SEAMON, WHITESIDE & ASSOCIATES, INC. No. C00472 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 28155 JOSEPH W. BRYANT, JR.

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REVISIONS:

No.	Description	Date
0	PERMIT & CONSTRUCTION SET	2016-03-11

PROJECT: 3702-155430
DATE: 03/11/2016
DRAWN BY: DB
CHECKED BY: JB

STORM WATER MANAGEMENT POND RETROFIT DETAILS

C14

PERMIT & CONSTRUCTION SET

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arrowood + arrowood
Arrowood & Arrowood, PC
412-B Pettigru Street
Greenville, SC 29601
864.233.9383 (t)
864.232.7855 (f)
A&A PROJECT: 15-LS3P-60

Greenville County
Greenville County Rec
PARKS • RECREATION • TOURISM

STAUNTON BRIDGE CC ADDITION

01000 GENERAL

1. The structure reflected on the drawings is structurally sound in its completed condition only. The design of any and all temporary shoring and bracing prior to the completed condition shall be the contractor's responsibility. The Structural Engineer of Record (EOR) shall not be responsible for the means, methods, techniques, sequences, procedures nor safety programs which are empolyed by the contractor to build the completed structure. Any deviations from the completed structure represented in the drawings must be submitted to the EOR for approval in writing.
2. The Contractor shall verify all conditions including exsisting structures (above and below grade) and shall notify of the EOR of any discrepancies. The Contractor shall perform all required field measurements.
3. The Sections and Details shown shall be considered to be typical for all similar conditions. The Contractor shall submit written Requests for Information for areas in question.
4. The Contractor shall submit shop drawings for each of the structural components shown on the drawings. Four copies of the shop drawings shall be submitted to the Architect for distribution.

03000 FOUNDATIONS:

1. The Contractor shall notify the Structural Engineer of Record (EOR) of any below grade structure which may affect the foundation performance.
2. Foundations shall bear on residual soils or engineered fill capable of supporting an allowable pressure of 2,500 psf. Soils shall be stable, and any expansive, compressible, or shifting material shall be removed to ensure a stable moisture content. Slabs on grade are designed for 120 pci "k" subgrade modulus.
3. See soils reports from EAS dated Februaury 3, 2016 for foundation & slab preparation. See report for discussion of possible cut/undercut requirements.

03300 CAST-IN-PLACE CONCRETE:

1. All concrete work and materials shall be in accordance with ACI 318 2002 and ACI 301.
2. Concrete Material Specifications:
   a. Portland Cement: ASTM C150, Type 1
   b. Fly Ash in Foundations: ASTM C 618, Type F (limit to 20% of cementitious content)
   c. Fly Ash in Slabs: ASTM C 618, Type F - Limit to 15% of cementitious content.
3. Slabs-on-grade:
   a. Interior Slabs-on-grade shall have a 28 day compressive strength of 3,000 psi.
   b. Slabs shall be placed on a zero-permeability vapor barrier.
   c. Slabs shall receive a hard trowel finish with a floor flatness and levelness, Ff/Fl of 35/25, with local values of Ff 25 and Fl 17.
   d. Slabs shall be cured using a wet cure method.
   e. Specification of exterior concrete paving or sidewalks is by the Civil Engineer.
4. Foundations:
   a. Spread Footings shall have a 28 day compressive strength of 3000 psi.
5. Reinforcing Steel:
   a. All detailing, fabrication, and placing shall be in accordance with ACI 315.
   b. Reinforcing Bars: New billet bars; ASTM A615 Grade 60; deformed.
   c. Provide 3" concrete cover for all concrete cast against earth.
6. Post-Installed Anchors
   a. Expansion Anchors to be Hilti Kwik Bolt 3, ITW Redhead Trubolt, or approved equal. Sleeve anchors to be Hilti HLC Sleeve Anchor or ITW Redhead Dynabolt.
   b. Epoxy or chemical adhesive shall be Ramset Epcon A7 or C6; Hilti HY 150; or Simpson SET Epoxy-TIE.
   c. Anchors labeled as LDT anchors are to be hot-dip galvanized anchors with cutting threads such as Ramset/Redhead LDT; Simpson Titen HD; or Powers Wedge.

04300 MASONRY:

1. Masonry work and materials shall comply with ACI 530 02. All CMU shall conform to ASTM C90, ASA A79.1 for light weight block. Mortar shall conform with ASTM C270, Type S. Masonry cement and Type N mortar are not allowed.
2. The minimum compressive strength of the system, f'm, shall be 1900 psi.
3. CMU to be laid in running bond.
4. Provide bond beams at the top of all walls. Bond beams shall be low web type with (2) #5 continuous. Lap reinforcing at corners or bond beams.
5. As a minimum, provide (1) #5 vertical bar at 48" o.c. and 9 gage ladder type joint reinforcing at 16" o.c. Joint reinforcing to have prefabricated tees and corners. Fill all cells containing reinforcing with 3000 psi reinforced masonry grout meeting ASTM C476. Grout lifts are not to exceed 56". Provide joint reinforcing at 8" o.c. in all CMU below grade. Fill all cells below grade. Fill cells at stair landings.
6. Provide control joints as noted on the architectural drawings or 30' maximum. Maintain 2 to 1 panel width to height. Provide a control joint with strap anchors at 16" o.c. where interior partitions meet exterior walls. Control joints shall have a reinforced control joint block on each side of the joint with a rubber or PVC t-shaped gasket. Discontinue joint reinforcing at the joint. Continue bond beam reinforcing through the joint. Specification of the caulk and backing rod is by the architect.
7. Where a wall crosses a floor slab control joint, provide an 8'-0' bond beam at the first course centered on the joint.
8. Provide masonry lintels or steel lintels at all openings. Galvanize steel lintels with G60 finish.

05120 STRUCTURAL STEEL:

1. Design, fabrication and erection of all structural steel shall be in accordance with the AISC Manual of Steel Construction, ASD, Thirteenth Edition.
2. Minimum material specifications:
   a. Hollow Structural Sections: ASTM A500 gr. B
   b. Plates: ASTM A36
   c. Angles: ASTM A36
   d. Anchor Rods: ASTM F1554 gr. 36
   e. Bolts: ASTM A325N
   f. Weld Electrodes: AWS E70xx
   g. Shear Connectors ASTM A108, grades 1015 through 1020, headed stud type
   h. Non-shrink grout: ASTM C 1107, non metallic – 5000 psi
3. Product Submittals:
   a. Typical shop fabrication and field erection drawings.
   b. Calculations for braced frame connections and for truss connections based on loading indicated.
4. Provide 2 mils DFT of rust inhibitive primer (fabricator's standard) after power tool cleaning.
5. All steel below grade or slab elevation shall be coated with an asphaltic coating such as Sherwin Williams Tar Guard B69B60.
6. Any steel labeled as galvanized or hot-dip galvanized shall be coated in conformance with ASTM A123 (steel) or ASTM A153 (hardware).
7. Field connections shall be bolted unless shown otherwise on the drawings. Bolted connections shall be made with A325N bolts. Snug-tightened connections shall be designed by the fabricator's engineer to resist half of the uniform load given in Table 3-6 in the 13th Edition of AISC "Manual of Steel Construction".
8. Post-Installed Anchors
   a. Expansion Anchors to be Hilti Kwik Bolt 3, ITW Redhead Trubolt, or approved equal. Sleeve anchors to be Hilti HLC Sleeve Anchor or ITW Redhead Dynabolt.
   b. Epoxy or chemical adhesive shall be Ramset Epcon A7 or C6; Hilti HY 150; or Simpson SET Epoxy-TIE.
9. Cleaning of steel to remove dirt, dust, grease, etc from structural steel shall be performed at the direction of the General Contractor. The fabricator and erector shall be responsible for providing dunnage, coverings, etc. needed to maintain an "as fabricated" surface condition.

05210 STEEL JOISTS:

1. Design, fabrication and erection of all steel joists shall be in accordance with the Steel Joist Institute (SJI).
2. Use special joists at roof top units using the unit layout and weights shown on the structural drawings or on the mechanical drawings. Add unit weights to the K joist design values.
3. Bridging is to be designed and installed per SJI requirements. Anchor by welding to steel beam (per SJI).
4. Joists to be designed for a net uplift of 15 psf. Provide joist bridging as required and note on erection drawings.
5. Joists shall receive a shop-coat of rust-inhibitive primer (1 mil DFT minimum).
6. Do not weld bottom chord struts or girders or joist bottom chord extensions to stabilizer plates unless noted on the drawings.
7. Hang piping, lights, ceiling, etc. from joists only at panel points. Any point load greater than 100 pounds located between panel points must be accompanied by a chord strengthening detail per the joist shop drawings.
8. Joist vendor to coordinate sprinkler piping from sprinkler contractor's drawing.

05300 STEEL DECK:

1. Design, fabrication and erection of all steel deck shall be in accordance with the Steel Deck Institute. All welds shall be made following AWS D1.3 specifications by qualified welding operators.
2. Deck Sheet Steel shall conform with ASTM A611 and shall have FM Label attached.
3. Deck Vendor shall supply closures, ridge plates, valley plates, sump pans, etc. necessary to provide a finished roof surface. Deck Vendor shall supply pour stops, closures, and accessories required to provide a finished floor deck surface prior to placing concrete.
4. Roof deck shall be, 1-1/2" deep, 22 gage, type B, painted, (I) minimum = 0.16 in4/ft., 33 ksi. As a minimum, deck attachment to supports supports shall be made with a 36/7 (6" o.c.) pattern using 5/8" puddle welds. As a minimum, install (3) #10 sidelap screws between all supports. End laps of sheets shall be a minimum of 4" and shall occur over supports. Layup in triple span condition.

05400 LIGHT GAGE METAL FRAMING:

1. All structural members shall be designed in accordance with American Iron and Steel Institute (AISI) "Specification for the Design of Cold Formed Steel Structural Members." Members shall conform to ASTM A-653-SQ Grade 33 (UNO). The members listed below shall meet the minimum physical properties for the sizes and gages shown in the Clark Steel Framing Manual.
2. <u>All members and connections shall be designed by the vendor using the loads shown on the drawings and in the design criteria.</u>
   <u>The sizes shown on the drawings are minimum sizes. All wall stud thicknesses shown on the Architectural Drawings must remain. Minimum stud gage to be 43 mils.</u>
   a. The subcontractor shall provide preliminary engineering during the bid phase for sizing of studs, headers, tracks, connections, etc. as needed to provide a completed system.
   b. The subcontractor shall submit shop drawings for all exterior wall framing. Shop drawings shall include wall elevations, connection details, calculations, and product data.
3. Deflection Criteria for floor framing to be L/360 for Live Loads

Building Code
2012 International Building Code

Building Use
Assembly

Risk Category III

Vertical Loads

Roof Dead Loads	
Single Ply Roofing Membrane/Insulation	1.5 psf
Steel Deck	2.5 psf
Collateral	8 psf
Steel Framing	5 psf
Live Loads at Roof	
Occupancy (NON -Reducible)	20 psf
Storage Mezzanine	125 psf
Snow Loads	
Ground Snow Load	10 psf
Importance Factor	1.1
Rain on Snow Surcharge	5 psf

LATERAL LOADS

Wind Loads		
Risk Category III		
Velocity (3 Second Gust) - Ultimate Design		120 mph
Exposure		B
Enclosed Building		
Internal Pressure Coefficient		0.18
Components and Cladding (Strength Level Pressures)		
Roof Components Loads		
Zone 1	10 sf	-29 psf
	50 sf	-27 psf
	100 sf	-26 psf
Zone 2	10 sf	-47.8 psf
	50 sf	-36 psf
	100 sf	-31 psf
Zone 3	10 sf	-72 psf
	50 sf	-43 psf
	100 sf	-31 psf
Wall Components		
Zone 4	10 sf	26.1/-28.2 psf
	50 sf	23.4/-25.5 psf
	200 sf	21.1/-23.2 psf
Zone 5	10 sf	26.1/-34.7 psf
	50 sf	23.4/-29.4 psf
	200 sf	21.1/-24.8 psf
Seismic Loads		
Importance Factor		1.25
Ss		28% g
S1		11% g
Sds		28% g
Sd1		17% g
Site Class (Confirmed)		D
Response Modification Factor (Intermediate PC Walls)		4
Design Category		C

CMU Lintel Schedule

OPENING WIDTH	LINTEL BLOCK	MINIMUM BEARING
UP TO 4'-8"	8"x8" W/ (2) #5	8"
4'-8" TO 7'-4"	8"x16" W/ (2) #6	16"

1. (1) #5 AT ALL JAMBS AND SILLS OF OPENINGS. JAMB BARS TO RUN CONTINUOUS FROM FOUNDATION TO DECK. SILL BARS TO RUN 2'-0" PAST EDGE OF OPENING.

2. REVIEW CONTROL JOINTS WITH EOR PRIOR TO LAYUP OR BOND BEAM INSTALLATION.

3. SIZES SHOWN ARE FOR RUNNING BOND CMU ONLY.

LS3P
110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA ARROWOOD & ARROWOOD, PC No. C03036 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 20477 3-11-16 ANTHONY JOHN ARROWOOD

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: AP
CHECKED BY: AJA

GENERAL NOTES AND DESIGN CRITERIA

S-100

PERMIT & CONSTRUCTION SET

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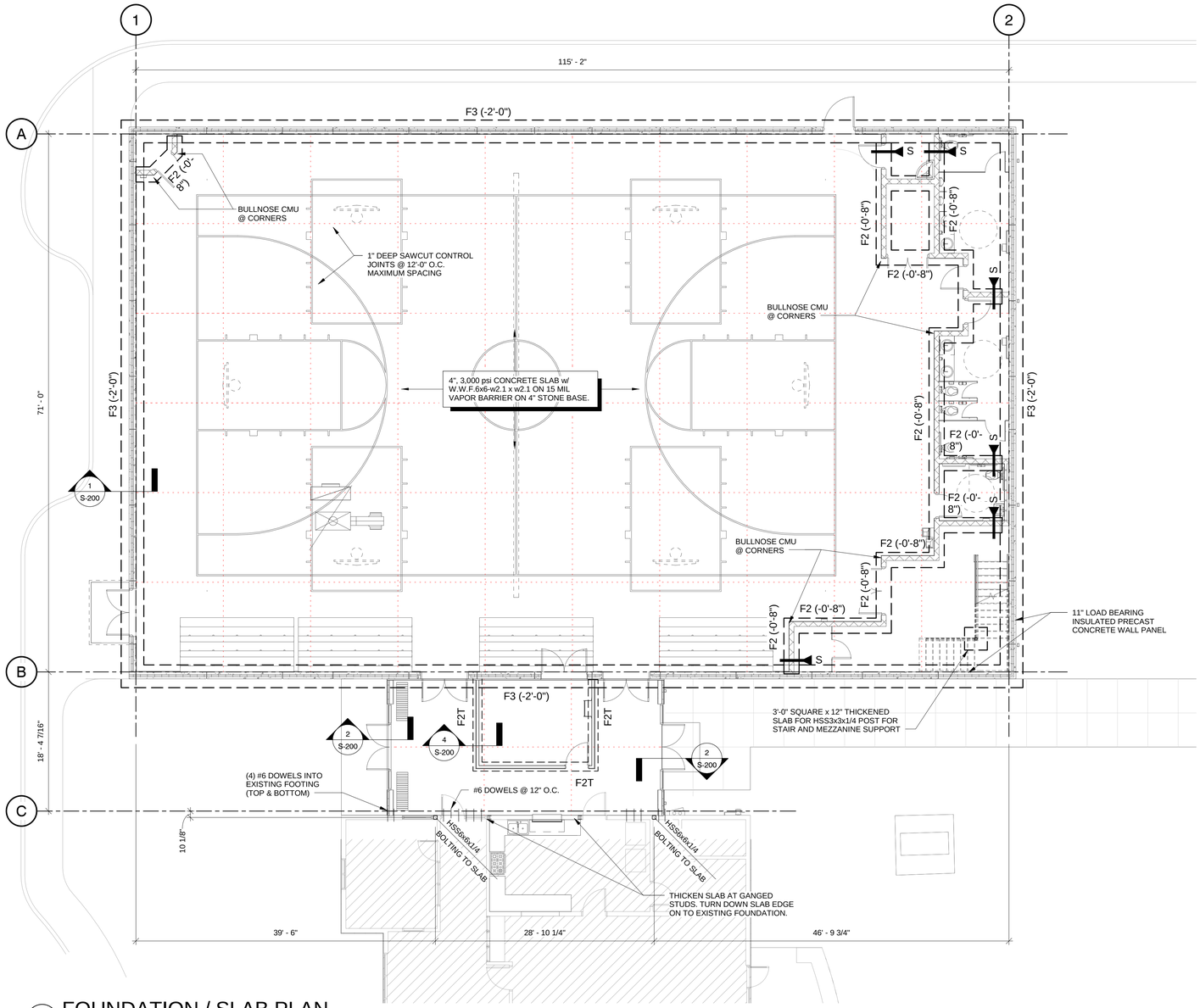

1 S-101 FOUNDATION / SLAB PLAN

1/8" = 1'-0"

LEGEND

FX(-X-X") = FOOTING TYPE "X" WITH TOP OF FOOTING REFERENCING TOP OF 1ST FLOOR ELEVATION

FOUNDATION SCHEDULE			
TYPE	WIDTH x LENGTH	THICKNESS	REINFORCING
F2	2'-0" x CONTINUOUS	12"	(2) #5 CONT.w/#5@32" SW
F26	2'-6" x CONTINUOUS	12"	(3) #5 CONT.w/#5@32" SW
F2T	2'-0" x CONTINUOUS	12" THICKENED SLAB	(2) #5 CONT.w/#5@32" SW
F3	3'-0" x CONTINUOUS	12"	(4) #5 CONT.w/#5@32" SW

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GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA ARROWOOD & ARROWOOD, PC No. C03036 CERTIFICATE OF AUTHORIZATION

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PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: AP
CHECKED BY: AJA

FOUNDATION / SLAB PLAN

S-101

PERMIT & CONSTRUCTION SET

N:\AA\Projects\LS3P\15-LS3P-60_Staunton Bridge CC\15-LS3P-60 STAUNTON BRIDGE R15.rvt
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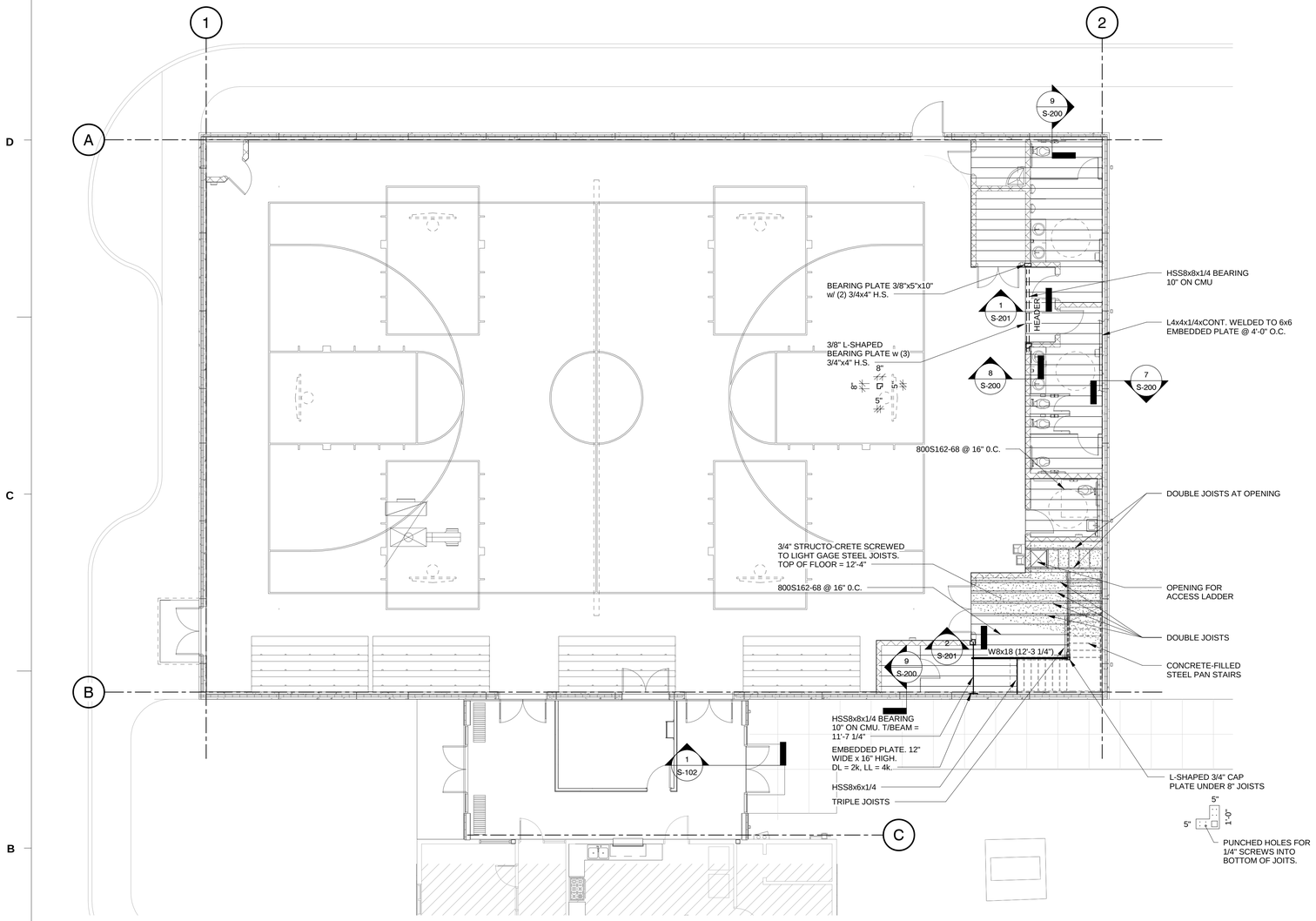
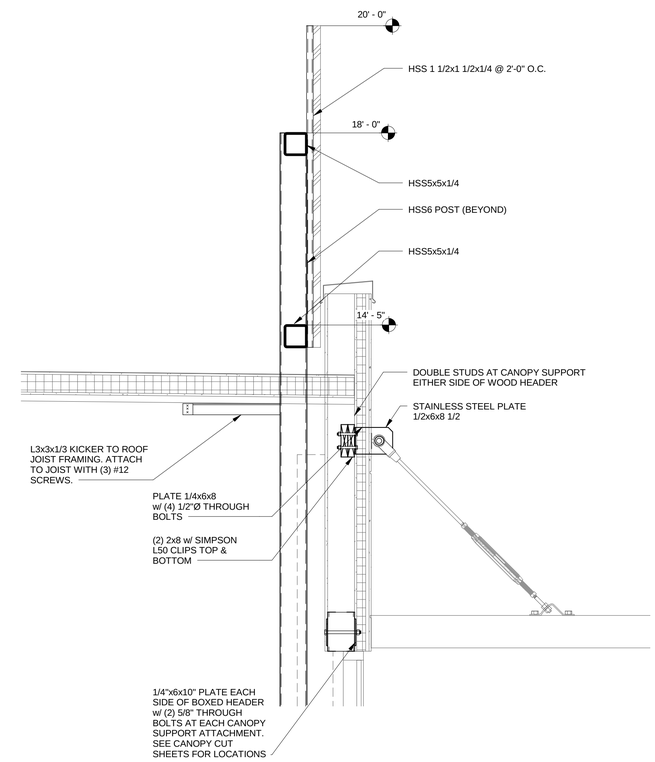


2 S-102 MECHANICAL PLATFORM PLAN

1/8" = 1'-0"



1 S-102 SECTION

3/4" = 1'-0"

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PLATFORM FRAMING PLAN

S-102

PERMIT & CONSTRUCTION SET

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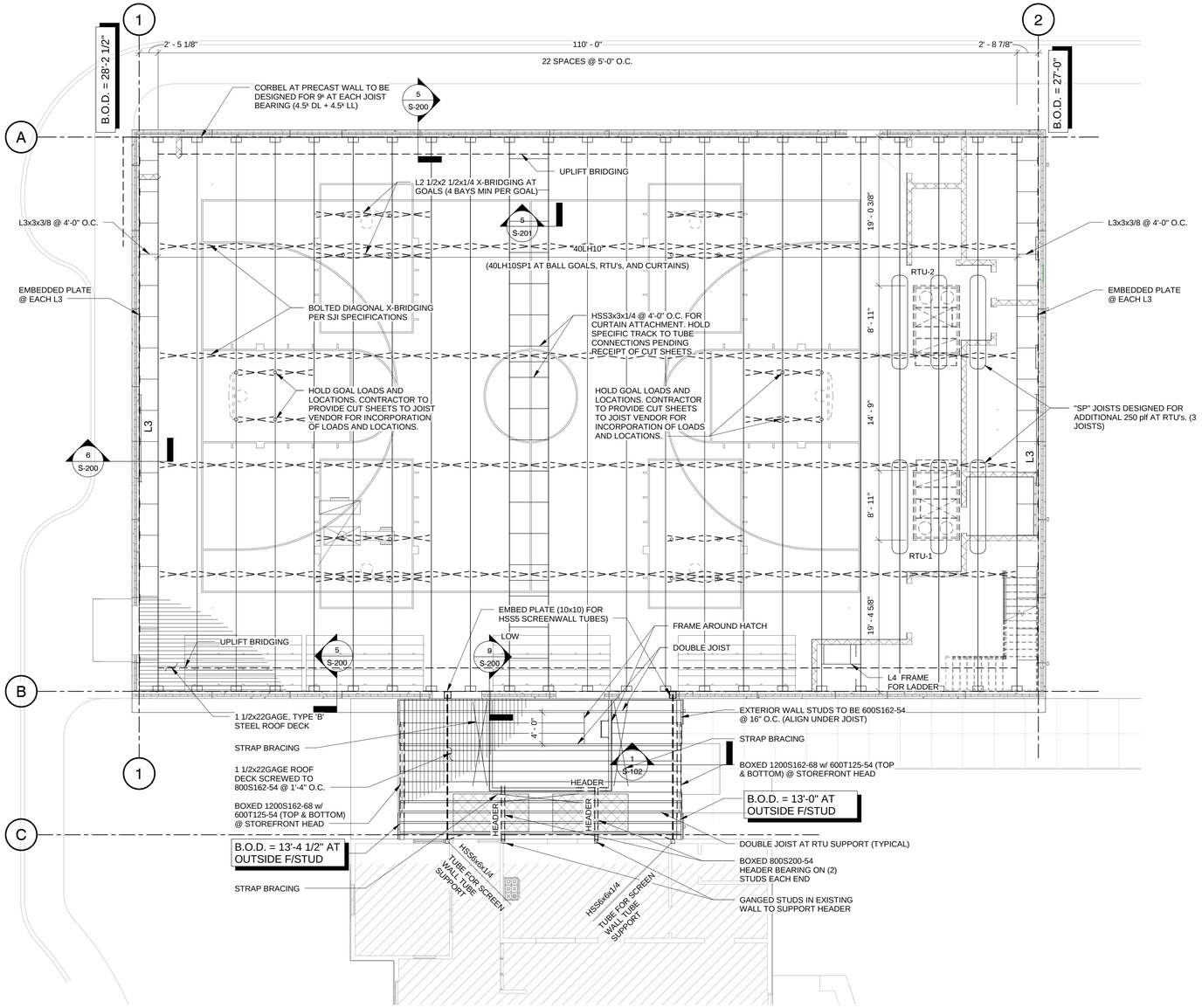
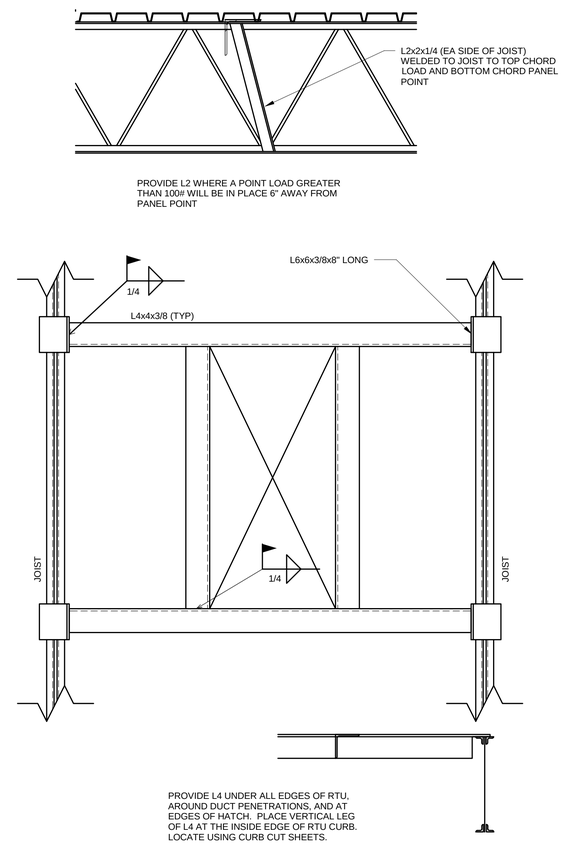


1 S-103 ROOF FRAMING PLAN

1/8" = 1'-0"



2 S-103 ROOF OPENING FRAME DETAIL

1" = 1'-0"

ALTERNATE 1

1) SUBSTITUTE 40LH JOISTS WITH 28" PRESTRESSED DOUBLE TEES. WITH DOUBLE TEE ALTERNATE; TOP OF DOUBLE TEES AT BEARING AND PARAPET WALLS ARE TO BE 1'-0" LOWER THAN ELEVATION SHOWN FOR BASE BID.

2) CONTRACTOR TO PROVIDE ADDITIONAL STEEL FOR GOAL ATTACHMENTS.

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ROOF FRAMING PLAN

S-103

PERMIT & CONSTRUCTION SET

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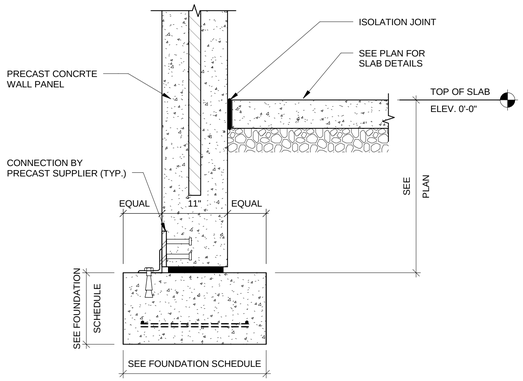
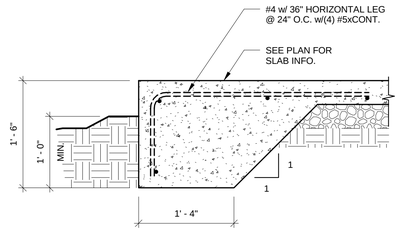
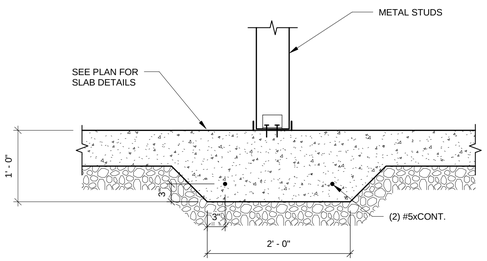


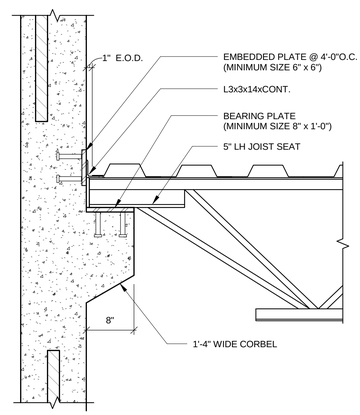
1 S-200 PRECAST WALL PANEL FOOTING SECTION
1" = 1'-0"



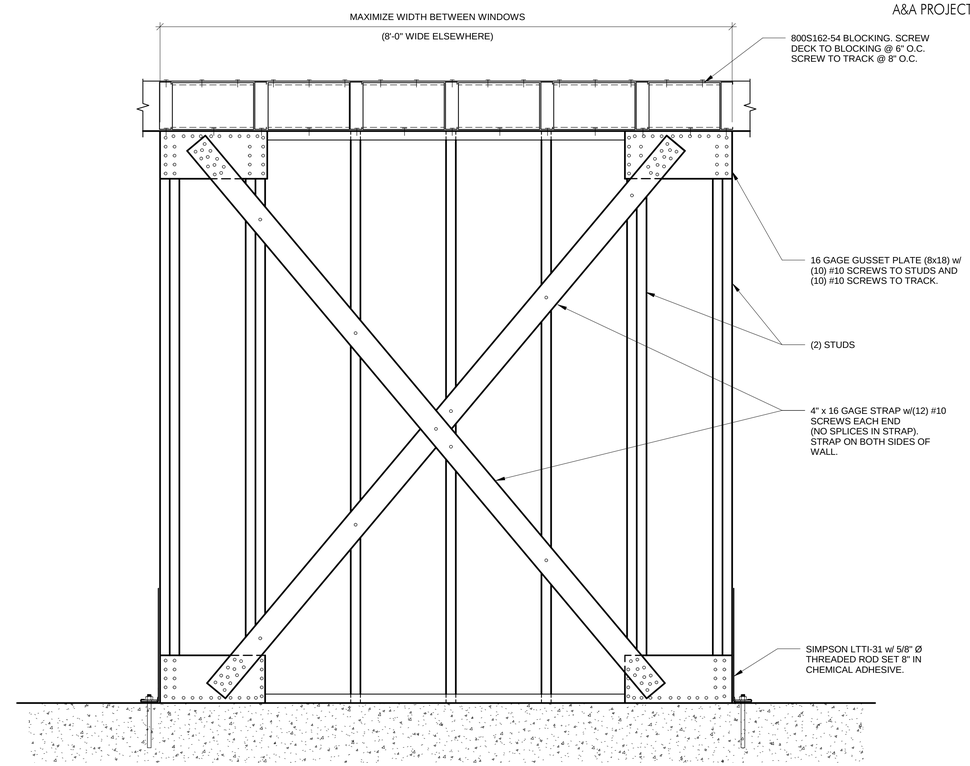
2 S-200 THICKENED EDGE SLAB SECTION
1" = 1'-0"



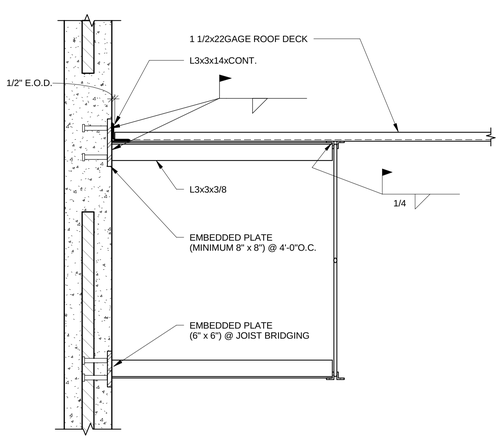
4 S-200 THICKENED SLAB FOOTING
1" = 1'-0"



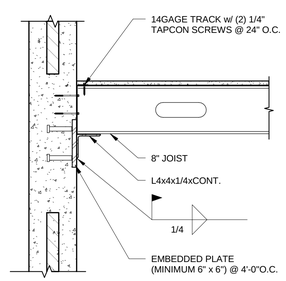
5 S-200 TYPICAL JOIST BEARING SECTION
1" = 1'-0"



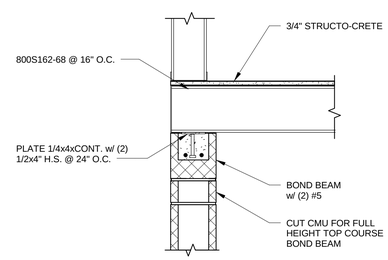
3 S-200 STRAP BRACE FRAME
1" = 1'-0"



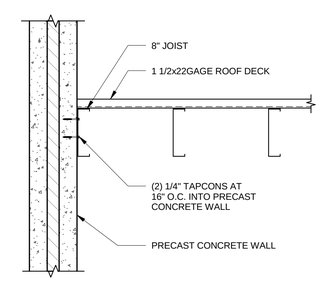
6 S-200 SECTION
1" = 1'-0"



7 S-200 SECTION
1" = 1'-0"



8 S-200 SECTION
1" = 1'-0"



9 S-200 SECTION
1" = 1'-0"

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DATE: MARCH 11, 2016
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CHECKED BY: AJA

SECTIONS & DETAILS

S-200

PERMIT & CONSTRUCTION SET

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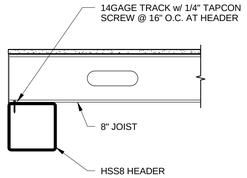
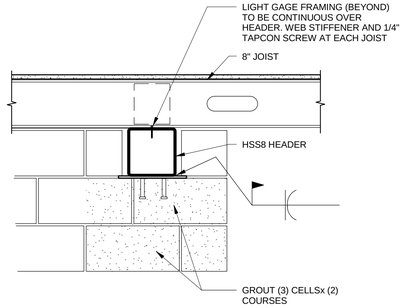
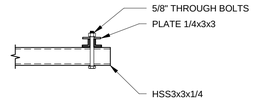


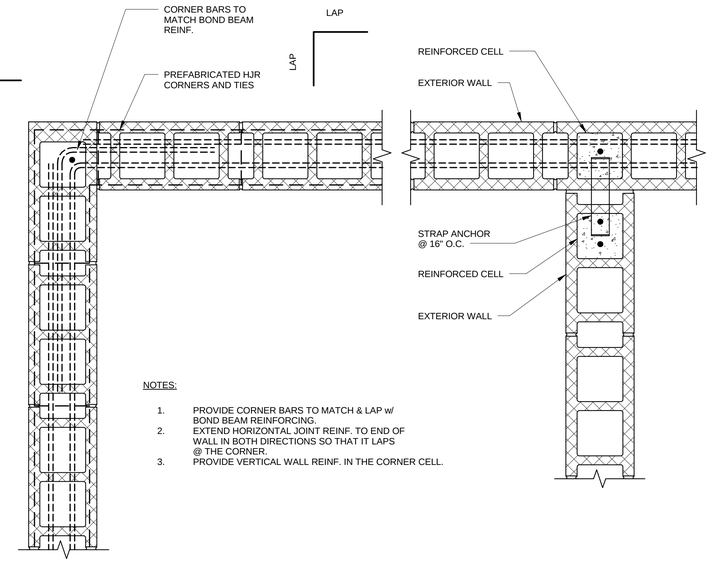
1 S-201 SECTION
1" = 1'-0"



2 S-201 SECTION
1" = 1'-0"



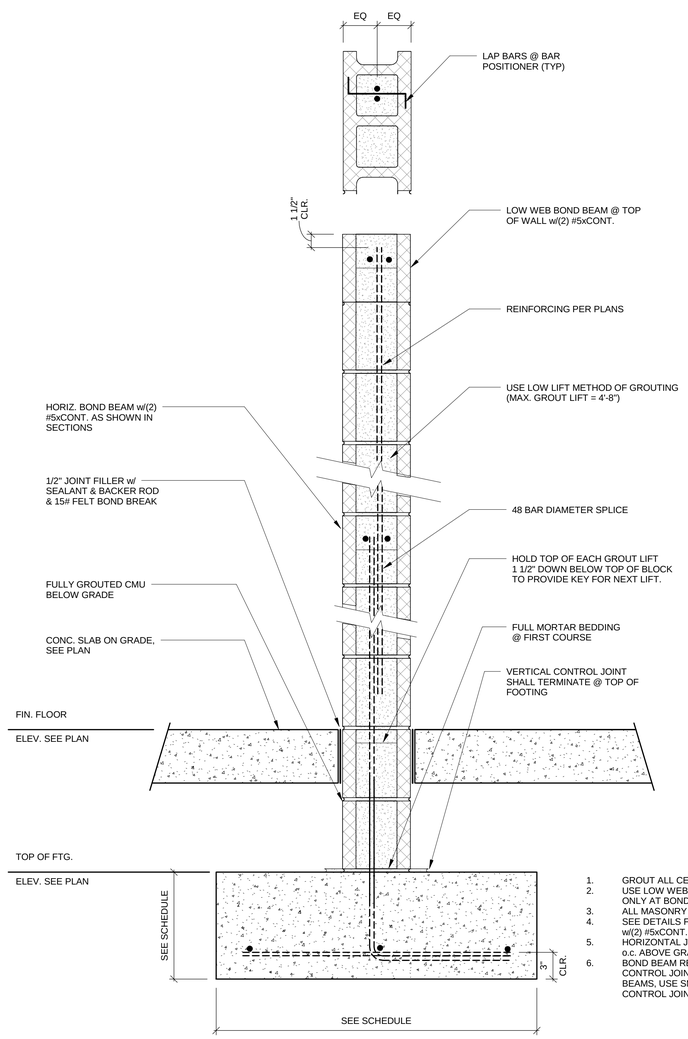
5 S-201 SECTION
1" = 1'-0"



NOTES:

1. PROVIDE CORNER BARS TO MATCH & LAP w/ BOND BEAM REINFORCING.
2. EXTEND HORIZONTAL JOINT REINF. TO END OF WALL IN BOTH DIRECTIONS SO THAT IT LAPS @ THE CORNER.
3. PROVIDE VERTICAL WALL REINF. IN THE CORNER CELL.

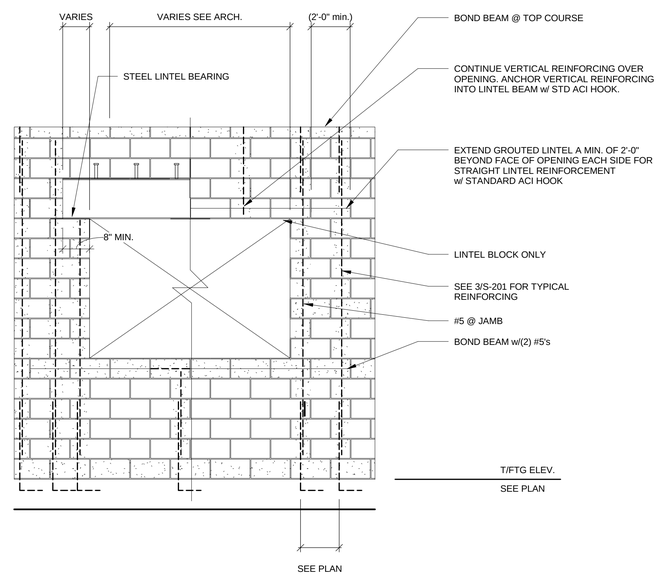
TYPICAL CORNER DETAIL



NOTES:

1. GROUT ALL CELLS w/REINFORCING.
2. USE LOW WEB BOND BEAM BLOCKS w/ OPEN BOTTOMS ONLY AT BOND BEAM LOCATIONS.
3. ALL MASONRY SHALL BE LAID IN RUNNING (COMMON) BOND.
4. SEE DETAILS FOR LOCATION OF ADDITIONAL BOND BEAMS w/(2) #5xCONT.
5. HORIZONTAL JOINT REINFORCING SHALL BE SPACED @ 16" o.c. ABOVE GRADE AND 8" BELOW GRADE.
6. BOND BEAM REINFORCEMENT TO BE CONTINUOUS THROUGH CONTROL JOINTS AT JOIST BEARING. AT INTERMEDIATE BOND BEAMS, USE SMOOTH BAR WITH ONE SIDE GREASED AT CONTROL JOINTS.

3 S-201 TYPICAL CMU DETAILS (SECTION)
1 1/2" = 1'-0"



4 S-201 TYPICAL CMU DETAIL (ELEVATION)
1 1/2" = 1'-0"

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DRAWN BY: Author
CHECKED BY: Checker

SECTION & DETAILS

S-201

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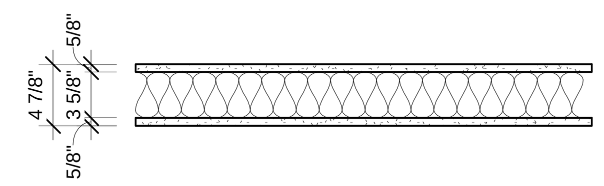
PERMIT & CONSTRUCTION SET

GENERAL PROJECT NOTES

1. WALL ACCESSORIES SUCH AS FIRE EXTINGUISHER CABINETS, PAPER TOWEL DISPENSER, ETC, SHALL BE INSTALLED IN SUCH A MANNER THAT IT SHALL NOT REDUCE THE FIRE RATING OF THE WALL.
2. ALL PENETRATIONS THROUGH FIRE RATED WALLS & FLOOR SLABS SUCH AS PIPING, CONDUITS, DUCT WORK, ETC., SHALL BE PACKED AND SEALED WITH FIRE RATED MATERIALS AND SEALED AGAINST WATER PENETRATION.
3. ALL WALLS SURROUNDING BATHROOMS SHALL HAVE A CLOSURE GASKET AT TOP, BOTTOM, AND SIDES WHERE SOUND LEAK WOULD OTHERWISE EXIST. ALL PENETRATIONS SHALL BE GASKETED AND SEALED ALONG THE PENETRATION PERIMETER.
4. PROVIDE 2x WOOD BLOCKING BEHIND WALL HUNG ITEMS TO SUPPORT ALL FASTENERS AND ANCHORING DEVICES. REFER TO ARCHITECTURAL & ELECTRICAL PANELS FOR MILLWORK AND EQUIPMENT. COORDINATE BLOCKING LOCATIONS WITH OWNER'S REP IN THE FIELD FOR WHITEBOARDS, BULLETIN BOARDS, AND DISPLAY MONITORS.
5. GENERAL CONTRACTOR SHALL PROVIDE INTERIOR OCCUPANCY SIGNS AS REQUIRED BY LOCAL BUILDING OFFICIALS. WORDING OF INTERIOR SIGNS SHALL BE ACCEPTABLE TO AUTHORITY HAVING JURISDICTION. COLOR AND DESIGN OF INTERIOR SIGNS SHALL BE PROVIDED FOR OWNER AND ARCHITECTS REVIEW AND APPROVAL.

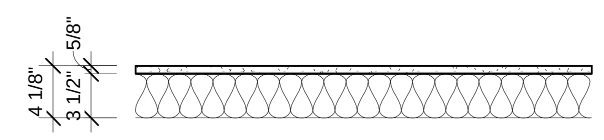
WALL TYPES

1



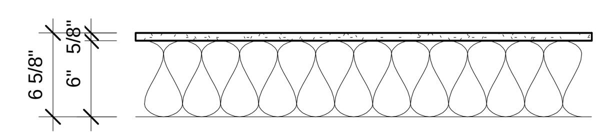
(1) LAYER OF 5/8" GYP. BOARD (TYPE X)
3 5/8" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
3 1/2" BATT INSULATION
(1) LAYER OF 5/8" GYP. BOARD (TYPE X)

2



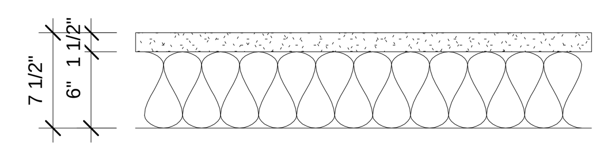
(1) LAYER OF 5/8" GYP. BOARD (TYPE X)
3 5/8" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
3 1/2" BATT INSULATION

3



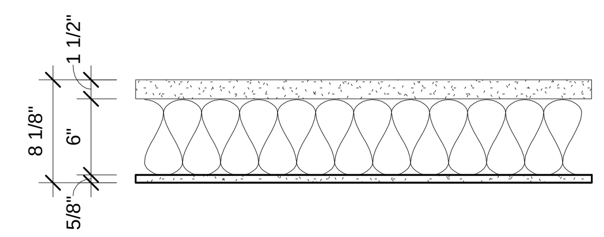
(1) LAYER OF 5/8" GYP. BOARD (TYPE X)
6" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
3 1/2" BATT INSULATION

4



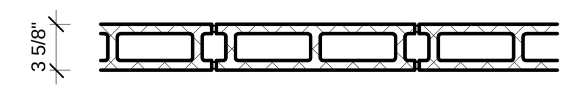
1 1/2" TECTUM PANEL
6" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
3 1/2" R-13 BATT INSULATION

5



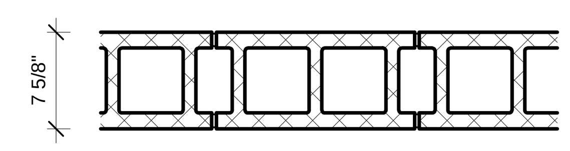
1 1/2" TECTUM PANEL
6" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
3 1/2" R-13 BATT INSULATION
(1) LAYER 5/8" GYP.BOARD (TYPE X)

6



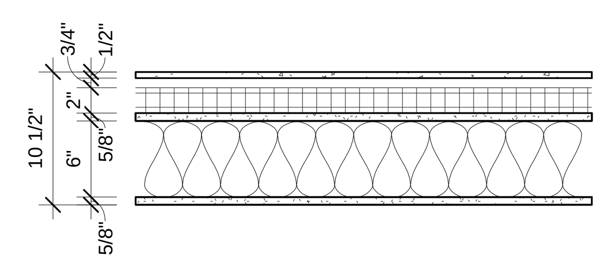
4" X 8" X 16" CONCRETE MASONRY UNIT
SEE DWG. S-100 NOTES

7



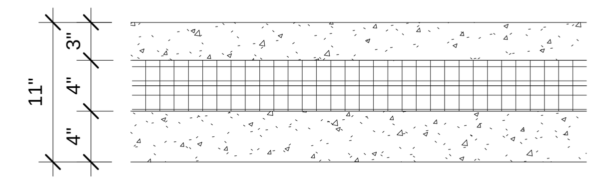
8" X 8" X 16" CONCRETE MASONRY UNIT
SEE DWG. S-100 NOTES

8

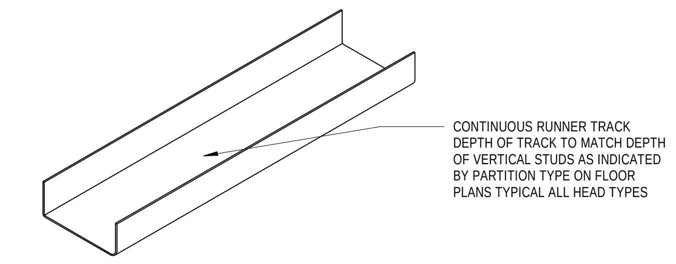


CEMENTITIOUS REVEAL PANEL RAINSCREEN
3/4" Z CLIPS OR HAT CHANNEL @ 16" O.C.
2" RIGID INSULATION
FLUID APPLIED AIR BARRIER
(1) LAYER 5/8" GYPSUM SHEATHING
6" METAL STUDS @ 16" O.C. (SEE STRUCTURAL FOR GAGE)
6" R-19 BATT INSULATION
(1) LAYER 5/8" GYP.BOARD (TYPE X)

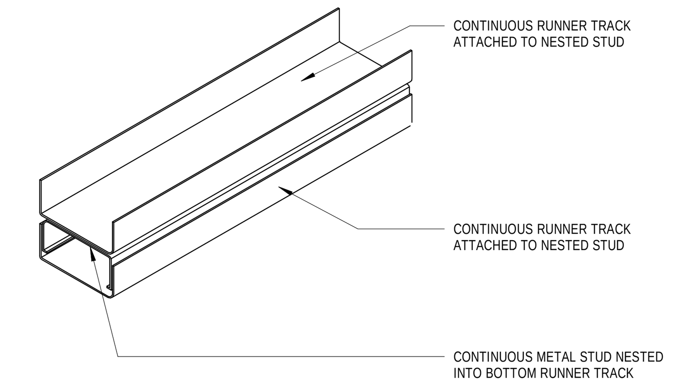
9



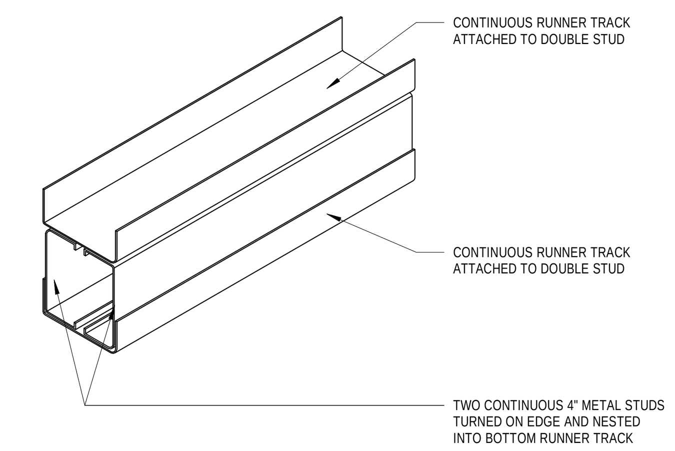
3" PRECAST CONCRETE PANEL
4" INSULATION
4" PRECAST CONCRETE PANEL



(A) TYPICAL HEAD TYPE 1 - OPENINGS UP TO 3'-6" WIDE

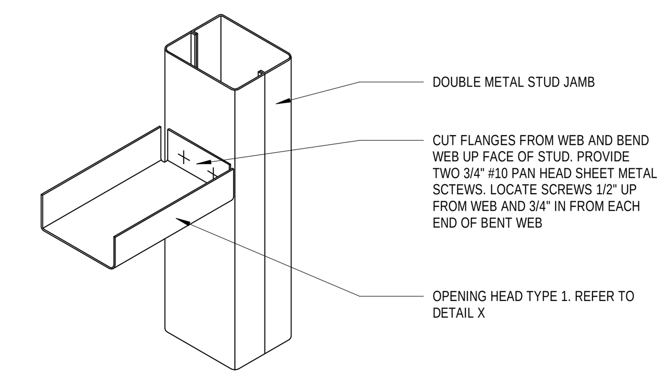


(B) TYPICAL HEAD TYPE 2 - OPENINGS 3'-6" TO 8'-0" WIDE

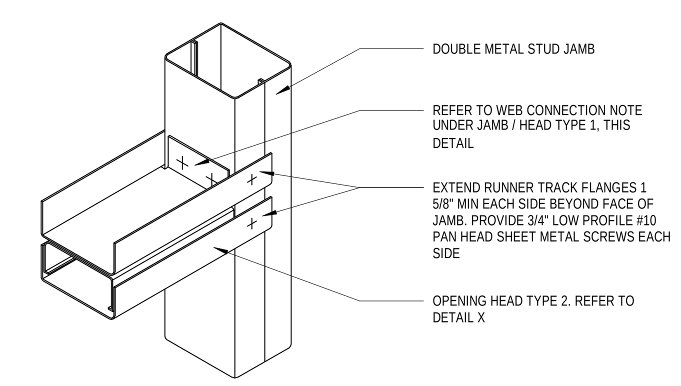


(C) TYPICAL HEAD TYPE 3 - OPENINGS 8'-0" TO 12'-0" WIDE

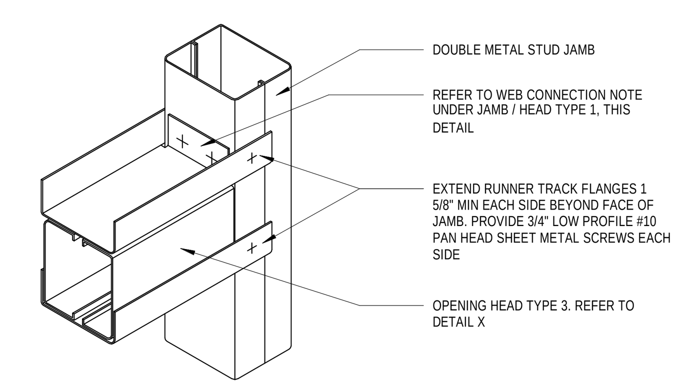
(1) HEAD TRACK FRAMING
TYPICAL DETAILS
SCALE: NTS



(A) JAMB / HEAD TYPE 1



(B) JAMB AT TYPE 2 HEAD



(C) JAMB AT TYPE 3 HEAD

(2) HEAD / JAMB CONNECTION
TYPICAL FRAMING DETAILS
SCALE: NTS

INTERIOR NON LOAD BEARING ONLY.
NOT ALL TYPES USED.

GENERAL PARTITION NOTES

1 THE CONSTRUCTION SUBSYSTEMS AND PARTITION TYPES SHOWN, INDICATE THE GENERAL CONSTRUCTION FEATURES OF THE MAJORITY OF THE CONSTRUCTION SYSTEMS TO BE PROVIDED. THEY ARE NOT INTENDED TO REPRESENT A COMPLETE LISTING OF SYSTEMS REQUIRED AND DO NOT NECESSARILY INDICATE ALL OF THE CONSTRUCTION REQUIREMENTS TO BE PROVIDED BY THE CONTRACT DOCUMENTS.

2. SEE REFLECTED CEILING PLANS FOR ADDITIONAL REQUIREMENTS FOR PARTITION TYPES.

3. REFERENCE FOR FIRE RESISTANCE & SOUND RATINGS:
   - CCMA: CAROLINAS CONCRETE MASONRY ASSOCIATION, CONCRETE MASONRY HANDBOOK, SOUND CONTROL
   - GA: GYPSUM ASSOCIATION, FIRE RESISTANCE DESIGN MANUAL, ELEVENTH EDITION
   - NCMA: NATIONAL CONCRETE MASONRY ASSOCIATION, TEK NOTES
   - SA: SHINER AND ASSOCIATES
   - SBCC: STANDARD BUILDING CODE CONGRESS, LATEST EDITION
   - UL: UNDERWRITERS LABORATORY, INC., FIRE RESISTANCE DIRECTORY

4. WHERE FURRED/SINGLE FACED SYSTEMS OCCUR ON CONCRETE MASONRY UNIT WALL OR PARTITION SURFACE, PROVIDE GYPSUM BOARD TO 4" ABOVE CEILING, OR IF NO CEILING OCCURS, PROVIDE GYPSUM BOARD TO UNDERSIDE OF DECK.

5. CONCRETE MASONRY UNIT WALLS AND PARTITIONS: PROVIDE HORIZONTAL JOINT REINFORCEMENT, VERTICAL REINFORCEMENT, BOND BEAMS, GROUTING, AND ADDITIONAL REQUIREMENTS AS INDICATED BY STRUCTURAL DRAWINGS AND SPECIFICATIONS.

6. COLOR, TEXTURE AND FACE PATTERN MAY VARY. SEE MISCELLANEOUS AND EXTERIOR COLOR SCHEDULE (SPEC SECT 9000), SPECIFICATIONS AND DRAWINGS FOR CLARIFICATION.

7. KEEP CAVITY CLEAR OF ALL MORTAR.

8. SEE FINISH SCHEDULE FOR LOCATION OF APPLIED FINISHES (SUCH AS CERAMIC TILE, WALL COVERING, ETC) THAT MAY AFFECT THE PARTITION SURFACE AND CONSTRUCTION REQUIREMENTS.

9. WHERE CERAMIC TILE AND CEMENTITIOUS BACKER UNIT ARE NOT SCHEDULED TO BE FULL HEIGHT OF PARTITION, PROVIDE GYPSUM BOARD (TYPE X @ RATED PARTITIONS) @ THOSE PORTIONS OF THE PARTITION NOT SCHEDULED TO RECEIVE CERAMIC TILE. CEMENTITIOUS BACKER UNIT TO BE SAME THICKNESS AS GYPSUM BOARD.

10. PROVIDE FIRE RATED CMU (OR EQUIVALENT) WHERE PARTITION INDICATED TO BE FIRE RATED ON REFLECTED CEILING PLANS. RATED PARTITION TO MEET CONSTRUCTION REQUIREMENTS OF FIRE RATING REFERENCE LISTED.

11. PROVIDE MANUFACTURER'S PROPRIETARY TYPE 'X' GYPSUM BOARD (MEETING THE DESIGNATED FIRE REFERENCE LISTED) WHERE PARTITION IS INDICATED TO BE FIRE RATED ON REFLECTED CEILING PLANS. RATED PARTITION TO MEET CONSTRUCTION REQUIREMENTS OF FIRE RATING REFERENCE LISTED.

12. PROVIDE ACOUSTICAL SEALANT (09250.K) AT PERIMETER OF ALL SOUND RATED PARTITIONS AND AT ALL PARTITION PENETRATIONS. IF PARTITION IS FIRE RATED, PROVIDE UL LABELED FIRESTOPPING IN PLACE OF ACOUSTICAL SEALANT. AT PARTITIONS THAT ARE SOUND AND FIRE RATED, PROVIDE ACOUSTICAL SEALANT AT PARTITION PENETRATIONS THAT DO NOT REQUIRE FIRESTOPPING (EXAMPLE: DUCT PENETRATIONS WITH FIRE DAMPERS).

13. ALL PIPE AND CONDUIT PENETRATIONS THROUGH RATED PARTITIONS, FLOORS, ROOF, ETC. SHALL BE SEALED WITH A RESPECTIVELY RATED FIRE BARRIER PENETRATION SEALING SYSTEM BY 3M OR U.L. APPROVED EQUAL.

14. CONTRACTOR SHALL COORDINATE WITH MECHANICAL DUCTWORK PRIOR TO FABRICATION OF PARTITION WALLS.

15. SHOULD CONDUITS OCCUR WHERE A WALL IS UNABLE TO GO STRAIGHT UP TO STRUCTURE DUE TO PIPING, DUCTWORK, ETC., THE PARTITION (GYPSUM BOARD AND FRAMING) MAY JOG HORIZONTALLY ABOVE THE CEILING TO AVOID THE PROBLEM. RATED WALL INTEGRITY SHALL BE MAINTAINED.

16. WHERE STUDS EXTEND TO STRUCTURE AND GYPSUM WALLBOARD AND SOUND ATTENUATION BLANKETS EXTEND JUST ABOVE THE FINISHED CEILING, CAP OFF PARTITION FINISHES WITH A RUNNER CHANNEL WHEN CEILING PLENUM IS USED AS A RETURN AIR PLENUM.

17 DIMENSIONAL CONFLICTS BETWEEN PARTITION TYPES AND THE ARCHITECTURAL FLOOR PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT.

18. PROVIDE A MIN. OF LEVEL 4 FINISH ON ALL WALLS LOCATED IN OCCUPIED SPACES AND ROOMS.

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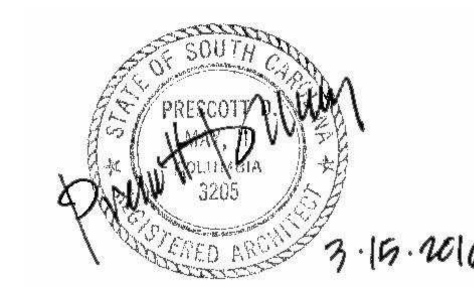

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REVISIONS:

No.	Description	Date

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CONSTRUCTION SUBSYSTEMS

A-002

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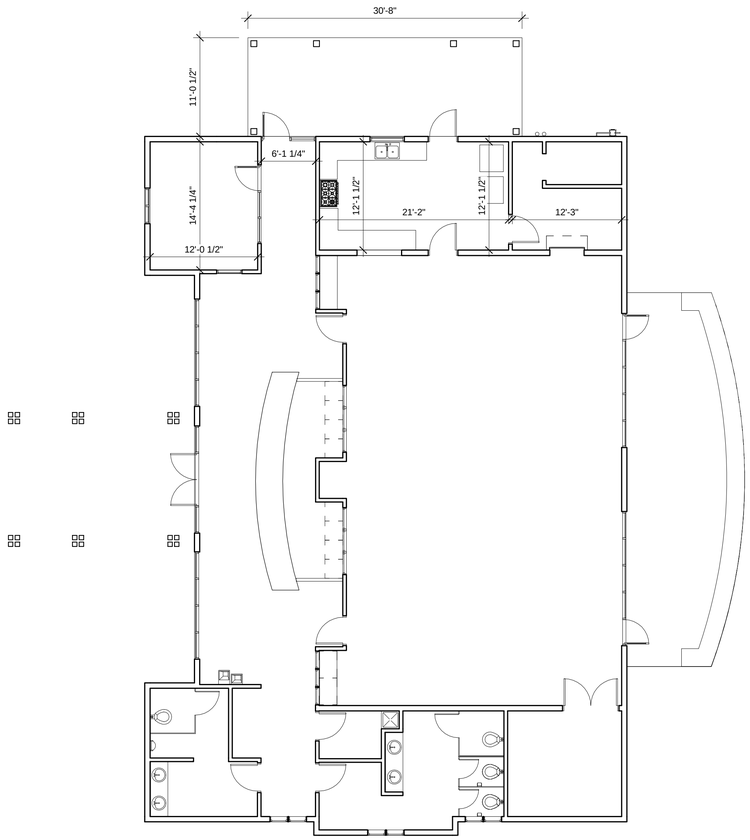
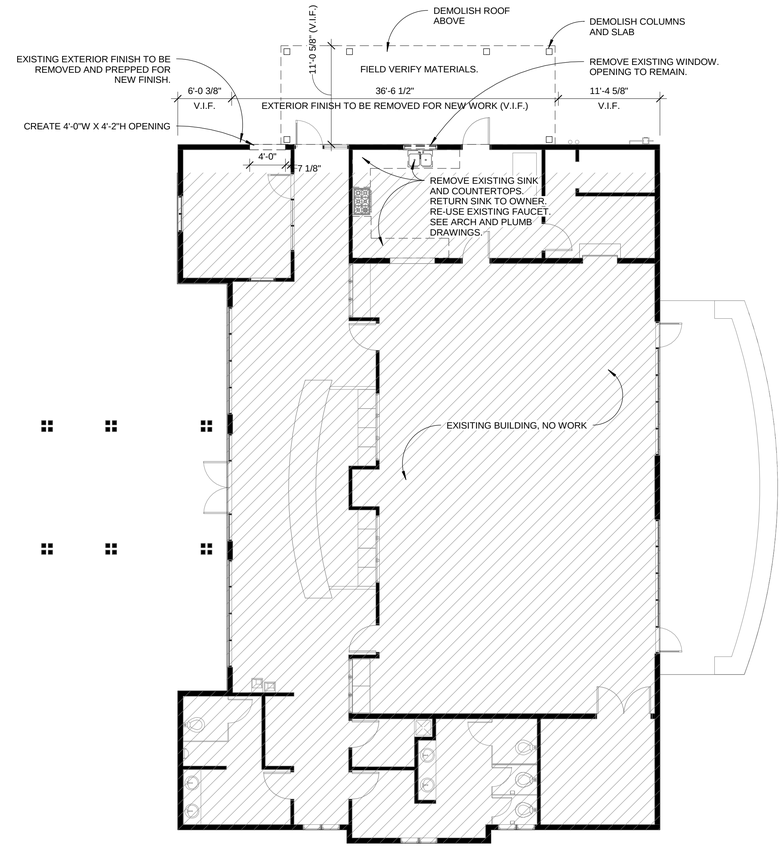


ALL EXISTING DIMENSIONS SHALL BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO WORK BEGINNING. DIMENSIONS ARE FROM FACE OF EXISTING WALL TO FACE OF EXISTING WALL. CONTRACTOR SHALL BE RESPONSIBLE FOR MINOR ADJUSTMENTS IN THE FIELD. MAJOR DISCREPANCIES SHALL BE BROUGHT TO THE OWNERS AND ARCHITECTS ATTENTION.

PROJECT NORTH
N

1 EXISTING FLOOR PLAN
1/8" = 1'-0"



PROJECT NORTH
N

2 EXISTING FLOOR PLAN - DEMO
1/8" = 1'-0"

DEMOLITION PLAN SHEET NOTES

1. DEMOLITION DRAWINGS ARE INTENDED TO SHOW GENERAL AREAS OF DEMOLITION AS WELL AS GENERAL EXISTING CONDITIONS. THEY DO NOT SHOW ALL WORK WHICH MAY BE NECESSARY. COMPARE WITH DRAWINGS INDICATING NEW CONSTRUCTION.
2. REFER TO OTHER DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION ON DEMOLITION. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION ON MECHANICAL AND ELECTRICAL DEMOLITION.
3. EXISTING WORK TO REMAIN SHALL BE TEMPORARILY SECURED, BRACED AND STABILIZED UNTIL PERMANENT CONSTRUCTION IS IN PLACE.
4. VERIFY FIELD CONDITIONS PRIOR TO START OF DEMOTION/CONSTRUCTION AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES.
5. VERIFY THAT CONSTRUCTION INDICATED FOR REMOVAL IS NOT LOAD BEARING OR IS ADEQUATELY SHORED AS INDICATED ON STRUCTURAL DRAWINGS PRIOR TO STARTING ANY WORK.
6. ERECT BARRICADES, FENCES OR OTHER SECURABLE MEANS TO PREVENT UNAUTHORIZED ACCESS INTO CONSTRUCTION ZONES.
7. DO NOT ALLOW MATERIAL AND DEBRIS GENERATED BY DEMOLITION ACTIVITIES TO ACCUMULATE ON THE JOB SITE. REMOVE DAILY AND DISPOSE OF IN A LEGAL MANNER. NO ON-SITE SALE OR BURNING OF REMOVED ITEMS IS PERMITTED.
8. THE CONTRACTOR MUST MAINTAIN ADEQUATE SUPPORT INSULATION, WATERPROOFING, EMERGENCY LIGHTING, SECURITY, ALARMS, ETC. FOR ALL OR PART OF ITEMS WHICH ARE TO REMAIN.
9. TERMINATE AND CAP ANY UTILITY IN WALLS CEILINGS AND FLOORS TO BE REMOVED AND NOT INTENDED FOR REUSE.
10. PREPARE AND PATCH SURFACES THAT RECEIVE NEW FINISHES AS REQUIRED BY REMOVING OR RELOCATING DEVICES, WIRING OR OTHER APPURTENANCES NO LONGER APPROPRIATE FOR THE NEW USE OF THE ROOM.
11. MAINTAIN EXISTING FINISHES, OPERATIONAL CHARACTERISTICS, AND APPEARANCE OF ITEMS SCHEDULED TO REMAIN OR BE REUSED.

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EXISTING & DEMOLITION PLAN

A-100

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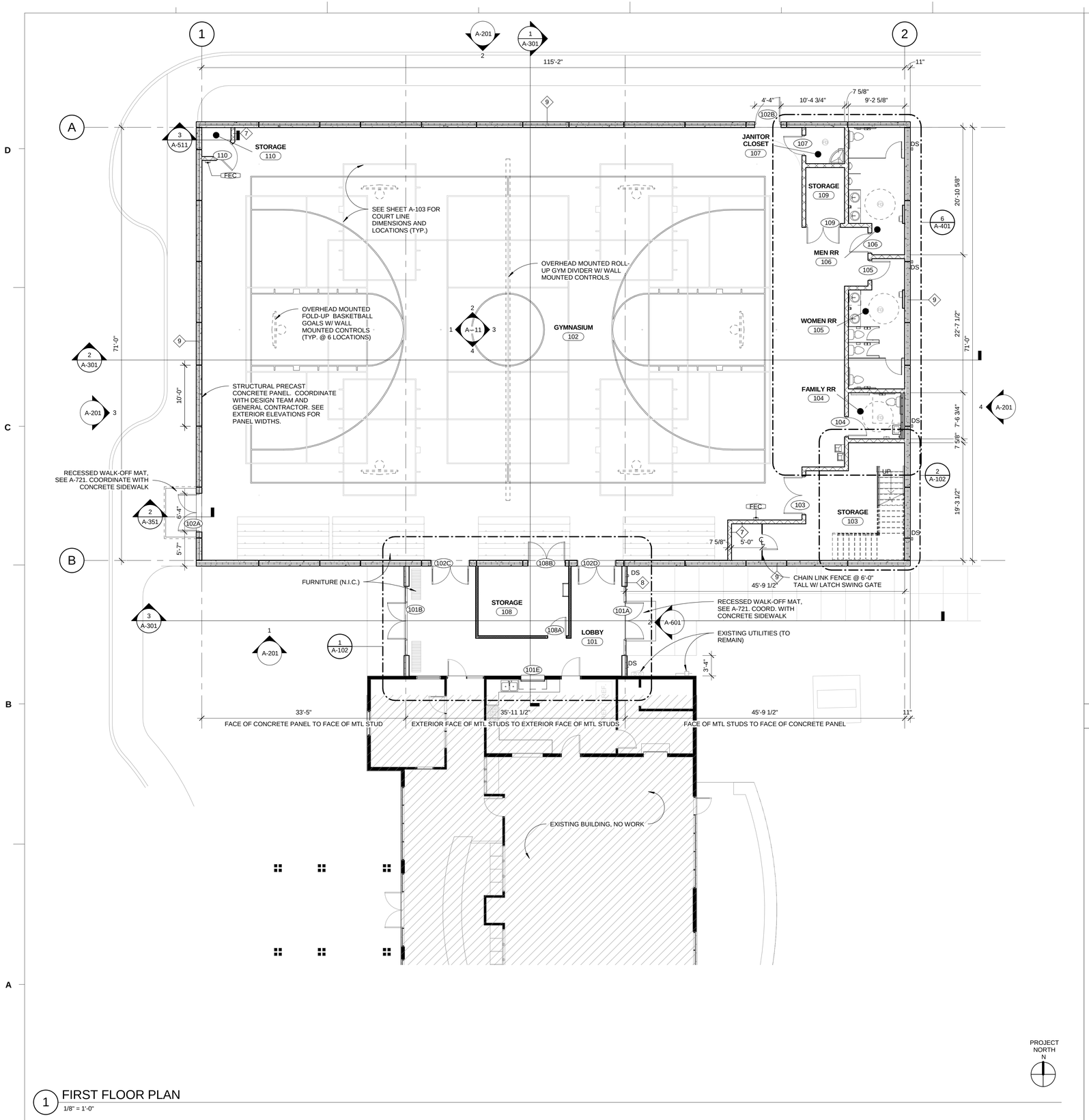
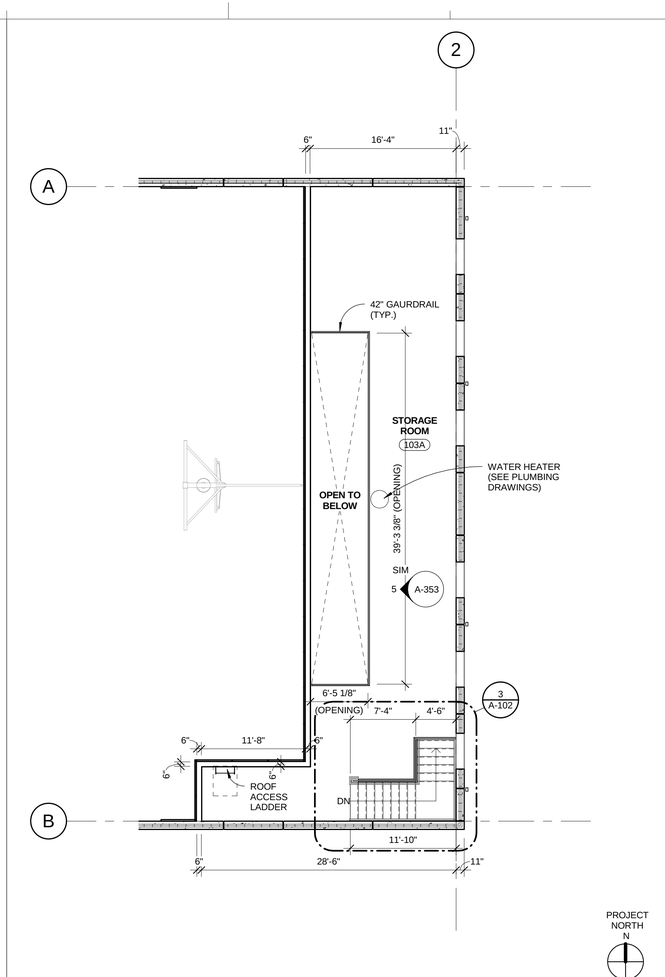


1 FIRST FLOOR PLAN
1/8" = 1'-0"



2 SECOND FLOOR STORAGE ROOM
1/8" = 1'-0"

FLOOR PLAN SHEET NOTES

1. EXTERIOR DIMENSION AT PRECAST ARE TO FACE OF PRECAST.
2. INTERIOR DIMENSIONS INDICATED ARE TO (FACE OF CONCRETE WALL, FACE OF STUD, AND CENTERLINES OF COLUMNS, UNO.
3. LOCATE DOOR OPENINGS 4" FROM NEAREST PERPENDICULAR WALL.
4. FIRE AND SOUND RATED WALLS/PARTITIONS TO BE CONSTRUCTED TIGHT TO STRUCTURE, PIPING, DUCTWORK AND OTHER PENETRATIONS. ALL WORK IS TO BE BRACED TO STRUCTURE ABOVE.
5. INSTALL BLOCKING IN PARTITIONS FOR CASEWORK, WALL MOUNTED EQUIPMENT, TRIM AND RELATED CONSTRUCTION AS INDICATED IN THE SPECIFICATIONS.
6. SEE STRUCTURAL DRAWINGS FOR SLAB DEPRESSIONS AND CUTOUTS.
7. PROVIDE WOOD BLOCKING IN ALL WALLS WHERE EQUIPMENT IS TO BE MOUNTED SUCH AS TVS, MONITORS, FLAT SCREENS, PROJECTION SCREENS, ETC. COORDINATE LOCATION W/ ARCHITECT & OWNER BEFORE GYP. BD. IS INSTALLED IN THE FIELD.
8. THE GENERAL CONTRACTOR AND HIS REPRESENTATIVES SHALL BE ADVISED THAT ALL AREAS OTHER THAN THE AREAS DESIGNATED FOR REQUIRING WORK SHALL BE "OFF LIMITS". THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING HIS EMPLOYEES WITH TOILET FACILITIES UNLESS INSTRUCTED OTHERWISE.

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FLOOR PLANS

A-101

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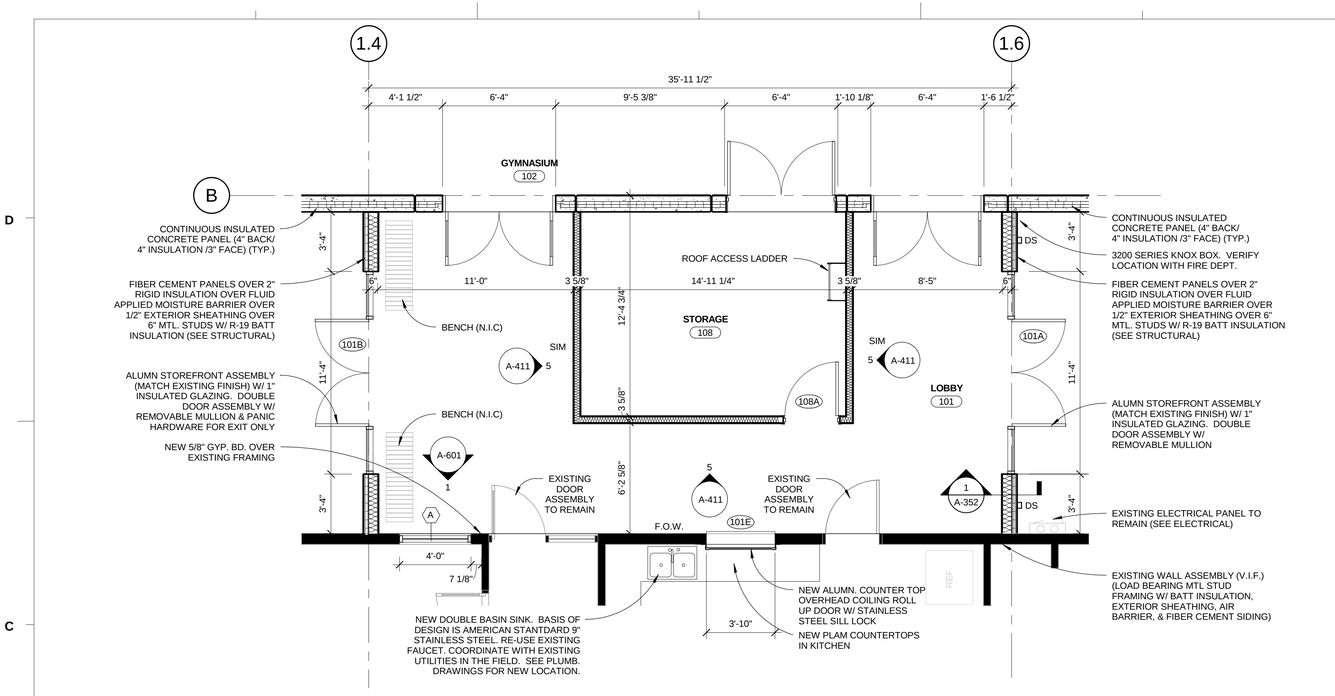
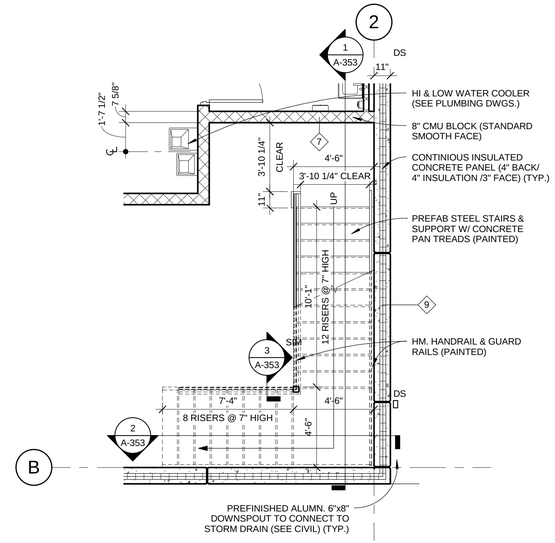
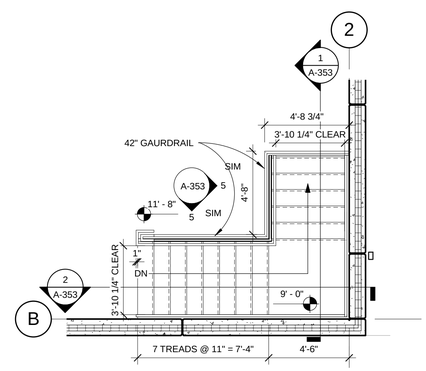


1 ENLARGED PLAN - CONNECTOR LOBBY
1/4" = 1'-0"



2 ENLARGED PLAN - STAIRS
1/4" = 1'-0"



3 ENLARGED PLAN - STAIRS (SECOND FLOOR)
1/4" = 1'-0"

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ENLARGED PLANS & MISC PLAN DETAILS

A-102

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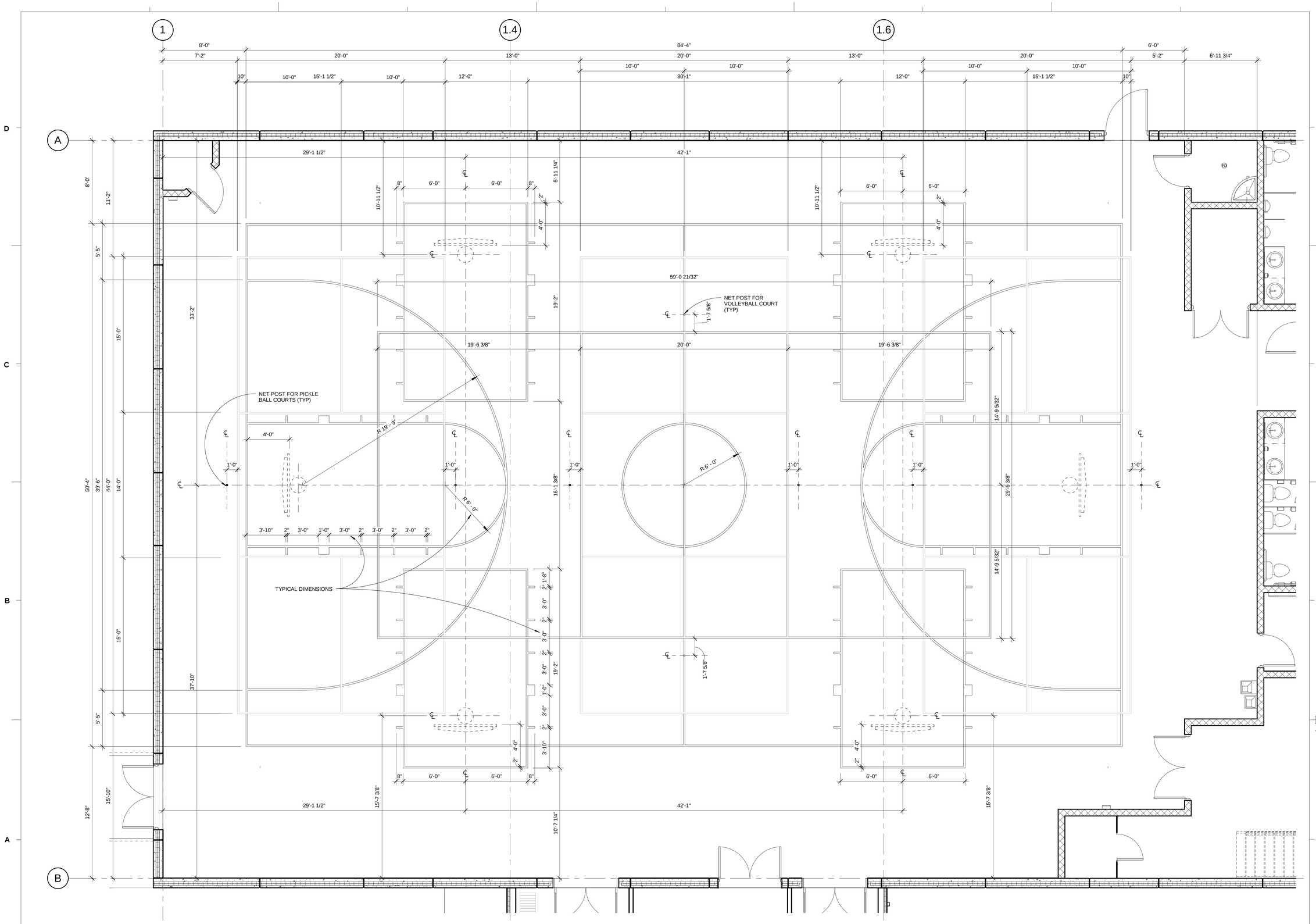

1 COURT DIMENSION PLAN

1/4" = 1'-0"

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COURT DIMENSION PLAN

A-103

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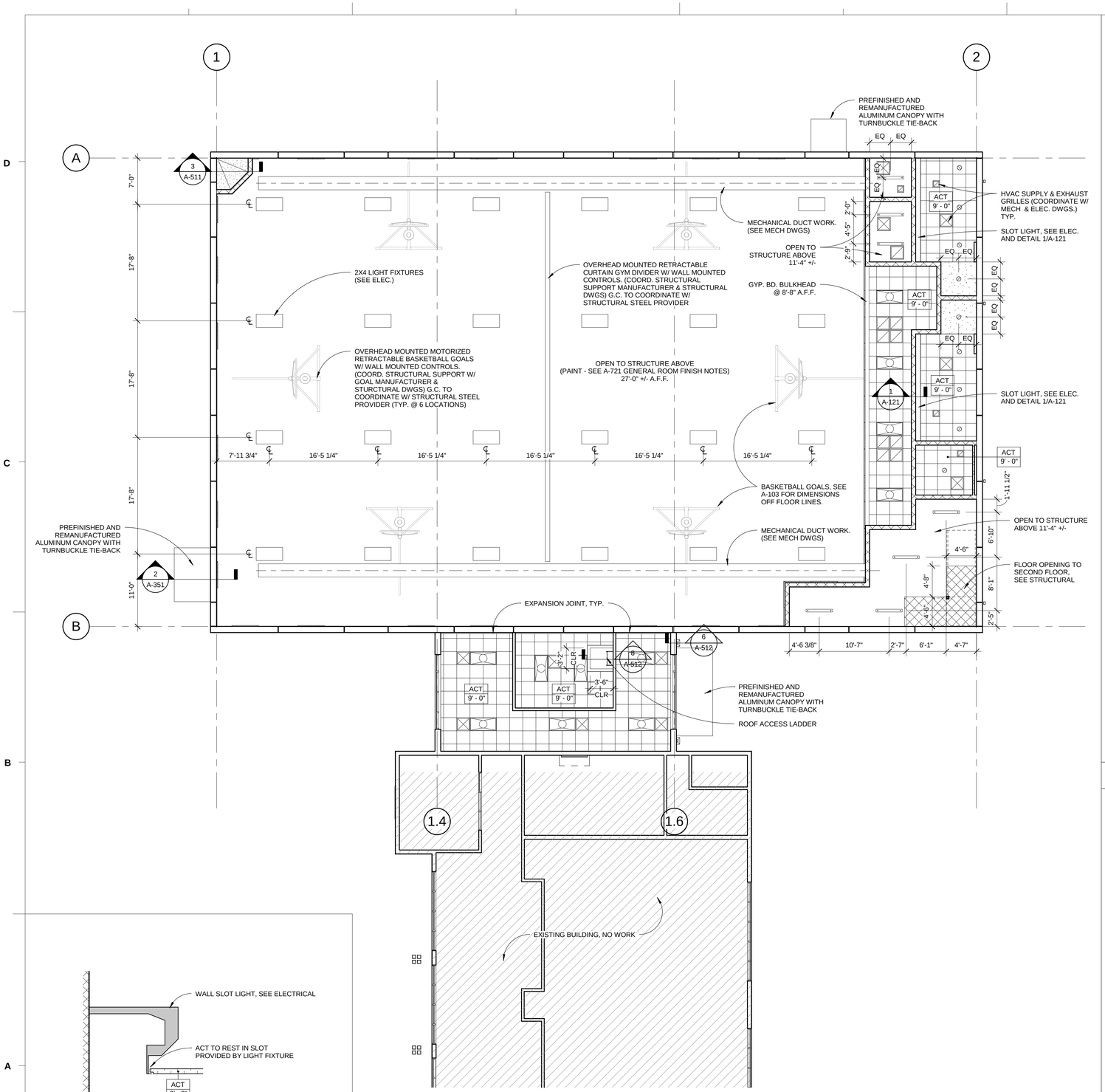
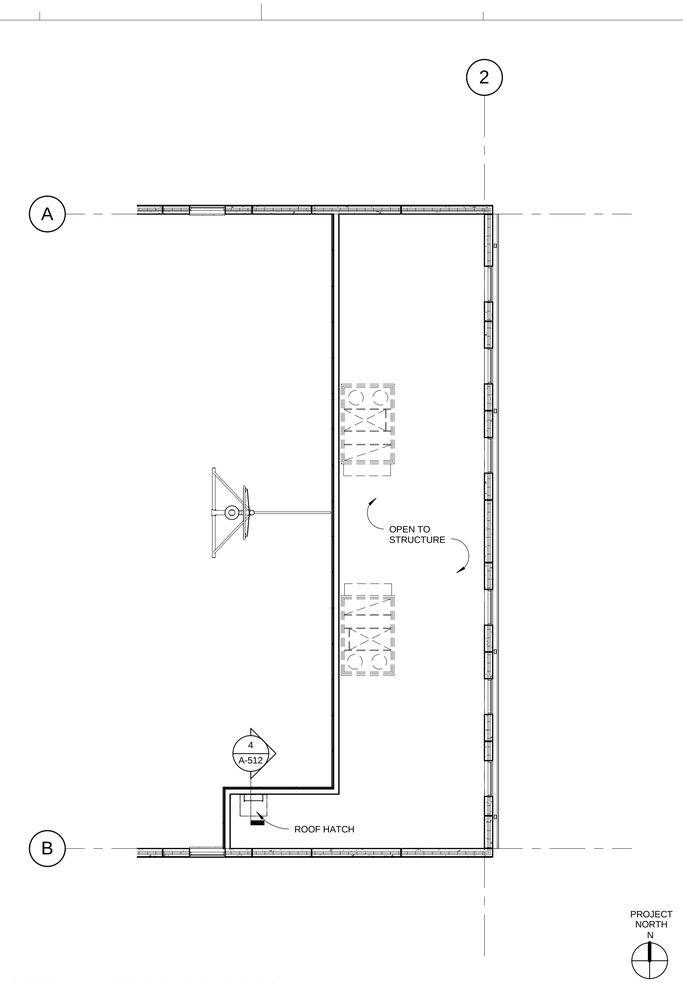


1 CEILING AT WALL SLOT LIGHTING
1 1/2" = 1'-0"



3 SECOND FLOOR STORAGE RCP
1/8" = 1'-0"

REFLECTED CEILING PLAN SHEET NOTES

1. PERIMETER TRACK FOR ALL ACOUSTICAL CEILINGS GRIDS TO BE 2" WIDE INSTALLED IN ACCORDANCE WITH IBC AND CISCA GUIDELINES.
2. DIMENSIONS LOCATED ON THE REFLECTED CEILING PLAN ARE TO FINISH FACE OF WALLS UNLESS NOTED OTHERWISE.
3. CEILING GRIDS/TILES TO BE CENTERED IN ALL ROOMS UNLESS NOTED OTHERWISE. PARTIAL TILES AT ROOM PERIMETERS SHALL NOT BE LESS THAN 6" IN EITHER DIMENSION.
4. ALL CEILINGS TO BE 9'-0" AFF, UNO. CEILING HEIGHTS SHOWN ON THE REFLECTED CEILING PLANS ARE NON-TYPICAL AND SPECIFIC TO THE AREA INDICATED. REFER TO INTERIOR ELEVATIONS FOR THE HEIGHTS OF SOFFITS ABOVE CASEWORK.
5. SEE ELECTRICAL, FIRE ALARM AND FIRE PROTECTION DRAWINGS FOR SPECIAL SYSTEMS, SMOKE DETECTORS, LIGHTING AND WALL MOUNTED FIXTURES NOT SHOWN ON THIS SHEET. COORDINATE LOCATIONS OF ALL FIXTURES NOT INDICATED WITH ELECTRICAL ENGINEER.
6. LIGHT FIXTURES AND MECHANICAL DIFFUSERS ARE SHOWN FOR POSITIONING IN FINISH CEILING SYSTEM. COORDINATE WITH MECHANICAL AND ELECTRICAL DRAWINGS FOR FIXTURE TYPES, MECHANICAL DIFFUSERS, WALL MOUNTED FIXTURES AND INSTALLATION OF FIXTURES IN SPACES WITHOUT CEILINGS. (LIGHTING AND HVAC DIFFUSERS ARE SHOWN FOR COORDINATION ONLY - SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR SPECIFIC INFORMATION).
7. EXTEND PERIMETER WALLS AND FINISH TO STRUCTURE ABOVE AT EXPOSED STRUCTURE AREAS. PAINT ALL EXPOSED DUCTWORK, PIPING, HANGERS, ETC…
8. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR MOUNTING LOCATIONS OF ITEMS WHERE NO CEILING IS INDICATED.
9. CENTER LIGHTS, DIFFUSERS, EXIT SIGNS SMOKE DETECTORS, SPEAKERS, GENERAL ALARM SPEAKERS/STROBES & MISC DEVICES IN CEILING TILES WHERE THEY ARE LOCATED. ALIGN MULTIPLE ITEM CENTER OR EDGES.
10. LOCATE MECHANICAL GRILLES AND DIFFUSERS SHOWN IN CORNERS OR NEAR WALL TO 12" OFF WALLS, UNO.
11. INSTALL ACCESS PANELS IN GYPSUM BOARD CEILINGS AT DUCT DAMPER CONTROLS, DUCT MOUNTED SMOKE DETECTORS, MANUAL DUCT CONTROLS, ETC.
12. ALL SINGLE LIGHT FIXTURES SHALL BE CENTERED IN THE CEILING WITHIN THEY OCCUR.
13. LOCATE SPRINKLER HEADS IN THE CENTER ZONE OF THE CEILING TILE. ALIGN CORRIDOR SPRINKLER HEADS IN THE SAME LINE PARALLEL TO THE WALL WITHIN EACH SPECIFIC CEILING CONSTRUCTION.
14. SPRINKLER HEADS, OTHER THAN CONCEALED, SHALL BE FULLY RECESSED (CENTER IN CEILING TILE).
15. ALL GWB CEILINGS TO RECEIVE CONCEALED SPRINKLER HEADS.
16. ALL GYP. BD. CEILING AND BULKHEADS SHALL BE PAINTED. SEE INTERIOR FINISH SCHEDULE FOR COLOR AND FINISH.

RCP LEGEND

- 2X2 LAY-IN HIGH IMPACT CEILING TILE
- GYPSUM BOARD-PAINTED (SEE A-721)
- EXPOSED STRUCTURE - PAINTED (SEE A-721)
- 1'-0" AFF — HEIGHT (FEET, INCHES) ABOVE FINISHED FLOOR, 9'-0" U.N.O.
- 1 X 4 FLUORESCENT FIXTURE
- 2 X 4 FLUORESCENT FIXTURE
- 2 X 2 FLUORESCENT FIXTURE
- INCANDESCENT FIXTURE
- SUPPLY AIR DIFFUSER
- RETURN AIR DIFFUSER
- EXHAUST FAN

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REFLECTED CEILING PLANS

A-121

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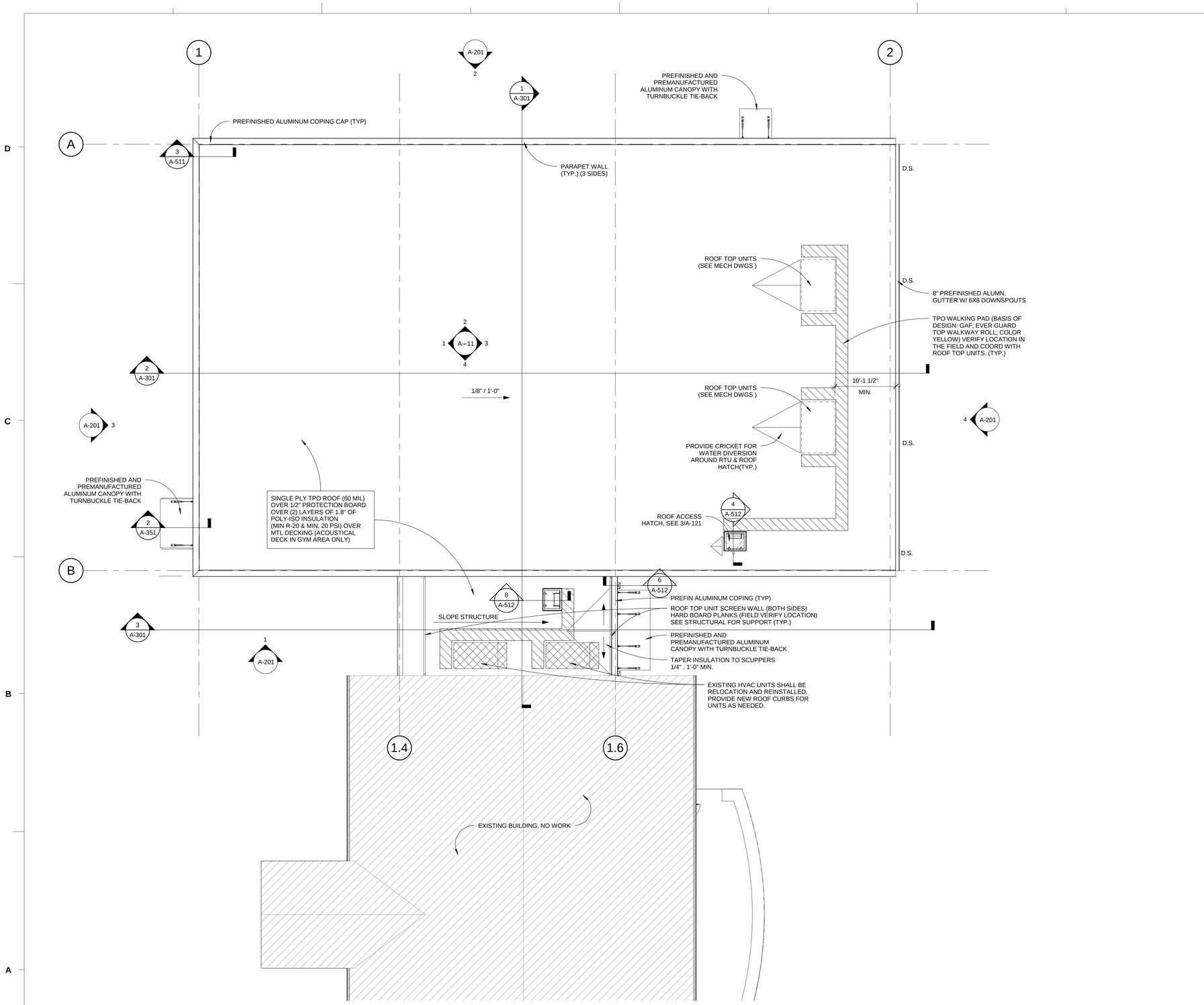

1 ROOF PLAN
1/8" = 1'-0"

ROOF PLAN SHEET NOTES

1. ROOF SURFACE SHOWN IS TPO MEMBRANE, UNO.
2. LOCATIONS AND SIZES OF MECHANICAL EQUIPMENT ARE APPROXIMATE. SEE STRUCTURAL AND MECHANICAL DRAWINGS FOR ACTUAL LOCATIONS.
3. SEE PLUMBING DRAWINGS FOR VENTS THROUGH ROOF LOCATIONS.
4. SEE STRUCTURAL DRAWINGS FOR FASTENING REQUIREMENTS.
5. SLOPE ALL LOW SLOPED ROOFS TO ROOF DRAINS WITH MINIMUM SLOPE OF 1/4" PER FOOT. INSTALL ROOF DRAIN IN SQUARE RECESSED SUMP 18" SQUARE.
6. PROVIDE CRICKETS AT ALL CURBS AND EQUIPMENT RAILS SET PERPENDICULAR TO ROOF SLOPE WHICH ARE GREATER THAN 24" WIDE.
7. SLOPE ALL COPINGS BACK TO ROOF U.N.O.
8. COPING CORNERS TO BE PREFABRICATED PIECES WITH EQUAL RETURNS A MINIMUM OF 18" IN LENGTH. TOP HORIZONTAL JOINTS TO BE STANDING SEAM, VERTICAL JOINTS TO BE FLAT JOINTS.
9. WOOD BLOCKING SHOWN IN ROOF DETAILING SHALL BE PRESERVATIVE TREATED. USE SUITABLE FASTENERS WITH THE PRESERVATIVE TREATED WOOD.
10. EXTEND ALL PENETRATIONS, CURBS, AND COMPONENTS A MINIMUM OF 8" ABOVE THE ROOF SURFACE. PROVIDE 12" CLEAR DISTANCE BETWEEN PENETRATIONS AND TO ANY VERTICAL SURFACE.
11. IF NOT DETAILED, APPLY MOST STRINGENT CONDITION OF NRCA AND SMACNA (CURRENT EDITIONS) STANDARDS FOR ROOF DETAIL CONDITIONS.

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ROOF PLAN

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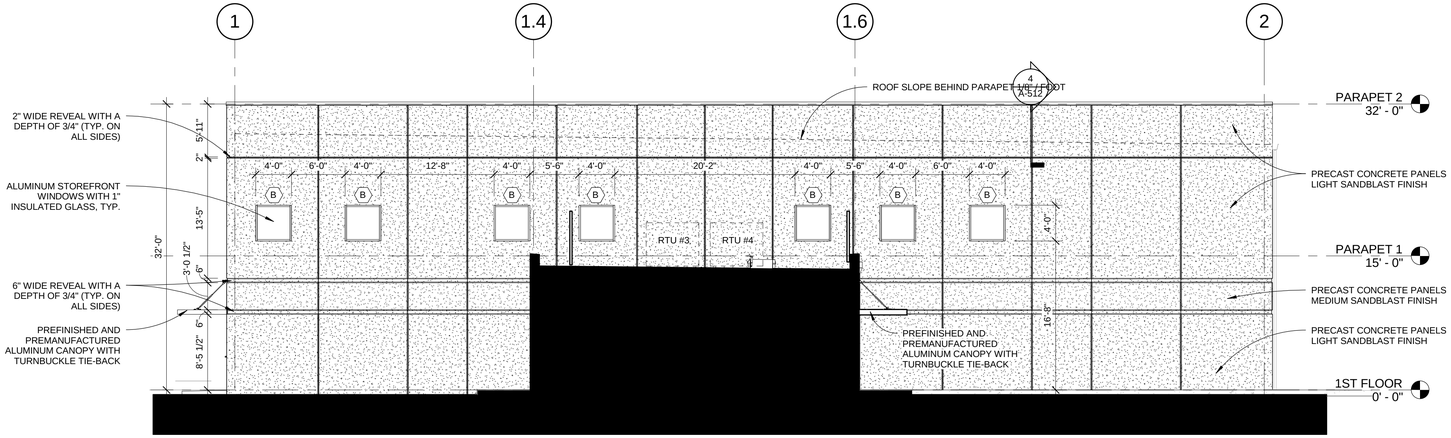
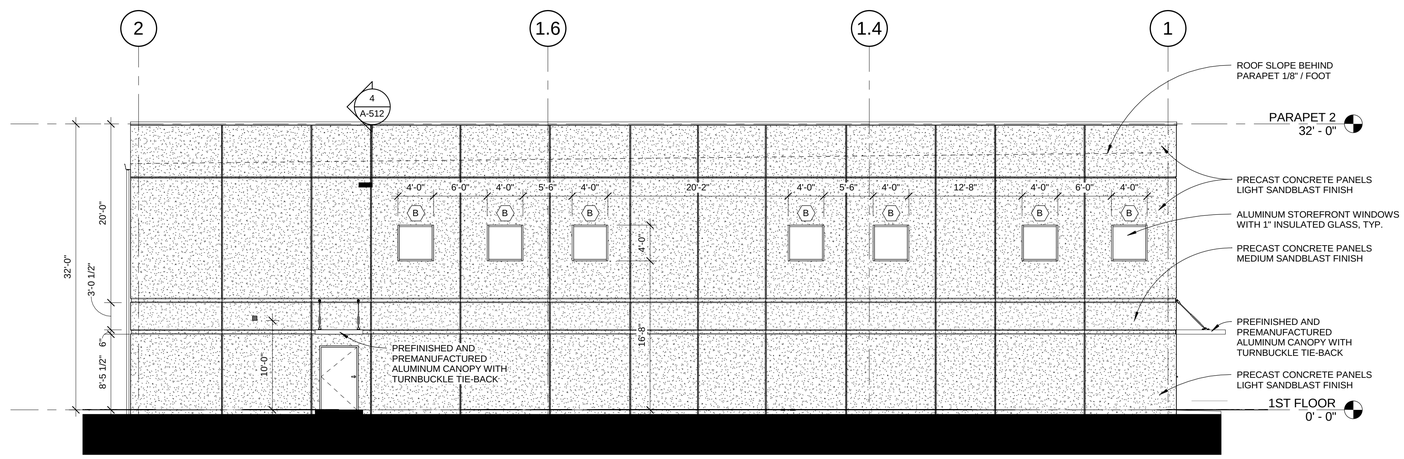
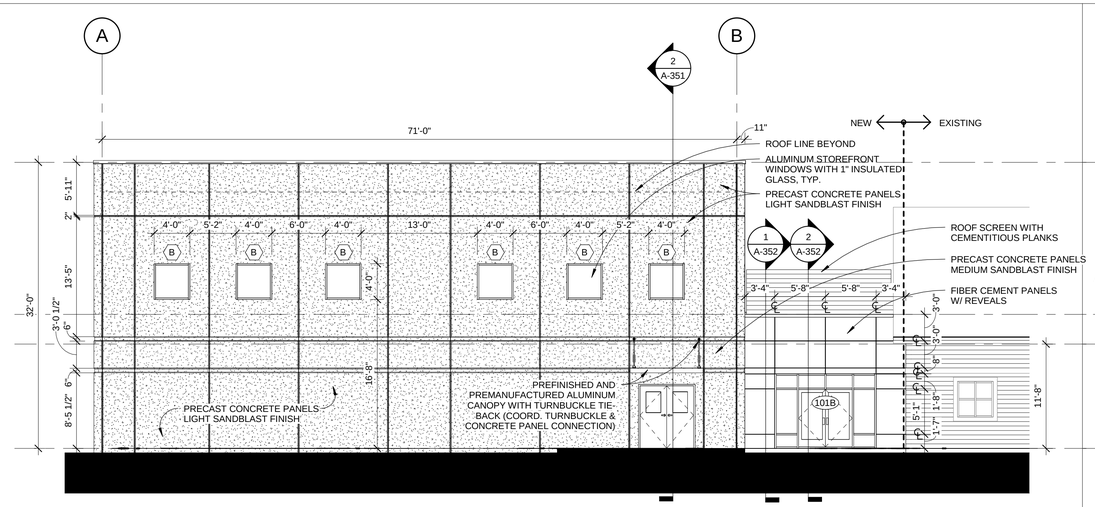
NOTE:
ALL CONCRETE PANEL JOINTS SHALL BE IN THE VERTICAL DIRECTION (SEALANT SHALL BE INSTALLED A MIN. OF 3/4" BACK FROM THE FACE OF THE CONCRETE PANEL) TYP.



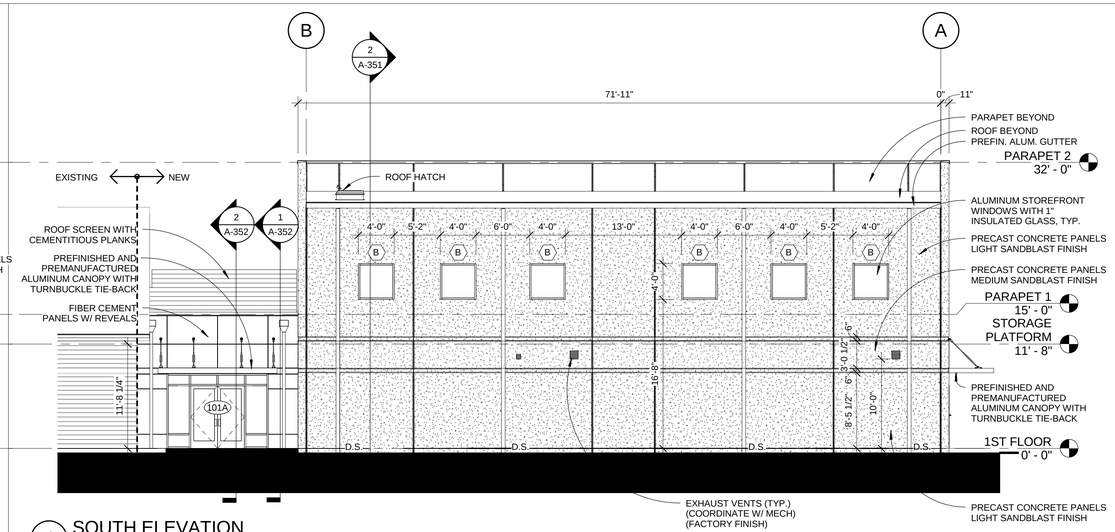
1 WEST ELEVATION
1/8" = 1'-0"



2 EAST ELEVATION
1/8" = 1'-0"



3 NORTH ELEVATION
1/8" = 1'-0"



4 SOUTH ELEVATION
1/8" = 1'-0"

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EXTERIOR ELEVATIONS

A-201

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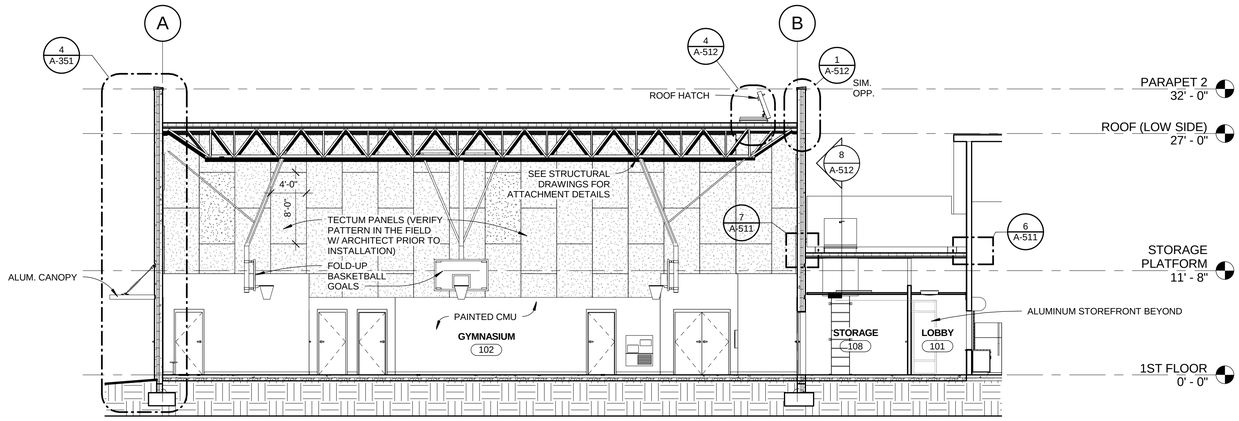
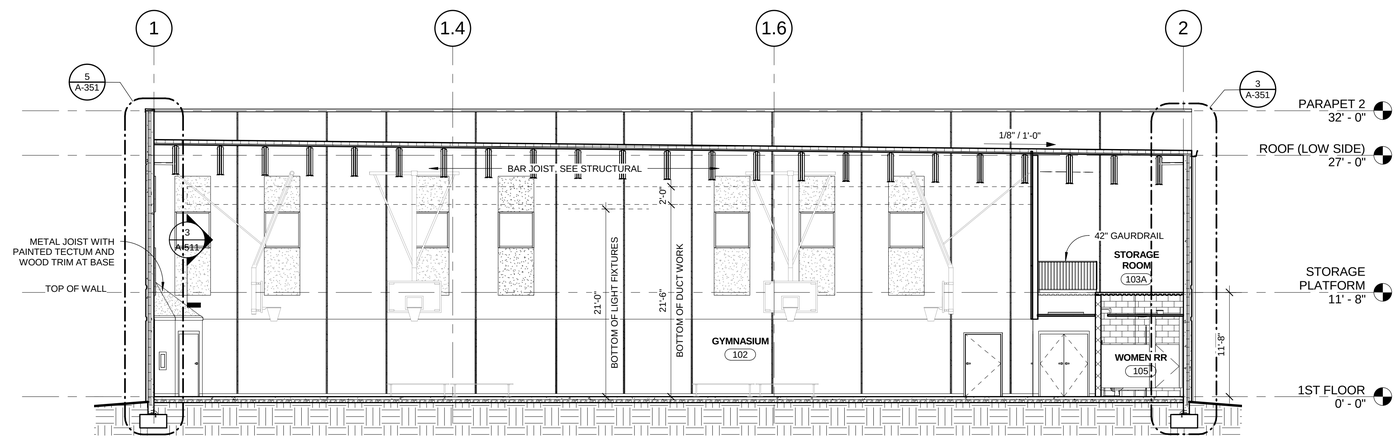


1 BUILDING SECTION 1
1/8" = 1'-0"



2 BUILDING SECTION 2
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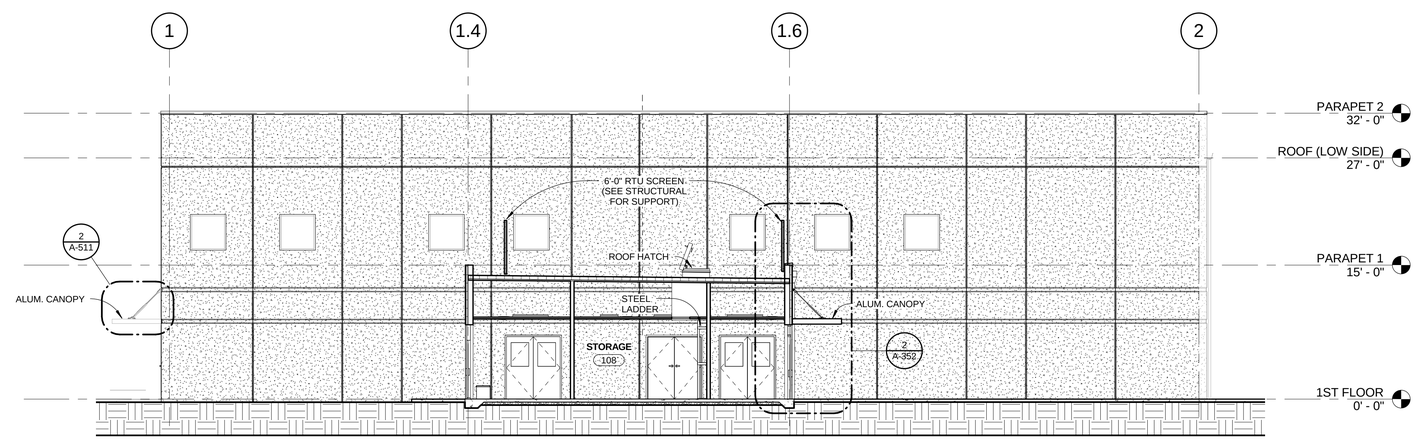

3 BUILDING SECTION 3
1/8" = 1'-0"

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BUILDING SECTIONS

A-301

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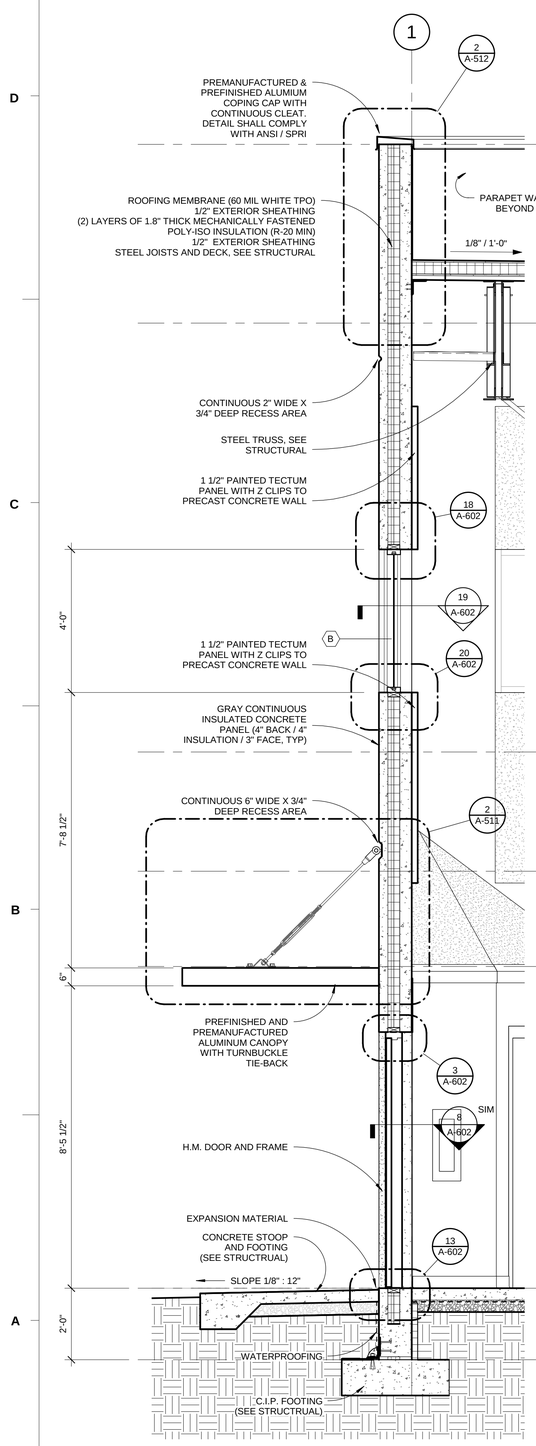
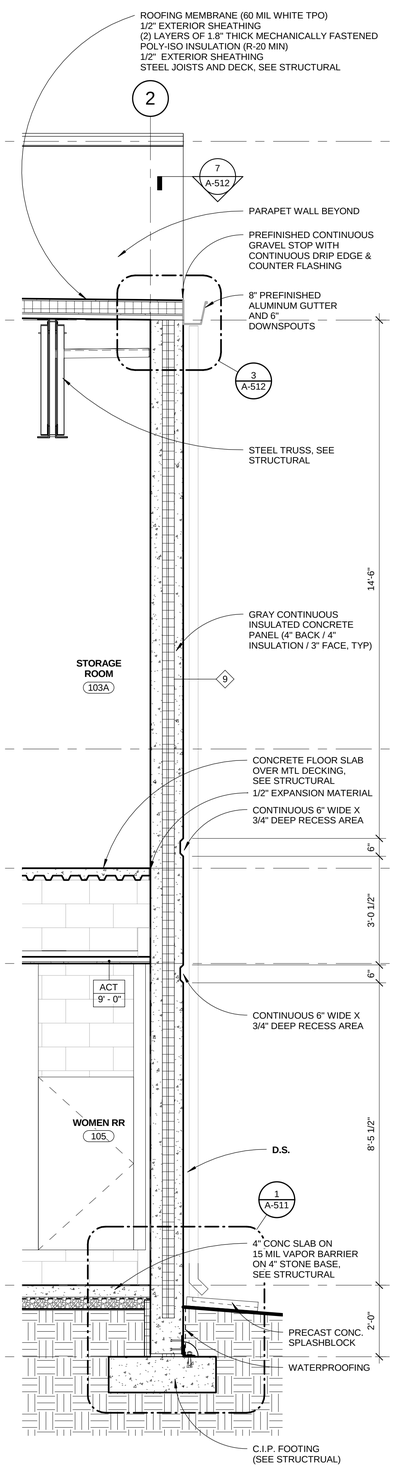
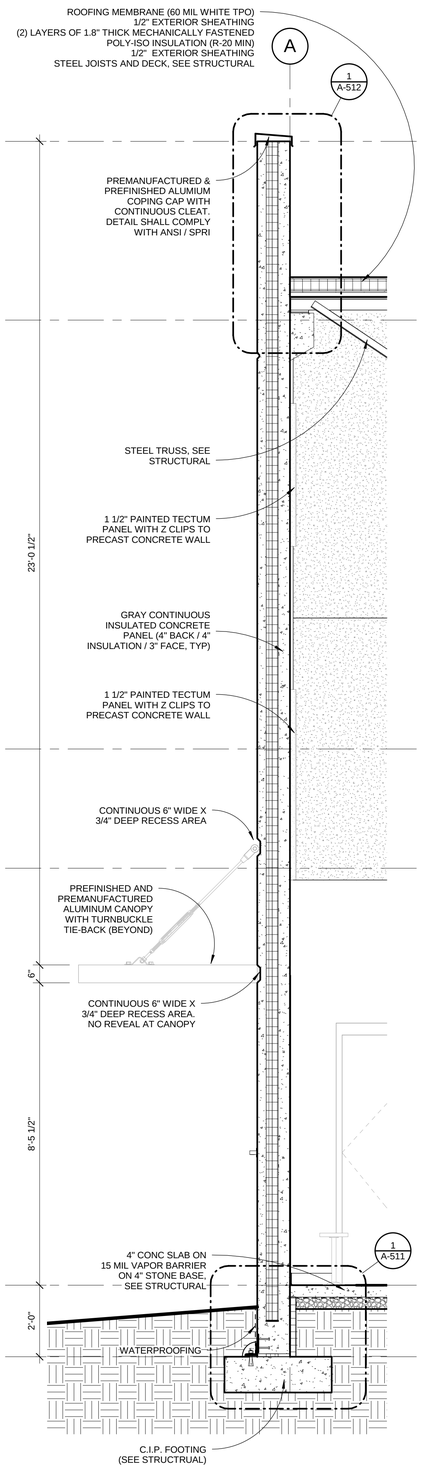


2 WALLS SECTION
1/2" = 1'-0"



3 WALL SECTION
1/2" = 1'-0"



4 WALL SECTION
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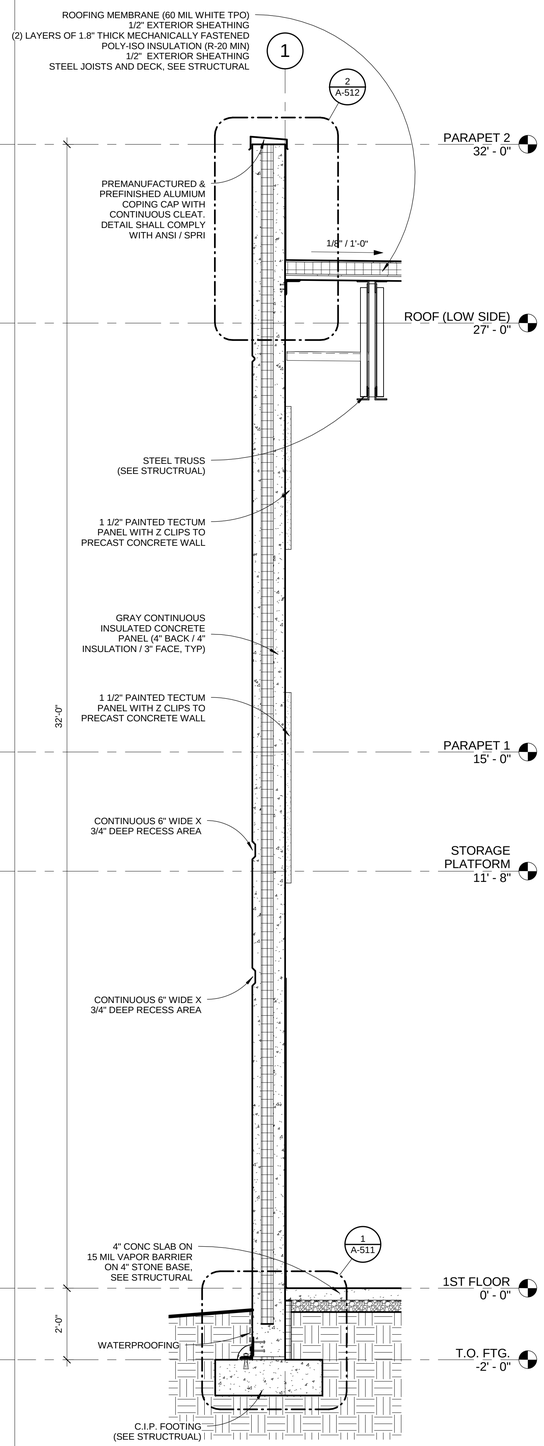

5 WALL SECTION
1/2" = 1'-0"

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WALL SECTIONS

A-351

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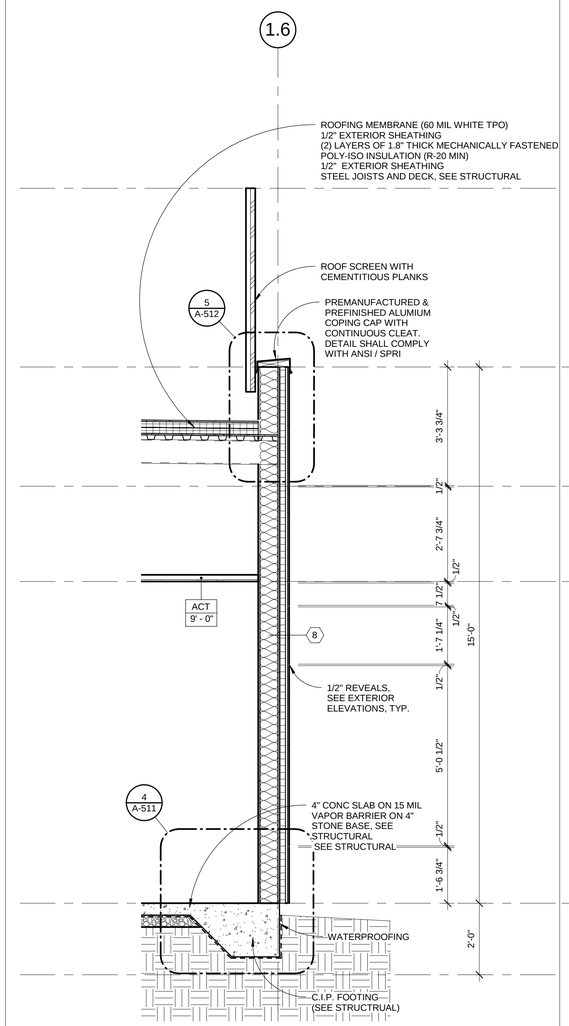
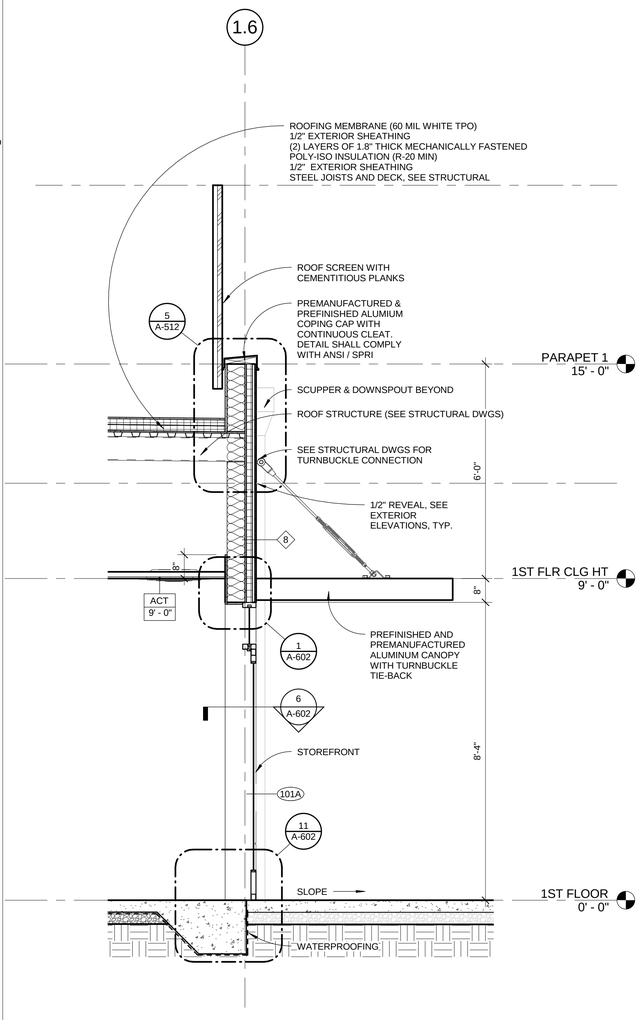


1 WALL SECTION
1/2" = 1'-0"



2 WALL SECTION
1/2" = 1'-0"

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WALL SECTIONS

A-352

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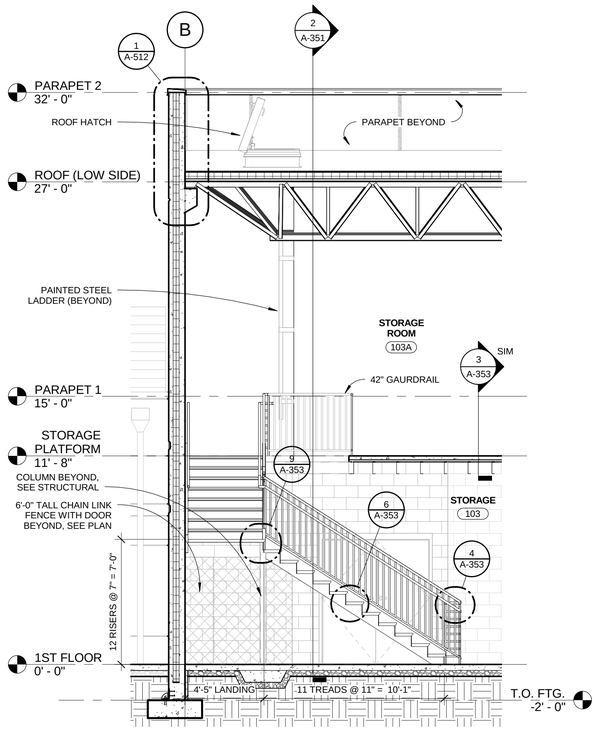
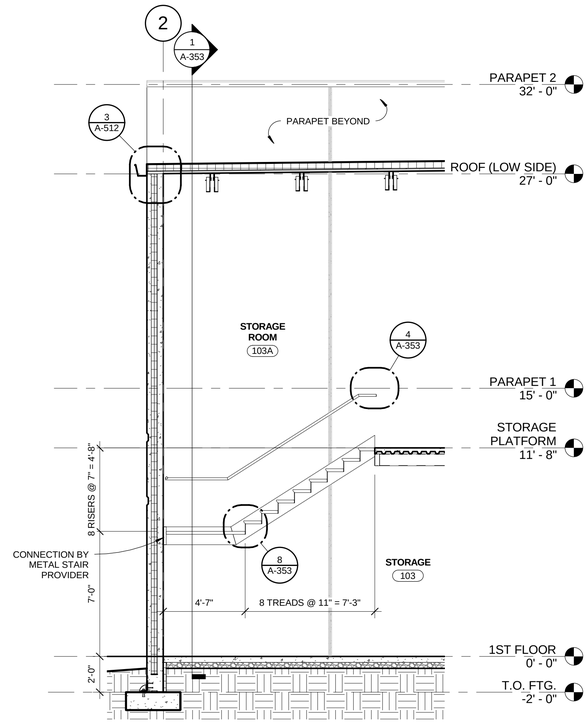
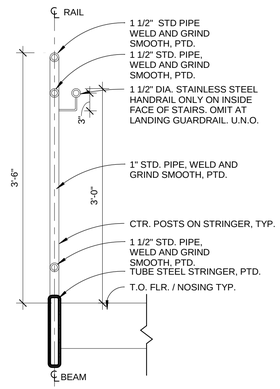


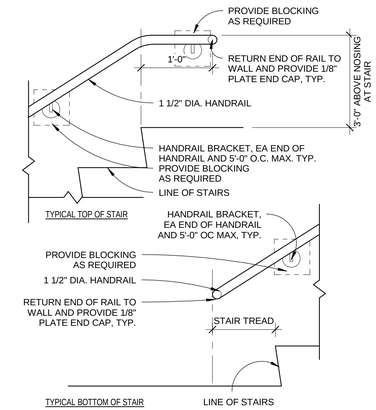
1 STAIR SECTION 1
1/4" = 1'-0"



2 STAIR SECTION 2
1/4" = 1'-0"

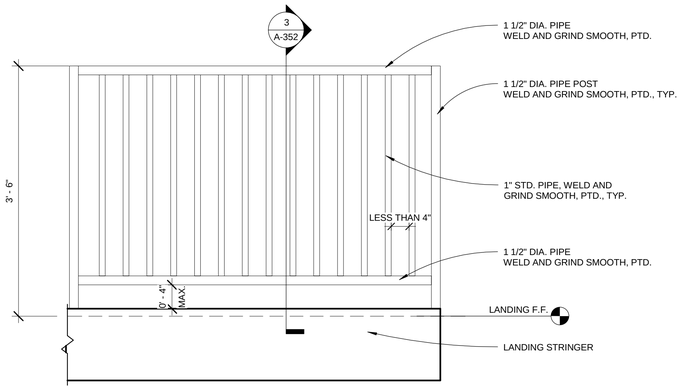


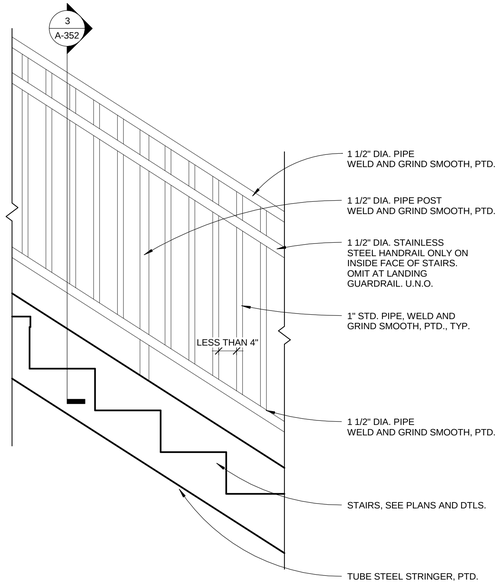
3 GUARDRAIL SECTION DETAIL
1" = 1'-0"



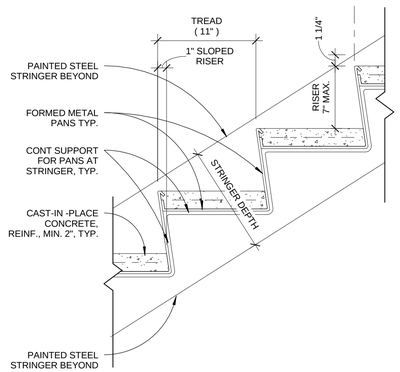
NOTES:
1. DIMENSIONS RELATED TO HANDRAILS APPLY TO ALL STAIRS.
2. HANDRAILS AND BRACKETS SHALL BE STAINLESS STEEL.
3. PROVIDE 1 1/2" CLEAR BETWEEN HANDRAIL AND WALLS/POSTS AND MAX. 3 1/2" PROJECTION INTO REQUIRED STAIR WIDTH.

4 TYP HANDRAIL WALL MOUNTED DETAIL
1" = 1'-0"

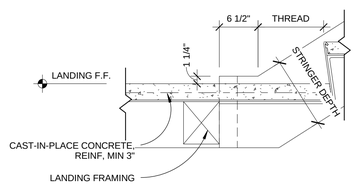




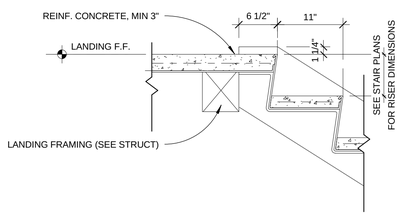
5 GUARDRAIL ELEVATION AT STORAGE 103
1" = 1'-0"



6 TYP. STAIR TREAD DETAIL
1 1/2" = 1'-0"



8 TYP. BOTTOM LANDING @ STAIR
1" = 1'-0"



9 TYP. TOP LANDING @ STAIR
1" = 1'-0"

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STAIR SECTIONS AND DETAILS

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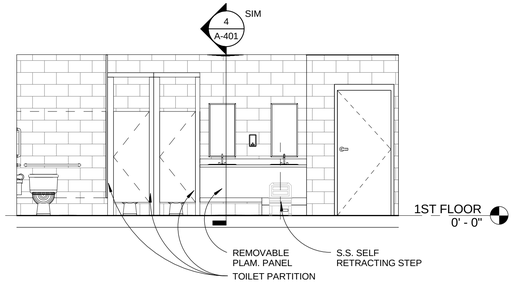
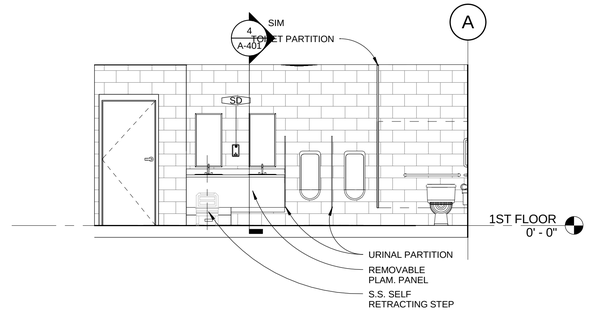
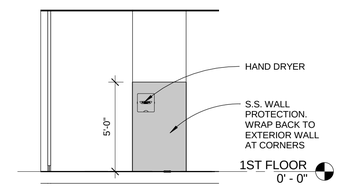


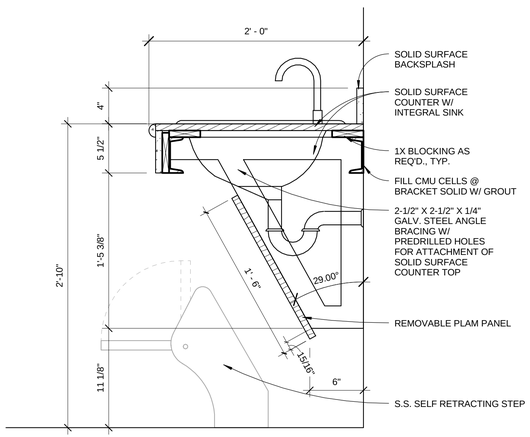
1 WOMEN RR ELEVATION
1/4" = 1'-0"



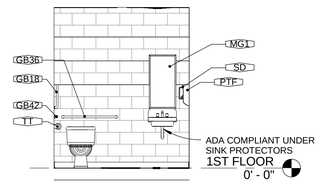
2 MEN RR ELEVATION
1/4" = 1'-0"



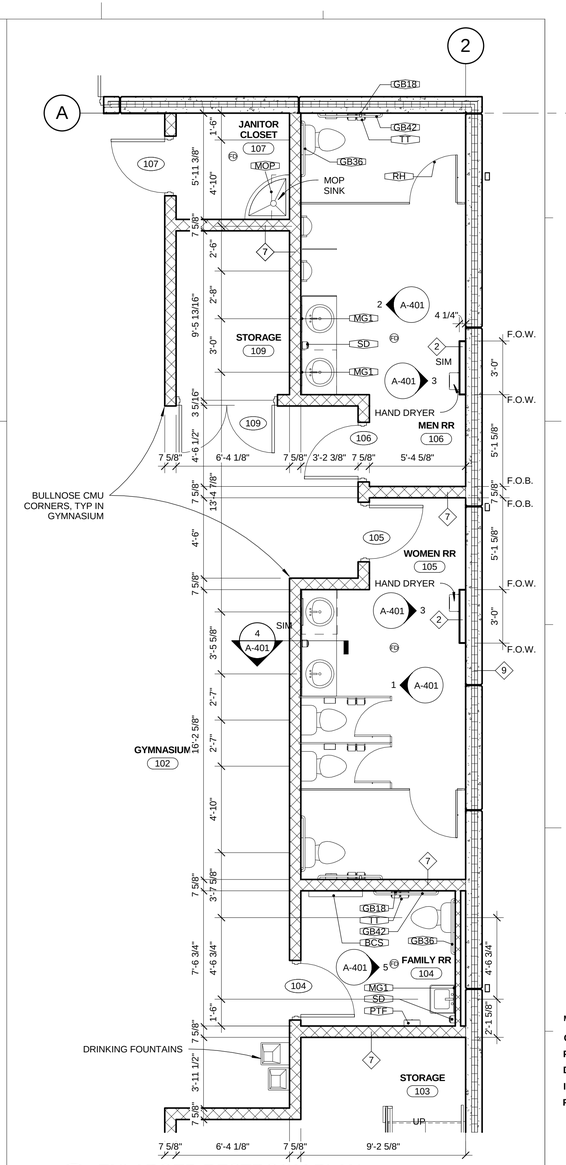
3 WOMEN RR ELEVATION @ HAND DRYER
1/4" = 1'-0"



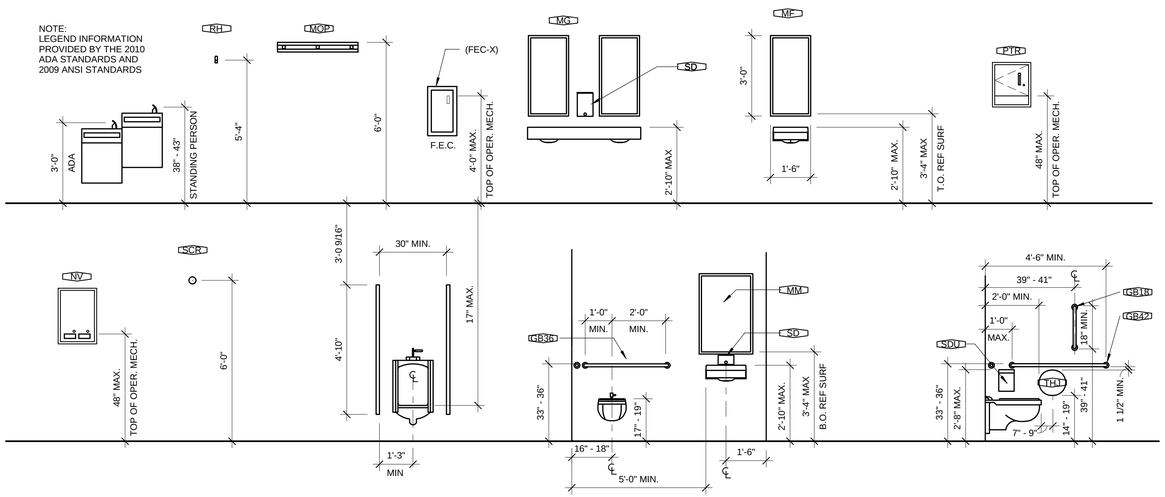
4 VANITY DETAIL
1 1/2" = 1'-0"



5 FAMILY RR ELEVATION
1/4" = 1'-0"



6 ENLARGED RESTROOM PLAN
1/4" = 1'-0"



TYPICAL MOUNTING HEIGHTS
3/8" = 1'-0"

ACCESSORY SCHEDULE

KEY	ACCESSORY DESCRIPTION	BOBRICK NO. *	MOUNTING HEIGHT	QUANTITY
TT	SURFACE-MOUNTED MULTI-ROLL TISSUE DISPENSER (BY OWNER)	--	BOTTOM OF UNIT - 1'-6"	5
SDU	SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL	B-270	TOP OF UNIT - 2'-5"	3
BCS	SURFACE-MOUNTED BABY CHANGING STATION	KB110-SSWM	TOP OF UNIT - 4'-0"	1
PTF	SURFACE-MOUNTED PAPER TOWEL DISPENSER (BY OWNER)	--	TOP OF UNIT - 4'-6" - 5'-10"	3
MG1	GLASS MIRROR WITH STAINLESS STEEL ANGLE FRAME	B-290 1836	BOTTOM OF UNIT - 3'-4"	5
SD	SURFACE-MOUNTED SOAP DISPENSER (BY OWNER)	--	BOTTOM OF UNIT - 3'-6"	3
GB18	1 1/2" DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE	B-6806 x 18	CENTER OF UNIT - 3'-3"	3
GB36	1 1/2" DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE	B-6806 x 36	CENTER OF UNIT - 3'-0"	3
GB42	1 1/2" DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE	B-6806 x 42	CENTER OF UNIT - 3'-0"	3
RH	STAINLESS STEEL ROBE HOOK	B-233	CENTER OF UNIT - 3'-2" - 4'-0"	5
MOP	UTILITY SHELF WITH MOP / BROOM HOLDERS AND RAG HOOKS	B-224	TOP OF UNIT - 5'-0"	1

* CONTRACTOR TO PROVIDE BOBRICK ACCESSORY AS NOTED OR ACCEPTED EQUAL

Greenville County

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: DO
CHECKED BY: PDM/WSW

ENLARGED BATHROOM PLANS

A-401

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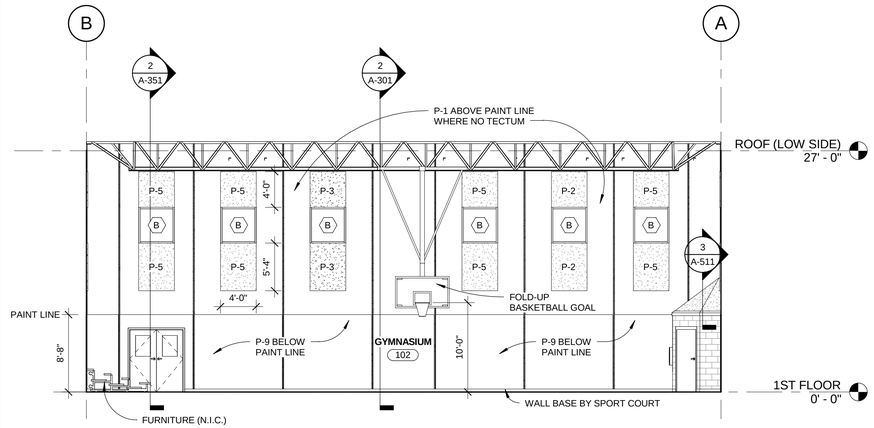
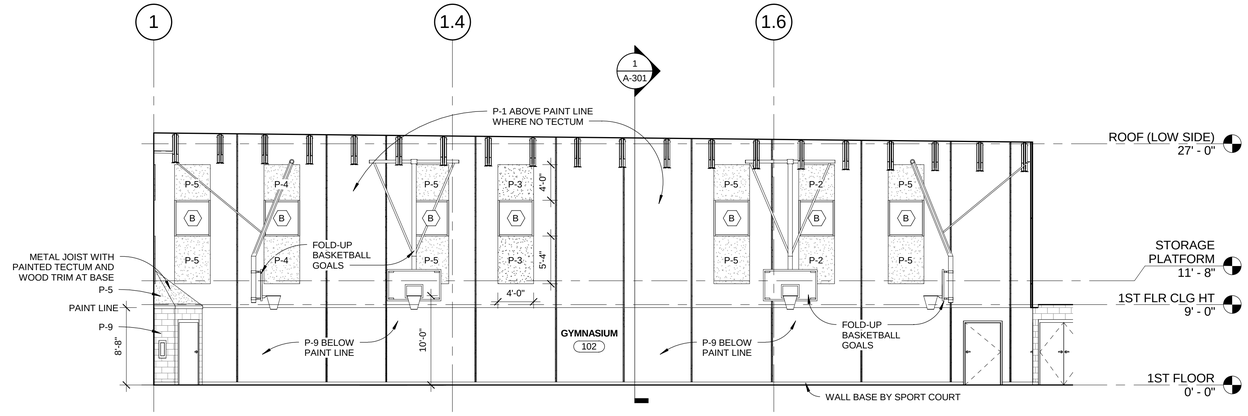
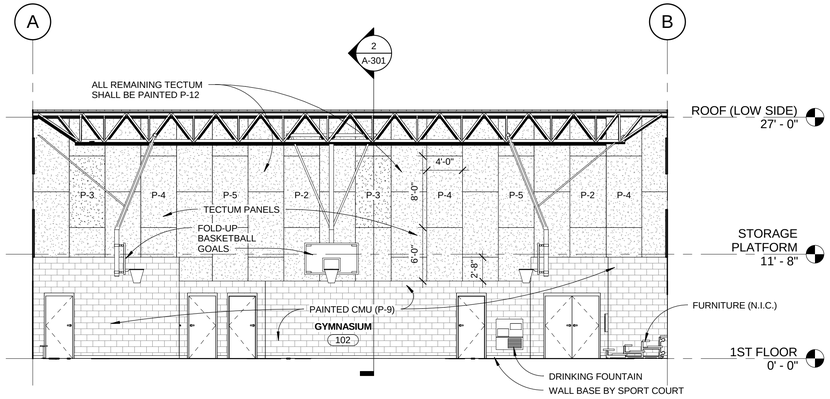


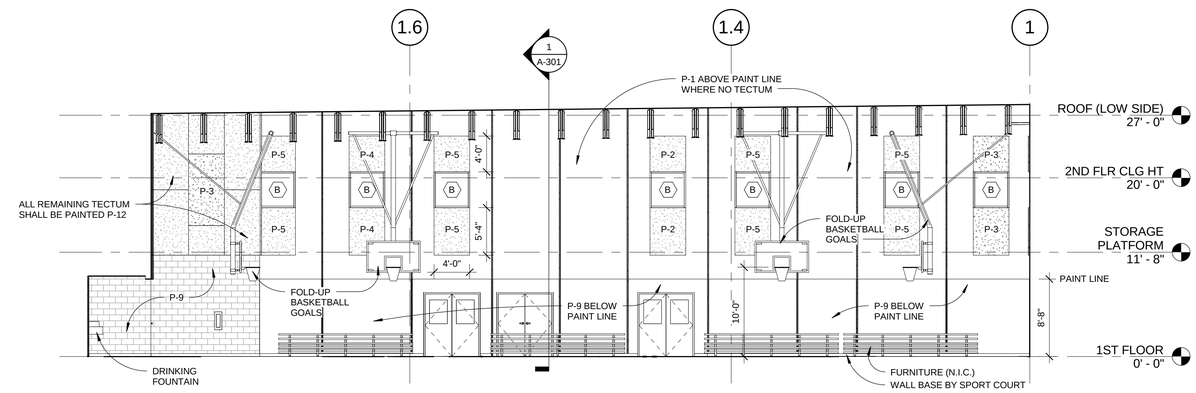
1 INTERIOR ELEVATION - GYMNASIUM NORTH WALL
1/8" = 1'-0"



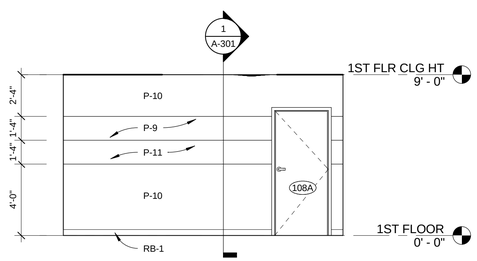
2 INTERIOR ELEVATION - GYMNASIUM EAST WALL
1/8" = 1'-0"



3 INTERIOR ELEVATION - GYMNASIUM SOUTH WALL
1/8" = 1'-0"



4 INTERIOR ELEVATION - GYMNASIUM WEST WALL
1/8" = 1'-0"



5 INTERIOR ELEVATION - LOBBY
1/4" = 1'-0"

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
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CHECKED BY: Checker

INTERIOR ELEVATIONS

A-411

PERMIT & CONSTRUCTION SET

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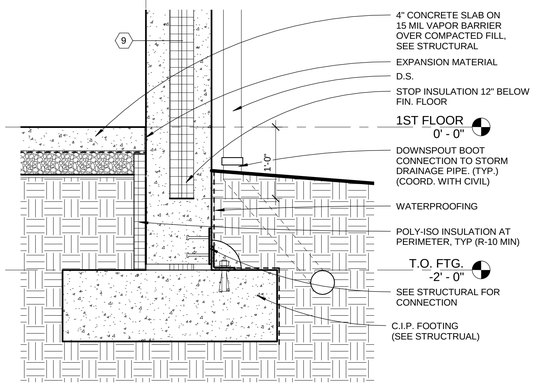
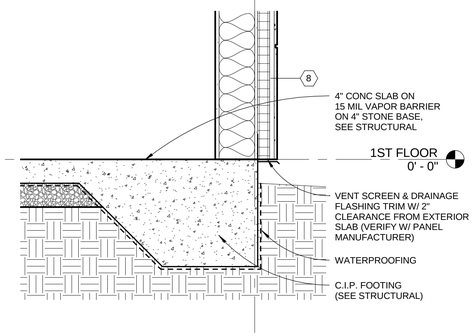
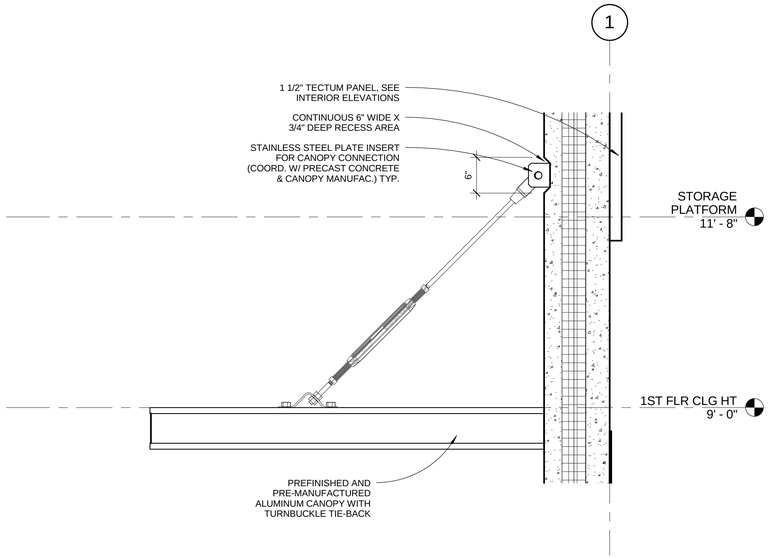


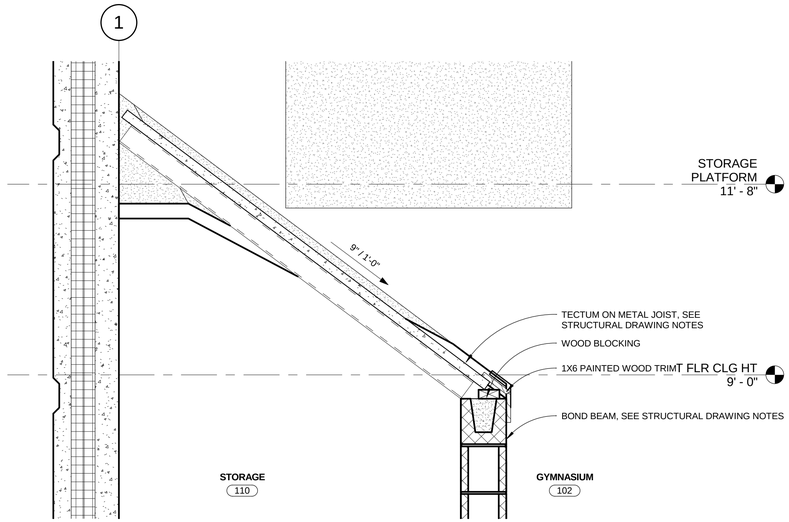
1 TYPICAL PRECAST WALL BASE
1" = 1'-0"



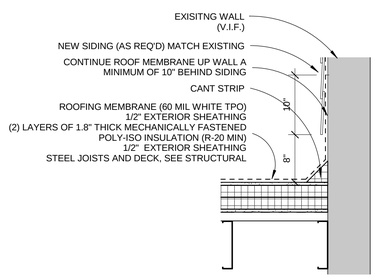
4 DETAIL @ LOBBY WALL BASE
1" = 1'-0"



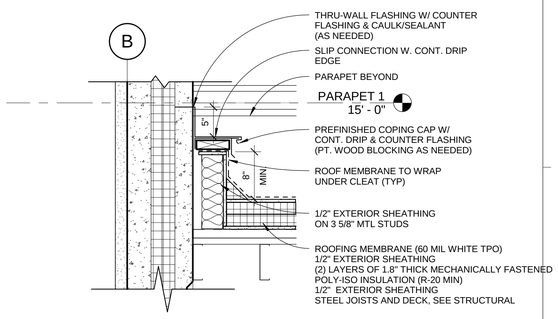
2 CANOPY DETAIL
1" = 1'-0"



3 DETAIL AT STORAGE 100 ROOF
1" = 1'-0"



6 DETAIL @ EXISTING BUILDING
1" = 1'-0"



7 DETAIL @ LOBBY TO GYM WALL
1" = 1'-0"

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: Author
CHECKED BY: Checker

SECTION DETAILS

A-511

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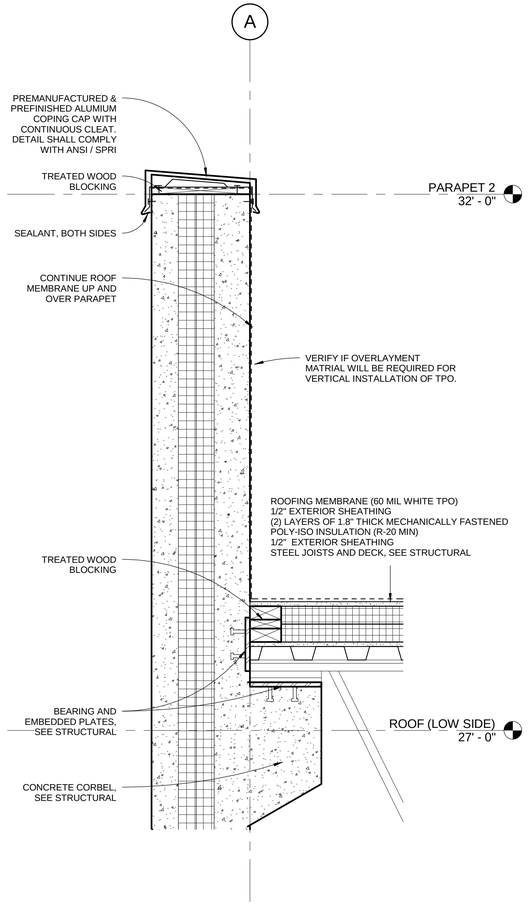
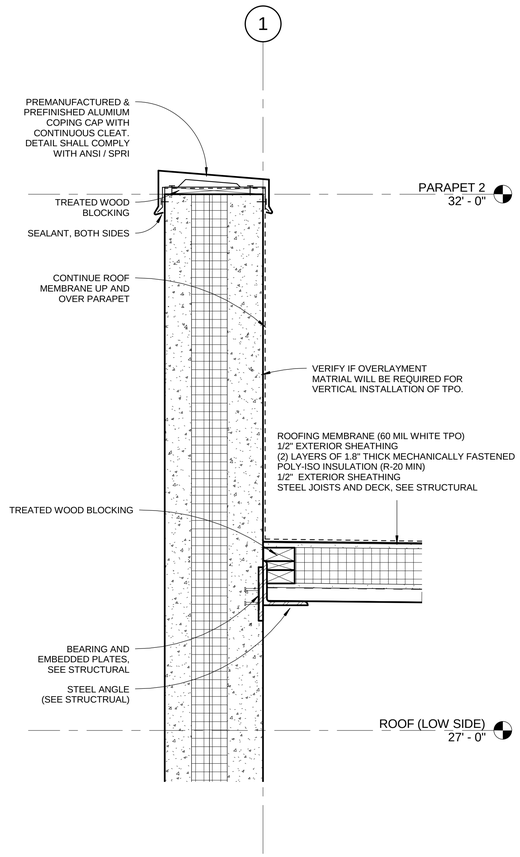
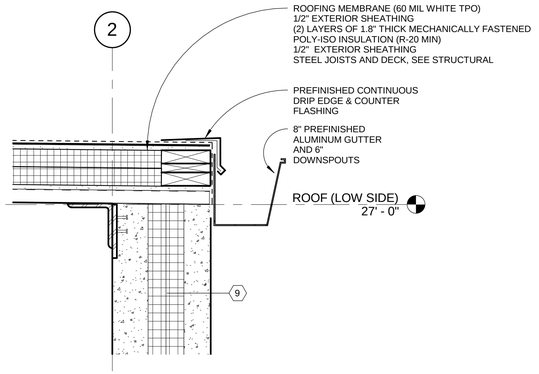
PERMIT & CONSTRUCTION SET



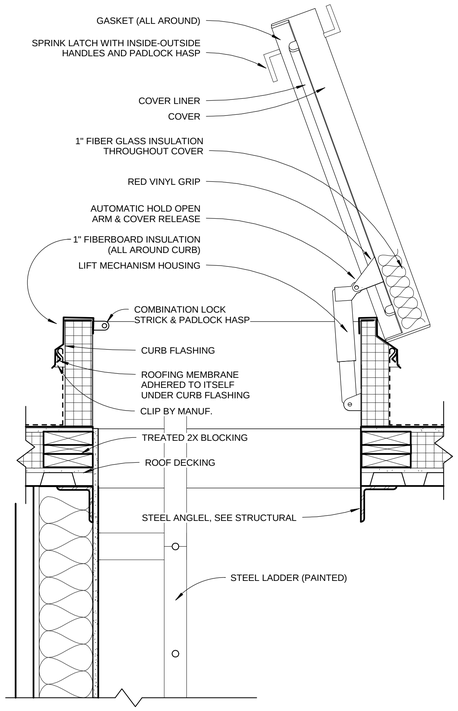
1 PRECAST PARAPET PERPENDICULAR TO JOISTS
1 1/2" = 1'-0"



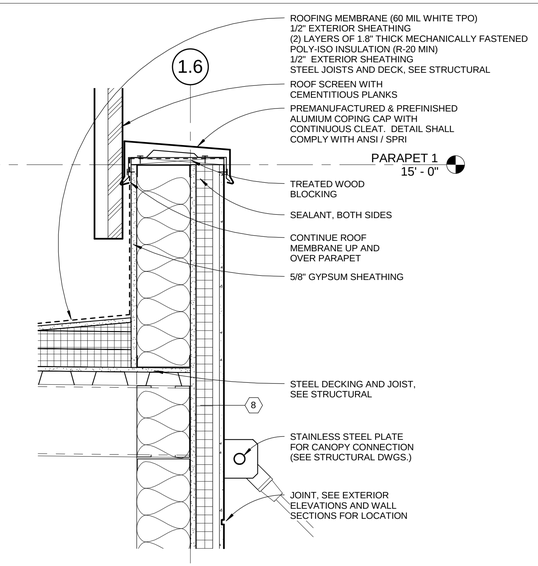
2 PRECAST PARAPET PARALLEL TO JOISTS
1 1/2" = 1'-0"



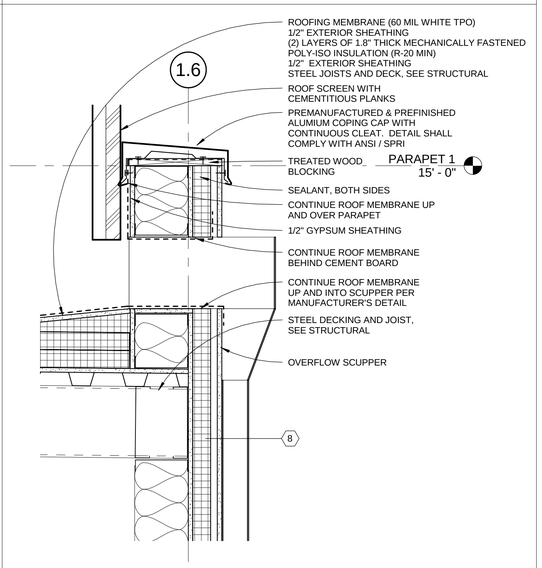
3 ROOF WITHOUT PARAPET
1 1/2" = 1'-0"



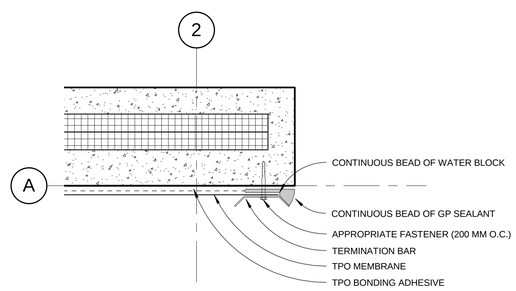
4 ROOF HATCH (2ND FLR STORAGE)
1 1/2" = 1'-0"



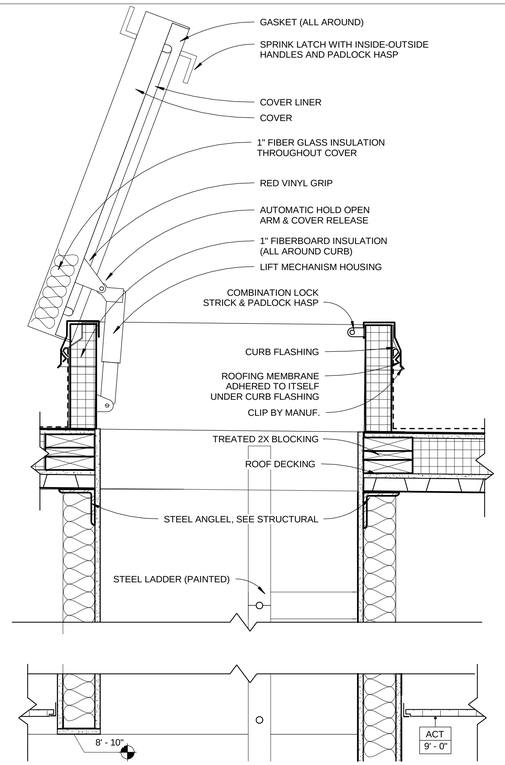
5 PARAPET @ LOBBY
1 1/2" = 1'-0"



6 SCUPPER DETAIL
1 1/2" = 1'-0"



7 TPO EDGE ERMINATION DETAIL
1 1/2" = 1'-0"



8 ROOF HATCH (STORAGE)
1 1/2" = 1'-0"

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: DO
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ROOF DETAILS

A-512

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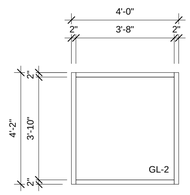
PERMIT & CONSTRUCTION SET

DOOR AND FRAME SCHEDULE

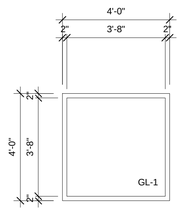
DOOR NUMBER	DOOR					FRAME			DETAILS			COMMENTS
	WIDTH	HEIGHT	TYPE	MATL	FINISH	TYPE	MATL	FINISH	HEAD	JAMB	SILL	
101A	6' - 0"	7' - 0"	(2) D3	AL	MATCH EXISTING	F3	AL	MATCH EXISTING	1/A-602	6/A-602	11&16/A-602	REMOVABLE MULLION
101B	6' - 0"	6' - 5"	(2) D3	AL	MATCH EXISTING	F3	AL	MATCH EXISTING	1/A-602 SIM	6/A-602	11&16/A-602	REMOVABLE MULLION
101E	3' - 10"	4' - 4"	OH-1	-	-	-	-	-	5/A-602	10/A-602	15/A-602	COILING DOOR
102A	6' - 0"	7' - 0"	(2) D2	HM	PT-1	F1	HM	PT-1	3/A-602	8/A-602	18/A-602	REMOVABLE MULLION
102B	4' - 0"	7' - 0"	D1	HM	PT-1	F1	HM	PT-1	3/A-602	8/A-602	18/A-602	
102C	6' - 0"	7' - 0"	(2) D2	HM	PT-1	F1	HM	PT-1	3/A-602	8/A-602	13/A-602	REMOVABLE MULLION
102D	6' - 0"	7' - 0"	(2) D2	HM	PT-1	F1	HM	PT-1	3/A-602	8/A-602	13/A-602	REMOVABLE MULLION
103	6' - 0"	7' - 0"	(2) D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
104	3' - 0"	7' - 0"	D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
105	3' - 0"	7' - 0"	D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
106	3' - 0"	7' - 0"	D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
107	3' - 0"	7' - 0"	D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
108A	3' - 0"	7' - 0"	D1	HM	PT-1	F1	HM	PT-1	2/A-602	7/A-602	-	
108B	6' - 0"	7' - 0"	(2) D1	HM	PT-1	F1	HM	PT-1	3/A-602	8/A-602	13/A-602	
109	5' - 4"	7' - 0"	(2) D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	
110	3' - 0"	7' - 0"	D1	HM	PT-1	F2	HM	PT-1	4/A-602	9/A-602	-	

*SEE SPECIFICATIONS FOR DOOR HARDWARE SETS

MARK	GLAZING TYPE	THICKNESS	OUTSIDE GLASS	INSIDE GLASS	REMARKS
GL-1	INSULATED	1"	CLEAR	CLEAR	LOW-E GLASS, TEMPERED WHERE NOTED- (B.O.D. GUARDIAN 68 #2)
GL-2	INTERIOR	1/4"		CLEAR	TEMPERED WHERE NOTED

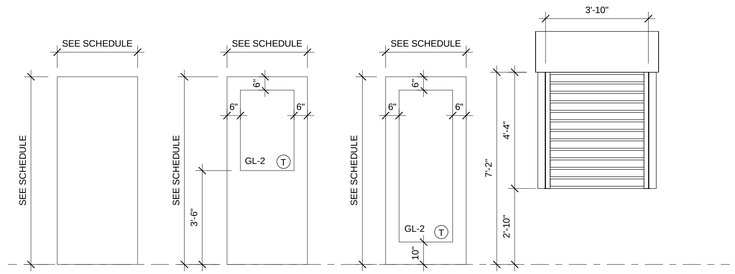


TYPE A



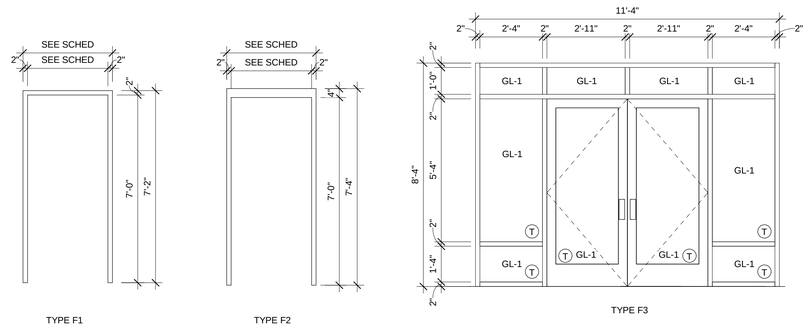
TYPE B

WINDOW TYPE LEGEND
3/8" = 1'-0"



TYPE D1 TYPE D2 TYPE D3 TYPE OH-1

DOOR TYPE LEGEND
3/8" = 1'-0"



TYPE F1 TYPE F2 TYPE F3

FRAME TYPE LEGEND
3/8" = 1'-0"

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
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DOOR SCHEDULE, DOOR TYPE LEGEND & FRAME TYPES

A-601

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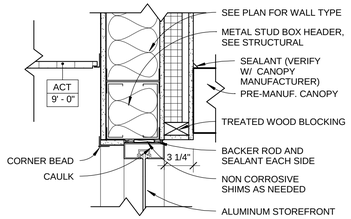
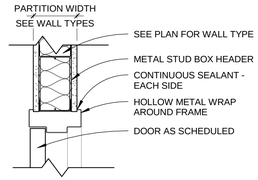
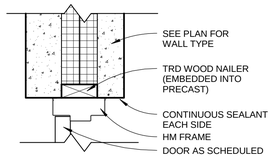


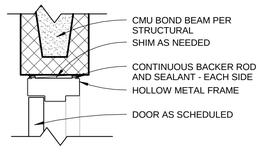
1 STOREFRONT HEAD @ LOBBY
1 1/2" = 1'-0"



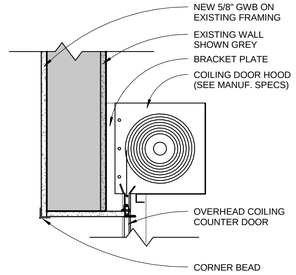
2 H.M. DOOR HEAD @ MTL & GWB
1 1/2" = 1'-0"



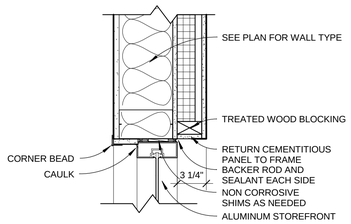
3 H.M. DOOR HEAD @ PRECAST
1 1/2" = 1'-0"



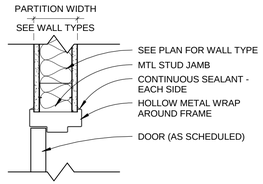
4 H.M. DOOR HEAD @ CMU
1 1/2" = 1'-0"



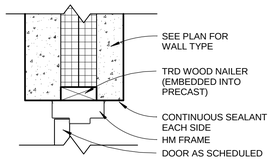
5 COILING DOOR HEAD
1 1/2" = 1'-0"



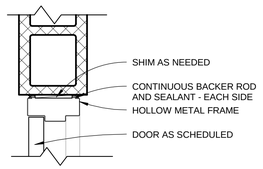
6 STOREFRONT JAMB @ LOBBY
1 1/2" = 1'-0"



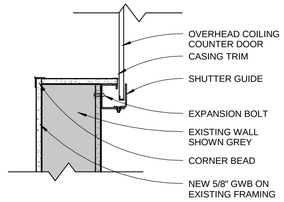
7 H.M. DOOR JAMB @ MTL & GWB
1 1/2" = 1'-0"



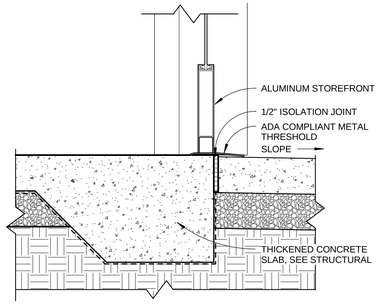
8 H.M. DOOR JAMB @ PRECAST
1 1/2" = 1'-0"



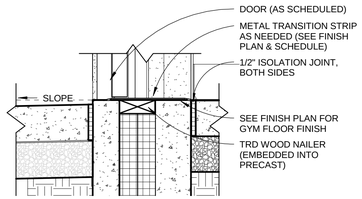
9 H.M. DOOR JAMB @ CMU
1 1/2" = 1'-0"



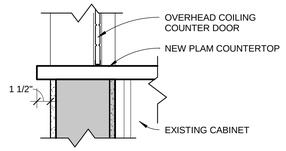
10 COILING DOOR JAMB
1 1/2" = 1'-0"



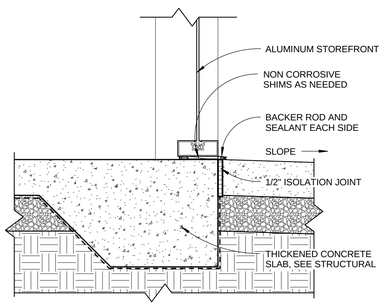
11 STOREFRONT SILL @ LOBBY
1 1/2" = 1'-0"



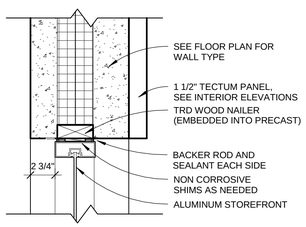
13 H.M. DOOR SILL DETAIL @ EXTERIOR
1 1/2" = 1'-0"



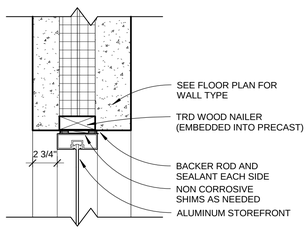
15 COILING DOOR SILL
1 1/2" = 1'-0"



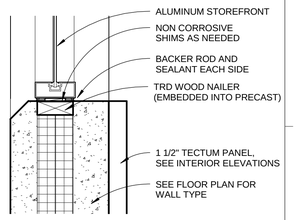
16 STOREFRONT SILL 2 @ LOBBY
1 1/2" = 1'-0"



18 WINDOW HEAD DETAIL
1 1/2" = 1'-0"



19 WINDOW JAMB DETAIL
1 1/2" = 1'-0"



20 WINDOW SILL DETAIL
1 1/2" = 1'-0"

Greenville County

STAUNTON BRIDGE CC ADDITION

GREENVILLE CountyRec PARKS • RECREATION • TOURISM

LS3P

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STATE OF SOUTH CAROLINA — LS3P ASSOCIATES LTD. Greenville, SC B74003 — REGISTERED ARCHITECT

STATE OF SOUTH CAROLINA — PRESCOTT PHILLIPS MIA 3205 — REGISTERED ARCHITECT — 3-15-2016

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REVISIONS:

No.	Description	Date

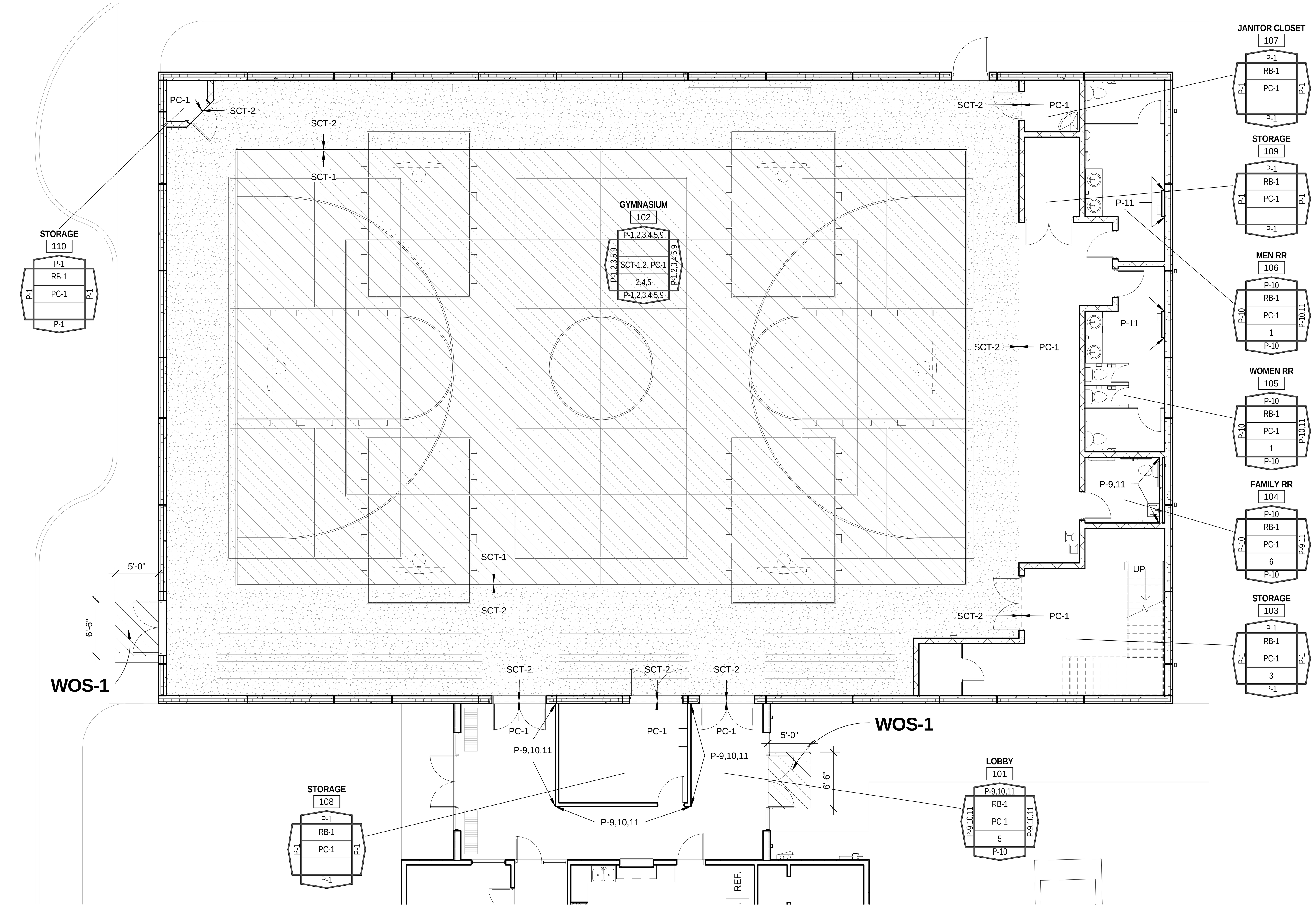
PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: Author
CHECKED BY: Checker

DOOR & WINDOW DETAILS

A-602

PERMIT & CONSTRUCTION SET

C:\Users\deanoang\Documents\StauntonBridgeCC-Addition_2015_deanoang.rvt
3/15/2016 10:11:56 AM



1 FIRST FLOOR FINISH PLAN

1/8" = 1'-0"

REPRESENTATIVE CONTACT

MANUFACTURER: FORMICA
NAME: SHERI REID
CONTACT: (704) 534-7300

MANUFACTURER: JOHNSONITE
NAME: ERIN SALIN
CONTACT: (800) 899-8916 ext 731

MANUFACTURER: MILLIKEN
NAME: HEIDI BURMEISTER
CONTACT: (704) 661-1876

MANUFACTURER: NEVAMAR/PIONITE
NAME: BETTY GERULA
CONTACT: (800) 638-4380

MANUFACTURER: PANOLAM
NAME: BETTY GERULA
CONTACT: (800) 638-4380

MANUFACTURER: SCRANTON PRODUCTS
NAME: SARA HIERS
CONTACT: (706) 207-7802

MANUFACTURER: SHERWIN WILLIAMS
NAME: CHRISTOPHER ODEN
CONTACT: (980) 207-9410

MANUFACTURER: SPORT COURT
NAME: ROBIN BRINKLEY
CONTACT: (704)-608-1307

MANUFACTURER: WILSONART
NAME: PAT LORENZ
CONTACT: (803) 788-9160

FINISH SPECIFICATIONS

HDPE

HDPE-1: MFR.: SCRANTON PRODUCTS
PRODUCT: HINY HIDERS
COLOR: BLUEBERRY
TEXTURE: ORANGE PEEL

PAINT

P-1: MFR.: SHERWIN WILLIAMS
PRODUCT: PROMAR 200, ZERO VOC
COLOR: SW7071 GRAY SCREEN
FINISH: EGGSHELL

P-2: MFR.: SHERWIN WILLIAMS
PRODUCT: WATERBORNE ACRYLIC DRYFALL B42W1
COLOR: SW SAFETY ORANGE
FINISH: FLAT

P-3: MFR.: SHERWIN WILLIAMS
PRODUCT: WATERBORNE ACRYLIC DRYFALL B42W1
COLOR: SW4056 BLUEPRINT
FINISH: FLAT

P-4: MFR.: SHERWIN WILLIAMS
PRODUCT: WATERBORNE ACRYLIC DRYFALL B42W1
COLOR: SW4056 TECHNO TEAL
FINISH: FLAT

P-5: MFR.: SHERWIN WILLIAMS
PRODUCT: WATERBORNE ACRYLIC DRYFALL B42W1
COLOR: SW4026 SLATE GRAY
FINISH: FLAT

FINISH SPECIFICATIONS

PAINT CONTINUED

P-6: MFR.: SHERWIN WILLIAMS
PRODUCT: PRE-CATALYZED EPOXY
COLOR: SW4026 SLATE GRAY
FINISH: SEMI-GLOSS

P-7: MFR.: SHERWIN WILLIAMS
PRODUCT: PRE-CATALYZED EPOXY
COLOR: SW4056 BLUEPRINT
FINISH: SEMI-GLOSS

P-8: MFR.: SHERWIN WILLIAMS
PRODUCT: PROMAR 200, ZERO VOC
COLOR: SW7070 SITE WHITE
FINISH: FLAT

P-9: MFR.: SHERWIN WILLIAMS
PRODUCT: PRE-CATALYZED EPOXY
COLOR: SW4056 BLUEPRINT
FINISH: EGGSHELL

P-10: MFR.: SHERWIN WILLIAMS
PRODUCT: PRE-CATALYZED EPOXY
COLOR: SW7071 GRAY SCREEN
FINISH: EGGSHELL

P-11: MFR.: SHERWIN WILLIAMS
PRODUCT: PRE-CATALYZED EPOXY
COLOR: SW SAFETY ORANGE
FINISH: EGGSHELL

P-12: MFR.: SHERWIN WILLIAMS
PRODUCT: WATERBORNE ACRYLIC DRYFALL B42W1
COLOR: SW7071 GRAY SCREEN
FINISH: FLAT

FINISH SPECIFICATIONS

PLASTIC LAMINATE

PL-1: MFR.: WILSONART
STYLE #: 4830-60
PATTERN: SATIN STAINLESS
FINISH: STANDARD

POLISHED CONCRETE

PC-1: CLEAR

RUBBER BASE

RB-1: MFR.: ROPPE
STYLE: COVE
COLOR: 177 STEEL BLUE
SIZE: 4"

SPORT COURT TILE

SCT-1: MFR.: SPORT COURT
PRODUCT: RESPONSE HG
COLOR: MAPLE SELECT
SIZE: 25CM X 25CM X 12.7MM
SYSTEM TYPE: MODULAR
NOTE: SEE ROOM FINISH NOTES FOR COURT LINE COLORS.

SCT-2: MFR.: SPORT COURT
PRODUCT: RESPONSE HG
COLOR: TBD
SIZE: 25CM X 25CM X 12.7MM
SYSTEM TYPE: MODULAR
NOTE: USE APPROPRIATE TRANSITION MATERIAL AT EDGE OF FLOORING SYSTEM. COORDINATING WALL BASE AND FLOORING TRANSITIONS SHALL BE BLACK AND PROVIDED THROUGHOUT GYMNASIUM 102 BY SPORT COURT.

FINISH SPECIFICATIONS (CONT.)

SOLID SURFACE

SS-1: MFR.: CORIAN
PATTERN/COLOR: DEEP NIGHT SKY
THICKNESS: 3/4"
EDGE: NO DRIP
SINK: UNDERMOUNT

WALK OFF SYSTEM

WOS-1: MFR.: MILLIKEN
COLLECTION: OBEX ENTRY SYSTEM
PRODUCT: ARX
STYLE: PRIOR11C
COLOR: TBD
NOMINAL TILE SIZE: 7.87"x7.87"
THICKNESS: 11mm
INSTALLATION: 6'-6"X5' MAT SHALL BE INSTALLED IN 3/8" DEEP MATWELL

POLISHED CONCRETE FINISH SPECIFICATIONS:
Apply Honed and Polished Finish to trowel-finished floors as indicated on the drawings. Protect adjacent surfaces as required to prevent damage by the concrete polishing procedure. Fill construction joints and cracks with filler products as specified in accordance with manufacturer's instructions.

Honed Finish:

1. Grind the concrete floor to within 1-5 inches of walls with ConcreteMedic VCH 40 grit, removing construction debris, floor slab imperfections and until there is a uniform scratch pattern. Vacuum the floor thoroughly using a squeegee vacuum attachment.

2. Apply Eucosil undiluted at approximately 200 square feet per gallon using a stiff, long bristled broom. Cover the entire work area liberally and allow to sit for 10 minutes. Apply again to areas where the Eucosil has soaked in and allow to sit for an additional 30 minutes. Squeegee excess materials off of the floor. Allow 12 to 24 hours for full cure.

3. Grind the concrete floor to within 1-5 inches of walls with ConcreteMedic VCH 80 grit, removing construction debris, floor slab imperfections and until there is a uniform scratch pattern. Vacuum the floor thoroughly using a squeegee vacuum attachment.

4. Grind the floor to within 1-5 inches of walls with ConcreteMedic VCH metal bonded diamond grit of 150 and 300 grinding 90 degrees from each previous grind and removing all the scratches form the previous grit. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.

5. Grind the edges with kgs 60, 120 and 220 grit grinding pads, removing all of the scratches from the previous grit. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.

6. Grind the floor with HTC phenolic resin bonded diamond grit of 400, first grinding the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each grind, clean the floor thoroughly using clean water and an autoscrubber or a mop and a wet vacuum.

Polished Finish:

1. Execute specified steps for Honed Finish.

2. Grind the floor with HTC phenolic resin bonded diamond grit of 800, first grinding the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each grind, clean the floor thoroughly using clean water and an autoscrubber or a mop and a wet vacuum.

3. Grind the floor with HTC phenolic resin bonded diamond grit of 1500, first grinding the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each grind, clean the floor thoroughly using clean water and an autoscrubber or a mop and a wet vacuum.

4. Grind the floor with HTC phenolic resin bonded diamond grit of 3000, first grinding the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each grind, clean the floor thoroughly using clean water and an autoscrubber or a mop and a wet vacuum.

ROOM FINISH PLAN SHEET NOTES

1. PRIOR TO INSTALLATION AND FABRICATION, CONTRACTOR SHALL COORDINATE WITH ARCHITECT AND INTERIOR DESIGNER TO REVIEW ALL FLOOR PATTERNS, FINISHES AND DOCUMENTATION INFORMATION

2. PRIOR TO PAINTING, PAINTING CONTRACTOR SHALL SUBMIT TO ARCHITECT/INTERIOR DESIGNER EACH PAINT COLOR FINISH ON A 8 1/2" X 11" SHEET OF CHIPBOARD FOR PRELIMINARY APPROVAL. FOR FINAL APPROVAL BY OWNER AND ARCHITECT PRIOR TO PAINTING, THE PAINTING CONTRACTOR SHALL PAINT EACH PAINT COLOR WITH THE DESIGNATED FINISH ON A 4' X 4' PIECE OF GYPSUM BOARD. SAMPLE BOARDS SHALL BE REVIEWED AND APPROVED AT THE JOB SITE WITH THE APPROPRIATE LIGHTING.

3. INSTALLERS OF EACH FINISH MATERIAL SHALL INSPECT BOTH THE SUBSTRATE AND CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. INSTALLER SHALL NOT PROCEED UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN AN ACCEPTABLE MANNER TO ALL PARTIES AND MEET ALL MANUFACTURER'S REQUIREMENTS

4. ALL INTERIOR FINISHES SHALL COMPLY WITH SECTION 803 OF RESTRICTIONS OF COMBUSTIBLE MATERIALS OF THE INTERNATIONAL BUILDING CODE. ALL INTERIOR FINISHES SHALL BE CLASS B OR BETTER

5. THE INTENT IS TO PROVIDE A COMPLETE FINISHED INTERIOR WHETHER OR NOT SPECIFICALLY INDICATED. ITEMS SHALL BE FINISHED AND/OR PAINTED AS DIRECTED BY DESIGNER, WHETHER OR NOT SPECIFICALLY SCHEDULED OR INDICATED ON DRAWINGS

6. TILE SUBCONTRACTOR SHALL USE LATEX ADDITIVE IN SETTING BED PER MANUFACTURER'S RECOMMENDATIONS UNLESS OTHERWISE NOTED

7. INSTALL ALL VINYL COMPOSITION TILE IN THE SAME DIRECTION UNLESS OTHERWISE NOTED

8. CARPET INSTALLER SHALL SUBMIT SEAMING SHOP DRAWING FOR ALL AREAS SPECIFIED TO RECEIVE CARPET FLOORING PRIOR TO COMMENCEMENT OF WORK

9. PAINT ALL EXPOSED AND SEMI-EXPOSED WOOD BLOCKING AND METAL SUPPORTS TO MATCH ADJACENT SURFACES. COORDINATE WITH INTERIOR DESIGNER

10. PAINTED FINISH ON METAL SURFACES SHALL BE SMOOTH, CLEAR AND FREE OF ALL BRUSH MARKS

11. ADHESIVE FOR WALL COVERING SHALL BE STRIPPABLE, MILDEW RESISTANT AND NON-STAINING PER MANUFACTURER'S REQUIREMENTS

12. ALL WALL COVERING SHALL BE WRAPPED AT LEAST 2" AROUND OUTSIDE CORNERS. MATCH ALL PATTERN AT SEAMS

13. WHERE WOOD BASE IS SPECIFIED, CAULK AT TOP OF BASE AND WALL WITH COLORED CAULK TO MATCH WOOD STAIN

14. INSTALL TRANSITION STRIP AT THRESHOLD WHERE DIFFERING FLOORING MATERIALS ABUTT, UNLESS OTHERWISE NOTED. COORDINATE COLOR/FINISH WITH DESIGNER

15. PAINT METAL WALL-MOUNTED ACCESS DOORS, GRILLES, RETURN AIR GRILLES, COVER PLATES, FAN COIL UNITS, FIRE EQUIPMENT CABINETS, AND ELECTRICAL CABINETS TO MATCH ADJACENT SURFACE UNLESS OTHERWISE NOTED.

16. ALL FLOOR FINISH CHANGES SHALL OCCUR AT THE CENTER LINE OF CLOSED DOORS.

17. FLOOR PATTERN TO CONTINUE UNDER ALL OPEN WOODWORK/ WORKSURFACES.

18. FLOORING CONTRACTOR SHALL MAKE ADJUSTMENTS TO ACCOMMODATE FOR ANY DIFFERENCES IN THE PILE HEIGHT OF THE CARPET.

19. PRIOR TO ORDERING, SUB-CONTRACTORS FOR FLOORING, PAINTING, AND MILLWORK SHALL SUBMIT TO ARCHITECT / INTERIOR DESIGNER AN 8" X 8" SAMPLE OF EACH MATERIAL SPECIFIED FOR FINAL APPROVAL.

20. IF ANY DISCREPANCIES OR OMISSIONS ARE NOTED IN THESE DRAWINGS, CONTACT INTERIOR DESIGNER OR ARCHITECT PRIOR TO ORDERING OR COMMENCING WORK.

21. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK LEAD TIMES ON FINISHES IN ORDER TO AVOID DELAYING WORK.

22. ALIGN GROUT JOINTS AT FLOOR, BASE, AND WALL TILE.

GENERAL ROOM FINISH NOTES

1. TRIM SHALL BE PAINTED P-6. DOORS SHALL BE PAINTED P-7.
2. EXPOSED GYP AND CEILINGS SHALL BE PAINTED P-8 U.N.O. STRUCTURAL STEEL SHALL BE PAINTED P-7.

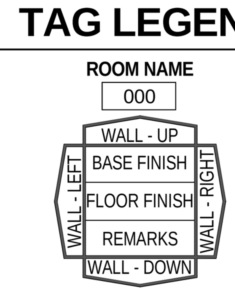
ROOM FINISH NOTES

1. VANITY TOP SHALL BE SS-1. VANITY SKIRT SHALL BE PL-1. TOILET PARTITIONS SHALL BE HDPE-1. SEE A-401 FOR ACCENT PAINT LOCATION DETAILS.
2. STC-1&2 WALL BASE SHALL CONTINUE TO CONCRETE FLOOR WITHIN GYM. STC-1 SHALL EXTEND TO PERIMETER LINE OF MAIN BASKETBALL COURT. STC-2 SHALL BE PERIMETER OF STC-1.
3. STAIR STRINGER AND RISERS SHALL BE P-7. STAIR RAILINGS SHALL BE P-11.
4. COURT LINES SHALL BE PAINTED TO MATCH PAINT COLORS AS FOLLOWS:
   - -MAIN BASKETBALL COURT, P-3
   - -SIDE BASKETBALL COURTS, P-2
   - -PICKLEBALL COURTS, P-4
   - -VOLLEYBALL COURTS, P-8
5. SEE A-411 FOR ACCENT PAINT LOCATIONS.
6. SEE A-401 FOR ACCENT PAINT LOCATIONS.

ADD ALTERNATE

1. ALL WALL PAINT TO BE EPOXY.

ROOM FINISH TAG LEGEND



MATERIAL CODE LEGEND

ACP: ACOUSTICAL PANEL
CG: CORNER GUARDS
CT: CEILING TREATMENT
ETR: EXISTING TO REMAIN
ML: MELAMINE
P: PAINT
PC: POLISHED CONCRETE
PHNL: PHENOLIC
PL: PLASTIC LAMINATE
RB: RUBBER BASE
SC: SEALED CONCRETE
SCT: SPORT COURT TILE
SS: SOLID SURFACE
TBD: TO BE DETERMINED
TR: TRANSITION STRIP
WOS: WALK OFF SYSTEM
WP: WALL PROTECTION

FLOORING LEGEND

STC-1

STC-2

PC-1

Greenville County

STAUNTON BRIDGE CC ADDITION

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110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

STATE OF SOUTH CAROLINA LS3P ASSOCIATES LTD. Greenville, SC B74003 REGISTERED ARCHITECT

STATE OF SOUTH CAROLINA PRESCOTT ... 3205 REGISTERED ARCHITECT 3·15·2016

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: Author
CHECKED BY: Checker

FIRST FLOOR FINISH PLAN

A-721

PERMIT & CONSTRUCTION SET

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PLUMBING FIXTURE SCHEDULE

ID #	MANUFACTURER	MODEL #	DESCRIPTION	CW	HW	WASTE	NOTES:
EWC-1	ELKAY JB PRODUCTS ZURN ELKAY	EZSTL8C 813PVCBG1 Z8808XLPC (WITH UNIT)	TWO-STATION WALL-MOUNT BARRIER FREE WATER COOLER (REQUIRES 115-V AC) 1-1/4" P-TRAP; TUBULAR PVC (MUST BE PVC IN ORDER FOR REQ'D DI-ELECTRIC ISOLATION) ½" SWT X ⅜" OD SUPPLY KIT; CHROME-PLATED BRASS; ROUND WHEEL HANDLE NON-METALLIC WATER SUPPLY STRAINER	1/2"	–	2"	ENSURE PROPER DI-ELETRIC ISOLATION ON WASTE AND SUPPLY.
FD-1	PROSET SYSTEMS	T35630-F-P	3"ø FLOOR DRAIN; PVC BASE; 5"ø ROUND NICKEL BRONZE TOP; PATENTED "TRAP GUARD" DEVICE COMPLIES WITH THE IPC ALTERNATE METHODS EXCLUSION FOR THE TRAP PRIME REQUIREMENT	–	–	3"	INSTALL ON GRADE LEVEL.
HB-1	ZURN ZURN	Z1321-C -(SPECIAL)	WALL HYDRANT; EXPOSED; INTEGRAL BACKFLOW PREVENTER; NON-FREEZE; LOOSE KEY ¾ 90° SWEAT INLET ELBOW CONNECTION (AS REQ'D FOR VERTICAL SUPPLY IN-WALL INSTALLATION)	3/4"	–	–	MUST PROVIDE W/ SEPARATE SHUT-OFF VALVE INSIDE BLDG. COORDINATE W/ GC.
HD-1	PROSET SYSTEMS	TG34HD	3"x4" HUB DRAIN; PVC; PATENTED "TRAP GUARD" DEVICE COMPLIES WITH THE IPC ALTERNATE METHODS EXCLUSION FOR THE TRAP PRIME REQUIREMENT	–	–	3"	
LAV-1	AMERICAN STANDARD T&S BRASS ZURN ZURN ZURN TRUEBRO WILKINS	0476.028.020 B-2711 Z8743-1-PC Z8702 Z8808XLPC 102 12-ZW1070C	OVAL COUNTERTOP SINK: 20"Wx17"D; 4" CENTERS; SELF-RIMMING SINGLE LEVER FAUCET (NO POP-UP) WITH TEMP LIMIT STOP GRID STRAINER; CHROME-PLATED BRASS; WITH TAIL PIECE (PLUMBER TO CONFIRM REQ'D LENGTH) 1-1/2" P-TRAP; CHROME-PLATED BRASS; TRAP CLEAN-OUT; SHALLOW ESCUTCHEON ½" SWT X ⅜" OD SUPPLY KIT; CHROME-PLATED BRASS; ROUND WHEEL HANDLE LAV GUARD2; ADA LAVATORY GUARDS FOR P-TRAP AND ANGLE VALVES POINT-OF-USE MIXING VALVE; ASSE 1070; ½" SWEAT CONNECTIONS WITH UNIONS	1/2"	1/2"	2"	INSTALL THERMOSTATIC MIXING VALVE TO PRODUCE TEMPERED WATER (CHECK TEMP FOR NO MORE THAN 100F).
MS-1	ZURN ZURN ZURN ZURN	Z1996-24 -SF -WG -MH	MOP SERVICE BASIN; 24"x24"x10"; MOLDED COMPOSITE; SS STRAINER; 3"ø OUTLET SERVICE SINK FAUCET; CHROME PLATED; VACUUM BREAKER; WALL BRACE; PAIL HOOK; THREAD NOSE #20 GAGE SS WALL GUARD FOR 24"x24" BASIN MOP HANGER	1/2"	1/2"	3"	ABSOLUTELY NO SUBSTITUTIONS FOR FAUCETS WITHOUT A VACUUM BREAKER.
UR-1	AMERICAN STANDARD SLOAN	6550.001.020 186-1	FLUSH VALVE URINAL; SIPHON-JET; ADA; 1.0 GPF; ¾" INLET; 2" FEMALE NPT OUTLET CONNECTION TOP SPUD FLUSH VALVE FOR URINALS; 1.0 GPF; CHROME-PLATED	3/4"	–	2"	CONFIRM REQ'D MOUNTING ELEVATION ON ARCH. DWGS FOR ADA COMPLIANCE.
WC-1	AMERICAN STANDARD BEMIS ZURN	2467.016 1955C Z8802CR	"CADET" ADA ELONGATED TOILET; PRESSURE-ASSIST TANK-TYPE; 1.6 GPF; VITREOUS CHINA OPEN-FRONT PLASTIC SEAT ½" SWT X ⅜" CLOSET SUPPLY KIT; CHROME-PLATED BRASS; ROUND WHEEL HANDLE	1/2"	–	3"	CONFIRM FLUSH CONTROLS ORIENTATION. MUST BE ON OPEN SIDE OF WC PER ANSI A117.1
WC-2	AMERICAN STANDARD BEMIS ZURN	2467.100 1955C Z8802CR	"CADET" NON-ADA ELONGATED TOILET; PRESSURE-ASSIST TANK-TYPE; 1.6 GPF; VITREOUS CHINA OPEN-FRONT PLASTIC SEAT ½" SWT X ⅜" CLOSET SUPPLY KIT; CHROME-PLATED BRASS; ROUND WHEEL HANDLE	1/2"	–	3"	CONFIRM FLUSH CONTROLS ORIENTATION. MUST BE ON OPEN SIDE OF WC PER ANSI A117.1

ELECTRIC WATER HEATER SCHEDULE

ID #	MANUFACTURER MODEL #	TANK CAPACITY (GALLONS)	RECOVERY GPH (100° DT)	DIMENSIONS		ELECTRICAL		CONN. SIZE	THERMAL EXPAN TANK (MANUF/MODEL)	NOTES:
				DIAMETER	HEIGHT	VOLTS/PH	KW			
WH-1	RHEEM ELD52	50	18	22.25"	57"	208/3	4.5	3/4" NPT	WILKINS WXTP-8	ALL

NOTES:
1. ELD UNITS TO BE DUAL ELEMENT, NON-SIMULTANEOUS.
2. PLACE ON ELEVATED STAND (SUCH AS "HOLDRITE" GALVANIZED STEEL QUICK STAND) IN ORDER TO PROVIDE ADEQUATE FALL AS REQUIRED. MODEL MUST BE RATED FOR ENTIRE REQ'D TOTAL STATIC LOAD (WATER HEATER + FULL TANK OF WATER + ACCESSORIES).
3. WATER HEATER DISCHARGE TEMPERATURE TO BE SET AS REQUIRED BY CODE OFFICIAL (NO GREATER THAN 120°F).
4. WATER HEATER AS SPECIFIED IS COMMERICAL TYPE. UNIT CANNOT BE SUBSTITUTED WITH RESIDENTIAL TYPE AS WARRANTY BY MANUFACTURER WILL BE VOIDED.

CODE SEISMIC REQUIREMENTS SUMMARY FOR PLUMBING COMPONENTS

COMPONENT TYPE	SITE SEISMIC DESIGN CATEGORY	COMPONENT IMPORTANCE FACTOR	SEISMIC SUPPORT	BASIS FOR EXEMPTIONS:
ALL PLUMBING PIPING COMPONENTS AND ELECTRIC PLUMBING EQUIPMENT	C	1.0	NOT REQUIRED	EXEMPT PER ASCE 7-05 SECTION 13.1.4 ITEM 3.

BUILDING PLUMBING DATA

FIXTURE TYPE	Qty.	Sewer Drainage DFU*	Sewer Drainage Total DFU	Water Supply WSFU**	Water Supply Total WSFU
Drinking Fountain	1	0.5	0.5	0.25	0.25
Floor Drain	3	2	6	0	0
Lavatory	5	1	5	2	10
Service/Mop Sink	1	2	2	3	3
Urinal (1.0 gpf, 3/4" valve)	2	2	4	5	10
Water Closet (flushometer tank)	5	4	20	2	10
		Total DFU=	37.5	Total WSFU=	33.25

Drain Size= 4" (per IPC Table 710.1(1) for 1/8" per ft slope		Demand GPM=	24
		(per IPC Table E103.3(3))	
*Drainage Fixture Units per IPC Table 709.1		Line Size=	1-1/2"
		Max Velocity (ft/s)=	3.78

GREENVILLE COUNTY CODE ANALYSIS: PLUMBING DATA

SEPTIC:	(NONE)
SEWER:	(EXISTING)
LF OF UNDERGROUND DRAIN/WASTE:	125
LF OF INTERWALL DRAIN LINES:	175
# OF WATER CLOSETS	MALE: 1 FEMALE: 3
# OF UNISEX WATER CLOSETS	1
# OF URINALS	2
# OF LAVATORIES	MALE: 2 FEMALE: 2
# OF UNISEX LAVATORIES	1
# OF BATHTUBS/SHOWERS	0
# OF DRINKING FOUNTAINS	1
# OF SERVICE SINKS	1
# OF KITCHEN SINKS	0
# OF HAND SINKS	0
# OF WATER HEATERS	1
# OF GREASE TRAPS	0
# OF FLOOR DRAINS WITH TRAP PRIMERS	3 (TRAP PRIMER ALTERNATE)
# OF MISCELLANEOUS	0
TOTAL # OF FIXTURES	17
TOTAL DRAINAGE FIXTURE UNITS IPC TABLE 709.1	37.5

PLUMBING CODE COMPLIANCE DATA

Greenville County

STAUNTON BRIDGE CC ADDITION

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GREENVILLE, SOUTH CAROLINA 29601
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SOUTH CAROLINA W.G. BARTLETT ENGINEERING SERVICES, LLC No. C02469 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 16175 WILLIAM GRADY BARTLETT

William G. Bartlett 3/11/2016

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
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PLUMBING SCHEDULES

P-001

[redacted]

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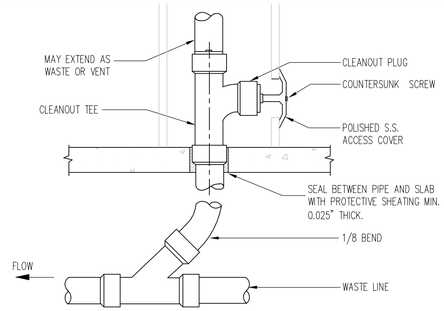
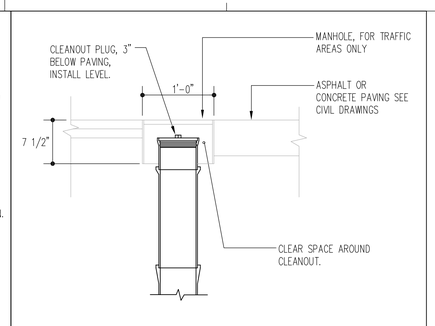
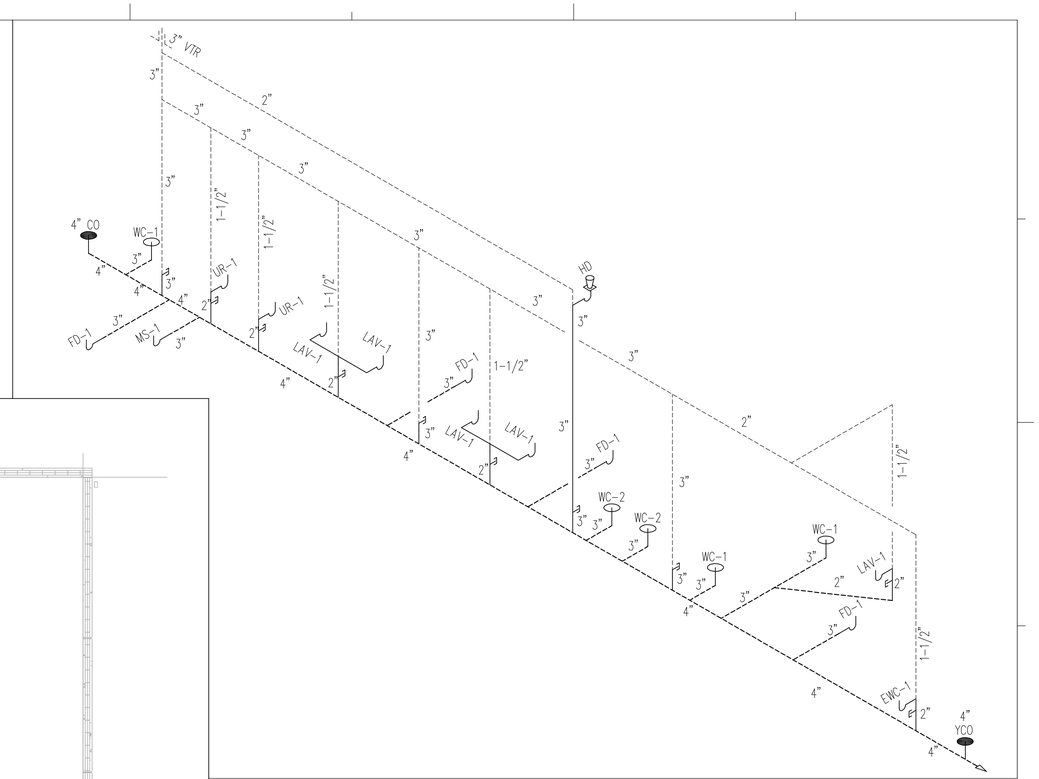


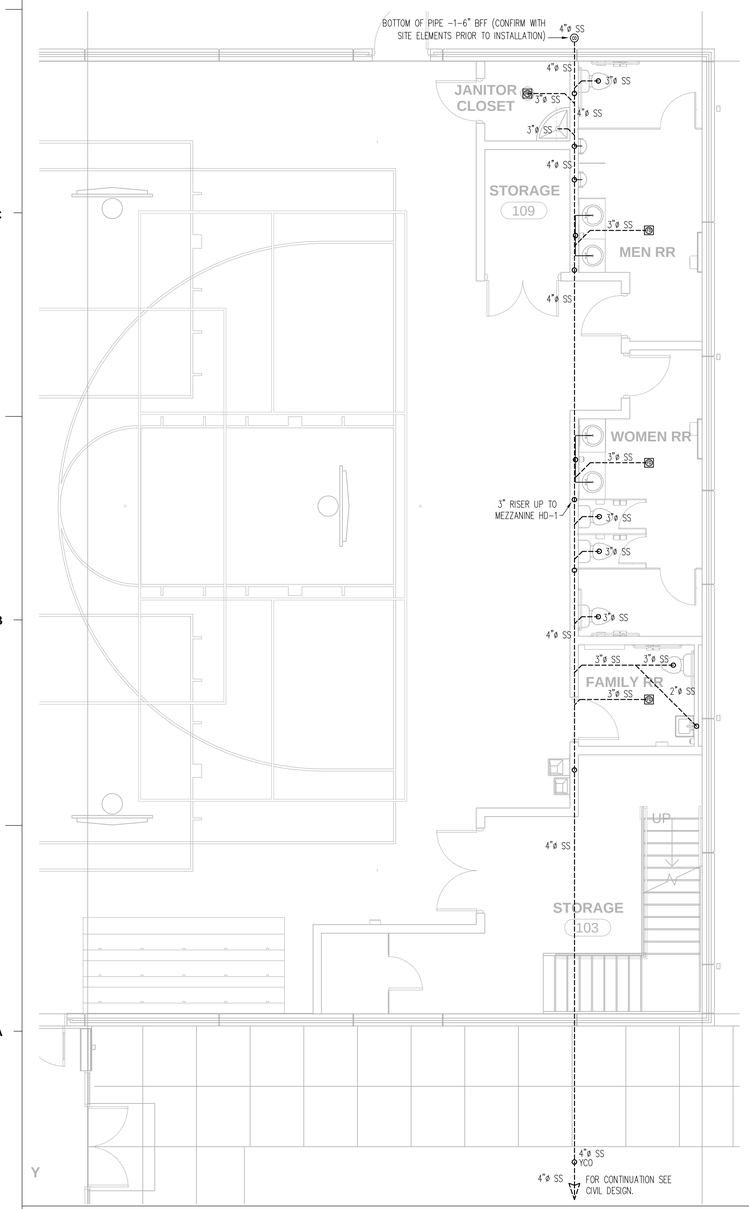
TYPICAL WALL CLEAN-OUT



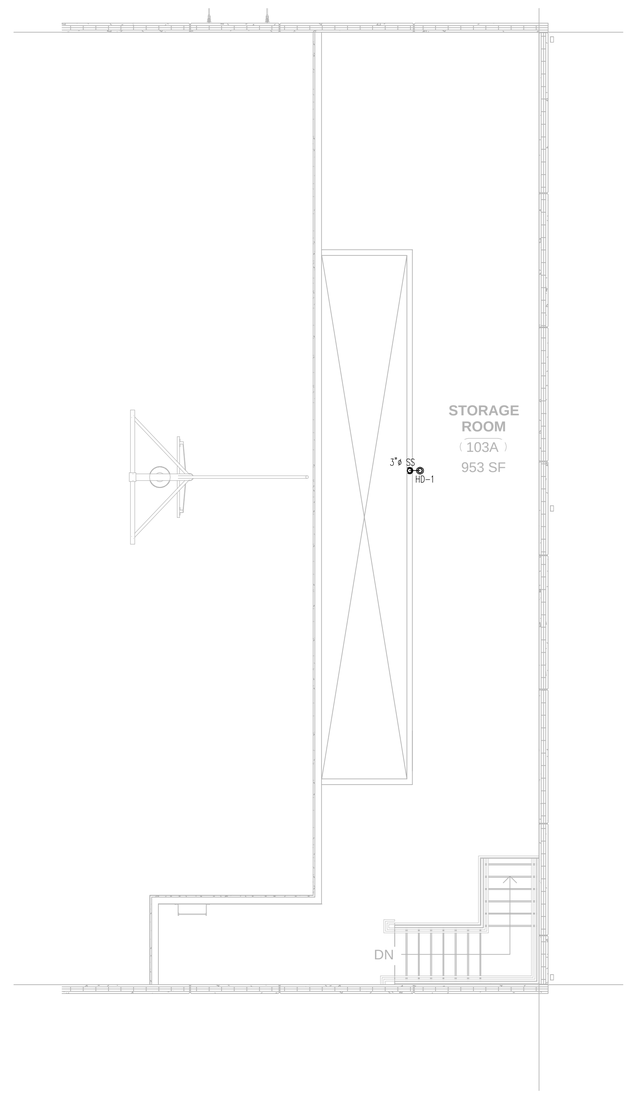
TYPICAL YARD CLEAN-OUT



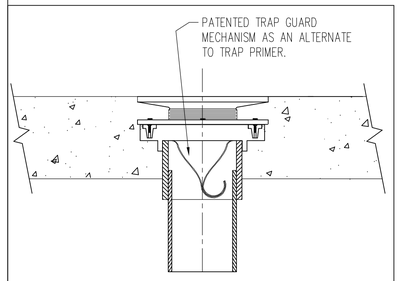
DRAIN / WASTE / VENT RISER DIAGRAM



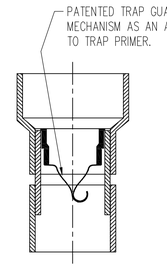
FIRST FLOOR LEVEL PLUMBING WASTE PLAN SCALE: 3/16"=1'-0"



MEZZANINE LEVEL PLUMBING WASTE PLAN SCALE: 3/16"=1'-0"



FLOOR DRAIN DETAIL



HUB DRAIN DETAIL

LEGEND

SS	SANITARY SEWER PIPE (ABOVE GROUND)
SS	SANITARY SEWER PIPE (BURIED)
CW	COLD WATER PIPE (ABOVE GROUND)
CW	COLD WATER PIPE (BURIED)
HW	HOT WATER PIPE (ABOVE GROUND)
HW	HOT WATER PIPE (BURIED)
	VENT PIPE
	PIPE UP
	PIPE DOWN
FCO-#	FLOOR CLEAN-OUT
FD-#	FLOOR DRAIN
	WALL CLEAN-OUT
	VENT THRU ROOF
	CHECK VALVE
	GATE VALVE
	BALL VALVE
	UNION
TEMP/PRESS RELIEF VALVE	PRV PRESSURE REDUCING VALVE
HB	WALL HYDRANT
WH	WATER HEATER

AFF	ABOVE FINISHED FLOOR
BFF	BELOW FINISHED FLOOR
CI	CAST IRON
CO	CLEAN-OUT
CW	COLD WATER
DIA	DIAMETER
DWG	DRAWING
FCO	FLOOR CLEAN-OUT
FD	FLOOR DRAIN
FS	FLOOR SINK
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HD	HUB DRAIN
HP	HORSEPOWER
HW	HOT WATER
HWR	HOT WATER RETURN
LAV	LAVATORY
NG	NATURAL GAS
SS	SANITARY SEWER
TYP	TYPICAL
UR	URINAL
VTR	VENT TO ROOF
WC	WATER CLOSET
WCO	WALL CLEAN-OUT
WH	WATER HEATER
YCO	YARD CLEAN-OUT

Greenville County

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PLUMBING PLANS

P-100

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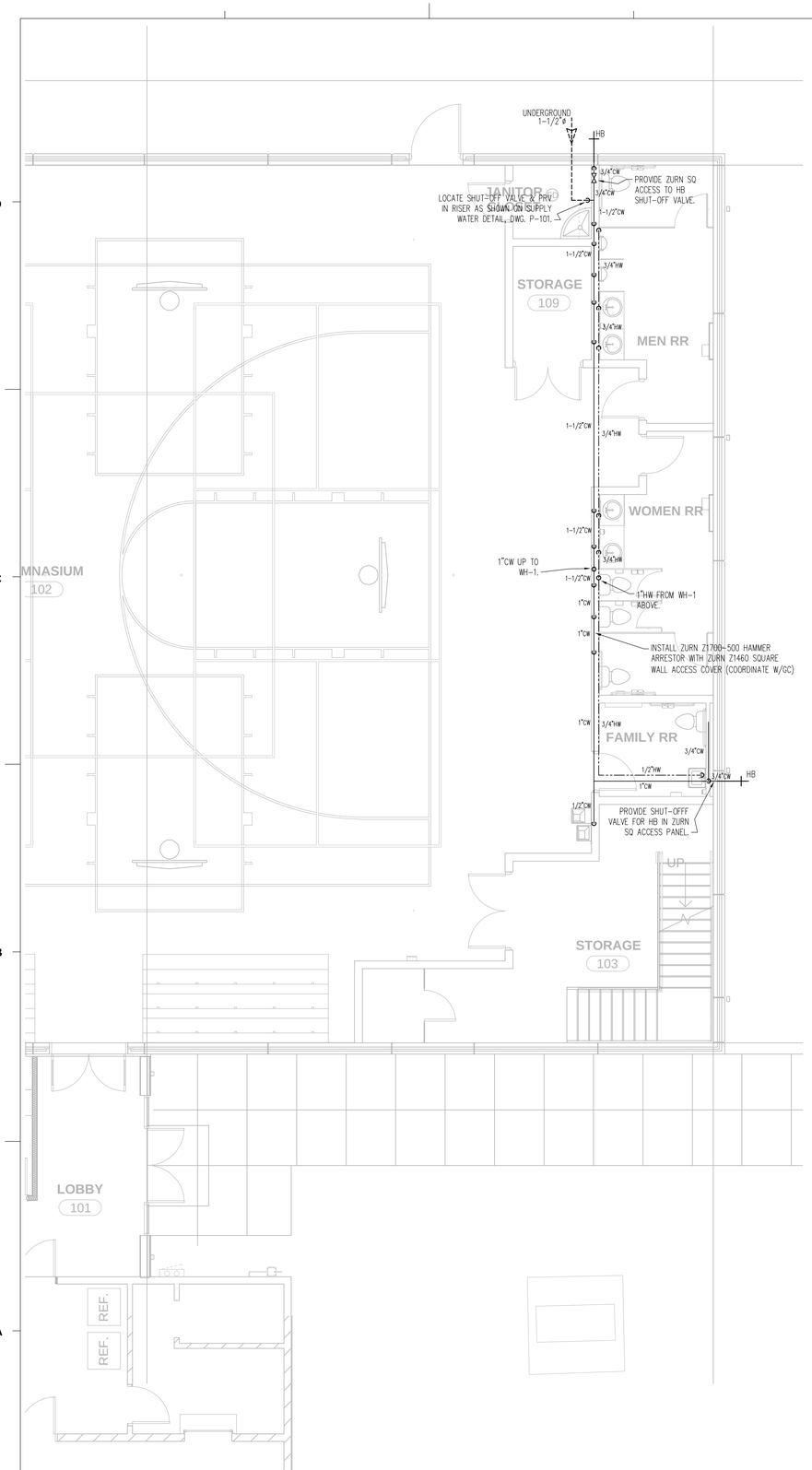
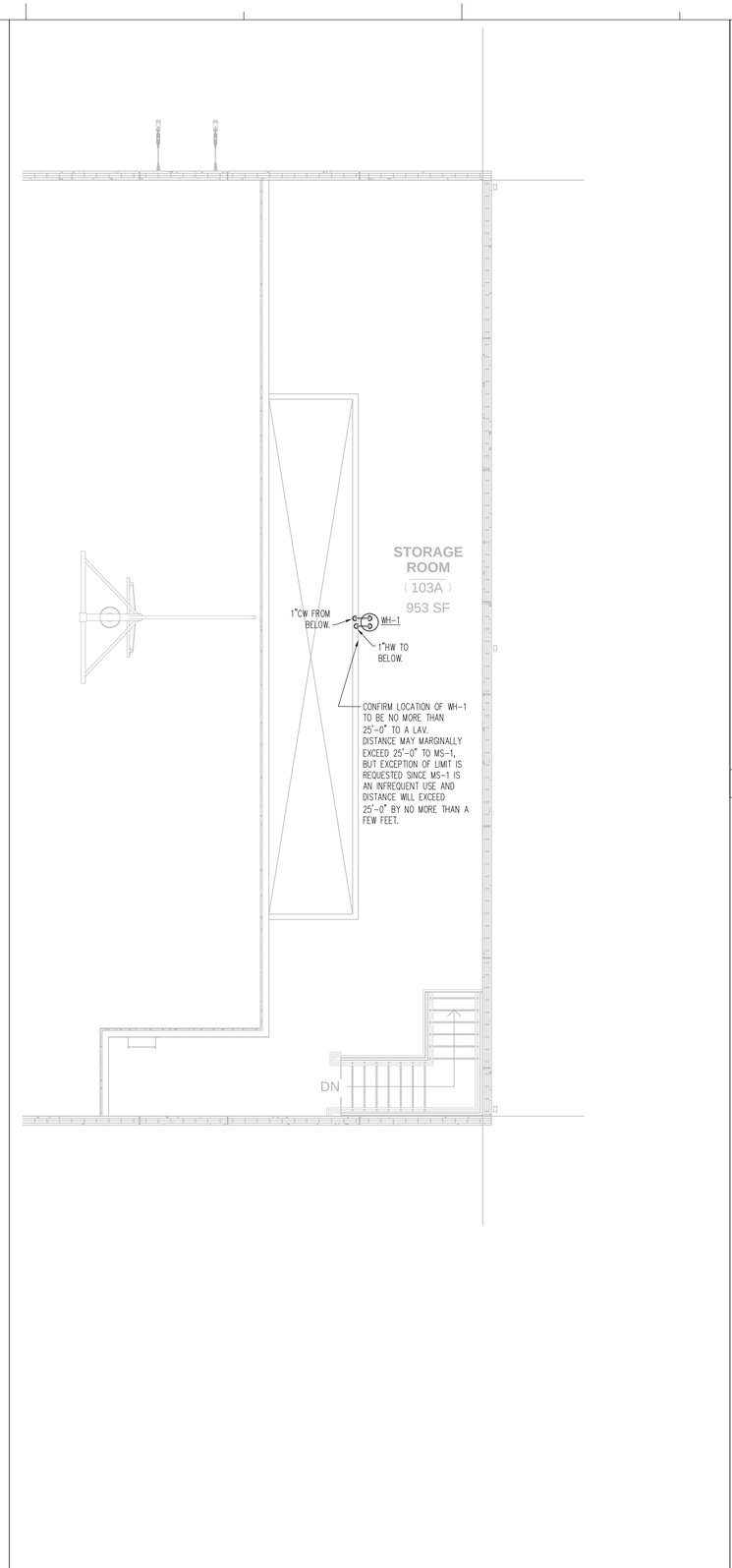
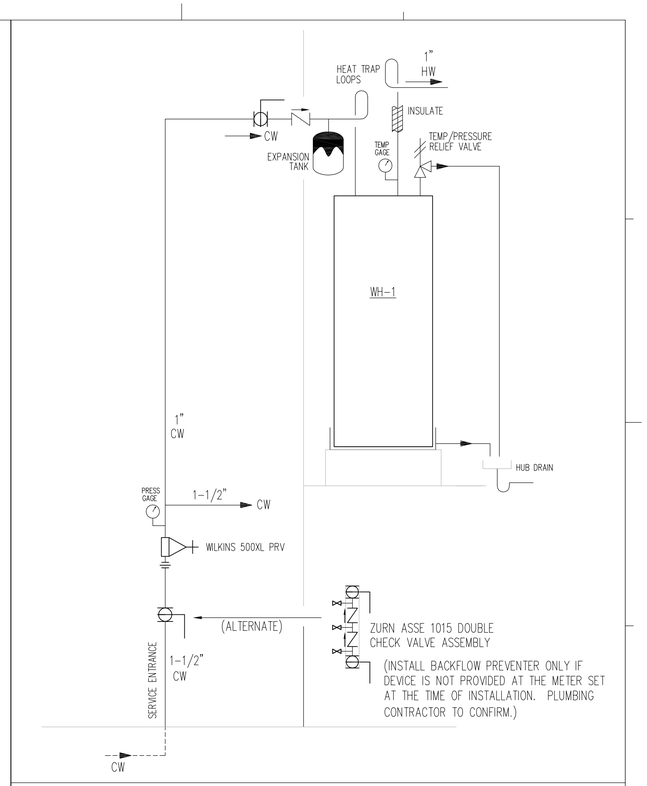


FIRST LEVEL SUPPLY WATER PLAN SCALE: 3/16"=1'-0"



MEZZANINE LEVEL SUPPLY WATER PLAN SCALE: 3/16"=1'-0"



SUPPLY WATER SCHEMATIC

LEGEND

SS	SANITARY SEWER PIPE (ABOVE GROUND)
SS	SANITARY SEWER PIPE (BURIED)
CW	COLD WATER PIPE (ABOVE GROUND)
CW	COLD WATER PIPE (BURIED)
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	PIPE UP
	PIPE DOWN
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	WALL CLEAN-OUT
	VENT THRU ROOF
	CHECK VALVE
	GATE VALVE
	BALL VALVE
	UNION
TEMP/PRESS. RELIEF VALVE	PRV PRESSURE REDUCING VALVE
HB	WALL HYDRANT
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CI	CAST IRON
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HP	HORSEPOWER
HW	HOT WATER
HWR	HOT WATER RETURN
LAV	LAVATORY
NG	NATURAL GAS
SS	SANITARY SEWER
TYP	TYPICAL
UR	URINAL
VTR	VENT TO ROOF
WC	WATER CLOSET
WCO	WALL CLEAN-OUT
WH	WATER HEATER
YCO	YARD CLEAN-OUT

Greenville County

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P-101

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ROOF-TOP UNIT SCHEDULE - GAS/ELECTRIC

ID #	ZONE	MANUFACTURER MODEL #	NOM. CAPACITY (TONS)	TOTAL COOL (MBH)	SENS. COOL (MBH)	TOTAL HEAT (MBH)	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN WG)	MOTOR HP	GAS HEATER DATA	SINGLE POINT ELECTRICAL			UNIT WT. (LBS.)	NOTES:
												VOLTS/PH	MCA	MOP		
RTU-1	GYM & ALL OTHER GYM AREAS	TRANE YSD150	12.5	150.1	116.0	203	5,000	848	0.7	3	250 MBH IN /203 MBH OUT HI 175 MBH IN /142 MBH OUT LO	208 /3	64.0	80.0	2,400	ALL
RTU-2	GYM	TRANE YSD150	12.5	150.1	116.0	203	5,000	848	0.7	3	250 MBH IN /203 MBH OUT HI 175 MBH IN /142 MBH OUT LO	208 /3	64.0	80.0	2,400	ALL

NOTES:

1. SHORT-CYCLE AND LOW AMBIENT (0°F) PROTECTION.
2. SMOKE DETECTOR INTERLOCK. SEE THE INSTALLATION SPECIFICATION FOR DETAILS.
3. CONFIRM ALL MODEL NUMBERS AND ELECTRICAL REQUIREMENTS PRIOR TO PURCHASE. PROVIDE ELECTRICAL DATA TO ELECTRICIAN FROM SUBMITTALS ONLY.
4. HOT GAS RE-HEAT FUNCTION FOR HUMIDITY CONTROL.
5. REQUIRES SEISMIC RESTRAINT. EQUIPMENT MUST SEISMICALLY CERTIFIED BY MANUFACTURER. CONTRACTOR TO PROVIDE SEISMICALLY-RATED CURB AND SEISMIC ANCHORS IN ACCORDANCE WITH THE SEISMIC SCHEDULE.
6. PROVIDE WITH COIL HAIL GUARDS.
7. TWO SCROLL COMPRESSORS.
8. MERV 8 FILTER.
9. PROVIDE WITH ECONOMIZER. ECONOMIZER DAMPER TO BE MODULATED BY AUTOMATIC ACTUATOR. CONTROL OF THE ACTUATOR TO BE BY A CO2 CONTROLLER LOCATED IN THE SPACE AND BY AMBIENT COMPARATIVE ENTHALPY CONTROL. THE MINIMUM POSITION SHALL ALLOW 300 CFM. THE MAXIMUM POSITION FOR VENTILATION SHALL ALLOW 848 CFM, AND THE ECONOMIZER POSITION SHALL BE FULLY OPEN.
10. BAROMETRIC RELIEF.
11. BELT DRIVE RE-CIRCULATION AIR FAN.
12. DOWNFLOW.
13. SINGLE NG BURNER. TWO-STAGE HEAT (250 MBH / 175 MBH OUTPUT). BELOW CURB GAS INTERCONNECT.
14. 11 EER COOLING EFFICIENCY. 81% NG BURNER HEATING EFFICIENCY.
15. PROVIDE WITH RTU NOISE REDUCTION SYSTEM PER THE RTU DETAIL ON DWG. M-102.

EXISTING ROOF-TOP UNIT SCHEDULE - GAS/ELECTRIC

ID #	ZONE	MANUFACTURER MODEL #	NOM. CAPACITY (TONS)	TOTAL COOL (MBH)	SENS. COOL (MBH)	TOTAL HEAT (MBH)	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN WG)	MOTOR HP	GAS HEATER DATA	SINGLE POINT ELECTRICAL			UNIT WT. (LBS.)	NOTES:
												VOLTS/PH	MCA	MOP		
RTU-3	EXISTING BUILDING	EXISTING TRANE YSC102	–	–	–	–	–	–	–	–	–	–	–	–	–	ALL
RTU-4	EXISTING BUILDING	EXISTING TRANE YSC102	–	–	–	–	–	–	–	–	–	–	–	–	–	ALL

NOTES:

1. UNIT TO BE REMOVED & STORED DURING CONSTRUCTION OF ADDITION.
2. UNIT TO BE PLACED BACK ON THE NEW CONNECTOR AREA ROOF AND SHALL BE MOUNTED ON A NEW SEISMIC CURB TO BE PROVIDED AND INSTALLED BY THE HVAC CONTRACTOR (NOTE THAT EXISTING UNIT IS NOT MOUNTED ON A CURB)- HVAC CONTRACTOR MUST CONFIRM REQUIRED CURB. ALSO, NOISE REDUCTION SYSTEM SHALL BE PROVIDED PER THE RTU DETAIL SHOWN ON DWG. M-102.

UNITARY SPLIT HEAT PUMP SYSTEM SCHEDULE

SYSTEM #	AIR HANDLING UNIT													HEAT PUMP SCHEDULE						NOTES
	ID #	AREA	TRANE MODEL #	TOTAL COOL (MBH)	SENS. COOL (MBH)	TOTAL HEAT (MBH)	SUPPLY AIR (CFM)	E.S.P. (IN WG)	OUTSIDE AIR (CFM)	ZONES	ELECTRIC HEATER KW	SINGLE POINT ELECTRICAL			ID #	TRANE MODEL #	NOM. CAP. (TONS)	SINGLE POINT ELECTRICAL			
												VOLTS/PH	MCA	MOP				VOLTS/PH	MCA	MOP	
AC-1	AHU-1	CONNECTOR	TEM3A0B24S	21.5	16.8	22.0	800	0.6	31	1	5	208/1	23	25	HP-1	4TWR4024	2	208/1	12	20	ALL

NOTES:

1. SHORT-CYCLE AND LOW AMBIENT (20°F) PROTECTION.
2. NO SMOKE DETECTOR REQUIRED.
3. FIELD MEASURE REFIGERANT LINE LENGTHS FOR THE SYSTEM AND CONFIRM ALL REQUIREMENTS WITH MANUFACTURER BASED ON SYSTEM AND LENGTH.
4. CONFIRM ALL MODEL NUMBERS AND ELECTRICAL REQUIREMENTS PRIOR TO PURCHASE. PROVIDE ELECTRICAL DATA TO ELECTRICIAN FROM SUBMITTALS ONLY.
5. AHU ELECTRICAL INSTALLTAION WITH SINGLE-POINT WIRING KIT. VERIFY ELECTRIC HEATER MATCH AND MODEL # WITH MANUFACTURERS REPRESENTATIVE.
6. PROVIDE HP-1 WITH CONDENSER BASE NOISE REDUCTION SYSTEM PER DETAIL ON DWG. M-102.
7. PROVIDE WITH AUXILIARY FILTER RACK AND BRACKET. PROVIDE WITH MERV 8 AIR FILTERS.

FAN SCHEDULE

ID #	MANUF. MODEL #	AREA	FAN TYPE	FAN DATA			ELECTRICAL DATA		WT.	NOTES:
				CFM	SP (WG)	RPM	VOLTS/PH	W		
EF-1	GREENHECK SP-B90	JANITOR'S CLOSET	CEILING-MOUNT EXHAUST FAN	50	0.35	700	120/1	50	10	1
EF-2	GREENHECK SP-A290	MEN'S ROOM	CEILING-MOUNT EXHAUST FAN	230	0.35	1,050	120/1	81	25	1
EF-3	GREENHECK SP-A250	WOMEN'S ROOM	CEILING-MOUNT EXHAUST FAN	210	0.35	1,000	120/1	83	25	1
EF-4	GREENHECK SP-A125	FAMILY TOILET	CEILING-MOUNT EXHAUST FAN	70	0.35	1,100	120/1	53	18	1

NOTES:

1. CEILING EXHAUST FAN: GALVANIZED STEEL SCROLL AND HOUSING, WHITE NON-YELLOWING GRILLE, PLUG-TYPE DISCONNECT, MOTOR WITH THERMAL OVERLOAD, UL 507, BACKDRAFT DAMPER, ISOLATION HANGING KIT, POLYPROPYLENE WHEEL.

HVAC SEQUENCE OF OPERATION

EQUIPMENT #	AREA	CONTROL SWITCH TYPE	CONTROL SWITCH LOCATION	AUTOMATIC INTERLOCK	SMOKE DETECTOR INTERLOCK	NOTES
RTU-1	GYM & ALL OTHER GYM AREAS	THERMOSTAT, CO2 SENSOR/CONTROLLER	(SEE PLAN)		YES	1-4
RTU-2	GYM	THERMOSTAT, CO2 SENSOR/CONTROLLER	(SEE PLAN)		YES	1-4
AC-1	CONNECTOR	THERMOSTAT (FACTORY)	(SEE PLAN)		NO	–
EF-1, -2, -3 & -4	TOILET AREAS & JANITOR'S CLOSET		NEAR UNIT	ROOM LIGHTS	–	5

NOTES:

1. SYSTEM TO HAVE A DEDICATED, REMOTE THERMOSTAT/CONTROLLER WITH SPACE-LOCATED SENSOR. THE THERMOSTAT/CONTROLLER IS TO BE A PROGRAMMABLE, AUTO CHANGE-OVER, TIME-OF-DAY TYPE FOR SCHEDULING OF THE SETPOINT TEMPERATURES AND FAN OPERATION. DURING THE PROGRAMMED OCCUPIED PERIODS, THE AIR HANDLER FAN SHALL OPERATE AT ALL TIMES. DURING UN-OCCUPIED MODES, THE UNIT WILL OPERATE BY DEMAND-ONLY OF THE THERMOSTAT (FAN, HEAT OR COOL).
2. THE CO2 CONTROL SHALL PROVIDE MODULATED DEMAND CONTROL VENTILATION OF THE OUTDOOR ECONOMIZER DAMPER WHEN THE AREA IS OCCUPIED AND ADDITIONAL VENTILATION AIR IS REQUIRED. WHEN THE CO2 CONTROL IS SATISFIED, THE DAMPER SHALL CLOSE BACK TO THE MINIMUM POSITION.
3. ENTHALPY CONTROL SHALL FULLY OPEN THE ECONOMIZER DAMPER WHEN THE CONDITIONS MEET THE SETPOINT REQUIREMENT. THIS SHALL OVERRIDE THE CO2 CONTROL.
4. A SMOKE DETECTOR SHALL SHUT-DOWN THE RTU AND SHALL HAVE AN OUTPUT TO INTERLOCK TO THE BUILDING FIRE ALARM SYSTEM. IF THERE IS NO FIRE ALARM SYSTEM, EACH DETECTOR MUST ACTIVATE AN ANNUCIATOR AS REQ'D AND LOCATED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL FIRE MARSHAL.
5. FAN SHALL OPERATE WHEN THE LIGHTING SWITCH OR SENSOR IN THE ROOM IS ACTIVATED AND FOR A TIME-DELAYED PERIOD OF FIVE MINUTES AFTER THE SWITCH OR SENSOR IS DE-ACTIVATED.

SUPPLY AIR DEVICE SCHEDULE

ID #	MANUFACTURER MODEL #	TYPE	MATL.	FINISH	CONNECTOR SIZE
SR18x8	PRICE 520 18Wx8H, DOUB. DEFL WITH DAMPER	SIDEWALL SUPPLY REGISTER	STEEL	ENAMEL, WHITE	(SEE DWG.)
SR14x6	PRICE 520 14Wx6, DOUB. DEFL WITH DAMPER	SIDEWALL SUPPLY REGISTER	STEEL	ENAMEL, WHITE	(SEE DWG.)
SR12x6	PRICE 520 12Wx6, DOUB. DEFL WITH DAMPER	SIDEWALL SUPPLY REGISTER	STEEL	ENAMEL, WHITE	(SEE DWG.)
SLD6	PRICE SCD (3-CONE)	SUPPLY LAY-IN DIFFUSER	STEEL	ENAMEL, WHITE	6"ø
SLD8	PRICE SCD (3-CONE)	SUPPLY LAY-IN DIFFUSER	STEEL	ENAMEL, WHITE	8"ø

NOTES:

1. CONFIRM REQUIRED FINISH.
2. INNER BLADES FOR 520 GRILLES TO BE PARALLEL TO "W" DIMENSION.

RETURN AIR DEVICE SCHEDULE

ID #	MANUFACTURER MODEL #	TYPE	MATL.	FINISH	CONNECTOR SIZE
RG12x6	PRICE 530 12Wx6H, 45° DEFL, 3/4"	RETURN GRILLE	STEEL	ENAMEL, WHITE	(SEE DWG.)
RG12x10	PRICE 530 12Wx10H, 45° DEFL, 3/4"	RETURN GRILLE	STEEL	ENAMEL, WHITE	(SEE DWG.)
RG28x20	PRICE 530 28Wx20H, 45° DEFL, 3/4"	RETURN GRILLE	STEEL	ENAMEL, WHITE	(SEE DWG.)
RLG8	PRICE PDDR	RETURN LAY-IN GRILLE	STEEL	ENAMEL, WHITE	8"ø
RLG14	PRICE PDDR	RETURN LAY-IN GRILLE	STEEL	ENAMEL, WHITE	14"ø
RLG2'x2'	PRICE PDDR 24x24	RETURN LAY-IN GRILLE	STEEL	ENAMEL, WHITE	SEE DWG.

NOTES:

1. CONFIRM REQUIRED FINISH.
2. BLADES FOR 530 GRILLES TO BE PARALLEL TO "W" DIMENSION.

LOUVER SCHEDULE

ID #	MANUF/ MODEL #	FREE AREA (SQ. FT.)	TYPE	MATL.	FINISH	NOTES:
L-1	RUSKIN ELF375DX- 12"W x 12" H	0.26	DRAINABLE, STATIONARY	ALUM	PAINT GRIP	ALL

NOTES:

1. FREE AREA FACE VELOCITY SELECTED TO BE <873 FT/MIN WHICH KEEPS THE WATER PENETRATION BELOW 0.01 OZ/SQ FT.
2. ROUGH OPEN WALL FRAME PROVIDED BY GENERAL CONTRACTOR BASED ON SUBMITTAL DATA FRAME REQUIREMENTS.
3. PLACE LOUVER ASSEMBLY IN 0.032" ALUMINUM WALL SLEEVE.

EXHAUST DISCHARGE DEVICE SCHEDULE

ID #	MANUFACTURER MODEL #	TYPE	MATL.	FINISH
ED-1, -4	GREENHECK WC-4	HOODED WALL CAP	ALUM	FACTORY
ED-2, -3	GREENHECK WC-8	HOODED WALL CAP	ALUM	FACTORY

NOTES:

1. PROVIDE WITH BIRD SCREEN.
2. PROVIDE WITH GRAVITY DAMPER.

HVAC AIR DEVICES

Greenville County

STAUNTON BRIDGE CC ADDITION

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 16175 WILLIAM GRADY BARTLETT

William G. Bartlett 3/11/2016

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HVAC SCHEDULES

M-001

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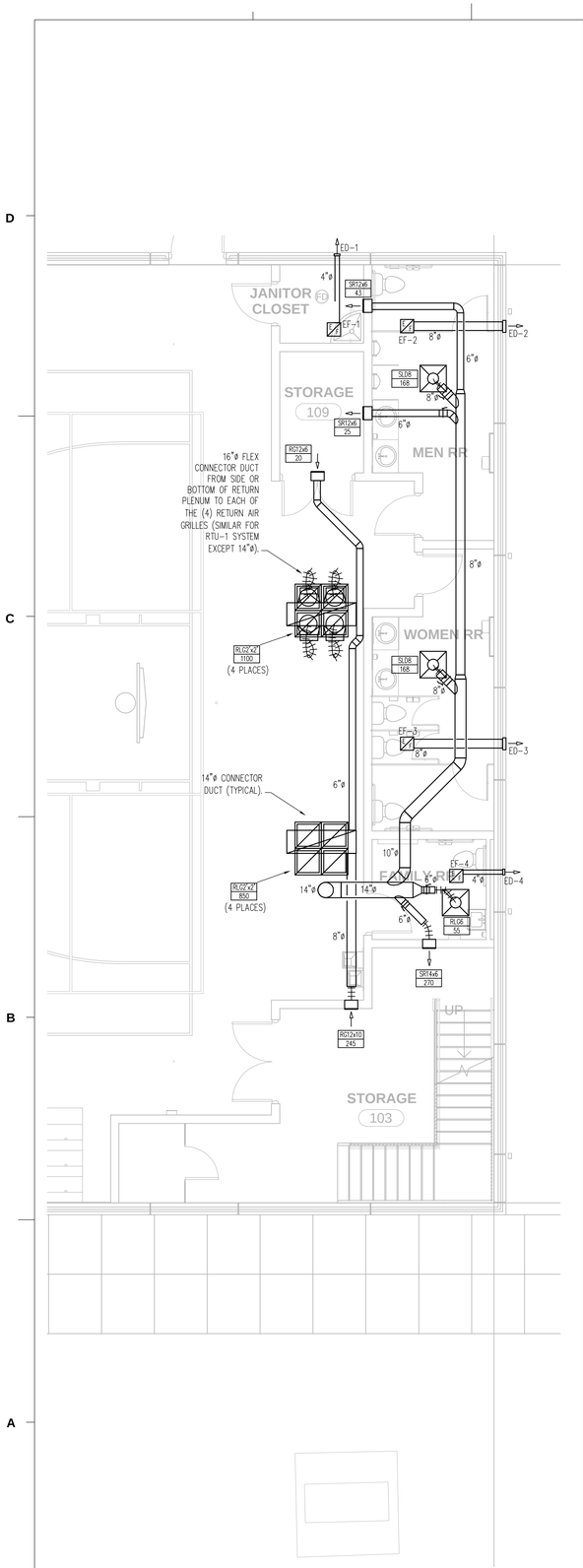
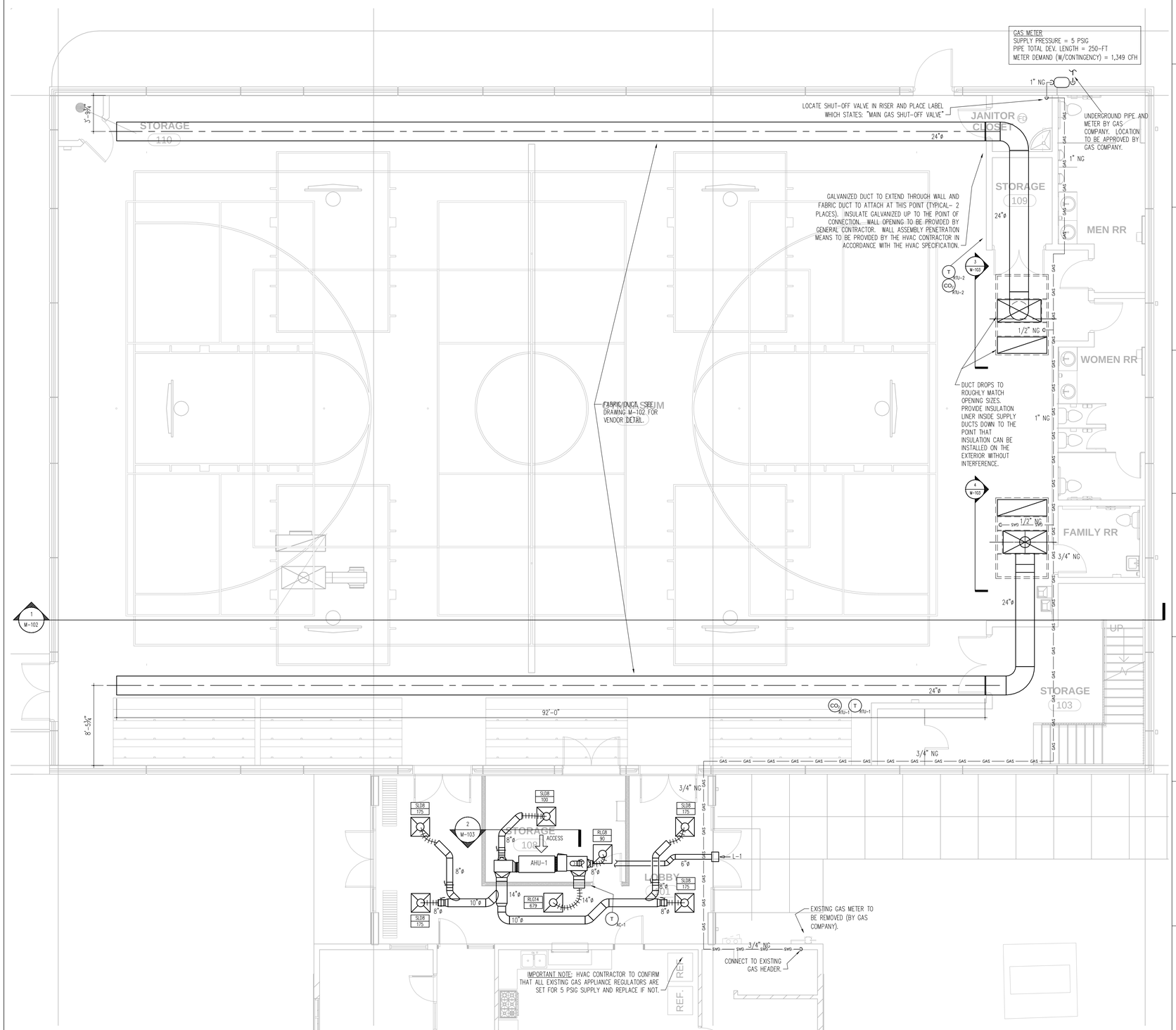


ABOVE CELING PLAN SCALE: 3/16"=1'-0"



BELOW ROOF PLAN SCALE: 3/16"=1'-0"

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HVAC PLANS

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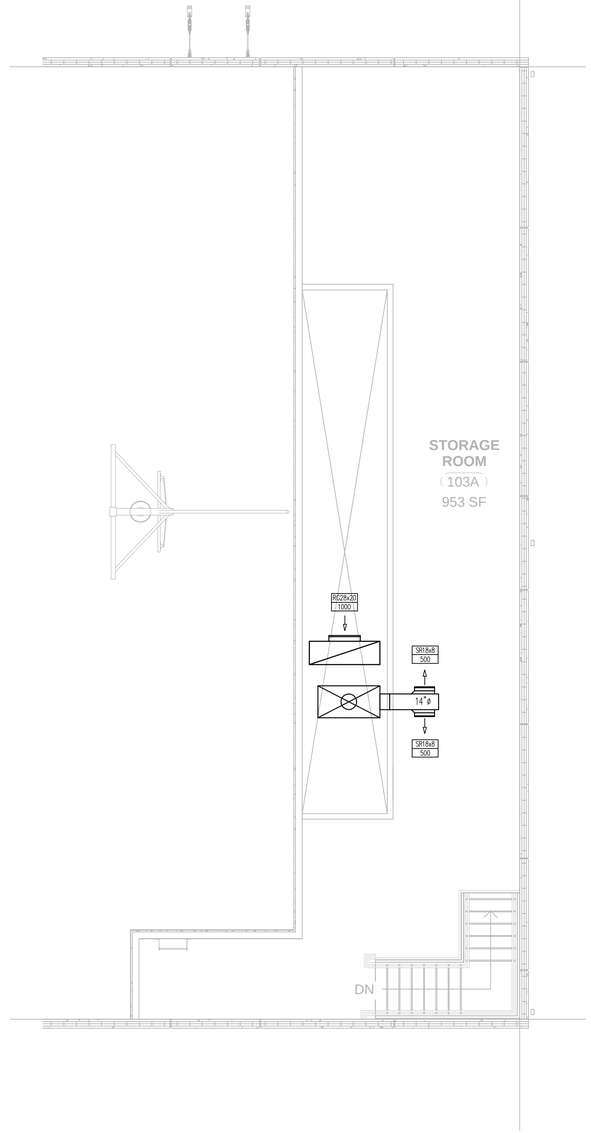
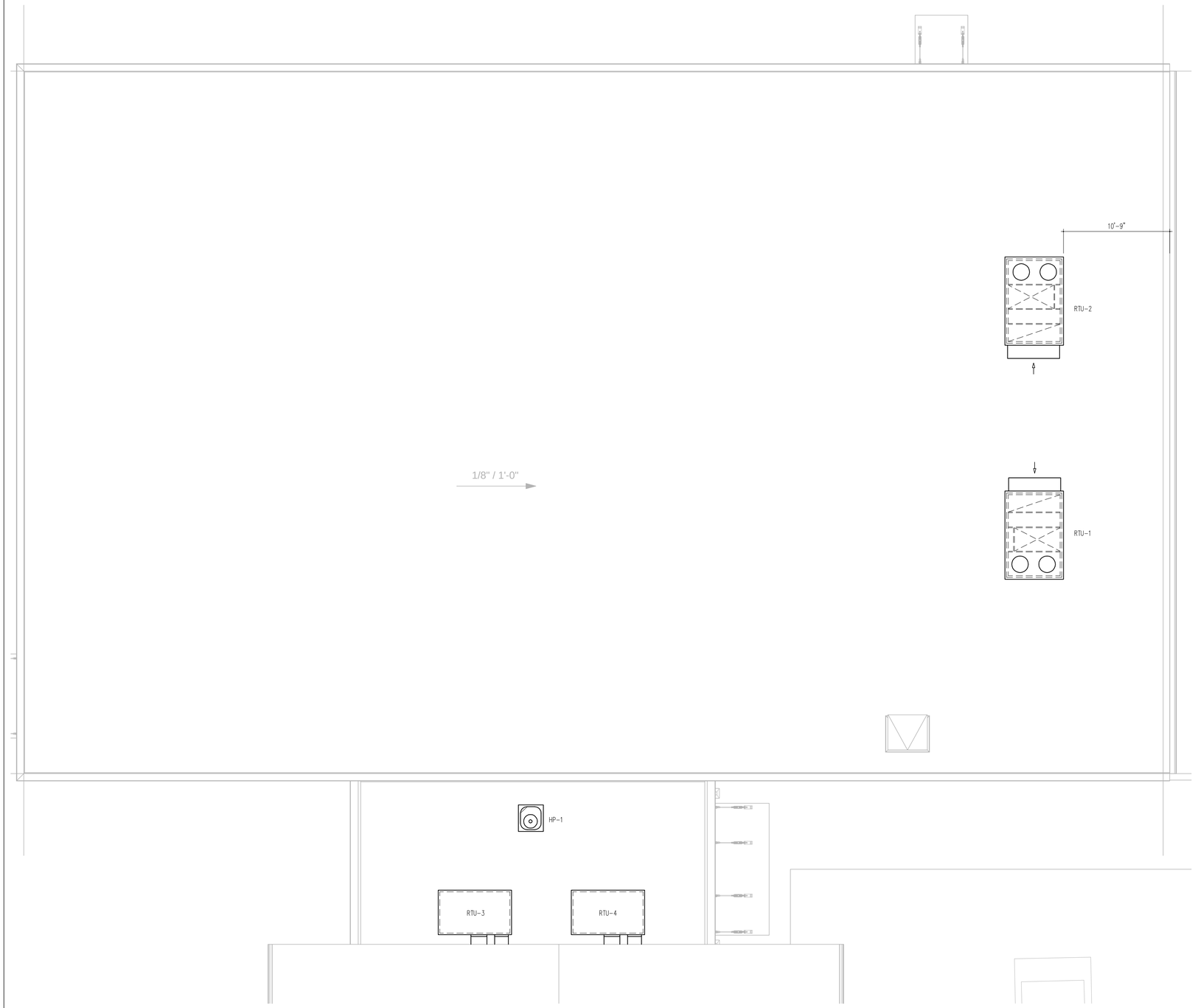


MEZZANINE PLAN SCALE: 3/16"=1'-0"



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

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WILLIAM GRADY BARTLETT
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HVAC PLANS

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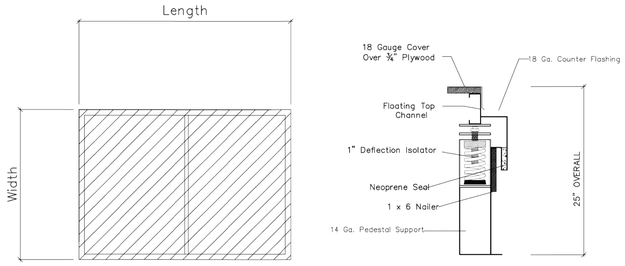
HUSHCORE™ *BASE* ™ RTU NOISE REDUCTION SYSTEM – PREASSEMBLED INTEGRATED VIBRATION ISOLATION CURB – MODEL HIPC–1



HIPC – 1 CONDENSER PLATFORM CURB

RTU NOISE REDUCTION SYSTEM

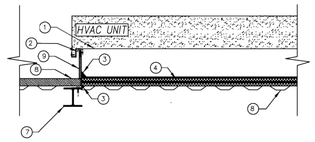
HUSHCORE™ ***BASE***™ Model HIPC-1 is a Vibration Isolation Platform Roof Curb, 14" tall base, flat, 3/4" plywood top with 18 gauge metal cover, 1" deflection, for use with Condenser Units, fully adjustable and fully assembled. The isolation springs shall be adjustable for leveling, contain restraints and snubbers to resist wind and seismic resistance. The HIPC-1 Curb shall have a wood nailer and shall be designed so the curb springs shall be adjustable for leveling. The complete curb system shall be shipped completely assembled. Factory curbs with a secondary vibration rail kit are not acceptable. A letter of certification shall be issued by the acoustical system supplier stating the complete system has been properly installed prior to setting the unit(s). Products and systems shall be by BRD Noise and Vibration Control, Inc., Wind Gap, PA.

PERFORMANCE

The complete HUSHCORE™ system shall provide minimum 85% vibration isolation efficiency. Seismic performance shall be as outlined elsewhere in the specification.

CONDENSER BASE NOISE REDUCTION SYSTEM DETAIL

HUSHCORE™ *ECONOMY* ™ NOISE REDUCTION SYSTEM FOR INTERNALLY ISOLATED RTU ON NON–ISOLATED FACTORY CURB – MODEL NIC–DS–41



BY RTU UNIT MANUFACTURER

1. RTU with internal isolation
2. Factory Non-Isolated Roof Curb

BY ACOUSTICAL MANUFACTURER

3. HUSH SEALANT ™ Acoustical Caulk at all Duct Drops & Curb Perimeter
4. HUSHCORE ™ DS-41 Deck System In-Curb Acoustical Treatment

BY HVAC CONTRACTOR

5. Duct Work - Horizontal Discharge or Downflow from unit
6. Submit Letter of Certification from Acoustical Supplier following Inspection

BY GENERAL CONTRACTOR

7. Building Steel
8. Built-up Roof or Concrete
9. Insulation and Cant Strip
10. Curb Slope requirements where applicable

RTU NOISE REDUCTION SYSTEM

HUSHCORE™ ***ECONOMY***™ Model NIC-DS-41 consists of an internally isolated RTU mounted on a non-isolated factory curb. The overall installed thickness shall be 8" for the in-curb composite treatment. Shall have a thermal value of R-27. The composite panels shall get HUSH SEALANT™ model HSAC-100 acoustical grade caulk at seams and all perimeter edges inside the curb. Decking shall be maintained inside the RTU roof curb to a clearance of ¼" maximum around all duct drops but never contact the duct. The manufacturer or their local authorized agent shall inspect the in-curb deck system work on site prior to lowering of the units and issue a letter of certification stating that the products have been properly installed and sealed around all ductwork and drops to eliminate air gaps which can compromise performance. Products and systems shall be by BRD Noise and Vibration Control, Inc., Wind Gap, PA.

PERFORMANCE

To assure optimized aerodynamic and acoustic performance as well as proper integration and coordination of the final installation, the HUSHCORE™ System shall be supplied by the rooftop unit manufacturer as part of a turnkey package. HUSHCORE™ Model NIC-DS-41 In-Curb Acoustical Treatment Performance shall be tested in accordance with procedure ASTM E-90-10. The assembly shall be rated at not less than STC-41 with 1/3 octave performance values as listed below for sound radiation through the deck inside the curb.

HUSHCORE In-Curb Composite - (Transmission Loss) in accordance with ASTM E-90-10																					
Freq. (Hz)	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	STC
Transmission Loss (dB)	13	13	18	20	25	40	48	52	56	58	60	58	60	60	61	62	65	69	72	72	74	41

RTU NOISE REDUCTION SYSTEM DETAIL

CODE SEISMIC REQUIREMENTS SUMMARY FOR MECHANICAL COMPONENTS

COMPONENT TYPE	SITE SEISMIC DESIGN CATEGORY	COMPONENT IMPORTANCE FACTOR	SEISMIC SUPPORT	BASIS FOR EXEMPTIONS:
ALL–ELECTRIC MECHANICAL EQUIPMENT	C	1.0	NOT REQUIRED	EXEMPT PER ASCE 7–05 SECTION 13.1.4 ITEM 3.
GAS–FIRED MECHANICAL EQUIPMENT	C	1.5	REQUIRED	
FANS (SAME AS ALL–ELECTRIC MECHANICAL EQUIPMENT)	C	1.0	NOT REQUIRED	EXEMPT PER ASCE 7–05 SECTION 13.1.4 ITEM 3.
GAS PIPING	C	1.5	REQUIRED WITH EXCEPTIONS	ASCE 7–05 SECTION 13.6.8 ALLOWS EXEMPTIONS FOR "HIGH DEFORMABILITY" PIPE OF DIA 2" OR LESS OR PIPE THAT IS SUPPORTED BY HANGERS OF 12" OR LESS LENGTH.
DUCTWORK	C	1.0	NOT REQUIRED	EXEMPT PER ASCE 7–05 SECTION 13.1.4 ITEM 3.
REFRIGERANT PIPING	C	1.0	NOT REQUIRED	EXEMPT PER ASCE 7–05 SECTION 13.1.4 ITEM 3.

NOTES:

1. ANY COMPONENT IS ASSUMED TO HAVE AN Ip=1.5 IF ANY OF THE FOLLOWING APPLY: COMPONENT IS REQ'D TO FUNCTION AS A LIFE SAFETY DEVICE, CONTAINS A HAZARD MATERIAL OR STORED ENERGY (SUCH AS NATURAL GAS OR COMPRESSED AIR), OR IS PART OF A CATEGORY IV STRUCTURE.
2. WHERE COMPONENTS REQUIRE SEISMIC RESTRAINT ACCORDING TO THIS TABLE, IT SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR TO OBTAIN THE INSTALLATION SUPPORT DESIGN, EQUIPMENT MANUFACTURER'S SEIMIC CERTIFICATION DOCUMENTS, PROVIDE ENGINEER–SEALED INSTALLATION SUBMITTALS FOR APPROVAL, AND INSTALL IN ACCORDANCE WITH ALL DOCUMENTS. AN ACCEPTABLE SEISMIC RESTRAINT/ISOLATION SYSTEM WOULD INCLUDE PRODUCTS REPRESENTED BY THE CHAPMAN COMPANY. FOR INQUIRY AND PURCHASE OF THE REQUIRED DESIGN DOCUMENTS AND COMPONENTS/SYSTEMS, CONTACT MR. MIKE STURKIE AT CHAPMAN (PHONE 866–350–6235). ALSO, ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS, VIBRATION ISOLATION FOR EQUIPMENT SHOULD BE INTEGRATED INTO THE SEISMIC RESTRAINT/ISOLATION SYSTEM. WHEN SEISMIC RESTRAINT/ISOLATION (OR EVEN JUST VIBRATION ISOLATORS) ARE INSTALLED, FLEXIBLE CONNECTIONS MUST BE INSTALLED BETWEEN THE EQUIPMENT AND ALL CONNECTIONS (I.E., DUCTWORK, PIPE, CONDUIT, ETC.). ALSO, WHEN A RESTRAINT/ISOLATION SYSTEM IS INSTALLED, A SPECIAL INSPECTION PLAN (QUALITY ASSURANCE PLAN) IN ACCORDANCE WITH THE BUILDING CODE MUST ALSO BE SPECIFIED ALONG WITH THE SUPPORT DETAILS; THIS PLAN SHOULD SIMPLY STATE THAT ALL INSTALLED RESTRAINT SYSTEMS SHALL BE INSPECTED BY THE MANUFACTURER'S REPRESENTATIVE AND SHALL BE DOCUMENTED WITH A LETTER ON THE REPRESENTATIVE'S LETTERHEAD WHICH STATES THE INSTALLATION IS IN COMPLIANCE.

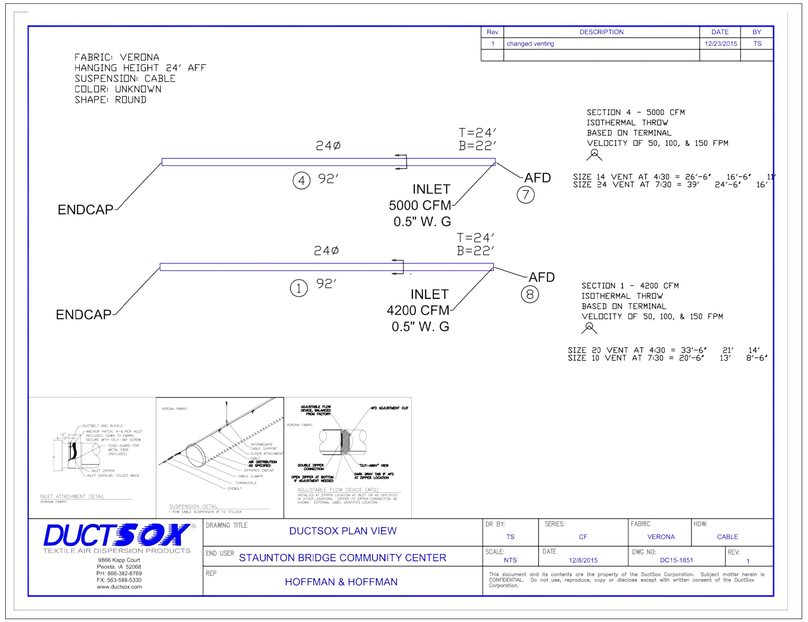
CODE VENTILATION TABLE

Gymnasium Building	1- Gymnasium	2- Storage	3- Family RR	4- Womens RR	5- Mes RR	6- Storage	7- Janitor Closet	10- Mezzanine	Zone Totals
Room Width	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Room Length	737.2	41.8	8.8	21.3	21.3	6.9	5.1	109.8	
Area (sq ft)	7,372	418	88	213	213	69	51	1,098	9,522
People/1000 s	--	--	--	--	--	--	--	--	
# of people	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150
CFM/sq ft	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	
CFM/person	7.5	5	5	5	5	5	5	5	
Total CFM	**1,567**	**25**	**5**	**13**	**13**	**4**	**3**	**66**	**1,696**

Connestor	8- Storage	9- Lobby	Zone Totals
Room Width	10.0	10.0	
Room Length	10.3	42.1	
Area (sq ft)	103	421	524
People/1000 s	--	--	
# of people	0.0	0.0	0
CFM/sq ft	0.06	0.06	
CFM/person	5	5	
Total CFM	**6**	**25**	**31**

NOTES:

1. VENTILATION RATES BASED ON THE REQUIREMENTS OF THE 2012 INTERNATIONAL MECHANICAL CODE TABLE 403.3.



Rev	DESCRIPTION	DATE	BY
1	changed venting	12/23/2015	TS

FABRIC DUCT VENDOR DETAIL

Natural Gas Pipe Design Data	
Item Name	Gas Input (MBH)
RTU-1 (new)	250
RTU-2 (new)	250
RTU-3 (exist.)	150
RTU-4 (exist.)	150
Tankless WH (exist.)	199
(Future)	350
	1,349

Pipe maximum developed length = 250-ft.
Gas: Natural, Inlet Pressure = 5 psi, PD = 3.5 psi
Gas lines sized based on 2012 IFGC T402.4(7)
Main Line Size = 1"

GREENVILLE COUNTY CODE ANALYSIS: HEAT	
# OF POWER BOILERS & BTU'S FOR EACH	0
# OF FURNACES & BTU'S FOR EACH	NEW: RTU–1 & –2, BOTH 250 MBH
# OF HEAT PUMPS & TONS FOR EACH	AC–1: 2–TONS
# OF UNIT HEATERS	0
# OF DUCT HEATERS	0
# OF VAV UNITS	0
# OF GAS LOGS	0
# OF THRU WALL UNITS	0
# OF PRE–FAB FIREPLACES	0

GREENVILLE COUNTY CODE ANALYSIS: ADDITIONAL EQUIPMENT	
# OF AIR HANDLERS ONLY OR FRESH AIR UNITS:	AHU–1: 800 CFM
# OF RANGE HOODS	0
# OF EXHAUST SYSTEMS/FANS	3
# DRYERS	0
REQUIRED OUTDOOR VENTILATION AIR?	YES
TOTAL CFM OF OUTDOOR AIR REQUIRED:	1,727
TOTAL CFM OF OUTDOOR AIR PROVIDED	1,727

GREENVILLE COUNTY CODE ANALYSIS: REFRIGERATION	
# OF WALK–IN COOLERS/FREEZERS	0
# OF COOLERS FREEZERS WITH EXTERNAL CONDENSERS	0
# OF CHILLERS AND/OR AIR CONDITIONERS AND TONS FOR EACH	0

HVAC COMPLIANCE DATA (CONTINUATION)

Greenville County

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HVAC DETAILS

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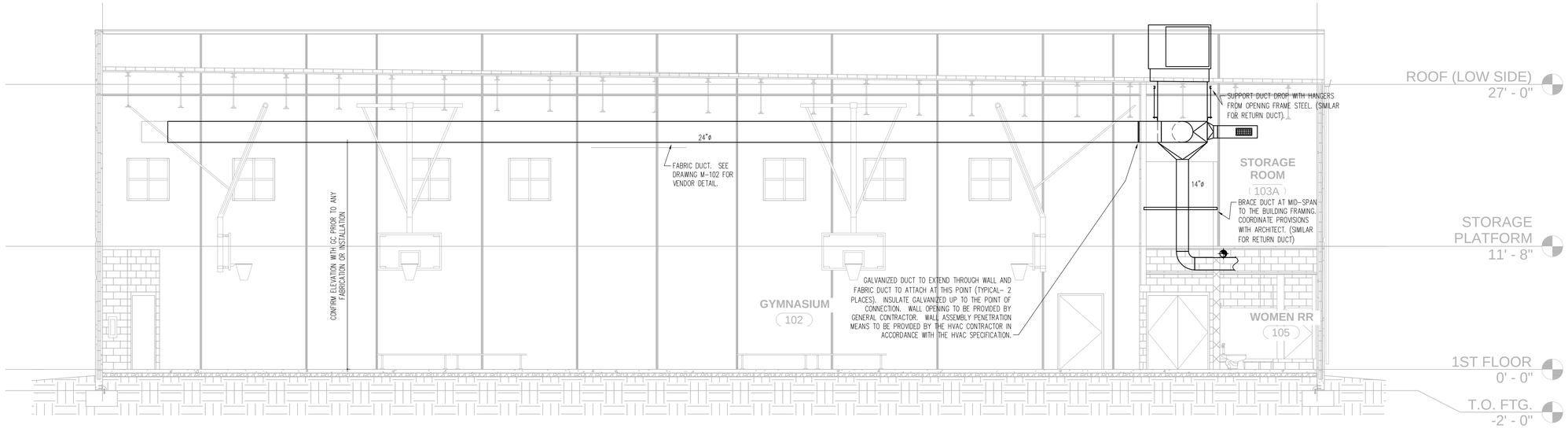

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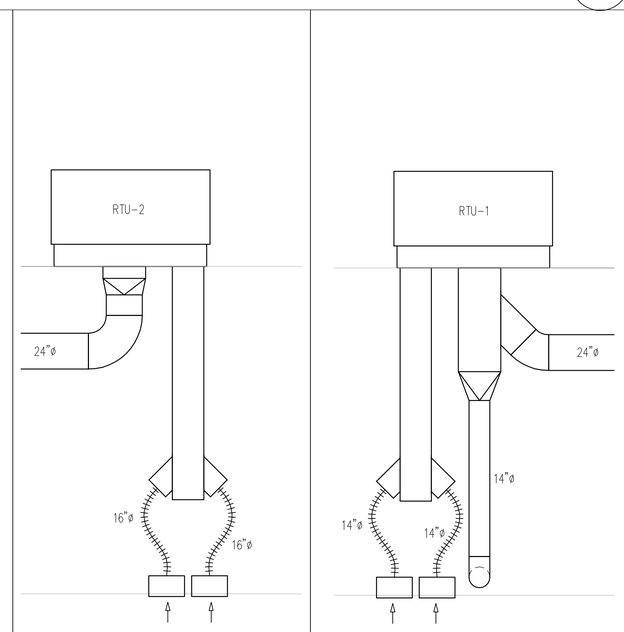
M-100

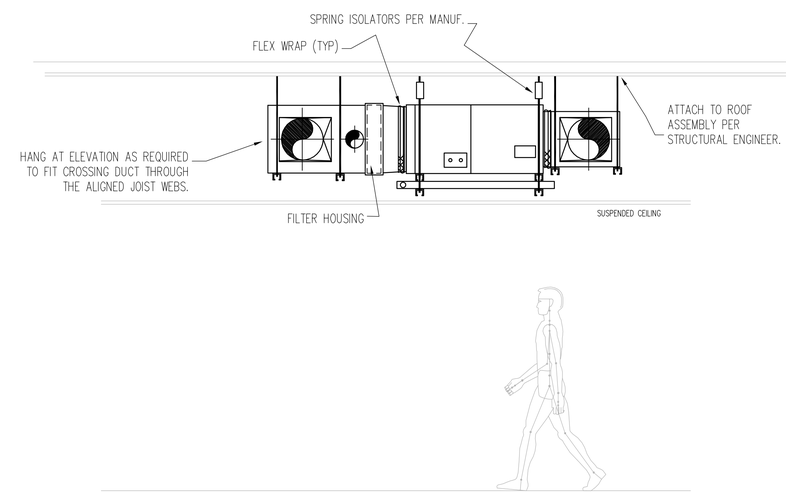
GYM BUILDING HVAC SECTION

SCALE: 3/16"=1'-0"



3
M-100

4
M-100



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M-100

AHU-1 HVAC SECTION

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

DETAIL:TYPICAL GAS PIPE EQIPMENT CONNECTION

LEGEND

- DUCTWORK
- FLEX DUCT
- SUPPLY DEVICES
- RETURN DEVICES
- XX / CFM — TERMINAL AIR DEVICE TAG
- SUPPLY DUCT UP
- SUPPLY DUCT DOWN
- RETURN DUCT UP
- RETURN DUCT DOWN
- MANUAL DAMPER
- MOTORIZED DAMPER
- T — THERMOSTAT
- H — HUMIDISTAT
- CO_2 — CO2 MONITOR
- EXHAUST FAN
- FIRE DAMPER
- SD — SMOKE DETECTOR
- SDA — SMOKE DETECTOR ANNUNCIATOR
- BDD — BACKDRAFT DAMPER
- AIR DIRECTION
- FLEX CONNECTOR

AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLER UNIT
CFM	CUBIC FEET PER MINUTE
CU	CONDENSING UNIT
DIA, ø	DIAMETER
DWG	DRAWING
EA	EXHAUST AIR
ED	EXHAUST DISCHARGE DEVICE
EF	EXHAUST FAN
EH	ELECTRIC HEATER
ERV	ENERGY RECOVERY VENTILATOR
FD	FIRE DAMPER
GC	GENERAL CONTRACTOR
HP	HEAT PUMP
HP	HORSEPOWER
IV	INTAKE VENTILATOR
L	LOUVER
MAU	MAKE-UP AIR UNIT
MS	MINI-SPLIT
OA	OUTSIDE AIR
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RTU	ROOF-TOP UNIT
SA	SUPPLY AIR
SD	SMOKE DETECTOR
TYP	TYPICAL

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HVAC DETAILS

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SYMBOL	DESCRIPTION
A-1,3	HOME RUN TO LIGHTING/SERVICE PANEL. HASH MARKS, WHEN SHOWN, INDICATE NUMBERS OF CONDUCTORS. '/' INDICATES HOT WIRE, '//' INDICATES NEUTRAL CONDUCTOR;'/G' INDICATES GROUND CONDUCTOR. HOME RUN NOTE INDICATES PANEL NAME AND CIRCUIT NAME OR FEEDER TAG. CONDUCTORS SHALL BE #12 AWG IN 3/4" CONDUIT UNLESS NOTED OTHERWISE. ANY HOME RUN OR CONDUIT WITHOUT HASH MARKS IS TO CONTAIN 3 CONDUCTORS; 1 HOT, 1 NEUTRAL, AND 1 EQUIPMENT GROUND, EACH HOT CIRCUIT SHALL BE PAIRED WITH A SEPARATE NEUTRAL CONDUCTOR. SHARING OF NEUTRAL CONDUCTORS BETWEEN CIRCUITS IS NOT ALLOWED.
	EXPOSED CONDUIT
	CONDUIT RUN IN SLAB OR UNDERGROUND.
	CONDUIT RUN CONCEALED ABOVE CEILING OR IN WALLS, UNLESS NOTED OTHERWISE.
	FLEXIBLE CONDUIT
J	JUNCTION BOX STEM INDICATES WALL MOUNTED
	LIGHTING OR SERVICE PANEL, SURFACE MOUNTED.(208V)
	LIGHTING OR SERVICE PANEL, FLUSH MOUNTED.(208V) PROVIDE 6-3/4" SPARE CONDUITS UP FROM PANEL INTO CEILING SPACE FOR FUTURE
EF	EXHAUST FAN. SEE MECHANICAL DRAWINGS FOR FAN SPECIFICATIONS.
WH	WATER HEATER.
30/20/3P/3R	SAFETY DISCONNECT SWITCH. "30" INDICATES AMP RATING, "20" INDICATES FUSE SIZES, "3P" INDICATES NUMBER OF POLES, ENCLOSURE TO BE NEMA 1 UNLESS NOTED OTHERWISE (3R, 4X, ETC.) SQUARE D H300 SERIES HEAVY DUTY SAFETY SWITCH
PE	PHOTOELECTRIC CELL, SPEC GRADE, TO BE MOUNTED ON ROOF, FACING NORTH, TORK MODEL 2101 OR EQUAL.
	WIRING DEVICES
	NOTE: ALL WIRING DEVICES TO BE IVORY, WITH #302 STAINLESS STEEL COVERPLATE (FLUSH MOUNTED) UNLESS NOTED OTHERWISE ON THE DRAWING OR SPECIFICATIONS.
	SWITCH SYMBOLS
S_M	MANUAL MOTOR STARTER
S	SINGLE POLE LIGHTING SWITCH 120-277 VOLT, 20 AMP, SPEC GRADE. LETTER ("a") DESIGNATES WHICH FIXTURES ARE CONTROLLED FROM WHICH SWITCHES WHEN MULTIPLE SWITCHES ARE USED ON ONE CIRCUIT
S_3	SAME AS "S" ABOVE EXCEPT "3" IN SUBSCRIPT DENOTES 3-WAY SWITCH.
S_D	DIMMER SWITCH WITH SLIDE CONTROL
S_{OS}	PASSIVE INFRARED WALL SWITCH/OCCUPANCY SENSOR - WATTSTOPPER # PW-301
	OMNI-DIRECTIONAL PASSIVE INFRARED CEILING OCCUPANCY SENSOR - WATTSTOPPER # CI-300
	STRAIGHT BLADE DEVICE SYMBOLS
	20A, 125V, 2P, 3W, NEMA 5-20R, DUPLEX RECEPTACLE. HUBBELL 5362-I OR EQUAL. STANDARD POWER. "WP" DENOTES WEATHERPROOF COVER PLATE. "GFI" DENOTES GFCI TYPE.
	SAME AS ABOVE EXCEPT BOTTOM OF OUTLET MOUNTED ABOVE COUNTER HEIGHT
	FIRE ALARM, COMMUNICATIONS AND CONTROLS
	COMBINATION DATA/TELEPHONE OUTLET WITH 1" CONDUIT TO TELEPHONE BACKBOARD, WITH PULL WIRE. JACKS, CABLE AND BOX COVER BY SYSTEM INSTALLER. "W" INDICATES WALL PHONE OUTLET, 54" A.F.F.
	TELEPHONE BOARD, ROUTE NO. 6 AWG CU. GROUND TO SERVICE GROUND
FACP	FIRE ALARM CONTROL PANEL, EXISTING.
	DUCT MOUNTED SMOKE DETECTOR.
	WATER FLOW SWITCH
	TAMPER SWITCH
	FIRE ALARM SYSTEM STROBE UNIT ONLY
	FIRE ALARM SYSTEM HORN/STROBE UNIT
F	MANUAL FIRE ALARM PULL STATION
	LIGHTING SYMBOLS:
	2' X 4' CEILING MOUNTED FIXTURE
	SWITCHED FIXTURE WITH EMERGENCY LIGHTED BATTERY BACKUP. ROUTE `HOT' SENSING CIRCUIT TO BATTERY
	4' STRIP FIXTURE
	EXTERIOR WALL MOUNTED FIXTURE
	SURFACE CEILING MOUNTED OR RECESSED DOWNLIGHT
	EXIT FIXTURE WITH INTEGRAL BATTERIES - ARROW INDICATES ILLUMINATED DIRECTIONAL ARROWS, SHADED SECTION INDICATES FACE WHICH IS ILLUMINATED. STEM INDICATES WALL MOUNTED. ALL EXIT LIGHTS SHALL BE MOUNTED TO THE STRUCTURE.

GENERAL LIGHTING NOTES:

1. MANUFACTURERS & NUMBERS ARE LISTED TO ESTABLISH QUALITY ONLY AND NOT TO LIMIT COMPETITION. PRIOR TO BIDDING, SUBSTITUTIONS ARE ALLOWED SUBJECT TO SUBMITTAL DATA, PHOTOMETRICS & ENGINEERS APPROVAL AS REQUIRED BY SPECIFICATIONS.
2. ALL FIXTURES TO BE U.L. LABELED. ALL EXTERIOR FIXTURES SHALL HAVE U.L. WET LABEL OR DAMP LABEL AS REQUIRED BY LOCATION. CONTRACTOR SHALL VERIFY BEFORE SUBMITTING FIXTURE.
3. PROVIDE ALL MOUNTING ACCESSORIES, BAR HANGARS & HARDWARE REQUIRED.
4. EMERGENCY BATTERY BALLAST SHALL PROVIDE A MINIMUM OF 1100 LUMEN OUTPUT. BALLAST SHALL CONTAIN INTEGRAL SENSING CIRCUIT TO ALLOW FIXTURE TO BE SWITCHED WITH AREA FIXTURES FOR NORMAL OPERATION AND ENERGIZE BATTERY POWERED LAMP UPON LOSS OF POWER CIRCUIT, REGARDLESS OF SWITCH POSITION. MANUFACTURER SHALL BE BODINE OR APPROVED EQUAL.

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	MOUNTING HEIGHT	LAMP	WATTAGE	VOLTAGE
BL	OUTDOOR LED BOLLARD	KIM # LED-20L-4K-UV EQUAL BY LSI, COOPER	GRADE	NOMINAL 1000 LUMEN LED PANEL 4000K	25 VA	UNIVERSAL
EX	UNIVERSAL MOUNTED EXIT SIGN WITH RED LETTERS ON WHITE HOUSING. DIFFUSER LENS, SPECIFICATION GRADE DIE CAST ALUMINUM HOUSING. EMERGENCY BATTERY BACKUP.	LITHONIA # LE-S-W-X-R-EL N EMERGILITE # WW-PDN-X-R LIGHTALARMS # X-XDN-W-RW	CEILING	RED LED BY MFR	5 VA	UNIVERSAL
EXW	SAME AS 'EX' EXCEPT WITH A WIRE GUARD	LITHONIA # LE-S-W-X-R-EL N-WG EMERGILITE # WW-PDN-X-R-WG LIGHTALARMS # X-XDN-W-RW-WG	CEILING	RED LED BY MFR	5 VA	UNIVERSAL
HB	HIGH BAY LED FIXTURE, ALUMINUM HOUSING, WIRE GUARD, Y-TOGGLE MOUNTING HARDWARE	ILP # CHB-190WLED-UNIV-5000K-HBXX18YPAD-WC EQUAL BY WILLIAMS, COOPER	24' AFF	24K LUMEN LED 5000K	190 VA	UNIVERSAL
HBE	SAME AS 'HB' EXCEPT WITH EMERGENCY BATTERY BACKUP	ILP # CHB-190WLED-UNIV-5000K-HBXX18YPAD-WC-LEDBB EQUAL BY WILLIAMS, COOPER	24' AFF	24K LUMEN LED 5000K	190 VA	UNIVERSAL
ILA	4', LED CHANNEL STRIP LIGHT, STEEL HOUSING, FROSTED ACRYLIC LENS, WHITE FINISH, PAF, 0-10V DIMMING DRIVER	LITHONIA # ZL1D-L48-5000LM-FST-MVOLT-35K-80CRI-WH LSI # SDL-4-LED-HO-WW-UE COLUMBIA # LCL4-35-ML-EDU-PAF	9' AFF	NOMINAL 5000 LUMEN LED PANEL 3500K	48 VA	UNIVERSAL
ILAE	SAME AS 'IA' EXCEPT WITH EMERGENCY BATTERY BACKUP	LITHONIA # C232-GEB-WG9-PAF-EL14 COLUMBIA # CS4-232-EU-PAF-CSWG4-EM1400 WILLIAMS # 76-4-232-WG11-EB2-UNV-EL14	9' AFF	2-FO32T8/35K	56 VA	UNIVERSAL
MUE	MULLION MOUNTED EGRESS FIXTURE, REMOTE MOUNT POWER SUPPLY ABOVE ACCESSIBLE CEILING, ROUTE WIRING THROUGH STOREFRONT	SIGNTEX # MUE EQUAL BY EXITRONIX	MULLION	LED	10 VA	UNIVERSAL
RL	6" DIA. RECESSED 2000 LUMEN LED CAN LIGHT, SELF-FLANGED WITH CLEAR SEMI-SPECULAR FINISH AND 0-10V DIMMING DRIVER. SPEC GRADE.	GOTHAM # EVO-35/20-6AR-MWD-LSS-MVOLT-EZ1 CREE # KR6-20L-35K-VOLT-10V/KR6T-SSGC-FF/KR6TA PRESCOLITE # LF6LEDG4-6LFLED7G4-35K	RECESSED	NOMINAL 2000 LUMEN LED PANEL 3500K	30 VA	UNIVERSAL
RLE	SAME AS 'RLE' EXCEPT WITH EMERGENCY BATTERY BACKUP.	GOTHAM # EVO-35/20-6AR-MWD-LSS-MVOLT-EZ1-EL CREE # KR6-20L-35K-VOLT-10V-EB7/KR6T-SSGC-FF/KR6TA PRESCOLITE # LF6LEDG4-EM-6LFLED7G4-35K-EM	RECESSED	NOMINAL 2000 LUMEN LED PANEL 3500K	30 VA	UNIVERSAL
RP	RECESSED PERIMETER, WHITE LOUVERS, STAGGERED LAMPS, FIXTURE TO EXTEND WALL TO WALL.	LITE CONTROL # 20L-C1-35K-D080-NDM-1C-UNV EQUAL BY PRUDENTIAL, COOPER	RECESSED	NOMINAL 800 LUMEN/FT LED PANEL 3500K	52 VA	UNIVERSAL
TLY	RECESSED 2X4 LED, DIRECT-INDIRECT CENTER-MOUNTED FIXTURE W/ACRYLIC CONTOUR LENS, PAINT AFTER FABRICATION.	COLUMBIA # LCAT24-35MLG-EU EQUAL BY WILLIAMS, COOPER	RECESSED	NOMINAL 4400 LUMEN LED PANEL 3500K	40 VA	UNIVERSAL
TLYE	SAME AS 'TLY' EXCEPT WITH EMERGENCY BATTERY BACKUP	COLUMBIA # LCAT24-35MLG-EU-EM EQUAL BY WILLIAMS, COOPER	RECESSED	NOMINAL 4400 LUMEN LED PANEL 3500K	40 VA	UNIVERSAL
WP	WALL-PAK, PRISMATIC POLYCARBONATE REFLECTOR, DARK BRONZE, ALUMINUM HOUSING, UL WET LOCATION.	SPAULDING # TRP-30L-4K-053-4-U-DB EQUAL BY WILLIAMS, COOPER	21' AFF	NOMINAL 4000 LUMEN LED PANEL 4000K	53 VA	UNIVERSAL

ALTERNATE #1 LIGHTING NOTES:

GENERAL: SUBSTITUTE FIXTURE TYPE 'HB' AND 'HBE' WITH T-5 FLUORESCENT EQUIVILANT.

SPECIFICATIONS:

1. ALL FLUORESCENT FIXTURES SHALL HAVE PREMIUM ELECTRONIC BALLASTS WITH 90% MIN. BALLAST FACTOR AND MAX. THD OF 15%. ALL FIXTURES TO BE PAINTED AFTER FABRICATION. BALLASTS SHALL BE MANUFACTURED BY SYLVANIA, ADVANCE OR MAGNETEK. LAMPS SHALL BE MANUFACTURED BY G.E. OR SYLVANIA.
2. PROVIDE ALL MOUNTING ACCESSORIES, BAR HANGARS & HARDWARE REQUIRED.
3. EMERGENCY BATTERY BALLAST FOR FLUORESCENT FIXTURES SHALL PROVIDE A MINIMUM OF 1100 LUMEN OUTPUT. BALLAST SHALL CONTAIN INTEGRAL SENSING CIRCUIT TO ALLOW FIXTURE TO BE SWITCHED WITH AREA FIXTURES FOR NORMAL OPERATION AND ENERGIZE BATTERY POWERED LAMP UPON LOSS OF POWER CIRCUIT, REGARDLESS OF SWITCH POSITION. MANUFACTURER SHALL BE BODINE OR APPROVED EQUAL.

ELECTRICAL GENERAL NOTES:

1. INSPECT SITE PRIOR TO SUBMITTING BID. DRAWINGS ARE INTENDED TO COVER THE REQUIRED ELECTRICAL SYSTEMS. DRAWINGS MAY NOT SHOW COMPLETE OR ACCURATE DETAILS OF THE BUILDING OR SYSTEM IN EVERY RESPECT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ANY ADDITIONAL INFORMATION AS REQUIRED.
2. CONFORM TO THE NATIONAL ELECTRICAL CODE (2011), IBC (2012), IECC (2009), APPLICABLE NEMA, ANSI AND IEEE PUBLICATIONS, U.L. AND ADA STANDARDS AND OSHA REQUIREMENTS. COMPLY WITH LOCAL, COUNTY, STATE AND NATIONAL CODES HAVING JURISDICTION.
3. FURNISH AND INSTALL ALL MATERIALS IN A NEAT AND WORKMANLIKE FASHION. ALL MATERIALS SHALL BE NEW, WITH FIRST QUALITY AND UL LABEL.
4. VERIFY ALL DIMENSIONS AND CLEARANCES PRIOR TO INSTALLATION OF EQUIPMENT AND RACEWAYS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF WORK WITH THAT OF ALL OTHER TRADES AS REQUIRED.
5. CONDUIT SHALL BE EMT FOR BRANCH CIRCUIT WIRING AS ALLOWED BY NEC, EXCEPT THAT SET SCREW OR CRIMP FITTINGS ARE NOT ALLOWED. WHERE EXPOSED TO PHYSICAL DAMAGE CONDUITS SHALL BE RIGID GALVANIZED STEEL. MINIMUM CONDUIT SIZE SHALL BE 3/4". ALL CONDUCTORS SHALL BE TYPE THHN/THWN, STRANDED 600V COPPER BUILDING WIRE. MINIMUM SIZE SHALL BE #12 AWG COPPER UNLESS NOTED. UNDERGROUND CONDUITS SHALL BE PVC SCHEDULE 40 WITH TRANSITION TO RIGID GALVANIZED STEEL FOR EXPOSED CONDUITS.
6. PROVIDE GROUNDING FOR ALL EQUIPMENT IN ACCORDANCE WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE. GROUND SERVICE TO BUILDING STEEL, DRIVEN GROUND ROD AND COLD WATER PIPE.
7. ALL ENCLOSURES SHALL BE OF THE NEMA TYPE WHICH IS SUITABLE FOR THE APPLICATION.
8. SEAL ALL CONDUIT PENETRATIONS TO MATCH RATING OF WALL BEING PENETRATED.
9. ALL WORK SHALL HAVE PROPER LABELING AND NAMEPLATES. ALL CIRCUITS SHALL BE LABELED AT PANELS AND BOXES AS INDICATED. ALL PANELS AND DISCONNECTS ARE TO BE PERMANENTLY MARKED WITH NAME OR EQUIPMENT SERVED. ALL PANELS ARE TO BE PROVIDED WITH TYPEWRITTEN PANEL SCHEDULES.
10. ALL BREAKERS ON CIRCUITS SUPPLYING HVAC EQUIPMENT SHALL BE TYPE HACR BREAKERS.
11. COORDINATE WITH ELECTRICAL UTILITY AS REQUIRED FOR SERVICE ENTRY. INSTALL PAD, METER AND CONDUITS PER UTILITY REQUIREMENTS AND PAY ALL REQUIRED FEES OR CHARGES FOR SERVICES SHOWN.
12. THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS BEFORE PLACING IN OPERATION. RESTORE FINISHED SURFACES IF DAMAGED AND DELIVER THE ENTIRE INSTALLATION IN AN APPROVED CONDITION. INSTRUCT THE OWNERS' PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE SYSTEMS. FURNISH TO THE OWNER THREE SETS OF OPERATION AND MAINTENANCE MANUALS FOR EACH SYSTEM.
13. GUARANTEE THE WORK INSTALLED FOR A PERIOD OF ONE YEAR AFTER DATE OF FINAL ACCEPTANCE. DEFECTS WHICH APPEAR AS A RESULT OF NORMAL USAGE SHALL BE REMEDIED BY THE CONTRACTOR TO THE COMPLETE SATISFACTION OF THE OWNER WITHOUT COST TO THE OWNER.
14. CONTRACTOR SHALL KEEP CURRENT A SET OF PLANS FOR THE DURATION OF CONSTRUCTION WITH ALL CHANGES TO WORK NEATLY AND ACCURATELY MARKED IN RED AND SHALL TURN OVER TO OWNER AT COMPLETION OF PROJECT.
15. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED TO MEET SEISMIC REQUIREMENTS OF 2012 IBC.
16. ALL PANELBOARDS SHALL BE FURNISHED WITH COPPER BUS BARS AND A COPPER GROUNDING BUS BAR.

ABBREVIATIONS:

AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
ACH	ABOVE COUNTER HEIGHT
BKR	BREAKER
CU	COPPER
CKT	CIRCUIT
D	DEDICATED OUTLET
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EMT	ELECTRICAL METALLIC TUBING
EWC	ELECTRIC WATER COOLER
FU	FUSE
FWE	FURNISHED WITH EQUIPMENT
GFI	GROUND FAULT INTERRUPTER DEVICE
LTG	LIGHTING (L.)
MLO	MAIN LUGS ONLY
MCB	MAIN CIRCUIT BREAKER
MFR	MANUFACTURER
MDP	MAIN DISTRIBUTION PANEL
NTS	NOT TO SCALE
PH	PHASE
PNL	PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
RECPT	RECEPTACLE (R.)
REQD	REQUIRED
RGS	RIGID GALVANIZED STEEL
SW	SWITCH
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UH	UNIT HEATER
UGND	UNDERGROUND
W/	WITH
WH	WATER HEATER
WP	WEATHER PROOF
XFMR	TRANSFORMER

Greenville County

STAUNTON BRIDGE CC ADDITION

GREENVILLE CountyRec PARKS • RECREATION • TOURISM

LS3P

110 WEST NORTH STREET SUITE 300
GREENVILLE, SOUTH CAROLINA 29601
TEL. 864.235.0405 FAX 864.233.4027

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER 3/10/16 No. 9330 DONALD J. BURDETTE

SOUTH CAROLINA BURDETTE ENGINEERING, INC. No. C00495 CERTIFICATE OF AUTHORIZATION

MEMBERS OF THE AMERICAN INSTITUTE OF ARCHITECTS

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BIDDERS SHALL USE COMPLETE SETS OF DOCUMENTS IN PREPARING BIDS. NEITHER THE OWNER NOR ARCHITECT ASSUMES RESPONSIBILITY FOR ERROR OR MISINTERPRETATIONS RESULTING FROM THE USE OF INCOMPLETE SET OF BIDDING DOCUMENTS.

REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: JDV
CHECKED BY: DJB

ELECTRICAL LEGEND AND SCHEDULES

E-001

PERMIT & CONSTRUCTION SET

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PANEL	MDP	CABINET	SURFACE	TYPE	SQUARE D NQ
VOLTAGE	120/208 Wye PHASE 3 WIRES 4	FEEDER	BOTTOM	MAINS	600 A MCB

DEVICE			BRANCH CIRCUIT		PHASE LOAD (VOLT-AMPS)							BRANCH CIRCUIT		DEVICE		
AMPS TRIP	POLES	NOTES	DESIGNATION	No.	A		B		C		No.	DESIGNATION	NOTES	POLES	AMPS TRIP
				1	11900	7685					2				
150 A	3		PANEL 'P'	3			10184	7685			4	RTU-1		3	80 A
				5					9883	7685	6				
				7	10417	7685					8				
300 A	3		PANEL 'A'	9			10417	7685			10	RTU-2		3	80 A
				11					10417	7685	12				
				13	2250	2392					14				
30 A	2		WATER HEATER	15			2250	2392			16	AC-1		2	25 A
--	--		SPACE	17					0	1248	18				
--	--		SPACE	19	0	1248					20	HP-1		2	20 A
--	--		SPACE	21			0	0			22	SPACE		--	--
--	--		SPACE	23					0	0	24	SPACE		--	--
--	--		SPACE	25	0	0					26	SPACE		--	--
--	--		SPACE	27			0	0			28	SPACE		--	--
--	--		SPACE	29					0	0	30	SPACE		--	--
RATING 35KAIC					43.6 kVA		40.6 kVA		36.9 kVA		PANELBOARD LOAD TOTAL			121.4 kVA	

EXISTING PEAD DEMAND OF PANEL 'A' IS 25KW.

PANEL	P	CABINET	SURFACE	TYPE	SQUARE D NQ
VOLTAGE	120/208 Wye PHASE 3 WIRES 4	FEEDER	BOTTOM	MAINS	150 A MLO

DEVICE			BRANCH CIRCUIT		PHASE LOAD (VOLT-AMPS)							BRANCH CIRCUIT		DEVICE		
AMPS TRIP	POLES	NOTES	DESIGNATION	No.	A		B		C		No.	DESIGNATION	NOTES	POLES	AMPS TRIP
20 A	1		L.-GYMNASIUM 102	1	760	1656					2	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	3			760	1656			4	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	5					760	1656	6	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	7	760	1656					8	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	9			760	1656			10	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	11					760	1656	12	BACKBOARD MOTOR GYM 102		1	20 A
20 A	1		L.-GYMNASIUM 102	13	160	1656					14	MOTORIZED CURTAIN		1	20 A
20 A	1		L.-EXTERIOR	15			517	900			16	R.-GYMNASIUM 102		1	20 A
20 A	1		L.-EXTERIOR BOLLARDS	17					175	720	18	R.-GYMNASIUM 102		1	20 A
20 A	1		L.-STORAGE 103, 103A	19	600	1080					20	R.-Room 102,104-107, 109		1	20 A
20 A	1		L.-ROOM 101, 108, 110, EXIT...	21			356	1080			22	R.-Room 102, 103		1	20 A
20 A	1		L.-ROOM 104-107, 109	23					922	900	24	R.-Room 102, 101, 108		1	20 A
20 A	1		SPARE	25	0	2400					26	FAMILY RR 104 HAND DRYER		1	25 A
20 A	1		SPARE	27			0	2400			28	WOMEN RR 105 HAND DRYER		1	25 A
20 A	1		SPARE	29					0	2400	30	MEN RR 106 HAND DRYER		1	25 A
20 A	1		SPARE	31	0	1260					32	R.-STORAGE ROOM 103A		1	20 A
20 A	1		SPARE	33			0	180			34	SCOREBOARD		1	20 A
20 A	1		SPARE	35					0	0	36	SPARE		1	20 A
--	--		SPACE	37	0	0					38	SPARE		1	20 A
--	--		SPACE	39			0	0			40	SPARE		1	20 A
--	--		SPACE	41					0	0	42	SPARE		1	20 A
RATING 10KAIC					12.0 kVA		10.3 kVA		9.9 kVA		PANELBOARD LOAD TOTAL			32.2 kVA	

PANEL	K (EXISTING)	CABINET	RECESSED	TYPE	CUTLER HAMMER PRL1A
VOLTAGE	120/208 Wye PHASE 3 WIRES 4	FEEDER	TOP	MAINS	225 A MLO

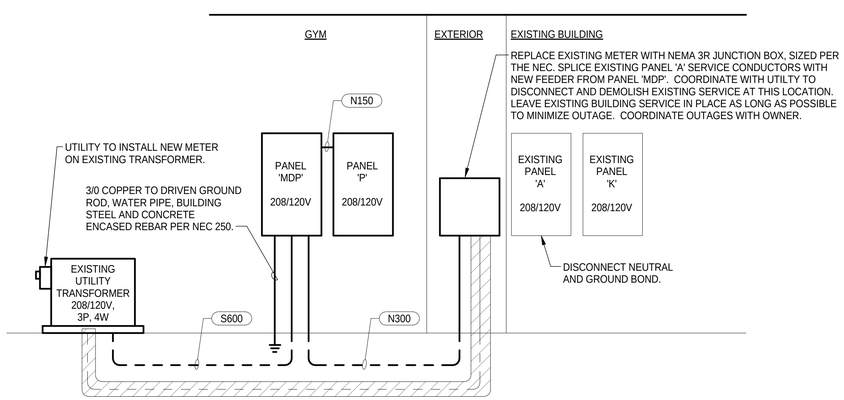
DEVICE			BRANCH CIRCUIT		PHASE LOAD (VOLT-AMPS)							BRANCH CIRCUIT		DEVICE		
AMPS TRIP	POLES	NOTES	DESIGNATION	No.	A		B		C		No.	DESIGNATION	NOTES	POLES	AMPS TRIP
20 A	1		R.-OFFICE	1	0	0					2	R.-KITCHEN		1	20 A
20 A	1		R.-LOBBY	3			0	0			4	R.-KITCHEN		1	20 A
20 A	1		R.-MEETING ROOM	5					0	0	6	R.-KITCHEN		1	20 A
20 A	1		R.-MEETING ROOM	7	0	0					8	R.KITCHEN		1	20 A
20 A	1		R.-EXTERIOR	9			0	0			10	R.-REFRIGERATOR		1	20 A
20 A	1		EXTERIOR LIGHTS	11					0	0	12	R.-FREEZER		1	20 A
--	--		SPACE	13	0	0					14	PROJECTOR		1	20 A
--	--		SPACE	15			0	0			16	R.-MEETING ROOM		1	20 A
20 A	1		EF-4 (KITCHEN HOOD)	17					0	0	18	R.-MICROWAVE		1	20 A
20 A	1		R.-TELEPHONE BOARD	19	0	0					20	STEREO		1	20 A
20 A	1		SPARE	21			0	0			22	COMPRESSOR		1	20 A
20 A	1		SPARE	23					0	0	24	SPARE		1	20 A
20 A	1		SPARE	25	0	0					26	SPARE		1	20 A
20 A	1		SPARE	27			0	0			28	SHUNT TRIP POWER		1	20 A
20 A	1		SPARE	29					0	0	30	HOOD LIGHTS & CONTROLS		1	20 A
20 A	1		SPARE	31	0	0					32	SPARE		1	20 A
20 A	1		SPARE	33			0	0			34				
20 A	1		SPARE	35					0	0	36	SHUNT TRIP RANGE		3	50 A
20 A	1		SPARE	37	0	0					38				
20 A	1		SPARE	39			0	0			40	SPACE		--	--
--	--		SPACE	41					0	0	42	SPACE		--	--
--	--		SPACE	43	0	0					44	SPACE		--	--
--	--		SPACE	45			0	0			46	SPACE		--	--
--	--		SPACE	47					0	0	48	SPACE		--	--
RATING 22KAIC					0.0 kVA		0.0 kVA		0.0 kVA		PANELBOARD LOAD TOTAL			0.0 kVA	

PANEL	A (EXISTING)	CABINET	RECESSED	TYPE	CUTLER HAMMER PRL1A
VOLTAGE	120/208 Wye PHASE 3 WIRES 4	FEEDER	BOTTOM	MAINS	300 A MCB

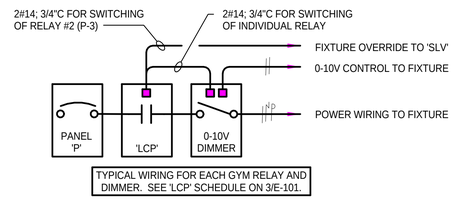
DEVICE			BRANCH CIRCUIT		PHASE LOAD (VOLT-AMPS)							BRANCH CIRCUIT		DEVICE		
AMPS TRIP	POLES	NOTES	DESIGNATION	No.	A		B		C		No.	DESIGNATION	NOTES	POLES	AMPS TRIP
20 A	1		R.-MEETING ROOM	1	0	0					2	L.-KITCHEN/OFFICE		1	20 A
20 A	1		R.-MEETING ROOM	3			0	0			4	L.-TOILETS/STORAGE		1	20 A
20 A	1		R.-STORAGE ROOM	5					0	0	6	L.-MEETING ROOM		1	20 A
20 A	1		R.-TOILETS EXC	7	0	0					8	L.-MEETING ROOM		1	20 A
20 A	1		R.-LOBBY	9			0	0			10	L.-LOBBY/RECEPTIONIST		1	20 A
20 A	1		R.-RECEPTIONIST	11					0	0	12	L.-EXTERIOR		1	20 A
20 A	1		R.-RECEPTIONIST	13	0	0					14	HAND DRYER		1	20 A
20 A	1		R.-VENDING	15			0	0			16	HAND DRYER		1	20 A
20 A	1		R.-VENDING	17					0	0	18	PROJECTOR		1	20 A
20 A	1		R.-EXTERIOR	19	0	0					20	R.-MEETING ROOM		1	20 A
20 A	1		R.-CABINET BASE	21			0	0			22	OUTDOOR LIGHTING...		1	20 A
20 A	1		SPARE	23					0	0	24	PUMP STATION PANEL		1	20 A
20 A	2		SITE LIGHTING	25	0	0					26				
				27			0	0			28	AC-1		3	60 A
20 A	1		WH2 & RECIRC PUMP	29					0	0	30				
20 A	1		WH1 & RECIRC PUMP	31	0	0					32				
20 A	1		SPARE	33			0	0			34	AC-2		3	60 A
20 A	1		SPARE	35					0	0	36				
				37	0	0					38				
100 A	3		PANEL 'K'	39			0	0			40	SEWER LIFT STATION		3	20 A
				41					0	0	42				
RATING 22KAIC					0.0 kVA		0.0 kVA		0.0 kVA		PANELBOARD LOAD TOTAL			0.0 kVA	

CABLE/CONDUIT SCHEDULE

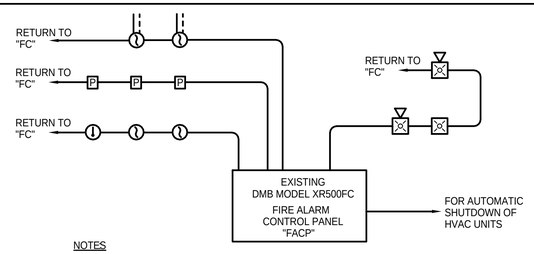
TAG	WIRE AND CONDUIT
N150	4 #1/0, 1 #6G; 2"C
N300	4-350KCMIL, 1#4G; 3"C
S600	2 [4-350KCMIL; 3"C]



1 E-002 ELECTRICAL RISER DIAGRAM
N.T.S.



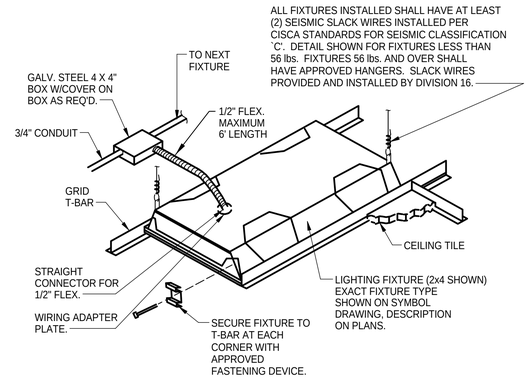
6 E-002 LCP WIRING DETAIL
N.T.S.



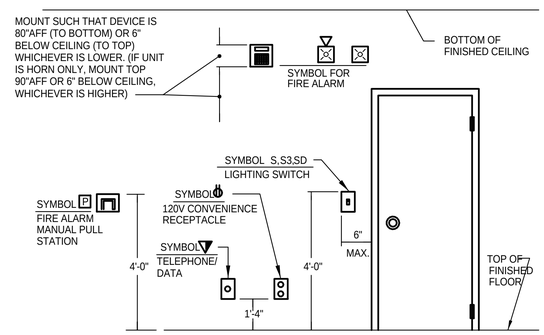
NOTES

1. ALL CONDUIT SHALL BE 3/4" MIN WITH WIRING AS REQUIRED BY MANUFACTURER. PAINT ALL JUNCTION BOXES, COVERS AND MARK CONDUIT EVERY 10' WITH RED PAINT.
2. DUCT MOUNTED SMOKE DETECTORS TO BE PROVIDED AND WIRED TO FACP BY DIVISION 16, MOUNTED IN RETURN DUCT OF EACH HVAC UNIT BY DIVISION 15. REFERENCE MECHANICAL DRAWINGS FOR EXACT LOCATIONS. PROVIDE AUXILIARY CONTACT FOR DIVISION 15 USE.
3. DIVISION 16 CONTRACTOR SHALL WIRE FROM FACP TO EACH INDIVIDUAL AIR HANDLER CONTROL CIRCUIT TO INSTALL SHUT DOWN CONTACT AS REQUIRED BY NFPA.

2 E-002 FIRE ALARM RISER DIAGRAM
N.T.S.



5 E-002 TYPICAL RECESSED FLUORESCENT FIXTURE MOUNTING
N.T.S.

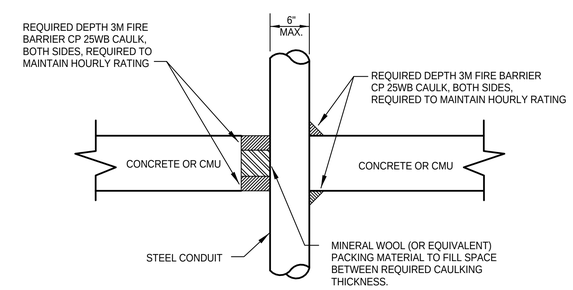


NOTES:

1. DEVICE BOXES MOUNTED IN THE SAME WALL BUT IN SEPARATE ROOMS OR SPACES SHALL NOT BE MOUNTED IN THE SAME WALL CAVITY.

4 E-002 TYPICAL DEVICE MOUNTING HEIGHT
N.T.S.

PROVIDE FIRESTOPPING THRU ALL RATED (1 HOUR AND ABOVE) WALLS. FIRESTOPPING SHALL BE 3M CP 25WB CAULK OR FIREDAM 150 CAULK OR EQUAL. FIRESTOPPING SHALL BE AS REQUIRED TO MAINTAIN A U.L. SYSTEM CLOSURE. PROVIDE U.L. NO. AND MANUFACTURER'S SPECIFICATION AND INSTALLATION DRAWING FOR ALL SUBSTITUTION REQUESTS.



3 E-002 TYPICAL CONDUIT SLEEVE DETAIL
N.T.S.

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 9330 DONALD J. BURDETTE 3/10/16

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: JDV
CHECKED BY: DJB

ELECTRICAL RISER AND SCHEDULES

E-002

PERMIT & CONSTRUCTION SET

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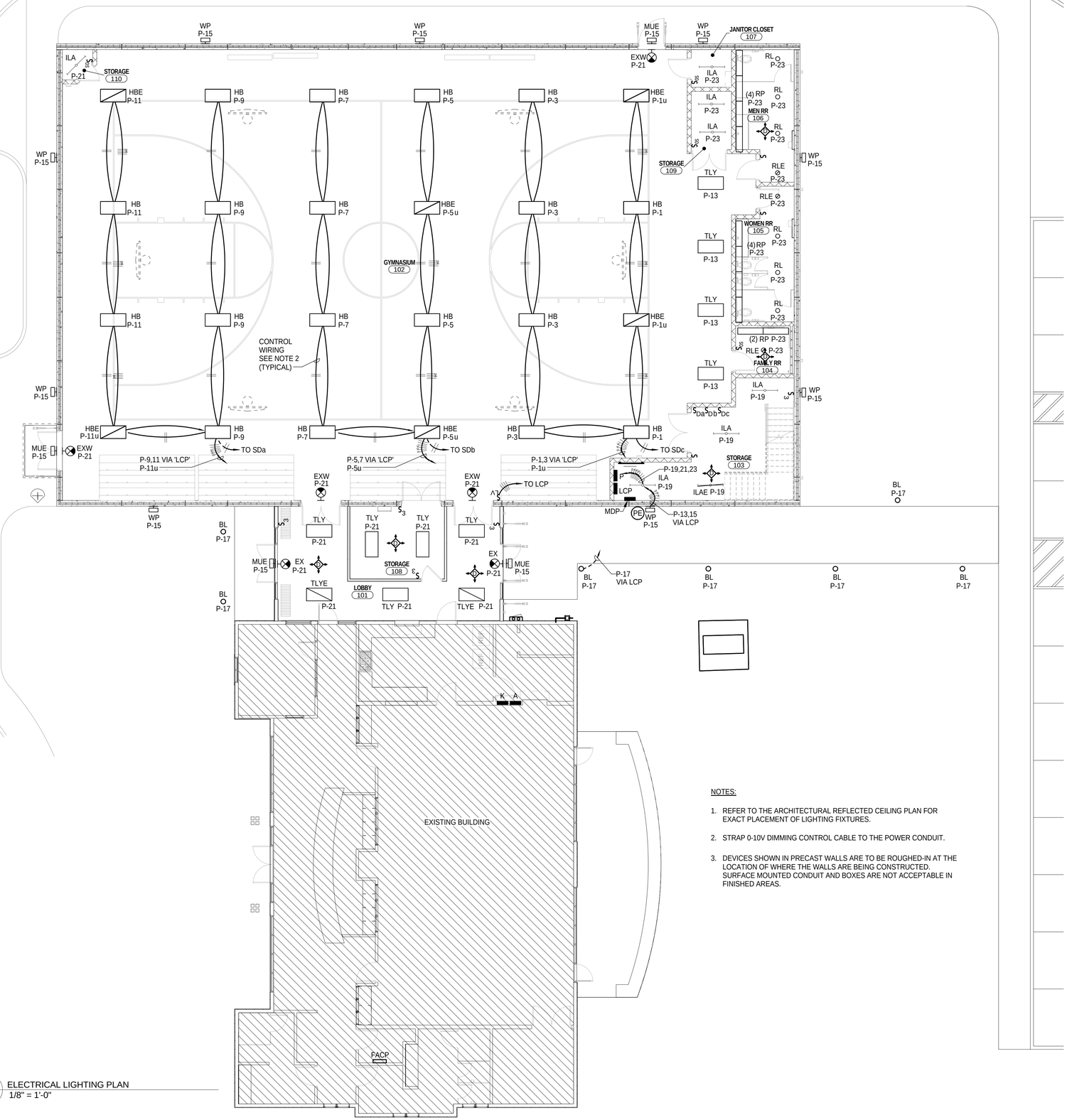
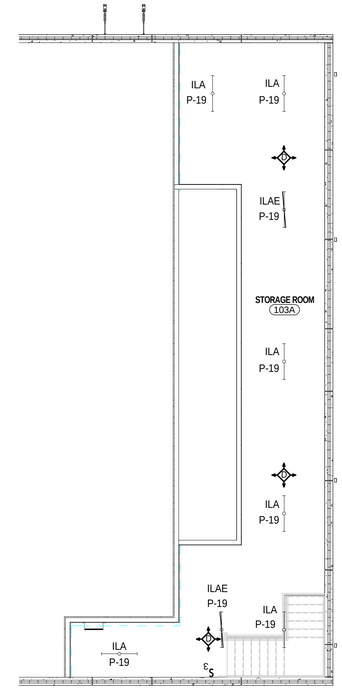


1 E-101 ELECTRICAL LIGHTING PLAN
1/8" = 1'-0"



2 E-101 ELECTRICAL LIGHTING PLAN - MECHANICAL PLATFORM
1/8" = 1'-0"

NOTES:

1. REFER TO THE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT PLACEMENT OF LIGHTING FIXTURES.
2. STRAP 0-10V DIMMING CONTROL CABLE TO THE POWER CONDUIT.
3. DEVICES SHOWN IN PRECAST WALLS ARE TO BE ROUGHED-IN AT THE LOCATION OF WHERE THE WALLS ARE BEING CONSTRUCTED. SURFACE MOUNTED CONDUIT AND BOXES ARE NOT ACCEPTABLE IN FINISHED AREAS.

RELAY PANEL SCHEDULE

RELAY	SUPPLY	DESCRIPTION	SEQUENCE
1	P-1	GYMNASIUM 102	DIMMER 'SDc' ON/OFF, SCHEDULE OFF
2	P-3	GYMNASIUM 102	SWITCH 'SLV' OR DIMMER 'SDc' ON/OFF, SCHEDULE OFF
3	P-5	GYMNASIUM 102	DIMMER 'SDb' ON/OFF, SCHEDULE OFF
4	P-7	GYMNASIUM 102	DIMMER 'SDb' ON/OFF, SCHEDULE OFF
5	P-9	GYMNASIUM 102	DIMMER 'SDa' ON/OFF, SCHEDULE OFF
6	P-11	GYMNASIUM 102	DIMMER 'SDa' ON/OFF, SCHEDULE OFF
7	P-13	GYMNASIUM 102	SWITCH 'SLV' ON/OFF, SCHEDULE OFF
8	P-15	EXTERIOR WALL PACKS	PHOTOCELL ON, PHOTOCELL OFF
9	P-17	BOLLARDS	PHOTOCELL ON, PHOTOCELL OFF
10	.	SPARE	.
11	.	SPARE	.
12	.	SPARE	.
13	.	SPARE	.
14	.	SPARE	.
15	.	SPARE	.
16	.	SPACE	.
17	.	SPACE	.
18	.	SPACE	.
19	.	SPACE	.
20	.	SPACE	.

LOW VOLTAGE SWITCH SCHEDULE

SWITCH	PART NUMBER	BUTTON	RELAY CONTROL
S_{LV}	WATTSTOPPER # LVSW-102I	1	2
		2	7

NOTES:

1. LIGHTING CONTROL PANEL TO BE WATTSTOPPER LIGHTING INTEGRATOR RELAY PANEL # LI24-115/277-15HDR-*GS-115-EM-24A2 OR APPROVED EQUAL. CONTROL PANEL TO INCLUDE (15), 20A MECHANICALLY LATCHING RELAYS, PHOTOCELL AND LOW VOLTAGE SWITCHES AS INDICATED ABOVE. PROVIDE PROGRAMMING AND TRAINING FOR OWNERS PERSONNEL USE AND OPERATION.
2. INCLUDE IN SUBMITTALS: EQUIPMENT CUT SHEETS, WIRING DIAGRAMS AND DEVICE LAYOUT SPECIFIC TO THIS PROJECT.
3. SEE DETAIL 6/E0.02 FOR 'LCP' WIRING INFORMATION.

3 E-101 'LCP' - LIGHTING CONTROL PANEL RELAY SCHEDULE
NOT TO SCALE

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 9330 DONALD J. BURDETTE 3/10/16

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: JDV
CHECKED BY: DJB

ELECTRICAL LIGHTING PLAN

E-101

PERMIT & CONSTRUCTION SET

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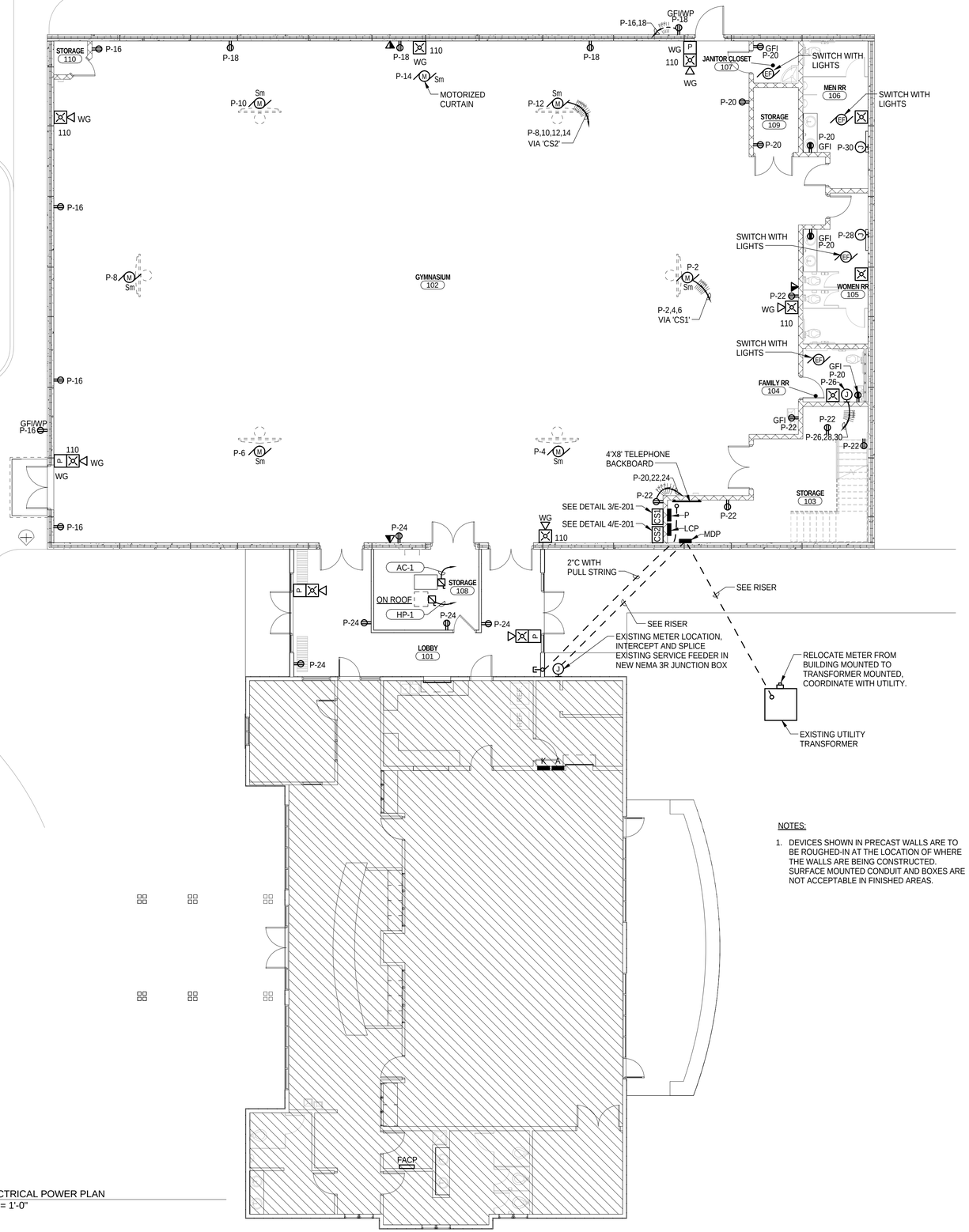
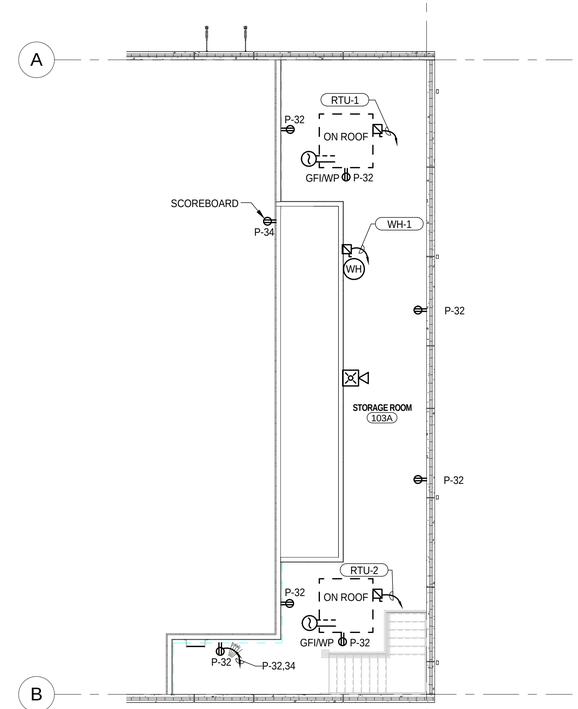


1 E-201 ELECTRICAL POWER PLAN
1/8" = 1'-0"



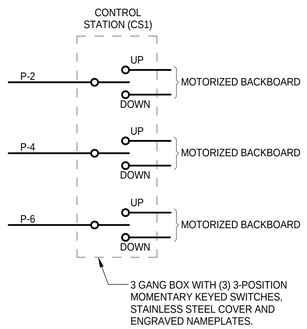
2 E-201 ELECTRICAL POWER PLAN - MECHANICAL PLATFORM
1/8" = 1'-0"

NOTES:

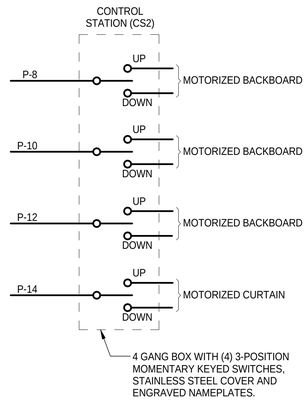
1. DEVICES SHOWN IN PRECAST WALLS ARE TO BE ROUGHED-IN AT THE LOCATION OF WHERE THE WALLS ARE BEING CONSTRUCTED. SURFACE MOUNTED CONDUIT AND BOXES ARE NOT ACCEPTABLE IN FINISHED AREAS.

EQUIPMENT SCHEDULE

EQUIPMENT TAG	ELECTRICAL DATA	PANEL	CIRCUIT NUMBER	WIRE/CONDUIT	DISCONNECT
	208 V/3-31250 VA	MDP	7,9,11		30/FU/3P
AC-1	208 V/2-4784 VA	MDP	14,16	2 #10, 1#10G; 3/4"C	30/FU/2P
HP-1	208 V/2-2496 VA	MDP	18,20	2 #12, 1#12G; 3/4"C	30/FU/2P
RTU-1	208 V/3-23056 VA	MDP	2,4,6	3 #4, 1 #8G; 1"C	100/FU/3P/ NEMA 3R
RTU-2	208 V/3-23056 VA	MDP	8,10,12	3 #4, 1 #8G; 1"C	100/FU/3P/ NEMA 3R
WH-1	208 V/2-4500 VA	MDP	13,15	2 #10, 1 #10G; 3/4"C	30/FU/2P



3 E-201 GYMNASIUM CONTROL STATION 'CS1' WIRING DIAGRAM
N.T.S.



4 E-201 GYMNASIUM CONTROL STATION 'CS2' WIRING DIAGRAM
N.T.S.

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: MARCH 11, 2016
DRAWN BY: JDV
CHECKED BY: DJB

ELECTRICAL POWER PLAN

E-201

PERMIT & CONSTRUCTION SET

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FIRE PROTECTION SYSTEM

15300 - 1

PART 1.0 - GENERAL

1.1 SCOPE

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the proper and satisfactory installation of the automatic fire protection systems as specified herein.

B. In addition to the point of connection into the underground water main as indicated on the Plumbing Drawings, this specification is intended to establish the required performance and quality of the work necessary to provide for a complete automatic sprinkler system to serve the buildings on site as indicated on the drawings.

C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided by this contractor and incorporated under this Section of the work at no additional cost to the Owner.

1.2 RELATED WORK

A. All electrical work required for electrical devices included in this specification is included in the scope of work.

B. Sealing of all penetrations of walls is included in the scope of work.

C. All painting of exposed piping is included in the scope of work.

D. All drawings, calculations, and submittals required by this specification are included in the scope of work.

1.3 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction Amendments.

B. Permits and Inspections: The Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by all legally constituted authorities and shall deliver all certificates to the Owner.

C. Installing Contractor shall meet all licensing requirements as required by the jurisdiction where work will be performed.

1.5 GENERAL REQUIREMENTS

A. It shall be the Contractor's responsibility to provide a complete automatic fire sprinkler system in complete conformance with the governing agencies mentioned herein. The contract drawings indicate only the underground fire line, point of connection and the main fire line riser location. It shall be this Contractor's complete responsibility to prepare drawings indicating the entire automatic fire sprinkler system.

B. Arrangement, size, location and quantity of service, riser and appurtenances indicated on the drawings is suggested as a minimum requirement only. It shall be this Contractor's responsibility to verify the exact requirements of the governing agencies and include these items in the bid. Piping sizes indicated are to be considered as a minimum and where sizes are not indicated the Contractor shall provide the sizes as necessary to meet the code requirements. The Architect prior to bid shall approve any variation from the drawings and specifications and/or piping or equipment relocation.

C. Prior to installation of any work, the Contractor shall carefully prepare complete working drawings of the automatic fire sprinkler system. The Contractor shall examine the Structural, Architectural, Mechanical, Plumbing and Electrical Drawings for the construction of the building in order to fully inform himself as to the scope and detail for the work which will be required of him before proceeding with the design and preparation of the final working drawings. Submit for approval to all legally constituted authorities, copies of completed working drawings. All automatic sprinkler locations shall be carefully coordinated with the lighting and diffuser systems to provide a symmetrical appearance.

1.6 PERMITS, LICENSES AND INSPECTIONS

A. Permits and Inspections: This Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by all legally constituted authorities and shall deliver all certificates to the Owner.

B. Installing Contractor shall meet all licensing requirements as required by the jurisdiction where work will be performed.

1.7 EXAMINATION OF PREMISES

A. Before bidding on work for new systems in an existing facility, modifications to an existing facility, and tenant improvements, contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work under this section of the specifications, the Contractor shall be deemed to have made such study and examination and that he is familiar with and accepts all conditions of the site.

1.8 COORDINATION

A. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

B. Piping runs found to be in conflict with work of other trades, as a result of neglected coordination, shall be removed and reinstalled in new locations designated by the Architect at no additional expense to the Owner.

C. To achieve coordination, Contractor shall contact the Architect and obtain necessary information to design his system to fit into allotted spaces without interfering with work by other trades.

1.9 SUBMITTAL DATA

A. Furnish all at one time, copies of valid submittal data on all material, equipment and devices. The Contractor shall make all presentations and clarifications although he may bring suppliers representatives for technical assistance to meetings called by the architect. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixtures and equipment schedules. Submittals not complying with this paragraph shall be rejected.

B. Submittals are required on all items to insure the latest and most complete manufacturer's data is available for review. Manufacturer's submittal literature and shop drawings often contain information not available in design literature; requirements of the submittals and engineer's submittal notes are a part of the work of this Division except that engineer's notes may not be used as a means of increasing the scope of work of this Division.

C. Submittals will be checked for general conformance with the design concept of the project, but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall repair all damage caused either directly or indirectly by his own work persons. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 UNINSPECTED WORK

A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover his work and, after it has been inspected, tested and approved, recover it at his own expense.

1.12 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of drawings, which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, shut-off valves, etc. On completion of the work, this set of prints shall be delivered to the Architect.

1.13 FINAL APPROVAL

A. Prior to final acceptance of the installation, the Contractor shall furnish to the Architect "certificates of approval" signed by all legally constituted authorities, stating that the systems, as installed, have been inspected and tested and meet all governing code requirements.

1.14 GUARANTEES

A. Contractor shall guarantee the automatic fire sprinkler systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, Contractor shall make good the defects promptly and without any expense to the Owner.

PART 2.0 - System Components and Hardware

2.1 GENERAL

A. All materials and devices essential to successful system operation shall be UL Listed.

B. Components that do not affect system performance such as drain piping, drain valves, and signs shall not be required to be listed.

C. The use of reconditioned valves and devices as replacement equipment in existing systems shall be permitted.

D. Reconditioned sprinklers shall not be permitted to be utilized on any new or existing system

2.2 AUTOMATIC SPRINKLERS

A. General

1. Acceptable Sprinkler manufacturers
   a. Viking Corporation
   b. Victaulic Company
   c. Reliable Automatic Sprinkler Company
   d. Tyco Fire

2. Automatic sprinklers shall be warranted by the manufacturer for ten (10) years against defects in material and workmanship

3. The temperature rating of the sprinkler shall be based on the maximum ambient temperature of the environment in which the sprinkler is being installed and shall comply with the requirements specified in NFPA 13.

4. Automatic sprinklers used under or on finished ceilings or walls shall be equipped with a metallic escutcheon plate of the same finish as the automatic sprinklers. Whenever possible, recessed escutcheons shall be utilized.

5. Automatic sprinkler used under unfinished ceilings shall be rough brass.

6. The following types of sprinklers and arrangements shall be permitted for dry pipe and preaction systems: Upright sprinklers, listed dry type sprinklers, pendent sprinklers and sidewall sprinklers installed on return bends, where the sprinklers, return bend, and branch line piping are in an area maintained at or above 40°F (4°C), and Horizontal sidewall sprinklers, installed so that water is not trapped.

7. All automatic sprinklers shall be the product of one manufacturer.

2.3 ABOVEGROUND PIPING AND FITTINGS

A. Steel Sprinkler Piping and Fittings

1. Sprinkler pipe shall be carbon steel and meet ASTM A-795 and/or A-135, and shall be UL listed and FM approved. Dry system piping shall be "hot-dip" galvanized in accordance with ASTM A-123 Zinc coating specifications. Sprinkler contractor shall supply manufacturer's mill certificates verifying that the products submitted meet the above criteria. Products accepted in this specification include Allied Tube & Conduit or approved equal.
   a. Black Steel: Piping shall be black steel. All piping shall be in accordance to latest edition of NFPA 13. Grades less than Schedule 10 will not be accepted.
   b. Approved Pipe Grades
      – Mill processed continuous or electric resistance welded.
      – ASTM specification A135 or A53 (A or B)
      – Schedule 40 for diameter 2" and smaller
      – Schedule 10 for all other
      – Light wall threaded pipe is not acceptable.

2. Fittings shall be cast, malleable, or ductile iron and designed for a minimum working pressure of 175 PSI. Fittings shall be specifically listed for sprinkler service. Fittings may be threaded, flanged, or grooved.
   a. Treaded Fittings shall be of cast iron, class 125, conforming to ANSI B16.1, malleable iron, class 150, conforming to ANSI B16.3, or ductile iron, class 150, conforming to ANSI B16.3.
   b. Flanged fittings shall be of cast iron, class 125, conforming to ANSI B16.1 or ductile iron, class 150, conforming to ANSI B16.5
   c. Grooved mechanical pipe couplings and fitting shall be cast iron, class 125, conforming to ANSI B16.1, Ductile iron, conforming to ASTM A-536 Grade 65-45-12, or Fabricated Steel conforming to ASTM A-53 Grade B. Grooved fittings and couplings shall the product of one manufacturer.
      – Grooved Fittings: Where grooved fittings are specified, they shall be specifically listed for fire protection use. Grooved Fittings shall be Cast Ductile iron, conforming to ASTM A-536 Grade 65-45-12 or Fabricated Steel conforming to ASTM A-53 Grade B. Fittings shall have protective coating consisting of non-lead orange paint or hot dipped galvanizing conforming to ASTM A-153. The maximum working pressure for these materials shall not exceed the listing for the product. Fittings shall be UL listed or FM approved.
      – Viking VGS V7705 Flexible Coupling: Where grooved flexible couplings are specified, they shall be specifically listed for fire protection use. Couplings shall have a Ductile iron Housing conforming to ASTM A-536, Grade 65-45-12. Couplings shall have protective coating consisting of non-lead orange paint or hot dipped galvanizing conforming to ASTM A-153. Coupling bolts and nuts shall be heat-treated carbon steel, oval-neck track head bolts and heavy hex nuts, conforming to ASTM A-183 minimum tensile strength of 110,000 psi. Bolts and nuts shall be Zinc electroplated. Gaskets selection for fire protection applications shall be based on the environment in which these materials shall be installed. The maximum working pressure for these materials shall not exceed the listing for the product. Couplings shall be UL listed or FM approved.
      – Viking VGS VZ05 Rigid Coupling: Where grooved rigid couplings are specified, they shall be specifically listed for fire protection use. Couplings shall have a Ductile iron Housing conforming to ASTM A-536, Grade 65-45-12. Couplings shall have protective coating consisting of non-lead orange paint or hot dipped galvanizing conforming to ASTM A-153. Coupling bolts and nuts shall be heat-treated carbon steel, oval-neck track head bolts and heavy hex nuts, conforming to ASTM A-183 minimum tensile strength of 110,000 psi. Bolts and nuts shall be Zinc electroplated. Gaskets selection for fire protection applications shall be based on the environment in which these materials shall be installed. The maximum working pressure for these materials shall not exceed the listing for the product. Couplings shall be UL listed of FM approved.
      – Groove Specifications: Proper pipe end preparation and grooving is mandatory to prevent leakage and proper engagement of the grooved coupling. Manufacturer's installation requirements shall be followed.

2.4 HANGERS & BRACING

A. General

1. Hangers and bracing shall meet or exceed the requirements specified in NFPA 13. Where jurisdictional requirements exceed those of NFPA, jurisdictional requirements shall take precedent.

2.5 VALVES

A. General

1. When water pressures exceed 175 psi (12.1 bar), valves shall be used in accordance with their pressure ratings.

2. Listed indicating valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.

3. Unless otherwise noted in this specification, all valves controlling connections to water supplies and to supply pipes to sprinklers shall be listed indicating valves. Such valves shall be sealed, locked, or electrically supervised in the open position.

4. Wafer-type valves with components that extend beyond the valve body shall be installed in a manner that does not interfere with the operation of any system components.

5. Drain valves and test valves shall be approved.

6. Identification of Valves.
   a. All control, drain, and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs.
   b. The identification sign shall be secured with corrosion-resistant wire, chain, or other approved means.
   c. The control valve sign shall identify the portion of the building served.

B. General Purpose Valves

1. Indicating valves: Indicating valves shall be used to control the flow of water in fire sprinkler systems and shall be designed to show whether the valve is open or closed at all times.
   a. Indicating gate valves
      – OS&Y Valves: OS&Y Valves hall be a Kennedy Valve Model 4068 or equivalent
      – Resilient Wedge Gate Valves: Resilient Wedge Gate Valves shall be a Kennedy Valve Model 4701 or equivalent
   b. Butterfly valves
      – Grooved End Butterfly Valve shall be Tyco model BFV-N or approved equal.
      – Wafer Butterfly Valves shall be a Kennedy Valve Model 93W1 or equivalent
      – Threaded End Butterfly in sizes 1", 1-1/4", 1-1/2", 2", 2-1/2" shall be a Milwaukee Valve Model BB-SCS02 or equivalent

2. Check Valves
   a. Grooved End Check Valves shall be Viking Model E-1, F-1 or approved equal.
   b. Wafer Check Valves shall be a Kennedy Valve Model 706 or equivalent.

C. Wet Pipe Systems

1. Relief Valves
   a. Unless otherwise noted in this specification a gridded wet pipe system shall be provided with a relief valve not less than 1/4 in. (6.4 mm) in size set to operate at 175 psi (12.1 bar) or 10 psi (0.7 bar) in excess of the maximum system pressure, whichever is greater.
   b. Where auxiliary air reservoirs are installed to absorb pressure increases, a relief valve shall not be required.

PART 3.0 - EXECUTION

3.1 INSTALLATION/FABRICATION

A. GENERAL

1. The Contractor shall furnish the services of an experienced Superintendent who shall be qualified in all phases of the work of this Section and who shall constantly be in charge of the work of this Section.

2. Qualified and trained personnel, experienced with the products involved, and the recommended methods of preparation, shall prepare all piping and fittings. All cuts, threads and grooves shall be made according to applicable codes, standards and accepted good practices. Pipe shall be free of damage, flaws and burrs. Threads and grooves shall not be excessively shallow or deep. Fittings shall be made onto pipe no tighter than necessary. Contractor shall replace cracked or broken fittings, without exception. Excess thread sealants and oils shall be removed before shipment to job site.

3. The Sprinkler Contractor shall be held responsible during the installation and testing periods of the sprinkler system for any damage to the work of others, to the building, its contents, etc., caused by leaks in any sprinkler equipment, by unplugged or disconnected sprinkler pipes, fittings, etc., or by overflow. He shall pay for necessary replacements or repairs to items damaged by such leakage.

4. The Contractor shall obtain detailed information from the material and equipment manufacturers as to the proper method of installation and shall execute accordingly.

5. Locate and install equipment such that it meets the requirements of NFPA, the regulatory agency and the local Fire Department. Identification tags shall be provided as required.

6. All equipment requiring operation, maintenance or inspection shall be so mounted/located to allow ready access. Equipment shall not be located behind other permanent fixtures, at a vertical height above the floor not readily accessible, and/or mounted in such a way as to make normal access difficult. The owner/tenant shall require all equipment located in violation to this section to be relocated at no additional cost to the owner/tenant.

7. The fire department connection shall be installed and located strictly in accordance with the regulations of the local fire department or their designated authority.

8. The contractor is responsible for all cutting and patching work required for this installation. Locations shall be marked carefully and holes shall be no larger than necessary for the pipe involved. Hole size shall be strictly limited to a size, which can be covered by a standard sized escutcheon. The contractor at no additional cost to the owner will patch misaligned and oversized holes. Cutting/drilling of exterior wall shall require the re-insulation and packing of the opening to meet original R-value and prevent air infiltration. Any cutting of structure shall be subject to approval by the Architect. Beams, decks and other structural components shall not be cut or altered in any way unless previously approved.

9. Contractor shall be responsible for all welded joints and any qualifying procedures or certification required for welders and related personnel. Welding methods shall meet or exceed the requirement described in NFPA 13

10. Holes in pipe for welded outlets shall be cut to full inside diameter of fitting, prior to welding in place. Holes shall be free of slag and welding residue, and of smooth, continuous bore. Fittings shall not penetrate internal diameter of run piping. Holes shall be cut by hole saw or other rotary bit. Torch cutting of holes is strictly prohibited.

11. Entire sprinkler system shall be installed in such a manner so that it can be drained in accordance with NFPA 13. Drains shall be located at suitable points as approved by Architect. No primary or auxiliary drain shall be located in any public area or electrical room. All drains shall discharge into dedicated receptors.

12. No work shall be covered or enclosed until inspected, tested, and approved by Architect and authority having jurisdiction. Should any work be concealed before inspection, the Contractor shall, at his own expense, uncover such work and after it has been inspected, tested and approved, provide for all repairs as may be necessary to restore any other affected work to its original and proper condition.

13. Upon completion of the work specified, and at other times during the progress of the work when required, the Contractor shall remove all surplus materials, rubbish and debris resulting from this work, and shall leave the entire building and involved portions of the site, insofar as the work of these Sections are concerned, in a neat, clean and acceptable condition.

14. Location of control valves, fire department connection, and inspector's test shall be as indicated and as required by authorities having jurisdiction, and as approved by Architect.

15. Local alarm bell shall be located so that it can be easily heard and seen by passersby and fire department personnel. Locate on exterior wall, approximately 10'-0" above finished grade, as approved by Architect.

B. ABOVE GROUND SPRINKLER PIPING

1. Use best of workmanship in the installation of all piping and in particular all piping exposed in areas having no suspended ceilings. Install all piping as high as possible and where possible, install branch piping between structural framing and run main piping only below beams.

2. All sprinkler branch lines and mains shall be supported from the building structural system using approved hangers, inserts and other devices. Hangers shall be placed between 12 inches and 18 inches from each head and shall conform to NFPA 13. Piping shall be secured in correct alignment and pitch, and in a manner to prevent sagging and vibration. All pipes shall be anchored for expansion.

3. Without exception, no piping shall be run under or through any skylight or skylight well. Any additional upright or pendent sprinklers, which may be required by skylight locations, shall be the responsibility of this Contractor.

4. Sprinkler risers shall be supported from suitable brackets fastened to the building structure in accordance with NFPA 13. The Sprinkler Contractor shall provide all miscellaneous steel to span between the bar joists and columns as required for pipe support.

5. All penetrations of wall and/or floor assemblies shall be suitably sleeved, patched and/or sealed in order to preserve fire rating, where applicable.

C. AUTOMATIC SPRINKLER

1. Where sprinklers have had paint applied by other than the sprinkler manufacturer, they shall be replaced with new listed sprinklers of the same characteristics, including orifice size, thermal response, and water distribution.

2. Sprinkler heads at finished ceilings, and in exposed locations shall form a symmetrical pattern, carefully integrated into the ceiling layout as shown on approved drawings. When possible, pendant heads in finished areas shall be located such that they line up with the lighting fixtures as well as with each other. Heads shall be located at the centerline of ceiling tiles.

3. Sprinkler head layout must accommodate ceiling-mounted HVAC register and lighting locations. Coordination with work of these trades is the responsibility of Contractor.

4. Provide sprinkler guards as required to protect the system from mechanical damage.

D. Hangers and Supports

1. Provide U.L. /F.M. approved hangers as required by NFPA. 13. Shop-fabricated supports shall be designed to meet requirements of NFPA 13.

2. Size all anchors and fasteners per NFPA 13. All lag screws, bolts and drive screws shall be installed as required by codes and accepted good practices. Pilot holes shall be drilled in all wood-framing members as required by structural engineer. Under no circumstances shall lag screws or bolts be hammered or pounded into framing.

E. EARTHQUAKE BRACING

1. All sprinkler system piping shall be braced to withstand earthquake (seismic) movement per the requirements of NFPA 13.

2. Pipe sway bracing shall be installed to resist lateral and longitudinal seismic loads and to prevent unrestrained vertical movement per the requirements of NFPA 13. This shall include 4-way bracing of all building risers to the building structure.

3. Flexible couplings shall be installed where required to provide expansion capability, and for earthquake protection per the requirements of NFPA 13.

4. Clearances around all system piping between building components and other trades shall be strictly maintained per the requirements of NFPA 13.

F. SUPERVISORY SWITCHES

1. All flow and supervisory switches shall be provided with dry contacts for wiring to a central station by the Owner/Tenant's Security Vendor and be installed per the requirements of NFPA 72.

2. The fire protection contractor shall mount all flow and valve tamper switches.

G. SYSTEM CONNECTIONS

1. Flushing Connections: Provisions shall be made to facilitate the flushing of the system. A flushing connection shall be provided at the end of each cross main terminating in 2 inch and larger pipe. Each flushing connection shall have a 2 inch capped nipple not less than 4 inches long.

2. Drain Connections: Provisions shall be made to drain all pockets or low points occurring in the piping systems. The two inch system drainpipe shall be arranged to discharge to the exterior of the building unless prohibited by regulatory authorities. The discharge point shall be low on exterior wall and away from normal pedestrian travel paths.

3. Test Connections: The Sprinkler Contractor shall provide a test connection at the highest point in the main portion of each sprinkler system. Each test connection shall be provided with a 1inch pipe and valve. The test pipe shall be connected to a sprinkler pipe at least 1-1/4 inches in size and shall discharge outside the building through a 1/2-inch smooth bore brass outlet where it can easily be seen.

3.2 TESTING AND FLUSHING

A. All piping in this installation shall be thoroughly cleaned and tested during the progress of the work, at the completion of the work, or at other times as may be required. All piping shall be hydrostatically tested per NFPA 13 to meet the approval of the local Fire Department or Authority Having Jurisdiction. The Sprinkler Contractor shall complete a standard Contractor's Material & Test Certificate for all above ground piping and forward same to the building owner at completion of all testing. No piping shall be concealed before being tested. All joints shall be inspected for leaks during the test, and any leaks, which develop, shall be repaired and the complete test repeated. Leaks shall be repaired by disassembly, correction and reassembly only. Caulking of joints will not be permitted and leaking joints must be remade. Stuffing boxes on all valves shall be repacked with new packing and made tight. Systems shall be tested and repaired until all requirements are met. Testing shall be done at the expense of the Sprinkler Contractor, with all required equipment furnished by him.

B. The sprinkler contractor shall complete a full fire pump acceptance test when applicable. The contractor is required to engage a qualified representative of the fire pump and controller suppliers to coordinate the equipment final installation details and the acceptance test.

3.3 MAINTENANCE MANUALS

A. Two complete sets of equipment maintenance manuals shall be assembled in 3-ring binders and placed in the sprinkler room. Binders shall include all manufacturers' cuts and maintenance information on equipment used in this fire protection installation.

B. Equipment shall include: valves, check valves, flow switches, tamper switches, and all other relevant fire protection equipment which could require future maintenance.

3.4 WARRANTY

A. The contractor shall warranty all materials and workmanship for a period of one (1) year. The contractor shall is responsible for the repair/replacement of all defects in equipment/workmanship and make all needed adjustments during this period in a timely manner and at no cost to the owner.

B. The warranty period shall begin on the day of the final system acceptance by the building owner and the Authority Having Jurisdiction.

End of Specification

Greenville County

STAUNTON BRIDGE CC ADDITION

GREENVILLE County Rec PARKS • RECREATION • TOURISM

LS3P

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GREENVILLE, SOUTH CAROLINA 29601
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SOUTH CAROLINA CROMER ENGINEERING LLC No. 4036 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 6506 MICHAEL J. CROMER

3-11-16

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: 3/11/2016
DRAWN BY: JCK
CHECKED BY: MJC

FIRE PROTECTION SPECIFICATIONS

F-001

PERMIT SET

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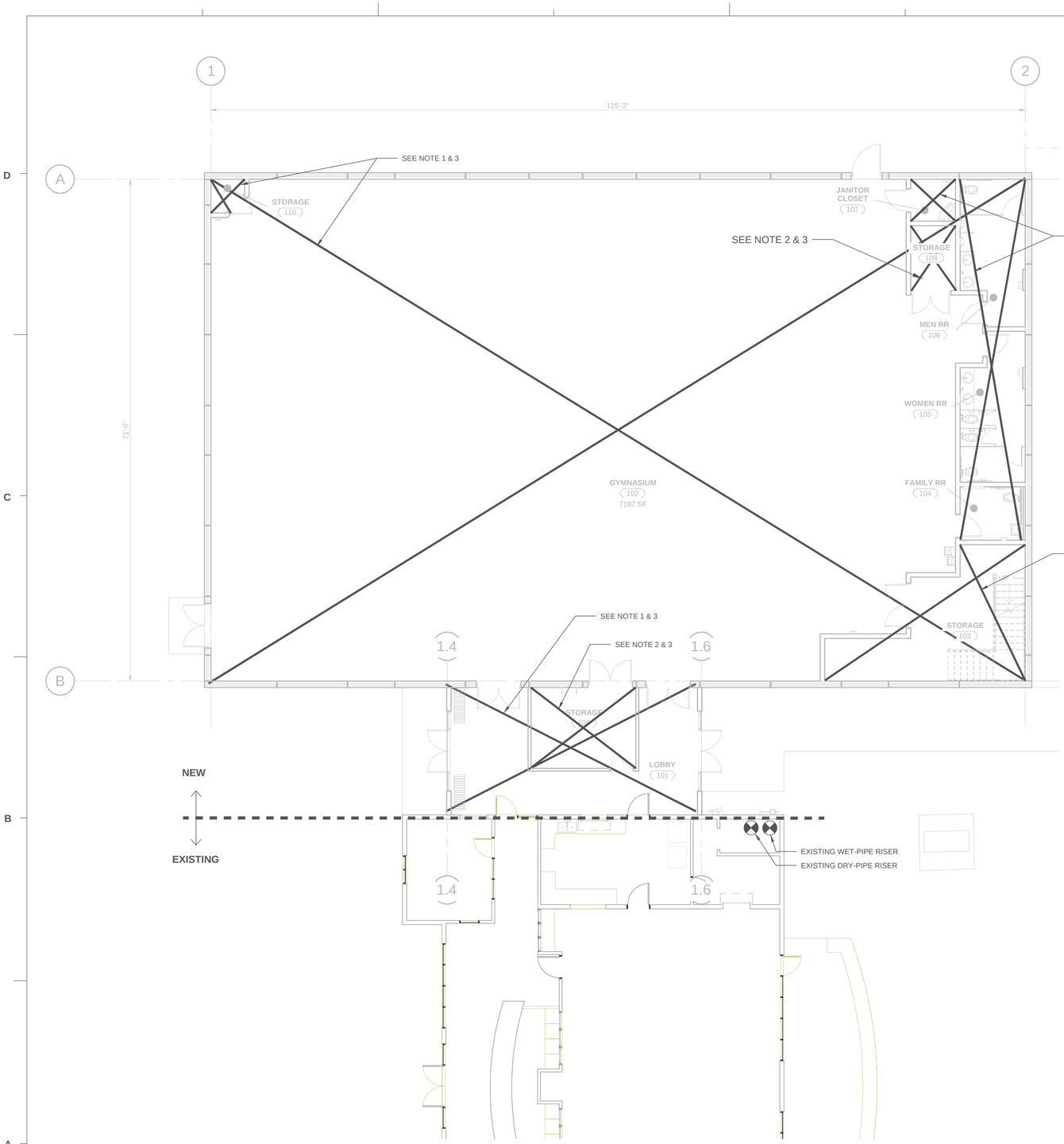
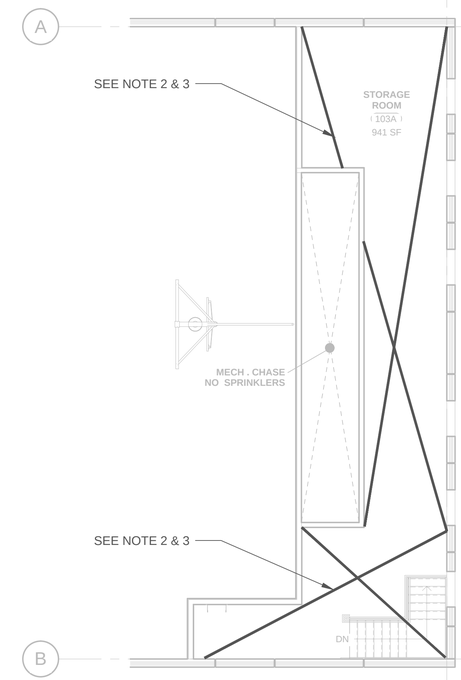


FIRE PROTECTION PLAN - GYMNASIUM & LOBBY

1/8" = 1'-0"



FIRE PROTECTION SHEET NOTES

1. PROVIDE AUTOMATIC WET-PIPE SPRINKLER PROTECTION IN THE AREAS INDICATED. SPRINKLER SYSTEM SHALL BE SIZED TO DISCHARGE 0.1 GPM / SF OVER THE MOST HYDRAULICALLY REMOTE 1,500 SF USING k5.6 ORIFICE SPRINKLERS RATED FOR 200 °F. INCLUDE A 100 GPM HOSE ALLOWANCE IN THE HYDRAULIC CALCULATIONS.

2. PROVIDE AUTOMATIC WET-PIPE SPRINKLER PROTECTION IN THE AREAS INDICATED. SPRINKLER SYSTEM SHALL BE SIZED TO DISCHARGE 0.2 GPM / SF OVER THE ENTIRE AREA USING k5.6 ORIFICE SPRINKLERS RATED FOR 200 °F. INCLUDE A 250 GPM HOSE ALLOWANCE IN THE HYDRAULIC CALCULATIONS.

3. UTILIZE EXISTING WET-PIPE FIRE RISER FOR WATER SOURCE WHERE INDICATED. CONNECT NEW SPRINKLER SYSTEM TO EXISTING WATER SUPPLY AT OR NEAR MECHANICAL ELBOW AT TOP OF RISER.

FIRE PROTECTION GENERAL NOTES:

A. SEE SPECIFICATIONS FOR COMPLETE FIRE PROTECTION SCOPE.
B. FIRE SPRINKLER DESIGN AND INSTALLATION PER NFPA 13 (2010).
C. FIRE SPRINKLER CONTRACTOR SHALL COORDINATE WORK WITH ALL TRADES PRIOR TO INSTALLATION.
D. PROVIDE PROTECTION UNDER OBSTRUCTIONS 48 INCHES AND WIDER PER NFPA 13 (2010).
E. WHERE DESIGN DENSITIES EXCEED THAT OF NFPA 13 (2010), DENSITIES GIVEN WITHIN THE DESIGN DOCUMENTS SHALL APPLY.
F. ALL MATERIALS USED SHALL BE U.L. LISTED FOR USE IN FIRE PROTECTION SYSTEMS.
G. CONTRACTOR SHALL PROVIDE MINIMUM 10 PSI SAFETY FACTOR IN ALL HYDRAULIC CALCULATIONS.
H. WHERE SPRINKLERS ARE TO BE INSTALLED BENEATH HANGING ACOUSTICAL TILES, SPRINKLER HEAD SHALL UTILIZE TWO-PIECE ESCUTCHEON AND SHALL BE CENTERED IN TILE.
I. SHUT DOWN OF EXISTING SYSTEM SHALL BE COORDINATED WITH OWNER. NO EXISTING SYSTEMS SHALL BE LEFT SHUT DOWN OVERNIGHT OR WHILE UNATTENDED.
J. CONTRACTOR SHALL SUBMIT FIRE PROTECTION PLANS, HYDRAULIC CALCULATIONS, SEISMIC "SWAY BRACE" CALCULATIONS AND MATERIAL DATA "CUT SHEETS" ELECTRONICALLY TO THE FOLLOWING FOR APPROVAL PRIOR INSTALLING ANY FIRE PROTECTION PIPING:

MICHAEL J. CROMER, P.E.
CROMER ENGINEERING, LLC.
MJCROMER@CHARTER.NET
304 CHERRY HILL ROAD
GREENVILLE, SC 29607

Greenville County

STAUNTON BRIDGE CC ADDITION

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REVISIONS:

No.	Description	Date

PROJECT: 3702-155430
DATE: 3/11/16
DRAWN BY: JCK
CHECKED BY: MJC

FIRE PROTECTION PLAN

F-101

PERMIT SET

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