
	<b>Lancaster County School District</b>  <i>Invitation for Bid</i>	Solicitation Number 202501 Solicitation Issue Date 07/30/24 Procurement Officer Trevor Hammond, NIGP-CPP, CPPB Phone (803) 416-8828 E-Mail Address <a href="mailto:trevor.hammond@lcsd.k12.sc.us">trevor.hammond@lcsd.k12.sc.us</a>	

DESCRIPTION: **Greenhouse for Career Center**

*The Term "Offer" Means Your "Bid" or "Proposal".*

SUBMIT OFFER BY (Opening Date/Time): **08/22/24 at 10:00 AM – EST**

See "Deadline for Submission of Offer" provision

QUESTIONS MUST BE RECEIVED BY: **08/12/2024 at 10:00 AM - EST**

See "Questions from Offerors" provision

NUMBER OF COPIES TO BE SUBMITTED: **One (1) original**

Offers must be submitted in a SEALED PACKAGE. Solicitation Number & Opening Date must appear on package exterior.

**SUBMIT YOUR OFFER TO THE FOLLOWING ADDRESS:**

<b>PHYSICAL &amp; MAILING ADDRESS:</b>  Lancaster County School District Attn: Trevor Hammond, Procurement Director 300 South Catawba Street Lancaster, SC 29720 <small>See "Submitting Your Offer" provision</small>
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CONFERENCE TYPE: <b>Non-Mandatory Pre-Bid</b> DATE & TIME: 08/07/24 @ 2:00 PM LOCATION: <b>Lancaster County School District Career Center, 625 Normandy Road, Lancaster, SC 29720</b> <small>(As appropriate, see "Conferences - Pre-Bid/Proposal" &amp; "Site Visit" provisions)</small>	
AWARD & AMENDMENTS	Notice of Intent to Award will be posted on or about 08/23/2024 at the physical address stated above and at the following web address: <a href="https://sites.google.com/lcsd.k12.sc.us/lcsd-procurement/solicitations-awards">https://sites.google.com/lcsd.k12.sc.us/lcsd-procurement/solicitations-awards</a> .
You must submit a signed copy of this form with your offer. By submitting a bid or proposal, you agree to be bound by the terms of the solicitation. You agree to hold your offer open for a minimum of sixty (60) calendar days after the opening date.	
NAME OF OFFEROR <small>(Full legal name of business submitting the offer)</small>	OFFEROR'S TYPE OF ENTITY: (Choose one) <input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporate entity (not tax-exempt) <input type="checkbox"/> Tax exempt corporate entity <input type="checkbox"/> Government entity (federal, state, or local) <input type="checkbox"/> Other _____ <small>(See "Signing your Offer" provision)</small>
AUTHORIZED SIGNATURE  <small>(Person signing must be authorized to submit binding offer to enter contract on behalf of Offeror named above.)</small>	
TITLE <small>(Business title of person signing above)</small>	
PRINTED NAME <small>(Printed name of person signing above)</small>	
DATE SIGNED	
Instructions regarding Offeror's name: Any award issued will be issued to, and the contract will be formed with, the entity identified as the offeror above. An offer may be submitted by only one legal entity. The entity named as the offeror must be a single and distinct legal entity. Do not use the name of a branch office or a division of a larger entity if the branch or division is not a separate legal entity, <i>i.e.</i> , a separate corporation, partnership, sole proprietorship, etc.	
STATE OF INCORPORATION <small>(If offeror is a corporation, identify the State of Incorporation.)</small>	
TAXPAYER IDENTIFICATION NO. <small>(See "Taxpayer Identification Number" provision)</small>	

**PAGE TWO**

**(Return Page Two with Your Offer)**

<b>HOME OFFICE ADDRESS</b> (Address for offeror's home office / principal place of business)	<b>NOTICE ADDRESS</b> (Address to which all procurement and contract related notices should be sent.) (See "Notice" clause)
	Area Code - Number - Extension                      Facsimile
	E-mail Address

<b>PAYMENT ADDRESS</b> (Address to which payments will be sent.) (See "Payment" clause)	<b>ORDER ADDRESS</b> (Address to which purchase orders will be sent) (See "Purchase Orders and "Contract Documents" clauses)
___ Payment Address same as Home Office Address ___ Payment Address same as Notice Address <b>(check only one)</b>	___ Order Address same as Home Office Address ___ Order Address same as Notice Address <b>(check only one)</b>

**ACKNOWLEDGMENT OF AMENDMENTS**  
 Offeror acknowledges receipt of amendments by indicating amendment number and its date of issue. (See "Amendments to Solicitation" Provision)

Amendment No.	Amendment Issue Date	Amendment No.	Amendment Issue Date	Amendment No.	Amendment Issue Date	Amendment No.	Amendment Issue Date

<b>DISCOUNT FOR PROMPT PAYMENT</b> (See "Discount for Prompt Payment" clause)	10 Calendar Days (%)	20 Calendar Days (%)	30 Calendar Days (%)	___ Calendar Days (%)
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Minority Participation: Are you a SC Certified Minority Vendor: Yes  No ; If yes, SC Certification # \_\_\_\_\_  
 Are you a Non SC Certified Minority Vendor - Yes  No

Preferences do not apply per LCSD Procurement Code Section 1524.Resendent Vendor Preference (S.C. Code 11-35-1524(E)(5))

Preferences do not apply per LCSD Procurement Code Section 1524.Resendent Vendor Preference (S.C. Code 11-35-1524(E)(5))

# Solicitation Outline

- I. **Scope of Solicitation**
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- III. **Scope of Work/Specifications**
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- V. **Qualifications**
- VI. **Award Criteria**
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  - B. **Special**
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- IX. **Attachments to Solicitation**
- X. **Minority Participation**

## I. SCOPE OF SOLICITATION

The Lancaster County School District is seeking competitive sealed bids from qualified sources to provide turn-key construction for quantity one Jaderloon Greenhouse, or approved alternate for the Lancaster County School District Career Center, in accordance with the requirements, specifications, and drawings of this solicitation..

**Acquire Service & Supplies:** The purpose of this solicitation is to acquire services and supplies complying with the enclosed description and/or specifications and conditions.

## II. INSTRUCTIONS TO OFFERORS – A. GENERAL INSTRUCTIONS

### **DEFINITIONS, CAPITALIZATION, AND HEADINGS:**

Clause headings used in this solicitation are for convenience only and shall not be used to construe meaning or intent. Even if not capitalized, the following definitions are applicable to all parts of the solicitation, unless expressly provided otherwise.

1. **Amendment** – means a document issued to supplement the original solicitation document.
2. **Board** – means the Lancaster County School District Board of Trustees.
3. **Business** – means any corporation, partnership, individual, sole proprietorship, joint stock company, joint venture, or any other legal entity.
4. **Change Order** - means any written alteration in specifications, delivery point, rate of delivery, period of performance, price, quantity, or other provisions of any contract accomplished by mutual agreement of the parties to the contract.
5. **Contract** - See clause entitled “Contract Documents & Order of Precedence.”
6. **Contract Modification** – means a written order signed by the procurement officer, directing the contractor to make changes which the clause of the contract titled “Changes”, if included herein, authorizes the Procurement Officer to order without the consent of the contractor.
7. **Contractor** - means the offeror receiving an award as a result of this solicitation.
8. **Cover Page** – means the top page of the original solicitation on which the solicitation is identified by number. Offerors are cautioned that amendments may modify information provided on the cover page.
9. **District** – means Lancaster County School District (LCSD)
10. **Offer** – means the bid or proposal submitted in response to this solicitation. The terms “Bid” and “Proposal” are used interchangeably with the term “Offer.”
11. **Offeror** – means the single legal entity submitting the offer. The term “Bidder” is used interchangeably with the term “Offeror.” See bidding provisions entitled “Signing Your Offer” and “Bid/Proposal As Offer To Contract.”
12. **Page Two** – means the second page of the original solicitation, which is labeled Page Two.

13. **Procurement Officer** – means the person, or his successor, identified as such on either the cover page, an amendment, or an award notice. Procurement Officer means the Chief Procurement Officer.
14. **Solicitation** – means this document, including all its parts, attachments, and any amendments.
15. **Subcontractor** – means any person you contract with to perform or provide any part of the work.
16. **Us (or) We** - means the Lancaster County School District
17. **Work** - means all labor, materials, equipment, services, or property of any type, provided or to be provided by the contractor to fulfill the contractor's obligations under the contract.
18. **You and Your** – means Offeror.

**Amendments to Solicitation:** (a) The solicitation may be amended at any time prior to opening. All actual and prospective offerors should monitor the following web site for the issuance of amendments: <https://sites.google.com/lcsd.k12.sc.us/lcsd-procurement/solicitations-awards>. (b) Offerors shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date in the space provided for this purpose on page two, (3) by letter, or (4) by submitting a bid that indicates in some way that the bidder received the amendment. (c) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

Because this solicitation is posted electronically, the District may not be aware of all potential offerors, particularly those that attained a copy from this web site or other unknown sources. ***It is the bidder's responsibility to check this web site periodically to determine if any amendments have been issued. Any amendments issued by the District shall become a formal part of this solicitation.***

**Authorized Agent:** All authority regarding this procurement is vested solely with the responsible Procurement Officer. Unless specifically delegated in writing, the Procurement Officer is the only district official authorized to bind the district with regard to this procurement or the resulting contract.

**Award Notification:** Notice regarding any award, cancellation of award, or extension of award will be posted at the location and on the date specified on the cover page or, if applicable, any notice of extension of award. The date and location of posting will be announced at opening. Should the contract resulting from this solicitation have a potential value of one hundred thousand dollars or more, such notice will be sent to all offerors responding to the solicitation and any award will not be effective until the eleventh day after such notice is given.

**Bid/Proposal as Offer to Contract:** By submitting your bid or proposal, you are offering to enter into a contract with the district. Without further action by either party, a binding contract shall result upon final award. Any award issued will be issued to, and the contract will be formed with, the entity identified as the offeror on the cover page. An offer may be submitted by only one legal entity; "joint bids" are not allowed.

**Bid Acceptance Period:** In order to withdraw your offer after the minimum period specified on the cover page, you must notify the Procurement Officer in writing.

**Bid in English & Dollars:** Offers submitted in response to this solicitation shall be in the English language and in US dollars, unless otherwise permitted by the solicitation.

**Board as Procurement Agent:** The Procurement Officer is an employee of the district acting on behalf of the Lancaster County School District pursuant to the Lancaster County School District Procurement Code. Any contracts awarded as a result of this procurement are between the contractor and the district. The Board is not a party to such contracts, unless and to the extent that the Board is a using district department, and bears no liability for any party's losses arising out of or relating in any way to the contract.



**Certificate of Independent Price Determination:**

GIVING FALSE, MISLEADING, OR INCOMPLETE INFORMATION ON THIS CERTIFICATION MAY RENDER YOU SUBJECT TO PROSECUTION UNDER SECTION 16-9-10 OF THE SOUTH CAROLINA CODE OF LAWS AND OTHER APPLICABLE LAWS.

(a) By submitting an offer, the offeror certifies that—

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to—

(i) Those prices;

(ii) The intention to submit an offer; or

(iii) The methods or factors used to calculate the prices offered.

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory—

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this certification; or

(2)(i) Has been authorized, in writing, to act as agent for the offeror's principals in certifying that those principals have not participated, and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this certification [As used in this subdivision (b)(2)(i), the term "principals" means the person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal];

(ii) As an authorized agent, does certify that the principals referenced in subdivision (b)(2)(i) of this certification have not participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this certification; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this certification.

(c) If the offeror deletes or modifies paragraph (a)(2) of this certification, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

**Certification Regarding Debarment and Other Responsibility Matters:**

(a)(1) By submitting an offer, offeror certifies, to the best of its knowledge and belief, that-

(i) Offeror and/or any of its Principals-

(A) Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;

(B) Have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision.

(ii) Offeror has not, within a three-year period preceding this offer, had one or more contracts terminated for default by any public (federal, state, or local) entity.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

(b) Offeror shall provide immediate written notice to the Procurement Officer if, at any time prior to contract award, offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) If offeror is unable to certify the representations stated in paragraphs (a)(1), Offeror must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the offeror's

responsibility. Failure of the offeror to furnish additional information as requested by the Procurement Officer may render the offeror non-responsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the offeror knowingly or in bad faith rendered an erroneous certification, in addition to other remedies available to the district, the Procurement Officer may terminate the contract resulting from this solicitation for default.

**Code of Laws Available:** The South Carolina Code of Laws, including the Consolidated Procurement Code, is available at <http://www.scstatehouse.gov/code/statmast.php>. The South Carolina Regulations are available at: <http://www.scstatehouse.gov/coderegs/statmast.php>.

**Deadline for Submission of Offer:** Any offer received after the Procurement Officer of the district or his designee has declared that the time set for opening has arrived, shall be rejected unless the offer has been delivered to the designated purchasing office prior to the bid opening.

**Disclosure Of Conflicts Of Interest Or Unfair Competitive Advantage:**

("OCI FAQ for Contractors" is available at [www.procurement.sc.gov](http://www.procurement.sc.gov))

(a) You certify that, after reasonable inquiry, to the best of your knowledge and belief: (1) your offer identifies any services that relate to either this solicitation or the work and that have already been performed by you, a proposed subcontractor, or an affiliated business or consultant of either; and (2) there are no relevant facts or circumstances that may give rise to an actual or potential organizational conflict of interest, as defined in S.C. Code Ann. Reg. 19-445.2127, or that your offer identifies and explains any unfair competitive advantage you may have in competing for the proposed contract and any actual or potential conflicts of interest that may arise from your participation in this competition or your receipt of an award.

(b) If you, a proposed subcontractor, or an affiliated business or consultant of either, have an unfair competitive advantage or an actual or potential conflict of interest, the District may withhold award. Before withholding award on these grounds, the District will notify you of the concerns and provide a reasonable opportunity for you to respond. The District may consider efforts to avoid or mitigate such concerns, including restrictions on future activities.

(c) The certification in paragraph (a) of this provision is a material representation of fact upon which the District will rely when considering your offer for award.

**Disclosure Of Your Bid / Proposal & Submitting Confidential Data:**

(a) According to Section 11-35-410, any person submitting a document in response or with regard to any solicitation or other request must "comply with instructions provided in the solicitation for marking information exempt from public disclosure. Information not marked as required by the applicable instructions may be disclosed to the public." IF YOU IDENTIFY YOUR ENTIRE RESPONSE AS EXEMPT FROM PUBLIC DISCLOSURE, OR IF YOU DO NOT SUBMIT A REDACTED COPY AS REQUIRED, THE DISTRICT MAY, IN ITS SOLE DISCRETION, DETERMINE YOUR BID OR PROPOSAL NONRESPONSIVE AND INELIGIBLE FOR AWARD.

(b) By submitting a response to this solicitation or request, Offeror agrees to the public disclosure of every page, or portion thereof, of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract (including, but not limited to, documents contained in a response, documents submitted to clarify a response, and documents submitted during negotiations), unless the page, or portion thereof, was redacted and conspicuously marked "Trade Secret" or "Confidential" or "Protected", (2) agrees that any information not redacted and marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, and (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure.

(c) If your offer includes any information that you claim is exempt from public disclosure, you must submit one complete copy of your offer from which you have removed or concealed such information (the redacted copy). Except for the information removed or concealed, the redacted copy must be identical to your original offer.

(d) Do not mark your entire response (bid, proposal, quote, etc.) as confidential, trade secret, or protected. If only portions of a page are subject to some protection, do not redact the entire page. The redacted copy must reflect the same pagination as the original and show the empty space from which information was redacted. The Procurement Officer must be able to view, search, copy and print the redacted copy without a password. If your response, or any part thereof, is improperly marked as confidential or trade secret or protected, the District may, in its sole discretion, determine it nonresponsive.

(e) On the redacted copy, you must identify the basis of your claim by marking each redaction as follows: You must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that you redacted and claim as exempt from public disclosure because it is either (1) a trade secret as defined in Section 30-4-40(a)(1) of the Freedom of Information Act, or (2) privileged and confidential, as that phrase is used in Section 11-35-410. You must separately mark with the words "TRADE SECRET" every page, or portion thereof, that you redacted and claim as exempt from public disclosure as a trade secret pursuant to Section 39-8-20 of the Trade Secrets Act. You must separately mark with the word "PROTECTED" every page, or portion thereof, that you redacted and claim as exempt from public disclosure pursuant to Section 11-35- 1810. All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text.

(f) In determining whether to release documents, the District will detrimentally rely on your redaction and marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "Protected". By submitting a response, you agree to defend, indemnify and hold harmless the District, its agencies, officers and employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from withholding information by the District or any of its agencies, that you have redacted or marked as "Confidential" or "Trade Secret" or "Protected". (All references to S.C. Code of Laws.)

**District Office Closings:** If an emergency or unanticipated event interrupts normal district processes so that offers cannot be received at the district office designated for receipt of bids by the exact time specified in the solicitation, the time specified for receipt of offers will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal district processes resume. In lieu of an automatic extension, an amendment may be issued to reschedule bid opening. If district offices are closed at the time a pre-bid or pre-proposal conference is scheduled, an amendment will be issued to reschedule the conference.

**Drug Free Work Place Certification:** By submitting an offer, contractor certifies that, if awarded a contract, contractor will comply with all applicable provisions of The Drug-free Workplace Act, Title 44, Chapter 107 of the South Carolina Code of Laws, as amended.

**Duty to Inquire:** Offeror, by submitting an offer, represents that it has read and understands the solicitation and that its offer is made in compliance with the solicitation. Offerors are expected to examine the solicitation thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements in the solicitation. Failure to do so will be at the offeror's risk. All ambiguities, discrepancies, errors, omissions, or conflicting statements in the Solicitation shall be interpreted to require the better quality or greater quantity of work and/or materials, unless otherwise directed by amendment. Offeror assumes responsibility for any patent ambiguity in the solicitation that offeror does not bring to the District's attention. See clause entitled "Questions from Offerors".

**Ethics Certificate:** By submitting an offer, the offeror certifies that the offeror has and will comply with, and has not, and will not, induce a person to violate Title 8, Chapter 13 of the South Carolina Code of Laws, as amended (ethics act). The following statutes require special attention: Section 8-13-700, regarding use of official position for financial gain; Section 8-13-705, regarding gifts to influence action of public official; Section 8-13-720, regarding offering money for advice or assistance of public official; Sections 8-13-755 and 8-13-760, regarding restrictions on employment by former public official; Section 8-13-775, prohibiting public official with economic interests from acting on contracts; Section 8-13-790, regarding recovery of kickbacks; Section 8-13-1150, regarding statements to be filed by consultants; and Section 8-13-1342, regarding restrictions on contributions by contractor to candidate who participated in awarding of contract. The district may rescind any contract and recover all amounts expended as a result of any action taken in violation of this provision. If contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders

regarding a public contract, contractor shall, if required by law to file such a statement, provide the statement required by Section 8-13-1150 to the procurement officer at the same time the law requires the statement to be filed.

**Open Trade Representation:** By submitting an Offer, Offeror represents that Offeror is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300.

**Prohibited Communications and Donations:** Violation of these restrictions may result in disqualification of your offer, suspension or debarment, and may constitute a violation of law.

- (a) During the period between publication of the solicitation and final award, ***you must not communicate, directly or indirectly, with the District or its employees, agents, or officials regarding any aspect of this procurement activity, unless otherwise approved in writing by the Procurement Officer.*** All communications must be solely with the Procurement Officer.
- (b) You are advised to familiarize yourself with Regulation 19-445.2165, which restricts donations to a governmental entity with whom you have or seek to have a contract. ***You represent that your offer discloses any gifts made, directly or through an intermediary, by you or your named subcontractors to or for the benefit of the District during the period beginning eighteen months prior to the Opening Date.***

**Protests:** If you are aggrieved in connection with the solicitation or award of the contract, you may be entitled to protest, but only as provided in Section 11-35-4210. To protest a solicitation, you must submit a protest within fifteen days of the date the applicable solicitation document is issued. To protest an award, you must (i) submit notice of your intent to protest within seven business days of the date the award notice is posted, and (ii) submit your actual protest within fifteen days of the date the award notice is posted. Days are calculated as provided in Section 11-35-310(13). Both protests and notices of intent to protest must be in writing and must be received by the appropriate Chief Procurement Officer within the time provided. See clause entitled "Protest- Procurement Department Address". The grounds of the protest and the relief requested must be set forth with enough particularity to give notice of the issues to be decided.

**Public Opening:** Offers will be publicly opened at the date/time and at the location identified on the cover page, or last amendment, whichever is applicable.

**Questions From Offerors:** (a) Any prospective offeror desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must request it in writing. Questions regarding the original solicitation or any amendment must be received by the Procurement Officer no later than ten (10) days prior to opening unless an earlier date is stated on the Cover Page. Label any communication regarding your questions with the name of the procurement officer, and the solicitation's title and number. Oral explanations or instructions will not be binding. [See R. 19-445.2042(B)] Any information given a prospective offeror concerning a solicitation will be furnished promptly to all other prospective offerors as an Amendment to the solicitation, if that information is necessary for submitting offers or if the lack of it would be prejudicial to other prospective offerors. See clause entitled "Duty to Inquire." We will not identify you in our answer to your question. (b) The District seeks to permit maximum practicable competition. Offerors are urged to advise the Procurement Officer -- as soon as possible -- regarding any aspect of this procurement, including any aspect of the Solicitation that unnecessarily or inappropriately limits full and open competition.

**Rejection/Cancellation:** The district may cancel this solicitation in whole or in part. The district may reject any or all bids in whole or in part (Article 5-1710 of the Lancaster County School District's procurement code).

**Responsiveness/ Improper Offers:**

- (a) Bid as Specified. Offers for supplies or services other than those specified will not be considered unless authorized by the Solicitation.
- (a) Multiple Offers. Offerors may submit more than one Offer, provided that each Offer has significant differences other than price. Each separate Offer must satisfy all Solicitation requirements. If this solicitation is an Invitation for Bids, each separate offer must be submitted as a separate document. If this solicitation is a Request for Proposals, multiple

offers may be submitted as one document, provided that you clearly differentiate between each offer and you submit a separate cost proposal for each offer, if applicable

- (b) Responsiveness. Any Offer which fails to conform to the material requirements of the Solicitation may be rejected as nonresponsive. Offers which impose conditions that modify material requirements of the Solicitation may be rejected. If a fixed price is required, an Offer will be rejected if the total possible cost to the District cannot be determined. Offerors will not be given an opportunity to correct any material nonconformity. Any deficiency resulting from a minor informality may be cured or waived at the sole discretion of the Procurement Officer. [R.19-445.2070 and Section 11-35-1520(13)]
- (c) Price Reasonableness: Any offer may be rejected if the Procurement Officer determines in writing that it is unreasonable as to price. [R. 19-445.2070].
- (d) Unbalanced Bidding. The District may reject an Offer as nonresponsive if the prices bid are materially unbalanced between line items or subline items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the District even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.
- (e) Do not submit bid samples or descriptive literature unless expressly requested. Unsolicited bid samples or descriptive literature will not be examined or tested, will not be used to determine responsiveness, and will not be deemed to vary any of the provisions of the solicitation. S.C. Code Ann. Reg. 19-445.2077(D).

**Signing Your Offer:** Every offer must be signed by an individual with actual authority to bind the offeror. (a) If the offeror is an individual, the offer must be signed by that individual. If the offeror is an individual doing business as a firm, the offer must be submitted in the firm name, signed by the individual, and state that the individual is doing business as a firm. (b) If the offeror is a partnership, the offer must be submitted in the partnership name, followed by the words "by its Partner," and signed by a general partner. (c) If the offeror is a corporation, the offer must be submitted in the corporate name, followed by the signature and title of the person authorized to sign. (d) An offer may be submitted by a joint venturer involving any combination of individuals, partnerships, or corporations. If the offeror is a joint venture, the offer must be submitted in the name of the joint venture and signed by every participant in the joint venture in the manner prescribed in paragraphs (a) through (c) above for each type of participant. (e) If an offer is signed by an agent, other than as stated in subparagraphs (a) through (d) above, the offer must state that it has been signed by an agent. Upon request, offeror must provide proof of the agent's authorization to bind the principal.

**Submitting Your Offer or Modification:** (a) All prices and notations should be printed in ink or typewritten. Errors should be crossed out, corrections entered and initialed by the person signing the bid. Do not modify the solicitation document itself (including bid schedule). (b) (1) All copies of the offer or modification, and any other documents required to be submitted with the offer shall be enclosed in a sealed, opaque envelope or package. (2) Submit your offer or modification to the address on the Cover Page. (3) The envelope or package must show the time and date specified for opening, the solicitation number, and the name and address of the bidder. If the offer or modification is sent by mail or special delivery service (UPS, Federal Express, etc.), the outermost envelope or wrapper must be labeled "OFFER ENCLOSED" on the face thereof. (c) If you are responding to more than one solicitation, submit each offer in a separate envelope or package. (d) Submit the number of copies indicated on the Cover Page. (e) Facsimile or e-mail offers, modifications, or withdrawals, will not be considered unless authorized by the Solicitation.

**Tax Credit For Subcontracting With Disadvantaged Small Businesses:** Pursuant to Section 12-6-3350, a taxpayer having a contract with this District who subcontracts with a socially and economically disadvantaged small business is eligible for an income tax credit equal to four percent of the payments to that subcontractor for work pursuant to the contract. The subcontractor must be certified as a socially and economically disadvantaged small business as defined in Section 11-35-5010 and regulations pursuant to it. The credit is limited to a maximum of fifty thousand dollars annually. A taxpayer is eligible to claim the credit for ten consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. A taxpayer claiming the credit shall maintain evidence of work performed for the contract by the subcontractor. The

credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return.

Questions regarding the tax credit and how to file are to be referred to: SC Department of Revenue, Research and Review, Phone: (803) 898-5786, Fax: (803) 898-5888. Questions regarding subcontractor certification are to be referred to: Governor's Office of Small and Minority Business Assistance, Phone: (803) 734-0657, Fax: (803) 734-2498.

**Withdrawal or Correction of Offer:** Offers may be withdrawn by written notice received at any time before the exact time set for opening. If the solicitation authorizes facsimile offers, offers may be withdrawn via facsimile received at any time before the exact time set for opening. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for opening, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid. The withdrawal and correction of offers is governed by Article 5-1520 of the Lancaster County School District's procurement code.

## II. INSTRUCTIONS TO OFFERORS – B. SPECIAL INSTRUCTIONS

**Bid Bond:** Your offer must include either a bid bond issued by a surety or sureties licensed in South Carolina or a certified check. The amount of surety shall be five per cent (5%) of the total bid amount. This bid bond penalty may be expressed in terms of a percentage of the bid price or may be expressed in dollars and cents. If a certified check is submitted in lieu of a bid bond, it must be made payable to the Lancaster County School District.

### **Conference – Pre- Bid:**

Pre-Bid Conference Date and Time: **August 7, 2024; 2:00 PM**

### **Location of Pre-Bid Conference:**

Lancaster County School District Career Center, 625 Normandy Road, Lancaster, SC 29720

Due to the importance of all offerors having a clear understanding of the specifications and requirements of this solicitation, a conference of potential offerors will be held on the date specified on the cover page. Bring a copy of the solicitation with you. Any changes resulting from this conference will be noted in a written amendment to the solicitation. Your failure to attend will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the District. The District assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available at the conference. Nor does the District assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

**Descriptive Literature - Labeling:** Include offeror's name on the cover of any specifications or descriptive literature submitted with your offer.

**Descriptive Literature – Required:** Your offer must include manufacturer's latest literature showing complete product specifications.

**Protest – Procurement Department Address:** Any protest must be addressed to the Chief Procurement Officer, Lancaster County School District, and submitted in writing (a) by email to [trevor.hammond@lcsd.k12.sc.us](mailto:trevor.hammond@lcsd.k12.sc.us), (b) by facsimile at 803-286-4865, or (c) by post or delivery to 300 South Catawba Street, Lancaster, SC 29720.

### III. SCOPE OF WORK / SPECIFICATIONS

**Objective:** The Lancaster County School District is seeking competitive sealed bids from qualified sources to provide turn-key construction for quantity one Jaderloon Greenhouse, or approved alternate for the Lancaster County School District Career Center, in accordance with the requirements, specifications, and drawings of this solicitation..

The Lancaster County School District shall assume no liability or responsibility for work until after delivery is complete in all respects and accepted by the district. The contractor shall be completely responsible for all terms and conditions in this contract until the above conditions are met.

#### **Minimum Specifications:**

Please find attached a list of minimum specifications. All offerors must comply with specifications and requirements. To be considered responsive.

It is the sole discretion of the District to determine if an alternate greenhouse meets minimum specifications and requirements.

All questions relating to the solicitation must be submitted in writing by email to [trevor.hammond@lcsd.k12.sc.us](mailto:trevor.hammond@lcsd.k12.sc.us)

**Delivery/Performance Location – Purchase Order:** After award, all deliveries shall be made and all services provided to the location specified by the district's purchase order.

#### **Contractor Requirements:**

1. Remanufactured or refurbished items will **NOT** be accepted.
2. All deliveries must be FOB Destination freight prepaid, Inside Delivery. No tailgate deliveries will be accepted. The term FOB Destination freight prepaid, Inside Delivery shall mean delivered, unloaded and brought inside to the district's designated receiving site with all charges for transportation and unloading paid by the contractor. **These charges are to be included in the price of the product, not invoiced separately.** Any claim for loss or damages shall be between the contractor and the carrier.
3. Contracted vendor must accompany delivery of the equipment to the job site and set in place at school.
4. District dumpsters are not to be used for this purpose.
5. All employees shall have some form of identification which fully identifies the employee as a member of the contractor's work force. Identification can either be uniforms or ID badges.
6. The contractor shall be responsible for furnishing portable toilets for personnel at the job site.

#### **Start & Completion Dates:**

1. The District anticipates a purchase order will be issued on or about September 5, 2024.
2. Work to be completed 120 days after Notice to Proceed. A designee of the District shall coordinate the scheduling of all work with the contractor.

**Operational Manuals:** Unless otherwise specified, contractor shall provide one operational manual for each item acquired.

**Quality – New:** All items and materials must be new. Refurbished or remanufactured items will NOT be accepted.

**Warranty/Guarantee:** The successful bidder shall supply a guarantee for all workmanship for the services provided for a period comparable to the standards in the industry. When defects or faulty material or equipment is discovered during the guarantee period, the contractor shall, immediately upon notification by the district, proceed at his own expense to repair or

replace the same, together with any damage to all finishes, equipment and furnishings that may have been damaged as a result of the defective product and or service.

#### IV. INFORMATION FOR OFFERORS TO SUBMIT

**Information for Offerors to Submit – General:** You shall submit a signed Cover Page and Page Two. Your offer should include all other information and documents requested in this part and in parts II.B. Special Instructions; III. Scope of Work; V. Qualifications; VIII. Bidding Schedule/Price Proposal; and any appropriate attachments addressed in Part IX. Attachments to Solicitations. You should submit a summary of all insurance policies you have or plan to acquire to comply with the insurance requirements stated herein, if any, including policy types; coverage types; limits, sub-limits, and deductibles for each policy and coverage type; the carrier's A.M. Best rating; and whether the policy is written on an occurrence or claims-made basis.

#### V. QUALIFICATIONS

**Qualifications of Offeror:** (1) To be eligible for award, you must have the capability in all respects to perform fully the contract requirements and the integrity and reliability which will assure good faith performance. We may also consider a documented commitment from a satisfactory source that will provide you with a capability. We may consider information from any source at any time prior to award. We may elect to consider (i) key personnel, any predecessor business, and any key personnel of any predecessor business, including any facts arising prior to the date a business was established, and/or (ii) any subcontractor you identify. (2) You must promptly furnish satisfactory evidence of responsibility upon request. Unreasonable failure to supply requested information is grounds for rejection. (3) **Corporate subsidiaries are cautioned that the financial capability of an affiliated or parent company will not be considered in determining financial capability;** however, we may elect to consider any security, e.g. letter of credit, performance bond, parent-company corporate guaranty, that you offer to provide. Instructions and forms to help assure acceptability are posted on [procurement.sc.gov](http://procurement.sc.gov), link to "Standard Clauses & Provisions."

**Subcontractor – Identification:** If you intend to subcontract, at any tier level, with another business for any portion of the work and that portion either (1) exceeds 10% of your cost, (2) involves access to any "district information," as defined in the clause entitled "Information Security - Definitions," if included, or (3) otherwise involves services critical to your performance of the work (err on the side of inclusion), your offer must identify that business and the work which they are to perform. Identify potential subcontractors by providing the business name, address, phone, taxpayer identification number, and point of contact. In determining your responsibility, the district may contact and evaluate your proposed subcontractors.

#### VI. AWARD CRITERIA

**Award Criteria – Bids:** Award will be made to the lowest responsible and responsive bidder(s).

**Award To One Offeror:** Award will be made to one Offeror.

**Unit Price Governs:** In determining award, unit prices will govern over extended prices unless otherwise stated.

#### VII. TERMS AND CONDITIONS – A. GENERAL

**Assignment, Novation, And Change Of Name, Identity, Or Structure:**

(a) Contractor shall not assign this contract, or its rights, obligations, or any other interest arising from this contract, or delegate any of its performance obligations, without the express written consent of the responsible procurement officer. The foregoing restriction does not apply to a transfer that occurs by operation of law (e.g., bankruptcy; corporate reorganizations and



consolidations, but not including partial asset sales). Notwithstanding the foregoing, contractor may assign monies receivable under the contract provided that the district shall have no obligation to make payment to an assignee until thirty days after contractor (not the assignee) has provided the responsible procurement officer with (i) proof of the assignment, (ii) the identity (by contract number) of the specific district contract to which the assignment applies, and (iii) the name of the assignee and the exact address or account information to which assigned payments should be made. (b) If contractor amends, modifies, or otherwise changes its name, its identity (including its trade name), or its corporate, partnership or other structure, or its FEIN, contractor shall provide the procurement officer prompt written notice of such change. (c) Any name change, transfer, assignment, or novation is subject to the conditions and approval required by Regulation 19-445.2180, which does not restrict transfers by operation of law.

**Bankruptcy - General:** (a) Notice. In the event the Contractor enters into proceedings relating to bankruptcy, whether voluntary or involuntary, the Contractor agrees to furnish written notification of the bankruptcy to the District. This notification shall be furnished within two (2) days of the initiation of the proceedings relating to the bankruptcy filing. This notification shall include the date on which the bankruptcy petition was filed, the identity of the court in which the bankruptcy petition was filed, and a listing of all District contracts against which final payment has not been made. This obligation remains in effect until final payment under this Contract. (b) Termination. This contract is voidable and subject to immediate termination by the District upon the contractor's insolvency, including the filing of proceedings in bankruptcy.

**Choice-of-Law:** The agreement, any dispute, claim, or controversy relating to the agreement, and all the rights and obligations of the parties shall, in all respects, be interpreted, construed, enforced and governed by and under the laws of the State of South Carolina, except its choice of law rules. As used in this paragraph, the term "Agreement" means any transaction or agreement arising out of, relating to, or contemplated by the solicitation.

**Contract Documents & Order Of Precedence:** (a) Any contract resulting from this solicitation shall consist of the following documents: (1) a Record of Negotiations, if any, executed by you and the Procurement Officer, (2) the solicitation, as amended, (3) documentation of clarifications [11-35-1520(8)] or discussions [11-35-1530(6)] of an offer, if applicable, (4) your offer, (5) any statement reflecting the District's final acceptance (a/k/a "award"), and (6) purchase orders. These documents shall be read to be consistent and complementary. Any conflict among these documents shall be resolved by giving priority to these documents in the order listed above. (b) The terms and conditions of documents (1) through (5) above shall apply notwithstanding any additional or different terms and conditions in any other document, including without limitation, (i) a purchase order or other instrument submitted by the District, (ii) any invoice or other document submitted by Contractor, or (iii) any privacy policy, terms of use, or end user agreement. Except as otherwise allowed herein, the terms and conditions of all such documents shall be void and of no effect. (c) No contract, license, or other agreement containing contractual terms and conditions will be signed by the District. Any document signed or otherwise agreed to by persons other than the Procurement Officer shall be void and of no effect.

**Discount for Prompt Payment:** (a) Discounts for prompt payment will not be considered in the evaluation of offers. However, any offered discount will form a part of the award, and will be taken if payment is made within the discount period indicated in the offer by the offeror. As an alternative to offering a discount for prompt payment in conjunction with the offer, offerors awarded contracts may include discounts for prompt payment on individual invoices. (b) In connection with any discount offered for prompt payment, time shall be computed from the date of the invoice. If the contractor has not placed a date on the invoice, the due date shall be calculated from the date the designated billing office receives a proper invoice, provided the district annotates such invoice with the date of receipt at the time of receipt. For the purpose of computing the discount earned, payment shall be considered to have been made on the date that appears on the payment check or, for an electronic funds transfer, the specified payment date. When the discount date falls on a Saturday, Sunday, or legal holiday when federal government offices are closed and government business is not expected to be conducted, payment may be made on the following business day.

**Disputes:** (1) Choice-of-Forum. All disputes, claims, or controversies relating to the Agreement shall be resolved exclusively by the appropriate Chief Procurement Officer in accordance with Title 11, Chapter 35, Article 17 of the South Carolina Code of Laws, or in the absence of jurisdiction, only in the Court of Common Pleas for, or a federal court located in the State of

South Carolina. Contractor agrees that any act by the district regarding the Agreement is not a waiver of either the government's sovereign immunity or the government's immunity under the Eleventh Amendment of the United States Constitution. As used in this paragraph, the term "Agreement" means any transaction or agreement arising out of, relating to, or contemplated by the solicitation. (2) Service of Process. Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any disputes, claims, or controversies relating to the Agreement; for any court action in connection therewith; or for the entry of judgment on any award made, may be served on Contractor by certified mail (return receipt requested) addressed to Contractor at the address provided as the Notice Address on Page Two or by personal service or by any other manner that is permitted by law, in or outside South Carolina. Notice by certified mail is deemed duly given upon deposit in the United States mail.

**Equal Opportunity:** Contractor is referred to and shall comply with all applicable provisions, if any, of Title 41, Part 60 of the Code of Federal Regulations, including but not limited to Sections 60-1.4, 60-4.2, 60-4.3, 60-250.5(a), and 60-741.5(a), which are hereby incorporated by reference.

**False Claims:** According to the S.C. Code of Laws § 16-13-240, "a person who by false pretense or representation obtains the signature of a person to a written instrument or obtains from another person any chattel, money, valuable security, or other property, real or personal, with intent to cheat and defraud a person of that property is guilty" of a crime.

**Fixed Pricing Required:** Any pricing provided by contractor shall include all costs for performing the work associated with that price. Except as otherwise provided in this solicitation, contractor's price shall be fixed for the duration of this contract, including option terms. This clause does not prohibit contractor from offering lower pricing after award.

- Price(s) shall include overhead, profit, insurance, rental equipment, power tools, travel, fuel, fuel surcharges, delivery, set-up charges, taxes, etc. The district shall not honor any hidden charges.

**No Indemnity Or Defense:** Any term or condition is void to the extent it requires the District to indemnify, defend, or pay attorney's fees to anyone for any reason.

**Notice:** (a) After award, any notices shall be in writing and shall be deemed duly given (1) upon actual delivery, if delivery is by hand, (2) upon receipt by the transmitting party of automated confirmation or answer back from the recipient's device if delivery is by telex, telegram, facsimile, or electronic mail, or (3) upon deposit into the United States mail, if postage is prepaid, a return receipt is requested, and either registered or certified mail is used. (b) Notice to contractor shall be to the address identified as the notice address on page two. Notice to the district shall be to the Procurement Office address on the cover page. Either party may designate a different address for notice by giving notice in accordance with this paragraph.

**Open Trade:** During the contract term, including any renewals or extensions, Contractor will not engage in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300.

**Organizational Conflict Of Interest:**

- (a) The Contractor agrees to immediately advise the Procurement Officer if an actual or potential organizational conflict of interest is discovered after award, and to make a full written disclosure promptly thereafter to the Procurement Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consultation with the Procurement Officer, to avoid, mitigate, or neutralize the actual or potential conflict.
- (b) The District may terminate this contract for convenience, in whole or in part, if it deems such termination necessary to avoid an organizational conflict of interest. Contractor's failure to include an appropriate termination for convenience clause in any subcontract shall not increase the obligation of the District beyond what it would have been if the subcontract had contained such a clause.
- (c) The disclosure required by paragraph (a) of this provision is a material obligation of the contract. If the Contractor knew or should have known of an organizational conflict of interest prior to award, or discovers an actual or potential conflict after award, and does not disclose, or misrepresents, relevant information to the Procurement Officer, the District may terminate the contract for default.

**Payment & Interest:** (a) The District shall pay the Contractor, after the submission of proper invoices or vouchers, the prices stipulated in this contract for supplies delivered and accepted or services rendered and accepted, less any deductions provided in this contract. Unless otherwise specified herein, including the purchase order, payment shall not be made on partial deliveries accepted by the District. (b) Notwithstanding any other provision, payment shall be made in accordance with S.C. Code Section 11-35-45, or Chapter 6 of Title 29 (real property improvements) when applicable, which provides the Contractor's exclusive means of recovering any type of interest from the Owner. Contractor waives imposition of an interest penalty unless the invoice submitted specifies that the late penalty is applicable. Except as set forth in this paragraph, the District shall not be liable for the payment of interest on any debt or claim arising out of or related to this contract for any reason. (c) Amounts due to the District shall bear interest at the rate of interest established by the South Carolina Comptroller General pursuant to Section 11-35-45 ("an amount not to exceed fifteen percent each year"), as amended, unless otherwise required by Section 29-6-30. (d) Any other basis for interest, including but not limited to general (pre- and post-judgment) or specific interest statutes, including S.C. Code Ann. Section 34-31-20, are expressly waived by both parties. If a court, despite this agreement and waiver, requires that interest be paid on any debt by either party other than as provided by items (b) and (c) above, the parties further agree that the applicable interest rate for any given calendar year shall be the lowest prime rate as listed in the first edition of the Wall Street Journal published for each year, applied as simple interest without compounding. (e) The District shall have all of its common law, equitable and statutory rights of set-off.

- All invoices for payment of purchases of goods or services shall be delivered to: Lancaster County School District, Attn: Accounts Payable, 300 S. Catawba St., Lancaster, SC 29720.
- All payment for purchases of goods and services shall be paid by the district within thirty (30) days after the acceptance of the goods or services and proper invoice, whichever is received later.

**Publicity:** Contractor shall not publish any comments or quotes by district employees, or include the district in either news releases or a published list of customers, without the prior written approval of the Procurement Officer.

**Purchase Orders:** Contractor shall not perform any work prior to the receipt of a purchase order from the district. The district shall order any supplies or services to be furnished under this contract by issuing a purchase order. Purchase orders may be used to elect any options available under this contract, e.g., quantity, item, delivery date, payment method, but are subject to all terms and conditions of this contract. Purchase orders may be electronic. No particular form is required. An order placed pursuant to the purchasing card provision qualifies as a purchase order.

- Purchase order number must be clearly stated on each carton or package, shipping ticket, invoice and any/all other information related to the order.

**Survival of Obligations:** The parties' rights and obligations which, by their nature, would continue beyond the termination, cancellation, rejection, or expiration of this contract shall survive such termination, cancellation, rejection, or expiration, including, but not limited to, the rights and obligations created by the following clauses: Indemnification - Third Party Claims, Intellectual Property Indemnification, and any provisions regarding warranty or audit.

**Taxes:** Any tax the contractor may be required to collect or pay upon the sale, use or delivery of the products shall be paid by the District, and such sums shall be due and payable to the contractor upon acceptance. Any personal property taxes levied after delivery shall be paid by the District. It shall be solely the District's obligation, after payment to contractor, to challenge the applicability of any tax by negotiation with, or action against, the taxing authority. Contractor agrees to refund any tax collected, which is subsequently determined not to be proper and for which a refund has been paid to contractor by the taxing authority. In the event that the contractor fails to pay, or delays in paying, to any taxing authorities, sums paid by the District to contractor, contractor shall be liable to the District for any loss (such as the assessment of additional interest) caused by virtue of this failure or delay. Taxes based on Contractor's net income or assets shall be the sole responsibility of the contractor.

**Termination Due To Unavailability Of Funds:** Payment and performance obligations for succeeding fiscal periods shall be subject to the availability and appropriation of funds therefor. When funds are not appropriated or otherwise made available

to support continuation of performance in a subsequent fiscal period, the contract shall be canceled. In the event of a cancellation pursuant to this paragraph, contractor will be reimbursed the resulting unamortized, reasonably incurred, nonrecurring costs. Contractor will not be reimbursed any costs amortized beyond the initial contract term.

**Third Party Beneficiary:** This contract is made solely and specifically among and for the benefit of the parties hereto, and their respective successors and assigns, and no other person will have any rights, interest, or claims hereunder or be entitled to any benefits under or on account of this contract as a third party beneficiary or otherwise.

**Waiver:** The district does not waive any prior or subsequent breach of the terms of the contract by making payments on the contract, by failing to terminate the contract for lack of performance, or by failing to strictly or promptly insist upon any term of the contract. Only the Chief Procurement Officer has actual authority to waive any of the district's rights under this contract. Any waiver must be in writing.

## **VII. TERMS AND CONDITIONS – B. SPECIAL**

### **Changes:**

(1) Contract Modification. By a written order, at any time, and without notice to any surety, the Procurement Officer may, subject to all appropriate adjustments, make changes within the general scope of this contract in any one or more of the following:

- (a) drawings, designs, or specifications, if the supplies to be furnished are to be specially manufactured for the District in accordance therewith;
- (b) method of shipment or packing;
- (c) place of delivery;
- (d) description of services to be performed;
- (e) time of performance (i.e., hours of the day, days of the week, etc.); or,
- (f) place of performance of the services. Subparagraphs (a) to (c) apply only if supplies are furnished under this contract. Subparagraphs (d) to (f) apply only if services are performed under this contract.

(2) Adjustments of Price or Time for Performance. If any such change increases or decreases the contractor's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, an adjustment shall be made in the contract price, the delivery schedule, or both, and the contract modified in writing accordingly. Any adjustment in contract price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of this contract. Failure of the parties to agree to an adjustment shall not excuse the contractor from proceeding with the contract as changed, provided that the District promptly and duly make such provisional adjustments in payment or time for performance as may be reasonable. By proceeding with the work, the contractor shall not be deemed to have prejudiced any claim for additional compensation, or an extension of time for completion.

(3) Time Period for Claim. Within 30 days after receipt of a written contract modification under Paragraph (1) of this clause, unless such period is extended by the Procurement Officer in writing, the contractor shall file notice of intent to assert a claim for an adjustment. Later notification shall not bar the contractor's claim unless the District is prejudiced by the delay in notification.

(4) Claim Barred After Final Payment. No claim by the contractor for an adjustment hereunder shall be allowed if notice is not given prior to final payment under this contract.

**Compliance with Laws:** During the term of the contract, contractor shall comply with all applicable provisions of laws, codes, ordinances, rules, regulations, and tariffs.

**Contract Limitations:** No sales may be made pursuant to this contract for any item or service that is not expressly listed. No sales may be made pursuant to this contract after expiration of this contract. Violation of this provision may result in termination of this contract and may subject contractor to suspension or debarment.

**Contractor's Liability Insurance – General:**

(a) Without limiting any of the obligations or liabilities of Contractor, Contractor shall procure from a company or companies lawfully authorized to do business in South Carolina and with a current A.M. Best rating of no less than A: VII, and maintain for the duration of the contract, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work and the results of that work by the contractor, his agents, representatives, employees or subcontractors.

(b) Coverage shall be at least as broad as:

(1) Commercial General Liability (CGL): Insurance Services Office (ISO) Form CG 00 01 12 07 covering CGL on an "occurrence" basis, including products- completed operations, personal and advertising injury, with limits no less than \$1,000,000 per occurrence. If a general aggregate limit applies, the general aggregate limit shall be twice the required occurrence limit. This contract shall be considered to be an "insured contract" as defined in the policy.

(2) Auto Liability: ISO Form Number CA 00 01 covering any auto (Code 1), or if Contractor has no owned autos, hired, (Code 8) and non-owned autos (Code 9), with limits no less than \$1,000,000 per accident for bodily injury and property damage.

(3) Worker's Compensation: As required by the State of South Carolina, with Statutory Limits, and Employer's Liability Insurance with limit of no less than \$1,000,000 per accident for bodily injury or disease.

(c) The district, and the officers, officials, employees and volunteers of the district, must be covered as additional insureds on the CGL policy with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance at least as broad as ISO Form CG 20 10 11 85 or if not available, through the addition of both CG 20 10 and CG 20 37 if a later edition is used.

(d) For any claims related to this contract, the Contractor's insurance coverage shall be primary insurance as respects the District, and the officers, officials, employees and volunteers of any of them. Any insurance or self-insurance maintained by the District, or the officers, officials, employees and volunteers of any of them, shall be excess of the Contractor's insurance and shall not contribute with it.

(e) Prior to commencement of the work, the Contractor shall furnish the District with original certificates and amendatory endorsements or copies of the applicable policy language effecting coverage required by this section. All certificates are to be received and approved by the District before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. The District reserves the right to require complete, certified copies of all required insurance policies, including endorsements required by this section, at any time.

(f) Should any of the above described policies be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions. In addition, the Contractor shall notify the District immediately upon receiving any information that any of the coverages required by this section are or will be changed, cancelled, or replaced.

(g) Contractor hereby grants to the District a waiver of any right to subrogation which any insurer of said Contractor may acquire against the District by virtue of the payment of any loss under such insurance. Contractor agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation, but this provision applies regardless of whether or not the District has received a waiver of subrogation endorsement from the insurer.

(h) Any deductibles or self-insured retentions must be declared to and approved by the District. The District may require the Contractor to purchase coverage with a lower deductible or retention or provide proof of ability to pay losses and related investigations, claim administration, and defense expenses within the retention.

(i) The District reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

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

**Contractor's Obligation – General:** The contractor shall provide and pay for all materials, tools, equipment, labor and professional and non- professional services, and shall perform all other acts and supply all other things necessary, to fully and properly perform and complete the work. The contractor must act as the prime contractor and assume full responsibility

for any subcontractor's performance. The contractor will be considered the sole point of contact with regard to all situations, including payment of all charges and the meeting of all other requirements.

**Default:**

(a) (1) The District may, subject to paragraphs (c) and (d) of this clause, by written notice of default to the Contractor, terminate this contract in whole or in part if the Contractor fails to:

- (i) Deliver the supplies or to perform the services within the time specified in this contract or any extension;
- (ii) Make progress, so as to endanger performance of this contract (but see paragraph (a)(2) of this clause); or
- (iii) Perform any of the other material provisions of this contract (but see paragraph (a)(2) of this clause).

(2) The District's right to terminate this contract under subdivisions (a)(1)(ii) and (1)(iii) of this clause, may be exercised if the Contractor does not cure such failure within 10 days (or more if authorized in writing by the Procurement Officer) after receipt of the notice from the Procurement Officer specifying the failure.

(b) If the District terminates this contract in whole or in part, it may acquire, under the terms and in the manner the Procurement Officer considers appropriate, supplies or services similar to those terminated, and the Contractor will be liable to the District for any excess costs for those supplies or services. However, the Contractor shall continue the work not terminated.

(c) Except for defaults of subcontractors at any tier, the Contractor shall not be liable for any excess costs if the failure to perform the contract arises from causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (1) acts of God or of the public enemy, (2) acts of the State in either its sovereign or contractual capacity, (3) fires, (4) floods, (5) epidemics, (6) quarantine restrictions, (7) strikes, (8) freight embargoes, and (9) unusually severe weather. In each instance the failure to perform must be beyond the control and without the fault or negligence of the Contractor.

(d) If the failure to perform is caused by the default of a subcontractor at any tier, and if the cause of the default is beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either, the Contractor shall not be liable for any excess costs for failure to perform, unless the subcontracted supplies or services were obtainable from other sources in sufficient time for the Contractor to meet the required delivery schedule.

(e) If this contract is terminated for default, the District may require the Contractor to transfer title and deliver to the District, as directed by the Procurement Officer, any (1) completed supplies, and (2) partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (collectively referred to as "manufacturing materials" in this clause) that the Contractor has specifically produced or acquired for the terminated portion of this contract. Upon direction of the Procurement Officer, the Contractor shall also protect and preserve property in its possession in which the District has an interest.

(f) The District shall pay contract price for completed supplies delivered and accepted. The Contractor and Procurement Officer shall agree on the amount of payment for manufacturing materials delivered and accepted and for the protection and preservation of the property; if the parties fail to agree, the Procurement Officer shall set an amount subject to the Contractor's rights under the Disputes clause. Failure to agree will be a dispute under the Disputes clause. The District may withhold from these amounts any sum the Procurement Officer determines to be necessary to protect the District against loss because of outstanding liens or claims of former lien holders.

(g) If, after termination, it is determined that the Contractor was not in default, or that the default was excusable, the rights and obligations of the parties shall, if the contract contains a clause providing for termination for convenience of the District, be the same as if the termination had been issued for the convenience of the District. If, in the foregoing circumstances, this contract does not contain a clause providing for termination for convenience of the District, the contract shall be adjusted to compensate for such termination and the contract modified accordingly subject to the contractor's rights under the Disputes clause.

(h) The rights and remedies of the District in this clause are in addition to any other rights and remedies provided by law or under this contract.

**Disposal of Packaging:** Contractor shall dispose of all wrappings, crating, and other disposable materials pertaining to this contract at the end of each working day and upon completion of installation.

**Illegal Immigration:** By signing your offer, you certify that you will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agree to provide to the district upon request any documentation required to

establish either: (a) that Title 8, Chapter 14 is inapplicable to you and your subcontractors or sub-subcontractors; or (b) that you and your subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14. 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." You agree to include in any contracts with your subcontractors language requiring your subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14.

**Indemnification- Third Party Claims – General:** Notwithstanding any limitation in this agreement, and to the fullest extent permitted by law, Contractor shall defend and hold harmless Indemnitees for and against any and all suits or claims of any character (and all related damages, settlement payments, attorneys' fees, costs, expenses, losses or liabilities) by a third party which are attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property arising out of or in connection with the goods or services acquired hereunder or caused in whole or in part by any act or omission of contractor, its subcontractors, their employees, workmen, servants, agents, or anyone directly or indirectly employed by them or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by an Indemnitee, and whether or not such claims are made by a third party or an Indemnitee; however, if an Indemnitee's negligent act or omission is subsequently determined to be the sole proximate cause of a suit or claim, the Indemnitee shall not be entitled to indemnification hereunder. Contractor shall be given timely written notice of any suit or claim. Contractor's obligations hereunder are in no way limited by any protection afforded under workers' compensation acts, disability benefits acts, or other employee benefit acts. This clause shall not negate, abridge, or reduce any other rights or obligations of indemnity which would otherwise exist. The obligations of this paragraph shall survive termination, cancelation, or expiration of the parties' agreement. This provision shall be construed fairly and reasonably, neither strongly for nor against either party, and without regard to any clause regarding insurance. As used in this clause, "Indemnitees" means the Lancaster County School District, its instrumentalities, agencies, departments, boards, political subdivisions and all their respective officers, agents and employees.

**Licenses And Permits:** During the term of the contract, the Contractor shall be responsible for obtaining, and maintaining in good standing, all licenses (including professional licenses, if any), permits, inspections and related fees for each or any such licenses, permits and /or inspections required by the State, county, city or other government entity or unit to accomplish the work specified in this solicitation and the contract.

**Material and Workmanship:** Unless otherwise specifically provided in this contract, all equipment, material, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade for the purpose intended.

**Performance Bond & Labor and Material Bond Required:** Within ten (10) days after award, contractor shall provide a Performance Bond & Labor and Material Bond in the full amount of the contract sum, issued by a surety company licensed in South Carolina, with an "A" minimum rating of performance as stated in the most current publication of "best's key rating guide, property liability" which shall show a financial strength rating of at least five (5) times the contract amount. Each bond must be accompanied by a "power of attorney" authorizing the attorney-in-fact to bind the surety and certified to include the date of the performance bond.

**Price Adjustments:**

(1) Method of Adjustment. Any adjustment in the contract price made pursuant to a clause in this contract shall be consistent with this Contract and shall be arrived at through whichever one of the following ways is the most valid approximation of the actual cost to the Contractor (including profit, if otherwise allowed):

- (a) by agreement on a fixed price adjustment before commencement of the pertinent performance or as soon thereafter as practicable;
- (b) by unit prices specified in the Contract or subsequently agreed upon;
- (c) by the costs attributable to the event or situation covered by the relevant clause, including profit if otherwise allowed, all as specified in the Contract; or subsequently agreed upon;

(d) in such other manner as the parties may mutually agree; or,  
(e) in the absence of agreement by the parties, through a unilateral initial written determination by the Procurement Officer of the costs attributable to the event or situation covered by the clause, including profit if otherwise allowed, all as computed by the Procurement Officer in accordance with generally accepted accounting principles, subject to the provisions of Title 11, Chapter 35, Article 17 of the S.C. Code of Laws.

(2) Submission of Price or Cost Data. Upon request of the Procurement Officer, the contractor shall provide reasonably available factual information to substantiate that the price or cost offered, for any price adjustments is reasonable, consistent with the provisions of Section 11-35-1830.

**Pricing Data – Audit – Inspection:** (a) Cost or Pricing Data. Upon Procurement Officer's request, you shall submit cost or pricing data, as defined by 48 C.F.R. Section 2.101 (2004), prior to either (1) any award to contractor pursuant to 11-35-1530 or 11-35-1560, if the total contract price exceeds \$500,000, or (2) execution of a change order or contract modification with contractor which exceeds \$100,000. Your price, including profit or fee, shall be adjusted to exclude any significant sums by which the district finds that such price was increased because you furnished cost or pricing data that was inaccurate, incomplete, or not current as of the date agreed upon between parties. (b) Records Retention. You shall maintain your records for three years from the date of final payment, or longer if requested by the chief Procurement Officer. The district may audit your records at reasonable times and places. As used in this subparagraph (b), the term "records" means any books or records that relate to cost or pricing data submitted pursuant to this clause. In addition to the obligation stated in this subparagraph (b), you shall retain all records and allow any audits provided for by 11-35-2220(2). (c) Inspection. At reasonable times, the district may inspect any part of your place of business which is related to performance of the work. (d) Instructions Certification. When you submit data pursuant to subparagraph (a), you shall (1) do so in accordance with the instructions appearing in Table 15-2 of 48 C.F.R. Section 15.408 (2004) (adapted as necessary for the district context), and (2) submit a Certificate of Current Cost or Pricing Data, as prescribed by 48 CFR Section 15.406-2(a) (adapted as necessary for the district context). (e) Subcontracts. You shall include the above text of this clause in all of your subcontracts. (f) Nothing in this clause limits any other rights of the district.

**Relationship Of The Parties:** Neither party is an employee, agent, partner, or joint venturer of the other. Neither party has the right or ability to bind the other to any agreement with a third party or to incur any obligation or liability on behalf of the other party.

**Restrictions on Presenting Terms of Use or Offering Additional Services:**

(a) Citizens, as well as public employees (acting in their individual capacity), should not be unnecessarily required to agree to or provide consent to policies or contractual terms in order to access services acquired by the district pursuant to this contract (hereinafter "applicable services") or, in the case of public employees, to perform their job duties; accordingly, in performing the work, contractor shall not require or invite any citizen or public employee to agree to or provide consent to any end user contract, privacy policy, or other terms of use (hereinafter "terms of use") not previously approved in writing by the procurement officer. Contractor agrees that any terms of use regarding applicable services are void and of no effect.

(b) Unless expressly provided in the solicitation, public contracts are not intended to provide contractors an opportunity to market additional products and services; accordingly, in performing the work, contractor shall not – for itself or on behalf of any third party – offer citizens or public employees (other than the procurement officer) any additional products or services not required by the contract.

(c) Any reference to contractor in items (a) or (b) also includes any subcontractor at any tier. Contractor is responsible for compliance with these obligations by any person or entity that contractor authorizes to take any action related to the work.

(d) Any violation of this clause is a material breach of contract. The parties acknowledge the difficulties inherent in determining the damage from any breach of these restrictions. Contractor shall pay the district liquidated damages of \$1,000 for each contact with a citizen or end user that violates this restriction.

**Shipping/Risk of Loss:** F.O.B. Destination, Freight Prepaid. Destination is the District's designated receiving site, or other location, as specified on the purchase order.



**Storage Of Materials:** Absent approval of the district, Contractor shall not store items on the premises of the district prior to the time set for installation.

**Termination For Convenience:** (1) Termination. The Procurement Officer may terminate this contract in whole or in part, for the convenience of the District. The Procurement Officer shall give written notice of the termination to the contractor specifying the part of the contract terminated and when termination becomes effective.

(2) Contractor's Obligations. The contractor shall incur no further obligations in connection with the terminated work and on the date set in the notice of termination the contractor will stop work to the extent specified. The contractor shall also terminate outstanding orders and subcontracts as they relate to the terminated work. The contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders connected with the terminated work. The Procurement Officer may direct the contractor to assign the contractor's right, title, and interest under terminated orders or subcontracts to the District. The contractor must still complete the work not terminated by the notice of termination and may incur obligations as are necessary to do so.

(3) Right to Supplies. The Procurement Officer may require the contractor to transfer title and deliver to the District in the manner and to the extent directed by the Procurement Officer: (a) any completed supplies; and (b) such partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (hereinafter called "manufacturing material") as the contractor has specifically produced or specially acquired for the performance of the terminated part of this contract. The contractor shall, upon direction of the Procurement Officer, protect and preserve property in the possession of the contractor in which the District has an interest. If the Procurement Officer does not exercise this right, the contractor shall use best efforts to sell such supplies and manufacturing materials in accordance with the standards of Uniform Commercial Code Section 2-706. Utilization of this Section in no way implies that the District has breached the contract by exercise of the Termination for Convenience Clause.

(4) Compensation. (a) The contractor shall submit a termination claim specifying the amounts due because of the termination for convenience together with cost or pricing data required by Section 11-35-1830 bearing on such claim. If the contractor fails to file a termination claim within one year from the effective date of termination, the Procurement Officer may pay the contractor, if at all, an amount set in accordance with Subparagraph (c) of this Paragraph.

(b) The Procurement Officer and the contractor may agree to a settlement and that the settlement does not exceed the total contract price plus settlement costs reduced by payments previously made by the District, the proceeds of any sales of supplies and manufacturing materials under Paragraph (3) of this clause, and the contract price of the work not terminated;

(c) Absent complete agreement under Subparagraph (b) of this Paragraph, the Procurement Officer shall pay the contractor the following amounts, provided payments agreed to under Subparagraph (b) shall not duplicate payments under this Subparagraph:

(i) contract prices for supplies or services accepted under the contract;

(ii) costs reasonably incurred in performing the terminated portion of the work less amounts paid or to be paid for accepted supplies or services;

(iii) reasonable costs of settling and paying claims arising out of the termination of subcontracts or orders pursuant to Paragraph (2) of this clause. These costs must not include costs paid in accordance with Subparagraph (c)(ii) of this paragraph;

(iv) any other reasonable costs that have resulted from the termination. The total sum to be paid the contractor under this Subparagraph shall not exceed the total contract price plus the reasonable settlement costs of the contractor reduced by the amount of payments otherwise made, the proceeds of any sales of supplies and manufacturing materials under Subparagraph (b) of this Paragraph, and the contract price of work not terminated.

(d) Contractor must demonstrate any costs claimed, agreed to, or established under Subparagraphs (b) and (c) of this Paragraph using its standard record keeping system, provided such system is consistent with any applicable Generally Accepted Accounting Principles.

(5) Contractor's failure to include an appropriate termination for convenience clause in any subcontract shall not (i) affect the District's right to require the termination of a subcontract, or (ii) increase the obligation of the District beyond what it would have been if the subcontract had contained an appropriate clause.

**Warranty – Standard:** Contractor must provide the manufacturer's standard written warranty upon delivery of product. Contractor warrants that manufacturer will honor the standard written warranty provided.

**Description:**

Provide turn-key Greenhouse at Lancaster County Career Center, in accordance with the requirements, specifications, and drawings of this solicitation. All applicable federal and state taxes shall be included in the base bid amount.

**BASE BID: \$ \_\_\_\_\_ (figures)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ Dollars **(Written)**

**Prime Contractor Name and SC Contractor's License #:**

Name: \_\_\_\_\_ License #: \_\_\_\_\_

**List of all Subcontractors by specialty who are expected to perform work to the Prime Contractor:**

(1) All subcontractors' bids shall be included in the base bid amount. (2) A prime contractor whose bid is accepted may not substitute a person as subcontractor in place of a subcontractor listed in the original bid, except for showing a satisfactory reason to the District. Request for substitution must be made to the District in writing. (3) If the bidder determines to use his own employees to perform a portion of the work for which he would otherwise be required to list a subcontractor and if the bidder is qualified to perform that work under the terms of the invitation for bids, the bidder shall list himself in the appropriate place in the bid and not subcontract that work except with the approval of the District for good cause shown.

*If you use more than one subcontractor for any trade, please list each individually.*

\_\_\_\_\_ : \_\_\_\_\_ **Bid Amount: \$** \_\_\_\_\_  
Trade Subcontractor's Name – SC Contractor's License #

\_\_\_\_\_ : \_\_\_\_\_ **Bid Amount: \$** \_\_\_\_\_  
Trade Subcontractor's Name – SC Contractor's License #

\_\_\_\_\_ : \_\_\_\_\_ **Bid Amount: \$** \_\_\_\_\_  
Trade Subcontractor's Name – SC Contractor's License #

\_\_\_\_\_ : \_\_\_\_\_ **Bid Amount: \$** \_\_\_\_\_  
Trade Subcontractor's Name – SC Contractor's License #

## IX. ATTACHMENTS TO SOLICITATION

### OFFEROR'S CHECKLIST AVOID COMMON BID/PROPOSAL MISTAKES

*Review this checklist prior to submitting your bid/proposal. If you fail to follow this checklist, you risk having your bid/proposal rejected.*

- Do not include any of your standard contract forms!
- Unless expressly required, do not include any additional boilerplate contract clauses.
- Reread your entire bid/proposal to make sure your bid/proposal does not take exception to any of the district's mandatory requirements.
- Make sure you have properly marked all protected, confidential, or trade secret information in accordance with the instructions entitled: “**Disclosure of Your Bid/Proposal & Submitting Confidential Data**”. Do not mark your entire bid/proposal as confidential, trade secret, or protected! Do not include a legend on the cover stating that your entire response is not to be released!
- Make sure you have properly acknowledged all amendments. Instructions regarding how to acknowledge amendments are outlined in section entitled: “**Instructions to Offerors – A. General Instructions (Amendments to Solicitation)**”.
- Make sure your bid/proposal is signed by a person that is authorized to contractually bind your business.
- Make sure your bid/proposal includes the number of copies requested.
- Make sure you properly mark the outside of your envelope with the bid number, due date, and time.
- Check to ensure your bid/proposal includes everything requested!
  - ❑ Cover Page – completed and signed
  - ❑ Page Two - completed
  - ❑ Bid Schedule – completed (to include name of company in space provided)
  - ❑ Company Profile and Reference Form (if required)
  - ❑ Evidence of Liability Insurance
  - ❑ Bid Bond, Certified Check or Cashier's Check (if required)
  - ❑ Appropriate Number of Copies Requested
- If you have concerns about this solicitation, do not raise those concerns in your response! **After opening, it is too late! If this solicitation includes a prebid/proposal conference or a question & answer period, raise your questions as a part of that process!** Please see instructions under the heading “**Instructions to Offerors – A. General Instructions - Questions from Offerors**” and any provisions regarding prebid/proposal conferences.

This checklist is included only as a reminder to help offerors avoid common mistakes. Responsiveness will be evaluated against the solicitation, **not** against this checklist. You do **not** need to submit this checklist with your response.

**X. MINORITY AND WOMAN BUSINESS ENTERPRISE POLICY AND REQUIREMENTS:**

a) Statement of Policy:

It is a practice of the Lancaster County School District that discrimination against businesses on the basis of race, color, national origin, and gender is prohibited. No person shall be denied the benefit of, or otherwise discriminated against, on the grounds of race, color, national origin or gender in connection with the award and/or performance of any contract or modification of a contract between a vendor or contractor and the District which contract is paid or is to be paid for, in whole or part, with monetary appropriations of the District. Further, it is the practice of the District to encourage and promote, on an inclusionary basis, contracting opportunities for all business, without regard to race, color, national origin or gender. It is expected that all firms seeking to do business with the Lancaster County School District will comply with this policy.

b) Subcontractor Participation:

The Lancaster County School District, through its contract documents, encourages contractors to utilize minority subcontractors on their projects.

A prime contractor must identify M/WBE utilization expenditures to certified M/WBE subcontractors that perform a commercially useful function in the work of the contract. An M/WBE subcontractor is considered to perform a commercially useful function when it is responsible for the execution of a distinct element of the work of a contract for which the MBE or WBE has the skill and expertise and carries out its responsibilities by actually performing, managing and supervising the work involved.

c) Business Utilization Report:

In order to facilitate an effective monitoring system, each contractor, bidder or offeror must submit a completed and signed Utilization Report with the bid submission which lists the names, addresses and contact persons of the M/WBE and majority owned businesses, if any, to be used in the contract, the type of work each business will perform, the dollar value of the work and the scope of work. The Utilization Report submitted by the contractor shall be submitted as a part of the contract with the Lancaster County School District. If the information contained in the Contractor's Utilization Report changes by the time the contract is executed, the Contractor shall amend the Utilization Report and such amended Utilization Report shall be incorporated into the contract.

**Business Enterprise Utilization Report**

List all vendors/subcontractors to be used on this project. All MBE's or WBE's proposed for utilization on this project must be certified by the Small and Minority Business Assistance Office through the State of South Carolina according to the criteria of the Lancaster County School District's Minority Business Enterprise Plan.

In column 6 below, please specify ethnic/racial/gender group as follows:

- AABE – African-American Business Enterprise
- HBE – Hispanic Business Enterprise
- ABE – Asian-American Business Enterprise
- FBE – Female Business Enterprise
- MAJ – Majority Business Enterprise

Project Title	W/M Business Enterprise Name	Address	Contact Person(s)	Telephone #	Designation Code

**Statement of Intent**

We, the undersigned have prepared and submitted all the documents required for this project. We have prepared these documents with a full understanding of the Lancaster County School District's goal to ensure equal opportunities in the proposed work to be undertaken in performance of this project. Specifically the District seeks to encourage and promote on an inclusionary basis contracting opportunities without regard to the race, gender, national origin or ethnicity of the ownership or management of any business and that it is an equal opportunity employer and contracting entity. We certify that the representations contained in the Minority/Women Business Enterprise (M/WBE) Utilization Report, which we have submitted with this solicitation, are true and correct as of this date. We commit to undertake this contract with the Minority/Women Business utilization Report we have submitted, and to comply with all non-discrimination provisions of the Minority/Women Business Enterprise Program in the performance of this contract.

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

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

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

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

# PROJECT MANUAL



## LCSD CAREER CENTER GREENHOUSE

625 NORMANDY ROAD

LANCASTER, SC 29720

LS3P COMMISSION NUMBER: 2201-240266

### CONSTRUCTION DOCUMENTS

JULY 3, 2024

ARCHITECT


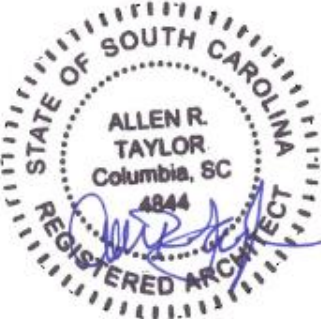




701 Lady Street #A  
Columbia, SC 29201

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DOCUMENT 000107 – PROJECT DIRECTORY AND SEALS PAGES

<p>ARCHITECT</p> <p>LS3P 803.765.2418</p>	<p>LS3P Corporate License #B74003 (SC)</p>	
<p>ARCHITECT</p> <p>LS3P 701-A Lady Street Columbia, SC 29201 803.765.2418 Ext. 4712</p>	<p>Allen R. Taylor License #4844</p>	 <p>03/15/2024</p>
<p>CIVIL ENGINEER</p> <p>Campco Engineering, Inc. 156 Oakland Ave #100 Rock Hill, SC 29730 803.327.7121</p>	<p>J. Michael Fry License #12879</p>	 <p>03/15/2024</p>
<p>STRUCTURAL ENGINEER</p> <p>Cranston Engineering Group 452 Ellis Street #1613 Augusta, GA 30901 706.722.1588</p>	<p>Jonathan Eric Pinto License #38682</p>	 <p>03/15/2024</p>

<p><b>PLUMBING ENGINEER</b></p> <p>MECA, Inc. 2330 Main Street Columbia, SC 29201 803.765-9421</p>	<p>Philip P. Claytor License #18709</p>	<p>PLUMBING SPECIFICATIONS ARE ON THE DRAWINGS.</p>
<p><b>MECHANICAL ENGINEER</b></p> <p>MECA, Inc. 2330 Main Street Columbia, SC 29201 803.765-9421</p>	<p>Philip P. Claytor License #18709</p>	<p>MECHANICAL SPECIFICATIONS ARE ON THE DRAWINGS.</p>
<p><b>ELECTRICAL ENGINEER</b></p> <p>GWA, Inc. 168 Laurelhurst Avenue Columbia, SC 29210 803.252-6919</p>	<p>S. Dickson O'Brien License #</p>	<p>ELECTRICAL SPECIFICATIONS ARE ON THE DRAWINGS.</p>



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## 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/Contractor-installed (OFCI) products.
4. Owner-furnished/Owner-installed (OFOI) products.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.

## 1.3 PROJECT INFORMATION

- A. Project Identification: LCSD Career Center Greenhouse; Project Number: 2201-240266.
  1. Project Location: 625 Normandy Road, Lancaster, SC 29720.
- B. Owner: Lancaster County School District | 300 South Catawba Street, Lancaster, SC 29720.
  1. Owner's Representative: Tim Bowers | [tim.bowers@lcsd.k12.sc.us](mailto:tim.bowers@lcsd.k12.sc.us).
- C. Architect: LS3P, 701-A Lady Street, Columbia, SC 29201; Phone: 803.765.2418.
  1. Architect's Representative: Allen Taylor, AIA | [allentaylor@ls3p.com](mailto:allentaylor@ls3p.com).
- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
  1. Structural Engineering: Cranston Engineering Group, P.C.
    - a. Structural Engineering Representative: Eric Pinto | [epinto@cranstonengineering.com](mailto:epinto@cranstonengineering.com)
- E. Other Owner Consultants: Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
  1. Mechanical, Electrical and Plumbing Engineering: MECA, Inc.:
    - a. Mechanical, Electrical and Plumbing Representative: Gene Wilson | [genewilson@mecainc.com](mailto:genewilson@mecainc.com).
  2. Civil Engineering : Campco Engineering, Inc..
    - a. Civil Engineering Representative: Michael Fry | [mfry@campcoengineering.com](mailto:mfry@campcoengineering.com).

- F. Project Information Management System: Project software will be used for purposes of managing communication and documents during the construction stage.
  - 1. See Section 013100 "Project Management and Coordination." for requirements for using Project Information Management System.

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
  - 1. Work required for this project includes a new single-story pre-engineered greenhouse building. Major construction systems include slab-on-grade floors, and a 30' x 72' x 8' high pre-engineered greenhouse building. Exterior doors and frames are aluminum. Interior finishes include sealed concrete floors, and exposed greenhouse structure. Site work and other Work indicated in the Contract Documents will be required.
- B. Type of Contract:
  - 1. Project will be constructed under a Single Prime Design Bid Build contract.

#### 1.5 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
  - 1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
  - 2. Provide for delivery of Owner-furnished products to Project site.
  - 3. Upon delivery, inspect, with Contractor present, delivered items.
    - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
  - 4. Obtain manufacturer's inspections, service, and warranties.
  - 5. Inform Contractor of earliest available delivery date for Owner-furnished products.
- B. Contractor's Responsibilities: The Work includes the following, as applicable:
  - 1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
  - 2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
  - 3. Receive, unload, handle, store, protect, and install Owner-furnished products.
  - 4. Make building services connections for Owner-furnished products.
  - 5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
  - 6. Repair or replace Owner-furnished products damaged following receipt.

#### 1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Each Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

- B. Limits on 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. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

## 1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
  2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
  2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

## 1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. 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.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on 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.
- B. Types of allowances include the following:
  - 1. Unit-cost allowances.

## 1.3 DEFINITIONS

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used 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.

## 1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner 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.

## 1.5 ACTION SUBMITTALS

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

## 1.6 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.

### 1.7 UNIT-COST 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 ordered by Owner or 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, required maintenance materials, 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 markups.
  - 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 due to a change in the 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.



END OF SECTION 012100



## SECTION 012500 - SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 016000 "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.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience (Not Allowed): Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

## 1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying 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 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 method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. Certificates and qualification data, where applicable or requested.
    - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
    - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.

- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
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:
    - 1) During Bid Phase: Addenda.
    - 2) During Construction: 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.

#### 1.5 PROCEDURES

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

#### 1.6 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. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.

- 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500



## 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. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

## 1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

## 1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with 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.
- 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. Owner's name.
    - c. Owner's Project number.
    - d. Name of Architect.
    - e. Architect's Project number.
    - f. Contractor's name and address.
    - g. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.

- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
  - 1) Labor.
  - 2) Materials.
  - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site.
6. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
7. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and Construction Manager and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. 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.
  1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- 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 for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.



- E. **Stored Materials:** Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. **Transmittal:** Submit three signed and notarized original copies of each Application for Payment to Architect Construction Manager 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.
- G. **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. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. **Waiver Forms:** Submit executed waivers of lien on forms acceptable to Owner.
- H. **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. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Sustainable design action plans, including preliminary project materials cost data.
  7. Schedule of unit prices.
  8. Submittal schedule (preliminary if not final).
  9. List of Contractor's staff assignments.
  10. List of Contractor's principal consultants.
  11. Copies of building permits.
  12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

13. Initial progress report.
  14. Report of preconstruction conference.
- I. Subsequent Application for Payment: After issuing the Initial Application for Payment, administrative actions and submittals that must precede or coincide with submittal of remaining Applications for Payment include the following:
1. Reports and other documents indicated in Division 01 Section "Construction Progress Documentation."
  2. Closeout Submittal List (preliminary, if not final).
- J. Retainage Reduction:
1. Owner shall pay the amount due to the Contractor on account of progress payments as indicated in the Agreement. After completion of a percentage of the Work, as agreed, the Contractor shall submit, for Owner's and Architect's review and approval a written request for retainage reduction. Upon Owner's approval, with written consent of the surety, the Architect may certify remaining partial payments to be paid in full.
  2. The Contractor, as a condition precedent to retainage reduction shall submit, for review and approval by the Architect, the required O&M manual.
- K. 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.
    - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. 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. Certification of completion of final punch list items.
  3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  4. Updated final statement, accounting for final changes to the Contract Sum.
  5. AIA Document G706.
  6. AIA Document G706A.
  7. AIA Document G707.
  8. Evidence that claims have been settled.
  9. 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.
  10. Final liquidated damages settlement statement.
  11. Proof that taxes, fees, and similar obligations are paid.
  12. Waivers and releases.

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. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Project Information Management System.
  - 5. Project meetings.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

## 1.2 DEFINITIONS

- A. RFI: Request for Information. 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, telephone number, and email address 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.
- B. Key Personnel Names: Prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Keep list current at all times.

## 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 assure proper performance of components, 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 the following requirements:
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 Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
  2. Review: Architect will review coordination drawings to verify that components requiring coordination have been included, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
  3. Coordination Drawing Format: Prepare coordination drawings according to requirements in Section 013300 "Submittal Procedures" for Shop Drawings and post to Project Information Management System.
- 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. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
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. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Review: Architect will review coordination drawings to verify that components requiring coordination have been included, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

#### 1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI via the Project Information Management System.
  1. Architect will not respond to those RFIs submitted to Architect by other entities controlled by Contractor.
  2. Coordinate and submit RFIs in a prompt manner 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. Specification Section number and title and related paragraphs, as appropriate.
  2. Drawing number and detail references, as appropriate.
  3. Field dimensions and conditions, as appropriate.

4. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  5. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five 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 Contractor-generated RFIs will not be reviewed:
    - 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 by Architect 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 Section 012600 "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.
- D. RFI Log: The Project Information Management System will create and maintain the RFI log.
- E. On receipt of Architect's action, immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

#### 1.7 WEB-BASED PROJECT INFORMATION MANAGEMENT SYSTEM

- A. The Architect has established a web-based Project Information Management System to facilitate communication and record-keeping during the project. Architect will provide access to Contractor's key personnel. Refer to [www.NewForma.com](http://www.NewForma.com).
1. Use Architect's web-based Project Information Management System for purposes of managing project communication and documentation until Final Completion.
  2. Due to the size restrictions on email communication, all electronic files must be submitted through the Project Information Management System. Architect assumes no responsibility for information not received or retrieved by Contractor's failure to use the Project Information Management System and such loss or delay of information will not be considered as a delay claim.
- B. The Project Information Management System shall include the following:
1. Project directory.
  2. Project correspondence.
  3. Meeting minutes.
  4. Contract modifications forms and logs.
  5. RFI forms and logs.



6. Submittal forms and logs.
7. Reminder and tracking functions.
8. Task and issue management.
9. Photo documentation.
10. Schedule and calendar management.
11. Payment application forms.
12. Drawing and specification document hosting, viewing, and updating.
13. Online document collaborations.
14. Archiving function.

- C. Contractor, subcontractors, and other parties granted access by Contractor to Project Information Management System shall execute a data licensing agreement in the Form of Agreement included in this Project Manual.

## 1.8 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 a minimum of 10 working days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record discussions and agreements achieved. Distribute the meeting minutes to attendees, 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, Architect and Contractor.

1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
  - a. Tentative construction schedule.
  - b. 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. Preparation of Record Documents.
  - k. Use of the premises.
  - l. Work restrictions.
  - m. Working hours.
  - n. Owner's occupancy requirements.
  - o. Responsibility for temporary facilities and controls.
  - p. Procedures for moisture and mold control.
  - q. Procedures for disruptions and shutdowns.
  - r. Construction waste management and recycling.

- s. Parking availability.
  - t. Office, work, and storage areas.
  - u. Equipment deliveries and priorities.
  - v. First aid.
  - w. Security.
  - x. Progress cleaning.
  - y. Bonds and insurance.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for 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. Review of mockups.
    - i. Possible conflicts and material compatibility problems.
    - j. Time schedules.
    - k. Weather limitations.
    - l. Manufacturer's written instructions.
    - m. Warranty requirements.
    - n. Acceptability of substrates.
    - o. Temporary facilities and controls.
    - p. Space and access limitations.
    - q. Regulations of authorities having jurisdiction.
    - r. Testing and inspecting requirements.
    - s. Installation procedures.
    - t. Coordination with other work.
    - u. Required performance results.
    - v. Protection of adjacent work.
    - w. Protection of construction and personnel.
  3. Record 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. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for completing sustainable design documentation.
    - f. Requirements for preparing operations and maintenance data.
    - g. Requirements for delivery of material samples, attic stock, and spare parts.
    - h. Requirements for demonstration and training.
    - i. Preparation of Contractor's punch list.
    - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - k. Submittal procedures.
    - l. Coordination of separate contracts.
    - m. Owner's partial occupancy requirements.
    - n. Installation of Owner's furniture, fixtures, and equipment.
    - o. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. 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) Resolution of BIM component conflicts.
  - 4) Status of submittals.
  - 5) Status of sustainable design documentation.
  - 6) Deliveries.
  - 7) Off-site fabrication.
  - 8) Access.
  - 9) Site use.
  - 10) Temporary facilities and controls.
  - 11) Progress cleaning.
  - 12) Quality and work standards.
  - 13) Status of correction of deficient items.
  - 14) Field observations.
  - 15) Status of RFIs.
  - 16) Status of Proposal Requests.
  - 17) Pending changes.
  - 18) Status of Change Orders.
  - 19) Pending claims and disputes.
  - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting 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.
- F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined 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.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.

- 3) Resolution of BIM component conflicts.
  - 4) Status of submittals.
  - 5) Deliveries.
  - 6) Off-site fabrication.
  - 7) Access.
  - 8) Site use.
  - 9) Temporary facilities and controls.
  - 10) Work hours.
  - 11) Hazards and risks.
  - 12) Progress cleaning.
  - 13) Quality and work standards.
  - 14) Status of RFIs.
  - 15) Proposal Requests.
  - 16) Change Orders.
  - 17) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100



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**SECTION 013300 - SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Submittal schedule requirements.
  2. Administrative and procedural requirements for submittals.

**1.2 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- 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. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

**1.3 SUBMITTAL SCHEDULE**

- A. Submittal Schedule: Submit, as an action submittal, a list 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 FORMATS**

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
  2. Date.
  3. Name of Architect.
  4. Name of Contractor.
  5. Name of firm or entity that prepared submittal.
  6. Names of subcontractor, manufacturer, and supplier.
  7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
  8. Category and type of submittal.
  9. Submittal purpose and description.
  10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
  11. Drawing number and detail references, as appropriate.
  12. Indication of full or partial submittal.
  13. Location(s) where product is to be installed, as appropriate.
  14. Other necessary identification.
  15. Remarks.

16. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

## 1.5 SUBMITTAL PROCEDURES

- A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings may be available from Architect for Contractor's use in preparing submittals.
  1. The digital data files are available under the following conditions:
    - a. Contractor shall execute a data licensing agreement in the form of Digital Data Letter of Agreement.
    - b. Digital data drawings are not to be considered Contract Documents as defined by the General Conditions for the Contract for Construction.
    - c. 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.
    - d. The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without the prior written consent of the Architect.
- 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- 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. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.



- E. 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.
- F. 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.

## 1.6 SUBMITTAL REQUIREMENTS

- A. 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 unsuitable 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 that show 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 Shop Drawings, and before or concurrently with Samples.
- B. 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.
  - 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. Paper 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.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Product name and name of manufacturer.
    - c. Number and title of applicable Specification Section.
  3. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
  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 one full set 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) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 2) 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.
- D. 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.
- E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

## F. Certificates:

1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
2. 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.
3. 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.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

## G. Test and Research Reports:

1. 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 substrate preparation and primers required.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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. Include the following information:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.

## 1.7 DELEGATED DESIGN SERVICES

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

## 1.8 CONTRACTOR'S REVIEW

- A. Action Submittals 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. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.
  - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

## 1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
  - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:
    - a. No Exceptions Taken: The work covered by the submittal may proceed.
    - b. Note Markings: The work covered by the submittal may proceed provided it complies with both the Architect's notations and corrections on the submittal and the Contract Documents.
    - c. Rejected: Do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the contract document.
- B. 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.

- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 inspection 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 quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

## 1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
  - 1. Mockups are used for one or more of the following:
    - a. Verify selections made under Sample submittals.
    - b. Demonstrate aesthetic effects.
    - c. Demonstrate the qualities of products and workmanship.
    - d. Demonstrate successful installation of interfaces between components and systems.
    - e. Perform preconstruction testing to determine system performance.
  - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance

with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

### 1.3 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Statement: Submit a statement 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

### 1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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.

## 1.5 INFORMATIONAL SUBMITTALS

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

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

#### 1.7 QUALITY ASSURANCE

- A. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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, applying, 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 product that is similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
  1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. **Testing and Inspecting Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
1. Provide test specimens representative of proposed products and construction.
  2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  3. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
  4. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
  4. Demonstrate the proposed range of aesthetic effects and workmanship.
  5. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  6. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  7. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  8. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  9. Demolish and remove mockups when directed unless otherwise indicated.

## 1.8 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 inspection 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.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor will 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 inspection 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 inspection 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. 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.
- D. 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 locations 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 duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  6. Security and protection for samples and for testing and inspection equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.9 SPECIAL TESTS AND INSPECTIONS

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

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

#### PART 3 - EXECUTION

##### 3.1 TEST AND INSPECTION LOG

- A. 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 and authorities' having jurisdiction reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

##### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 Section 017300 "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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- 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.
  - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- 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 are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
  1. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  2. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

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.

## 1.2 USE CHARGES

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

## 1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
  - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
  - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
  - 3. Indicate methods to be used to avoid trapping water in finished work.

#### 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.
- C. Accessible Temporary Egress: Comply with applicable provisions in the DOJ's "2017 ADA Standards for Accessible Design" and ICC A117.1.

#### 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:
  - 1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: 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 office clean and orderly. Furnish and equip offices as follows:
  - 1. Conference room of sufficient size to accommodate meetings of 20 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
  - 2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  - 3. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

#### 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- C. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

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

#### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service:
  1. Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash 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.
- E. Temporary Heating and Cooling: Provide temporary heating and cooling 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.
  1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Electric Power Service:

1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - a. Install electric power service underground unless otherwise indicated.
- G. 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.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
  1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
  2. Utilize designated area within existing building for temporary field offices.
  3. 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.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
  1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
  3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.

- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  3. Maintain and touch up signs, so they are legible at all times.
- I. Waste Disposal Facilities:
1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
  2. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- J. 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.
1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control:
1. Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
  2. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

- a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
  - b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  - c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  - d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection:
1. Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
  2. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- J. 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. Comply with additional limits on smoking specified in other Sections.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with 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. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  1. Protect porous materials from water damage.
  2. Protect stored and installed material from flowing or standing water.
  3. Keep porous and organic materials from coming into prolonged contact with concrete.
  4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.
  5. Do not install material that is wet.
  6. Discard and replace stored or installed material that begins to grow mold.
  7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

### 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. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. 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 Section 017700 "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.

## 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

### 1.3 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. Resolution of Compatibility Disputes between Multiple Contractors:

- a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
- b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
  - a. Name of product and manufacturer.
  - b. Model and serial number.
  - c. Capacity.
  - d. Speed.
  - e. Ratings.
3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

### 1.4 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

## 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 that products are undamaged and properly protected.
- C. Storage:
1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
  2. Store products to allow for inspection and measurement of quantity or counting of units.
  3. Store materials in a manner that will not endanger Project structure.
  4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
  5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  7. Protect stored products from damage and liquids from freezing.
  8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
  2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "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 meeting 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.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:
1. Sole 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.
    - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
  2. Sole 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.
    - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
  3. Limited List of Products: 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 not be considered unless otherwise indicated.

- a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
  4. Non-Limited List of Products: 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.
    - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
  5. Limited List of Manufacturers: 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 not be considered unless otherwise indicated.
    - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
  6. Non-Limited List of Manufacturers: 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.
    - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
    - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
  7. 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 may additionally 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.
    - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "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 Section 012500 "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 a 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 of Comparable Products: 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 the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  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.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
  2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

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. Coordination of Owner's portion of the Work.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
  - 8. Correction of the Work.

## 1.2 PREINSTALLATION MEETINGS

- A. Layout Conference: Conduct conference at Project site.
  - 1. Prior to establishing layout of new building perimeter, review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
    - a. Contractor's superintendent.
    - b. Professional surveyor responsible for performing Project surveying and layout.
  - 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
  - 3. Review requirements for including layouts on Shop Drawings and other submittals.
  - 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.

## 1.4 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

## 1.5 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. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 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, gas service piping, 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. 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, submit a request for information to Architect in accordance with requirements in Section 013100 "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 and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following 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. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. 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.
- E. 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. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. 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. 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.
  4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.
- 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 satisfactory results as judged by Architect. 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 of type expected for Project.
- 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: Select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.
  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, as judged by Architect. Fit exposed connections together to form hairline joints.

- J. Repair or remove and replace damaged, defective, or nonconforming Work.
  - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

### 3.6 PROGRESS CLEANING

- A. 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, in accordance with regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- 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 in accordance with 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: 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. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- 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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 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 Section 014000 "Quality Requirements."

### 3.8 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300



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**SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:
  - 1. Recycling nonhazardous demolition and construction waste.
  - 2. Disposing of nonhazardous demolition and construction waste.

**1.2 DEFINITIONS**

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

**1.3 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

**1.4 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

**PART 2 - PRODUCTS****2.1 PERFORMANCE REQUIREMENTS**

- A. Contractor is encouraged to recycle as much nonhazardous construction waste as practical, without incurring additional costs to the Owner.

**PART 3 - EXECUTION****3.1 PLAN IMPLEMENTATION**

- A. General: Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. 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 and recycled.
  - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

### 3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, 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.
- B. Burning: Do not burn waste materials.



END OF SECTION 017419



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## 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. Submittal of Project warranties.
  - 4. Final cleaning.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 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 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, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual 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.

5. Submit testing, adjusting, and balancing records.
  6. 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 Section 017900 "Demonstration and Training."
  6. Advise Owner of changeover in utility services.
  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.
  10. Touch up paint 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. 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.

## 1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 012900 "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 will 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.
- B. Inspection: Submit a written request for final inspection to determine acceptance 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 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.6 LIST OF INCOMPLETE ITEMS

- 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, listed by room or space number.
  2. Organize items applying to each space by major element, including categories for ceilings, 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 file.
    - b. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

#### 1.7 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, 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 Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit by uploading to web-based project software site.
- D. Warranties in Paper Form:
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.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: 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 site of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - f. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - g. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
    - h. Vacuum and mop concrete.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - o. Clean ducts, blowers, and coils.
      - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.

- p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
- q. Clean strainers.
- r. Leave Project clean and ready for occupancy.

### 3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

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 manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.

## 1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

## 1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved 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 operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit on digital media acceptable to Architect. Enable reviewer comments on draft submittals.
  - 2. Submit three paper copies of final manual.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final 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.

- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### 1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

#### 1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: 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.
- B. 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. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  - 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. 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.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. 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.

- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

#### 1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
  - 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
  - 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
  - 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

#### 1.7 EMERGENCY MANUALS

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

## 1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. 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 has 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.
- C. 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.
- D. 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.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

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

## 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. 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 warranties and bonds as described below.
- C. 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 and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins; 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.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - 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.
- E. 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.

- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
    - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
    - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
  - G. 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.
  - H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
  - I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
    - 1. Include procedures to follow and required notifications for warranty claims.
  - J. 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 maintenance manuals.
- 1.10 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
  - B. 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.
  - C. 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 and drawing or schedule designation or identifier where applicable.
  - D. 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.
  - E. 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.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823





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**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.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

**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 file prints.
      - 2) Print each drawing, whether or not changes and additional information were recorded.
    - c. Engineered Systems: For Manufacturer/Contractor engineered systems, i.e. fire protection systems, light gauge framing systems, panelized systems, etc., Contractor shall submit two sets of security protected record drawings as follows:
      - 1) One in \*.DWG or acceptable CAD format (write protected).
      - 2) One in \*.PDF format, with seals and signatures.

**1.3 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. Accurately record information in an acceptable drawing technique.

- c. Record data as soon as possible after obtaining it.
  - d. Record and check the markup before enclosing concealed installations.
  - e. Cross-reference record prints to corresponding photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Depths of foundations.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Construction Change Directive.
  - k. Changes made following Architect's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints 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.

#### 1.4 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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. Instruction 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.
- B. Qualification Data: For facilitator and instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

## 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 Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

## 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 instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

## 1.5 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. Systems and equipment operation manuals.
    - c. Systems and equipment maintenance manuals.
    - d. Product maintenance manuals.
    - e. Project Record Documents.
    - f. Identification systems.
    - g. Warranties and bonds.
    - h. 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.

## 1.6 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 Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

## 1.7 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.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900



## SECTION 024113 - SELECTIVE SITE DEMOLITION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section Includes the following:
1. Demolition and removal of structures.
  2. Demolition and removal of site improvements.
  3. Disconnecting, capping or sealing, and abandoning site utilities in place.
  4. Disconnecting, capping or sealing, and removing site utilities.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 01 Section "Cutting and Patching" for cutting and patching procedures for demolition operations.
  2. Division 01, Section "Construction Progress Documentation" for demolition schedule requirements.
  3. Division 01, Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures for demolition operations.
  4. Division 01, Section "Closeout Procedures" for record document requirements.
  5. Division 31, Section "Site Clearing" for site clearing and removing above- and below-grade improvements.
  6. Division 31, Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

#### 1.2 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed

to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

### 1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

### 1.4 SUBMITTALS

- A. Record drawings at Project closeout according to Division 01, Section "Closeout Procedures."
  - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

### 1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

### 1.6 PROJECT CONDITIONS

- A. Asbestos: It is not expected that asbestos will be encountered in the course of this Contract. If any materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and the Owner.
  - 1. Asbestos will be removed by Owner before start of Work.
- B. Storage or sale of removed items or materials on-site will not be permitted.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.

- B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

### 3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
  - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.
    - a. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.
- B. Owner will arrange for disconnecting and sealing indicated utilities serving structures to be demolished before start of demolition work, when requested by Contractor.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving structures to be demolished.
  - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
- D. Utility Requirements: Refer to Division 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

### 3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.
- B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.
  - 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
  - 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.

### 3.4 EXPLOSIVES

- A. Explosives: Use of explosives will not be permitted.

### 3.5 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
  - 1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

### 3.6 DEMOLITION

- A. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:
  - 1. Completely remove below-grade construction, including foundation walls and footings.
- B. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024113



## SECTION 033000 - CAST-IN-PLACE 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. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following.
  - 1. Portland cement.
  - 2. Fly ash.
  - 3. Slag cement.
  - 4. Blended hydraulic cement.
  - 5. Silica fume.
  - 6. Performance-based hydraulic cement
  - 7. Aggregates.
  - 8. Admixtures:
    - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
  - 9. Color pigments.
  - 10. Fiber reinforcement.
  - 11. Vapor retarders.

12. Floor and slab treatments.
13. Liquid floor treatments.
14. Curing materials.
  
15. Joint fillers.
16. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.

C. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

## 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
- 3.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.



7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:
  - a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

E. Preconstruction Test Reports: For each mix design.

F. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations:
- C. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- D. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- E. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

#### 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
1. Include the following information in each test report:
    - a. Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.
    - f. Permeability.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

#### 1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.
1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
  3. Do not use frozen materials or materials containing ice or snow.
  4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
  5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
  - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

#### 1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

#### 2.2 CONCRETE MATERIALS

- A. Source Limitations:
  - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
  - 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
  - 3. Obtain aggregate from single source.
  - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
  - 1. Portland Cement: ASTM C150/C150M, Type II gray.
  - 2. Fly Ash: ASTM C618, Class C or F.
  - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
  - 4. Silica Fume: ASTM C1240 amorphous silica.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Alkali-Silica Reaction: Comply with one of the following:

- a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
  - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
  - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).
2. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
  3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C260/C260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- F. Water and Water Used to Make Ice: ASTM C94/C94M, potable.
- 2.3 VAPOR RETARDERS
- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A not less than 10 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- 2.4 CURING MATERIALS
- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
    - a. Ambient Temperature Below 50 deg F (10 deg C): Black.

- b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
  - c. Ambient Temperature Above 85 deg F (29 deg C): White.
- D. Water: Potable or complying with ASTM C1602/C1602M.

## 2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240..
- C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

## 2.6 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested in accordance with ASTM C109/C109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

## 2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
  - 2. Slag Cement: 50 percent by mass.
  - 3. Silica Fume: 10 percent by mass.
  - 4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  - 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

## 2.8 CONCRETE MIXTURES

- A. Normal-weight concrete used for footings, grade beams, and tie beams.
  - 1. Exposure Class: ACI 318 (ACI 318M) F0 S0 C1.
  - 2. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
  - 3. Maximum w/cm: 0.45.
  - 4. Slump Limit: 4 inches (125 mm), plus or minus 1 inch.
  - 5. Air Content:
    - a. 3.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size
  - 6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- B. Normal-weight concrete used for interior slabs-on-ground.
  - 1. Exposure Class: ACI 318 (ACI 318M) F0 S0 C0.
  - 2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 3. Maximum w/cm: 0.45
  - 4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

5. Air Content:
  - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

##### A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

##### A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

#### 3.3 INSTALLATION OF VAPOR RETARDER

##### A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

- a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.

### 3.4 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
  1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.



1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.

6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

### 3.6 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish:
  1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
  2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with **ACI 117 (ACI A117M)** tolerances for conventional concrete.
  3. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish:
  1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
  2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
  3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  4. Do not add water to concrete surface.
  5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
  6. Apply a trowel finish to surfaces exposed to view.
  7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:
    - a. Slabs on Ground:
      - 1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm) in 2 feet (610 mm).
      - 2) Specified overall values of flatness,  $F_F$  25; and of levelness,  $F_L$  20; with minimum local values of flatness,  $F_F$  17; and of levelness,  $F_L$  15.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
  1. Coordinate required final finish with Architect before application.
  2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  - 2. Coordinate required final finish with Architect before application.
- F. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:
  - 1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
  - 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
  - 3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
  - 4. After final floating, apply a trowel finish.
  - 5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

### 3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
  - 1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
  - 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
  - 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

### 3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
  - 1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
  - 2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
  - 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1,) before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
  - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
  - 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
  - 3. If forms remain during curing period, moist cure after loosening forms.

4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

### 3.9 TOLERANCES

- A. Conform to ACI 117 (ACI 117M).

### 3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month(s).
  2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

### 3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
  1. Repair and patch defective areas when approved by Architect.
  2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.
    - a. Limit cut depth to 3/4 inch (19 mm).
    - b. Make edges of cuts perpendicular to concrete surface.
    - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    - d. Fill and compact with patching mortar before bonding agent has dried.
    - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
    - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
    - a. Correct low and high areas.
    - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  3. After concrete has cured at least 14 days, correct high areas by grinding.
  4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
    - a. Finish repaired areas to blend into adjacent concrete.
  5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
    - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    - b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.
    - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
    - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
    - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
    - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    - d. Place, compact, and finish to blend with adjacent finished concrete.
    - e. Cure in same manner as adjacent concrete.
  8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
    - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    - b. Dampen cleaned concrete surfaces and apply bonding agent.
    - c. Place patching mortar before bonding agent has dried.
    - d. Compact patching mortar and finish to match adjacent concrete.
    - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.
- 3.12 FIELD QUALITY CONTROL
- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
  - B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
    1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
    2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.

3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
  - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
    - 1) Project name.
    - 2) Name of testing agency.
    - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
    - 4) Name of concrete manufacturer.
    - 5) Date and time of inspection, sampling, and field testing.
    - 6) Date and time of concrete placement.
    - 7) Location in Work of concrete represented by samples.
    - 8) Date and time sample was obtained.
    - 9) Truck and batch ticket numbers.
    - 10) Design compressive strength at 28 days.
    - 11) Concrete mixture designation, proportions, and materials.
    - 12) Field test results.
    - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
    - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
  1. Verification of use of required design mixture.
  2. Concrete placement, including conveying and depositing.
  3. Curing procedures and maintenance of curing temperature.
  4. Verification of concrete strength before removal of shores and forms from beams and slabs.
  5. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
  1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
    - a. When frequency of testing provides 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 C143/C143M:

- a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
  - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast and laboratory cure one set of four 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
  - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
  - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
9. 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.
10. Additional Tests:
  - a. 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.



- b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
    - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
  - 11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  - 12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 48 hours of completion of floor finishing and promptly report test results to Architect. Flatness and levelness shall conform to the following:
- 1.  $SOF_F = 20$ ,  $SOF_L = 15$

### 3.13 PROTECTION

- A. Protect concrete surfaces as follows:
- 1. Protect from petroleum stains.
  - 2. Diaper hydraulic equipment used over concrete surfaces.
  - 3. Prohibit vehicles from interior concrete slabs.
  - 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
  - 5. Prohibit placement of steel items on concrete surfaces.
  - 6. Prohibit use of acids or acidic detergents over concrete surfaces.
  - 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000



## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes Cast-in-Place Concrete for Following Items:

1. Thrust blocks.
2. Manholes.
3. Fence post footing.

#### 1.2 SUBMITTALS

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

B. Design Data:

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

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of embedded utilities and components concealed from view in finished construction.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to ACI 301 and 318.
- B. Comply with ACI 305R when pouring concrete during hot weather.
- C. Comply with ACI 306.1 when pouring concrete during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Perform Work according to SCDOT standards.

## 1.5 AMBIENT CONDITIONS

- A. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Concrete:

##### 1. Cement:

- a. Comply with ASTM C150, Type I - Normal.
- b. Type: Portland.

##### 2. Normal Weight Aggregates:

- a. Comply with ASTM C33.
- b. Coarse Aggregate Maximum Size: 3/4 inches, according to ACI 318.

##### 3. Water:

- a. Comply with ACI 318.
- b. Potable.

#### B. Admixtures:

##### 1. Air Entrainment: Comply with ASTM C260.

##### 2. Chemical:

- a. Comply with ASTM C494.
- b. Type A - Water Reducing.

##### 3. Fly Ash or Calcined Pozzolan: Comply with ASTM C618, Class F or C.

##### 4. Silica Fume: Comply with ASTM C1240.

##### 5. Slag:

- a. Description: Ground-granulated blast-furnace slag.
- b. Comply with ASTM C989.
- c. Grade 100.

##### 6. Plasticizing:

- a. Comply with ASTM C1017.
- b. Type I plasticizing, II plasticizing and retarding.

#### C. Joint Devices and Filler:

##### 1. Joint Filler, Type A:

- a. Description: Asphalt-impregnated fiberboard or felt.
- b. Comply with ASTM D1751, D994.
- c. Thickness: 1/4 inch.
- d. Profile: Tongue-and-groove.

2. Sealant:

- a. Comply with ASTM D6690, Type I.

## 2.2 CONCRETE MIX

- A. Select proportions for normal weight concrete according to ACI 301, Method 1, 2, 3.
- B. Performance and Design Criteria:
  1. Compressive Strength: 3,000 psi or as noted on Drawings.
  2. Cement Type: ASTM C150.
  3. Aggregate Type: Normal weight.
  4. Maximum Water-Cement Ratio: 0.45 by weight
  5. Aggregate Size:
    - a. Maximum: 3/4 inch
  6. Air Content: 3 to 6 percent, plus or minus 1.5 percent.
  7. Admixture Type: Air - Entraining
  8. Maximum Fly Ash or Pozzolan Content: 50 percent of cementitious materials by weight.
  9. Maximum Slag Content: 50 percent of cementitious materials by weight.
  10. Slump: 3 inches, plus or minus 1 inch.
- C. Admixtures:
  1. Include admixture types and quantities indicated in concrete mix designs only if approved by Engineer.
  2. Cold Weather:
    - a. Use accelerating admixtures in cold weather.
    - b. Use of admixtures will not relax cold-weather placement requirements.
  3. Hot Weather: Use set-retarding admixtures.
  4. Do not use calcium chloride or admixtures containing calcium chloride.
  5. Add air entrainment admixture to concrete mix for Work exposed to freezing and thawing or deicing chemicals.
  6. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fumes, and slag content as required by applicable code.
- D. Average Compressive Strength Reduction: Not permitted.
- E. Ready-Mixed Concrete: Mix and deliver concrete according to ASTM C94, C685.
- F. Site-Mixed Concrete: Mix concrete according to ACI 318.

## 2.3 ACCESSORIES

### A. Bonding Agent:

1. Description: Polymer resin emulsion, Polyvinyl acetate, Latex emulsion, Two-component modified epoxy resin, Non-solvent two-component polysulfide epoxy, Mineral-filled polysulfide polymer epoxy, Mineral-filled polysulfide polymer epoxy resin, Polyamide-cured epoxy.

### B. Non-shrink Grout:

1. Description: Premixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing agents.
2. Comply with ASTM C1107.
3. Minimum Compressive Strength: 2,400 psi in 48 hours and 7,000 psi in 28 days.

### C. Concrete Reinforcing Fibers:

1. Description: High-strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete.
2. Comply with ASTM C1116.
3. Tensile Strength: 130 ksi.
4. Toughness: 15 ksi.
5. Fiber Length: 3/4 inch.
6. Fiber Count: 34 million per lb.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

### 3.2 PREPARATION

- A. Previously Placed Concrete:
  1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
  2. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doveled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

- D. Remove water from areas receiving concrete before concrete is placed.

### 3.3 INSTALLATION

#### A. Placing Concrete:

1. Place concrete according to ACI 301.
2. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
3. Ensure that reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.
4. Joint Filler:
  - a. Separate slabs on grade from vertical surfaces with 1/4-inch-thick joint filler.
  - b. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.
  - c. Finish Joint Sealer Requirements: As specified by manufacturer.
5. Deposit concrete at final position, preventing segregation of mix.
6. Place concrete in continuous operation for each panel or section as determined by predetermined joints.
7. Consolidate concrete.
8. Maintain records of concrete placement, including date, location, quantity, air temperature, and test samples taken.
9. Place concrete continuously between predetermined expansion, control, and construction joints.
10. Do not interrupt successive placement and do not permit cold joints to occur.
11. Saw-Cut Joints:
  - a. Saw-cut joints within 12 hours after placing.
  - b. Cut into 1/4 depth of slab thickness.

#### B. Curing and Protection:

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
2. Maintain concrete with minimal moisture loss at relatively constant temperature for period as necessary for hydration of cement and hardening of concrete.
3. Cure concrete according to ACI 308.1.

### 3.4 FIELD QUALITY CONTROL

- A. Perform inspection and testing according to ACI 318.
- B. Provide unrestricted access to Work and cooperate with appointed testing and inspection firm.

- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- D. Concrete Inspections:
  - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
  - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- E. Strength Test Samples:
  - 1. Sampling Procedures: Comply with ASTM C172.
  - 2. Cylinder Molding and Curing Procedures:
    - a. Comply with ASTM C31.
    - b. Cylinder Specimens: Standard Field cured.
  - 3. Sample concrete and make one set of three cylinders for every 75 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area for slabs and walls.
  - 4. If volume of concrete for a class of concrete would provide less than five sets of cylinders, take samples from five randomly selected batches, or from every batch if less than five batches are used.
  - 5. Make one additional cylinder during cold weather concreting and field cure.
- F. Field Testing:
  - 1. Slump Test Method: Comply with ASTM C143.
  - 2. Air Content Test Method: Comply with ASTM C173, C231.
  - 3. Temperature Test Method: Comply with ASTM C1064.
  - 4. Compressive Strength Concrete:
    - a. Measure slump and temperature for each sample.
    - b. Measure air content in air-entrained concrete for each sample.
- G. Cylinder Compressive Strength Testing:
  - 1. Test Method: Comply with ASTM C39.
  - 2. Test Acceptance: According to ACI 318.
  - 3. Test one cylinder at 7 days.
  - 4. Test one cylinder at 28 days.
  - 5. Retain one cylinder for testing when requested by Engineer.
  - 6. Dispose of remaining cylinders if testing is not required.
- H. Core Compressive Strength Testing:
  - 1. Sampling and Testing Procedures: Comply with ASTM C42.
  - 2. Test Acceptance: According to ACI 318.
  - 3. Drill three cores for each failed strength test from failed concrete.
- I. Water-Soluble Chloride Ion Concentration Test Method:



1. Comply with ASTM C1218.
2. Test at 28 days.
3. Maximum Chloride Ion Concentration: As permitted by applicable code.

J. Patching:

1. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
2. Honeycombing or Embedded Debris in Concrete:
  - a. Not acceptable.
  - b. Notify Engineer upon discovery.
3. Patch imperfections as directed by Engineer, according to ACI 301, according to ACI 318.

K. Defective Concrete:

1. Description: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.
2. Repair or replacement of defective concrete will be determined by Architect/Engineer.
3. Do not patch, fill, touch up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION 033000



## SECTION 133413 – PRE-ENGINEERED GREENHOUSE STRUCTURES

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Pre-engineered Greenhouse Structures.
2. Accessories.

## 1.2 REFERENCES

## A. American Welding Society (AWS): Structural Welding Code. B.

## B. ASTM International (ASTM):

1. ASTM A500 – Cold formed Welded and Seamless Carbon Steel Structural Tubing.
2. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

## C. Fenestration and Glazing Industry Alliance (FGIA):

1. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
2. AAMA 1503 - Voluntary Test Method For Thermal Transmittance And Condensation Resistance Of Windows, Doors, And Glazed Wall Sections.

## D. National Accreditation and Management Institute, Inc. (NAMI).

## E. National Greenhouse Manufacturer's Association (NGMA).

## 1.3 SUBMITTALS

## A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

## B. Product Data:

1. Manufacturer's data sheets on each product to be used.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Typical installation methods.

## C. Selection Samples: Two complete color chip sets representing manufacturer's full range of stocked colors with a standard size of 2 x 3 inches (50 x 75 mm).

## D. Shop Drawings: Detailed drawings prepared specifically for the project by manufacturer. Include information not fully detailed in manufacturer's standard product data, including, but not limited to wall elevations and detail sections of every typical composite member.

1. Show opening dimensions, framed opening tolerances, profiles, product components, anchorages, and accessories.
2. Include details of materials, construction, finish, fastener locations, glazing, hardware arrangements and relationship with adjacent construction.

3. Include schedule identifying each unit, with marks or numbers referencing Drawings.
4. Show surrounding substrates and relevant conditions.

E. Maintenance Manuals: Manufacturer's maintenance manuals.

F. Warranty: Manufacturer's warranty online registry.

#### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Review methods and procedures related to greenhouse building systems including, but not limited to, the following:
  - a. Condition of foundations and other preparatory work performed by other trades.
  - b. Structural load limitations.
  - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
  - d. Required tests, inspections, and certifications.
  - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

B. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

C. Delegated Design Submittals: For greenhouse building systems.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector.

B. Erector Certificates: For qualified erector, from manufacturer.

C. Material Test Reports: For each of the following products:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

D. Source quality-control reports.

E. Field quality-control reports.

F. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

- G. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For greenhouse to include in maintenance manuals.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations. Store products in manufacturer's original unopened packaging, covered to protect factory finishes from damage, precipitation, and construction dirt until ready for installation. Store materials off construction grounds in a secure location that is a dry.
- B. Unload, store, and erect panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store panels to ensure dryness, with positive slope for drainage of water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

## 1.8 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty against defects in materials and workmanship.
- B. Warranty Period for Pre-Engineered Greenhouse Structures: 10 year for cases of normal use.
  - 1. Warranty for Frame Finish:
    - a. Anodized Finishes: Provide a warranty of 5 years.
    - b. Stock Color AAMA 2605 Finishes: 2-3 coats powder or liquid dependent on color and/or application, provide paint manufacturer's warranty for color and film integrity for at least 15 years from date of application.
    - c. Custom Color AAMA 2605 Finishes: 2-3 coats powder or liquid dependent on color and/or application, provide paint manufacturer's warranty for color and film integrity for at least 15 years from date of application.
    - d. Stock Color AAMA 2604 Finishes: 2 coats powder or liquid, provide warranty for color and film integrity for 10 years from date of application.
    - e. Custom Color AAMA 2604 Finishes: 2 coats powder or liquid, provide paint manufacturer's warranty for cracking and pulling integrity for 10 years from date of application.
    - f. Custom AAMA 2603 Finishes: 1 coat liquid only, thermosetting acrylic resin finishes, provide warranty for cracking and pulling integrity for 5 years from date of application.
    - g. Stock Color AAMA 2603 Finishes: 1 coat liquid only, provide paint manufacturer's warranty for cracking and pulling integrity for at least 5 years from date of application.
  - 2. Warranty for Glazing: Provide glazing manufacturer's standard warranty against defective materials, delamination, seal failure, and defects in manufacturing for up to 20 years.
  - 3.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Air and Water Leakage Performance:

1. Design, fabricate, assemble, and erect the pre-engineered greenhouse system to be permanently free of significant air leakage.
  2. Significant leakage to be defined as a differential test pressure amounting to 20 percent of specified strength performance pressure required with operable windows doors, or joints, if any, sealed to prevent crack leakage.
  3. Significant Air Leakage: No more than 0.30 cfm per sq ft (91.4 L per min per sq m) projected area of module, determined by ASTM E283.
- B. Structural Performance: Structural performance as tested in accordance with ASTM A500; with no glazing breakage or permanent damage to fasteners, anchors, hardware, or actuating mechanisms.
1. Normal wall deflection not exceeding 1/175 of clear span for span lengths of 162 inches (4115 mm) or less and 1/240 plus 1/4 inch (6 mm) for others. Restrict deflection to 3/4 inch (19 mm) maximum for individual glazing lites.
  2. Parallel to wall deflection not exceeding 75 percent of glass edge clearance. Restrict deflection to L/360- or 1/8-inch (3 mm) maximum. Restrict deflection to 1/16-inch (1.6 mm) maximum above doors and/or windows. Increasing the deflection to 1/8 inch (3 mm) to be permitted if the door operation is not affected.
  3. Deflection of the entire assembly, including, but not limited to, glass, not to exceed 1- 1/2 inches (38 mm).

## 2.2 PRE-ENGINEERED GREENHOUSE STRUCTURES

### A. Pre-Engineered Greenhouse Structures:

1. Basis of Design: As scheduled and indicated on Shop Drawings by “The Greenhouse Company of South Carolina, LLC”, and as specified by the Jaderloon Instructor Greenhouse Specifications.
2. Dimensions: Dimensions: As scheduled and indicated on Shop Drawings by “The Greenhouse Company of South Carolina, LLC”.
  - a. Width: 30’.
  - b. Length: 72’.
  - c. Height: 8’.
  - d. Configuration: Double pitch / even span.
  - e. Framing:
    - 1) Columns: 2”x4” rectangular galvanized steel tube x 11ga (50,000psi yield / 55,000psi tensile).
    - 2) Upper and lower truss members: 2”x2” square galvanized steel tube x 12ga (50,000psi yield / 55,000psi tensile).
    - 3) Sidewall horizontals, roof purlins, and truss web members. 1.5”x 1.5” square galvanized steel tube x 16ga (45,000psi yield / 48,000psi tensile).
    - 4) Ridge Purlin: 2”x2” square galvanized steel tube x 15ga (50,000psi yield / 55,000psi tensile).
    - 5) Brace Cables: ¼” 7x19 galvanized steel.
    - 6) Endwall Framework: 2”x2” square galvanized steel tube x 12ga (50,000psi yield / 55,000psi tensile).
    - 7) Sidewall Framework: 1.5”x1.5” x 16ga square galvanized steel tube x 12ga (50,000psi yield / 55,000psi tensile).
    - 8)
  - f. Design Criteria:
    - 1) Column and truss spacing is 6’. Columns to be set in ground in concrete.
    - 2) Roof purlins are on 4’ spacing from peak to eave.
    - 3) Eave height is 8’.
    - 4) There are 2 sets of brace cables per column run.

- 5) All steel tubing meets ASTM A500 specifications for wall thickness.
  3. Covering:
    - a. Roof, Endwalls and Sidewalls:
      - 1) Twinwall 8mm clear polycarbonate with a minimum of a 10-year performance warranty against yellowing and loss of light transmission when properly maintained.
      - 2) Polycarbonate installed and trimmed with aluminum extrusions.
  4. Doors:
    - a. Two 3'-6" x 6'-8" ADA Insulated Steel Single hinged door with 22"x36" tempered glass window with lock and key. Lever hardware with automatic door closures with door touch bar, exit only.
- B. Greenhouse Operations Equipment:
1. Ventilation System:
    - a. System designed to produce a velocity of 400 cubic feet of air per second with approximately 1.3 air exchanges per minute.
    - b. Exhaust fans:
      - 1) Two 48" Exhaust fans with slope wall galvanized steel housings and aluminum shutters. Includes interior guards.
    - c. Vent and Shutters:
      - 1) One 4' x 23' Versa Vent Rack and Pinion vent system. Vent to be all aluminum frame powered by a Lock gear motor. Drive system to be rack and pinion type. Vent supports to be attached to the greenhouse frame and require no additional supports.
      - 2) One 4' x 23' Carolina Cooler evaporative cooling system.
      - 3) One 45" motorized inlet shutter with extruded aluminum frame with interlocking aluminum blades for maximum weather seal for gable ventilation.
  2. Heating System:
    - a. Heater:
      - 1) One Advanced Distributor Products natural gas unit heater with an output of 200,000 BTU with double wall vent pipe kit and heater hanger kit.
      - 2) Horizontal airflow fans (HAF)
        - a) Four Uni-Flo HAF fans to be 20" stamped aluminum 3 blade with vinyl coated guard and galvanized jack chains. Motor to be 1/15 HP, 9-amp, 100 watt, 115volt, 60 HZ. Totally enclosed permanent split capacitor developing 2000 CFM at 1400 RPM.
  3. Controller:
    - a. Thermostatic Logic Controller:
      - 1) Includes 5 cooling stages and 1 heating stage.
- C. Amenities:
1. Benches:
    - a. (2) 3' x 67' Stationary Sidewall Benches with galvanized expanded metal top and aluminum frame.

- b. (2) 6' x 63' Stationary Intermediate Benches with galvanized expanded metal top and aluminum frame.
    2. Irrigation System
      - a. Full Overhead Irrigation System included 8 zone controller, bench drip, mist, watering and baskets.
    3. Hanging Basket Rails:
      - a. (6) Runs of Hanging Basket Rails/Irrigation support x 72' long.
    4. Shade Cloth and Ground:
      - a. Black Knit Shade Cloth 50% with attachment kit.
    5. Safety Equipment
      - a. (2) Exit/Emergency light exit fixtures.
      - b. (1) Fire extinguisher.
      - c. (7) Ceiling mount keyless porcelain lights.
  - D. Engineering:
    1. Structural Engineer Sealed Plans – 3 sets of plans, 1 set of calculation.
- 2.3 Installation:
- A. Installation to be performed by an approved crew with a minimum of three years greenhouse construction experience.
  - B. The Greenhouse Company's Responsibilities:
    1. Provide all materials specified above.
    2. Install complete greenhouse frame.
    3. Install complete greenhouse cover on the roof, sides and ends.
    4. Assemble and install all interior equipment included in the quote.
    5. Dispose of all construction debris in Owner or General Contractor supplied dumpster.
    6. Provide all interior plumbing for quoted equipment (including cooling system, irrigation and two hose bibs).
    7. Provide all interior electrical wiring for quoted equipment (including panel box and two receptacles, interior lights and exit signs).
    8. Provide Certificate of insurance with applicable worker's compensation coverage.
  - C. Owner or General Contractor's Responsibilities:
    1. Provide all building, electrical and plumbing permits and licenses required.
    2. Provide all grading, drainage and site preparation.
    3. Provide concrete for columns and gravel flooring OR
    4. Provide and pour concrete slab with cutouts with gravel under the benches.
    5. Provide electrical service to the greenhouse and electrical connection to owner or contractor provided panel box.
    6. Provide water source and water connections to the interior of the greenhouse.
    7. Provide gas hookup to heater.
    8. Provide dumpster for waste disposal.
    9. Provide at least 3' of working space around the greenhouse.
    10. Receive and store all materials prior to installation crew arrival.
    11. Provide sanitary facilities for installation crew.
    12. Provide electrical service for construction within 100ft of greenhouse site.



## 2.4 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
  - a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION and PREPARATION

- A. Prepare substrates in strict accordance with the approved Shop Drawings, using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Thoroughly clean surfaces and substrates prior to installation.
- B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.
- C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
  - 1. Separate dissimilar materials using nonconductive tape, paint, or other material not visible in finished work.
  - 2. Provide attachments and shims to permanently fasten system to building structure.
  - 3. Maintain dimensional tolerances and alignment with adjacent work.
  - 4. Anchor securely in place, allowing for required movement, including but limited to expansion and contraction.
  - 5. Install glazing sealants in accordance with manufacturer's instructions, including but not limited to surface preparations.
  - 6. Set sill members in bed of sealant. Set other members with internal sealants to provide weather tight construction.
  - 7. Install flashings, bent metal closures, corners, gutters, and other accessories as detailed on Shop Drawings and required for complete installation.
  - 8. Clean surfaces and install sealant in accordance with sealant manufacturer's instructions and guidelines.

### 3.3 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

### 3.4 TESTING AND ADJUSTING

- A. Adjust hinge set, locksets, and other hardware for proper operation. Lubricate using a manufacturer approved lubricant compatible with frame coatings.
- B. Greenhouse installer to complete a water test to the AAMA 501.2 standard with AAMA standard equipment with Architect or general Contractor in presence.

### 3.5 TRAINING

- A. Greenhouse installer to provide one onsite day of training on operations and maintenance of the greenhouse structure in the presence of all requested parties.
- B. Greenhouse installer to coordinate onsite visit, commissioning, and training of greenhouse control system by greenhouse control system manufacturer.

### 3.6 CLEANING AND PROTECTION

- A. Clean and protect products in accordance with the manufacturer's recommendations.
  - 1. Remove temporary coverings and protection of adjacent work areas.
  - 2. Clean and dress sealant prior to installation completion.
  - 3. Clean glass prior to installation completion.
  - 4. Clean the entire enclosure one time at the completion of the installation. Cleaning to include surface cleaning of aluminum framing and glass and cleanup of construction debris.
- B. B. Touch-up, repair or replace damaged products before Substantial Completion.
  - 1. Areas with Abraded Surface Finish: Clean and touch-up with air dry paint, as approved and furnished by window manufacturer, color to match factory applied finish.
  - 2.

END OF SECTION 133419

## SECTION 310513 - SOILS FOR EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Subsoil materials.
  2. Topsoil materials.

#### 1.2 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations.
1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 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. Rock Excavation, Trench: Late-model, track-mounted hydraulic excavator; equivalent to Caterpillar Model N, 235D LC; measured according to SAE J-1179.

2. Rock Excavation, Mass: Late-model, track-mounted loader with a hydraulically operated power ripper; equivalent to Caterpillar Model No. D-8N, Heavy Duty; measured according to SAE J-732.
  3. This classification does not include materials such as loose rock, concrete, or other materials that can be removed by means other than drilling and blasting, but which for any reason, such as economic reasons, the Contractor chooses to remove by drilling and blasting.
- I. 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.
  - J. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
  - K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
  - L. 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 weeds, roots, and other deleterious materials.
  - M. Unsatisfactory Soils: Soils located below the design subgrade elevation and in excess of the topsoil striping, which are determined unsatisfactory by the geotechnical engineer.
  - N. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

### 1.3 QUALITY ASSURANCE

- A. Furnish each subsoil and topsoil material from single source throughout Work.
- B. Perform Work according to SCDHEC, SCDOT, and local municipality standards.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Subsoil:
  1. Satisfactory Soils:
    - a. Excavated and reused material, imported borrow, select or local borrow, structural.
    - b. Graded.

- c. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
- d. Plasticity index of 20 or less.
- e. Maximum dry density of at least 90 pounds per cubic feet when tested by the Standard Proctor Method (ASTM D698).
- f. Comply with ASTM D2487 Group Symbol GW, GP, ML, SW, SP, and SM.

B. Topsoil:

1. Satisfactory Soils:

- a. Excavated and reused material.
- b. Graded and single screened.
- c. Free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.
- d. Comply with ASTM D2487 Group Symbol OH, PT, SM, and ML.

2. Satisfactory Soils:

- a. Imported borrow.
- b. Friable loam.
- c. Reasonably free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.
- d. Single screened.
- e. pH: 5.5 to 7.5.
- f. Inorganic Material: Minimum 4 percent and maximum 25 percent.
- g. Comply with ASTM D2487 Group Symbol OH, PT, SM, and ML.

## 2.2 SOURCE QUALITY CONTROL

A. Testing and Analysis:

- 1. Subsoil Material: Comply with ASTM D698.
- 2. Topsoil Material: Comply with ASTM D698.
- 3. If tests indicate materials do not meet specified requirements, change material and retest.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Excavation:

- 1. Excavate subsoil and topsoil from designated areas.
- 2. Strip topsoil to full depth of topsoil in designated areas.
- 3. Remove excess excavated materials, subsoil, and topsoil not intended for reuse from Site.

4. Remove excavated materials not meeting requirements for subsoil and topsoil materials from Site.
- B. Stockpiling:
1. Stockpile excavated material meeting requirements for subsoil and topsoil materials.
  2. Stockpile materials on Site at locations as designated by Engineer.
  3. Stockpile in sufficient quantities to meet Project schedule and requirements.
  4. Separate differing materials with dividers or stockpile apart to prevent intermixing of soil types or contamination.
  5. Stockpile topsoil maximum 10 feet high.
  6. Direct surface water away from stockpile to prevent erosion or deterioration of materials.
  7. Stockpile hazardous materials on impervious material and cover to prevent erosion and leaching until they are disposed.

### 3.2 CLEANING

- A. Stockpile:
1. Remove stockpile and leave area in clean and neat condition.
  2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310513

## SECTION 310516 - AGGREGATES FOR EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Coarse aggregate materials.
  - 2. Fine aggregate materials.

#### 1.2 SUBMITTALS

- A. Product Data: Submit name of imported materials source.
- B. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout Work.
- B. Perform Work according to SCDOT and local municipality standards.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Coarse Aggregate:
  - 1. Comply with SCDOT standard.
  - 2. Gravel:
    - a. Description: Coarse stone, crushed, gravel.
    - b. Washed Stone: Pit run, angular crushed, natural.
    - c. Quality: Free of shale, clay, friable material, and debris.
    - d. Grading:
      - 1) Comply with ASTM C136/C136M and ASTM D2487; Group Symbol GW, GP, GM, and GC.
      - 2) Percent Passing According to Sieve Size:
        - a) 2 Inches: 100.
        - b) 1 Inch: 95.

- c) 3/4 Inch: 95 to 100.
- d) 5/8 Inches: 75 to 100.
- e) 3/8 Inches: 55 to 85.
- f) No. 4: 35 to 60.
- g) No. 16: 15 to 35.
- h) No. 40: 10 to 25.
- i) No. 200: 5 to 10.

3. Pea Gravel:

- a. Description: Pea Gravel.
- b. Stone: Natural and washed.
- c. Quality: Free of clay, shale, and organic matter.
- d. Grading:
  - 1) Comply with ASTM C136/C136M and ASTM D2487; Group Symbol GM and GC.
  - 2) Minimum Size: 1/4 inch.
  - 3) Maximum Size: 5/8 inch.

B. Fine Aggregate:

- 1. Comply with SCDOT standard.
- 2. Sand:
  - a. Description: Natural river or bank sand, washed.
  - b. Quality: Free of silt, clay, loam, friable or soluble materials, and organic matter.
  - c. Grading:
    - 1) Comply with ASTM C136/C136M and ASTM D2487; Group Symbol SW, SP, SM, and SC.
    - 2) Percent Passing According to Sieve Size:
      - a) No. 4: 100.
      - b) No. 14: 10 to 100.
      - c) No. 50: 5 to 90.
      - d) No. 100: 4 to 30.
      - e) No. 200: Zero.

2.2 SOURCE QUALITY CONTROL (COORDINATE W/2.2, 2.3, & 2.4)

A. Testing and Analysis:

- 1. Coarse-Aggregate Material: Comply with ASTM C136/C136M and ASTM D698.
- 2. Fine Aggregate Material - Testing and Analysis: Perform according to ASTM C136/C136M and ASTM D698.



3. If tests indicate materials do not meet specified requirements, change material and retest.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Excavation:

1. Excavate aggregate materials from Site locations as indicated and as specified in Section 312213 – Rough Grading, 312316 – Excavation, and 312316.13 – Trenching.
2. Remove excess excavated coarse-aggregate and fine-aggregate materials not intended for reuse from Site.
3. Remove excavated materials not meeting requirements for coarse aggregate and fine aggregate from Site.

#### B. Stockpiling:

1. Stockpile materials on Site at locations as designated by Engineer.
2. Stockpile excavated material meeting requirements for coarse-aggregate and fine-aggregate materials.
3. Stockpile in sufficient quantities to meet Project schedule and requirements.
4. Separate different aggregate materials with dividers or stockpile apart to prevent intermixing of aggregate types or contamination.
5. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
6. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching until they are disposed.

### 3.2 CLEANING

#### A. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310516



## SECTION 310519.13 - GEOTEXTILES FOR EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Turf reinforcement mats (TRMs).
  - 2. Nonwoven geotextile material.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer information including tensile strength, elongation, thickness, UV resistance, and other material specifications.
- B. Shop Drawings: Fabric layout, seam locations, and overlap details in installation drawings.
- C. Manufacturer's Certificate: Products meet or exceed specified requirements.
- D. Manufacturer Instructions: Installation requirements, including storage and handling procedures.
- E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
  - 1. Qualifications for manufacturer and installer.
  - 2. Manufacturer's approval of installer.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of geotextile material, including placement depth.

#### 1.4 QUALITY ASSURANCE

- A. Perform work according to governing agency standards.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM D4873.
- B. Store materials according to manufacturer instructions.
- C. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 TRM

- A. Manufacturers:
  - 1. Furnish materials according to governing agency standards, or as directed in plans.

2.2 NONWOVEN GEOTEXTILE MATERIALS

- A. Manufacturers:
  - 1. Furnish materials according to governing agency standards.

2.3 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.
- B. Certificate of Compliance:
  - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
  - 2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that underlying surface is smooth and free of ruts or protrusions that could damage geotextile material.

### 3.2 PREPARATION

- A. Subgrade Material and Compaction Requirements: As specified in Section 312316.13 – Trenching and 312323 – Fill.

### 3.3 INSTALLATION

A. Geotextile Material:

1. Lay and maintain smooth and free of tensile stresses, folds, wrinkles, or creases.
2. Ensure that material is in direct contact with subgrade.
3. Orientate with long dimension of each sheet parallel to direction of slope.
4. Minimum Unseamed Joints Overlap: 12 inches.

B. Securement Pins:

1. Insert through geotextile midway between edges of overlaps and minimum 2 inches from free edges.
2. Minimum Spacing:
  - a. Slopes Steeper than 3 Horizontal on 1 Vertical: 24 inches o.c.
  - b. Slopes 3 Horizontal on 1 Vertical to 4 Horizontal on 1 Vertical: 3 feet o.c.
  - c. Slopes Flatter than 4 Horizontal on 1 Vertical: 5 feet o.c.
3. Ensure that washer bears against geotextile.

C. Seams:

1. Minimum Seamed Joints Overlap: 18 inches at longitudinal and transverse joints.
2. Seams across Slope: Lap upper panel over lower panel.
3. Sewn Seams:
  - a. Continuously sew seams on slopes steeper than 1 vertical on 2 horizontal.
  - b. Stitch Type: As recommended by geotextile manufacturer.
  - c. Tie off thread at the end of each seam to prevent unraveling.
4. Thermal Seams:
  - a. As recommended by geotextile manufacturer.
  - b. Comply with ASTM D4886.

D. Penetrations: As indicated and recommended by geotextile manufacturer.

E. Repairing Damaged Geotextiles:

1. Repair torn or damaged geotextile by placing patch of same type of geotextile over damaged area minimum of 12 inches beyond edge of damaged area, and fasten as recommended by geotextile manufacturer.
2. Remove and replace geotextile rolls which cannot be repaired.

F. Fill and Cover:

1. Place fill to prevent tensile stress or wrinkles in geotextile.
2. Place fill from bottom of side-slopes upward.
3. Do not drop fill from height greater than 3 feet.

3.4 FIELD QUALITY CONTROL

- A. Testing: According to ASTM D4354.
- B. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

3.5 PROTECTION

- A. Ballast: Adequate to prevent uplift of material by wind.
- B. UV Exposure: Do not leave material uncovered for more than 14 days after installation.
- C. Do not use staples or pins to hold geotextiles in place where located adjacent to other geosynthetic layers that could be damaged.
- D. Do not operate equipment directly on top of geotextile.

END OF SECTION 310519.13

## SECTION 311000 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving, curbs, and concrete.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.

#### 1.2 QUALITY ASSURANCE

- A. Conform to applicable code for environmental requirements and disposal of debris.
- B. Perform Work according to SCDHEC standards.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become contractor's property and shall be removed from the site.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify existing plant life designated to remain is tagged or identified.
- B. Identify waste area for placing removed materials.

#### 3.2 PREPARATION

- A. Call local utility line information service at 811 not less than three (3) working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Protect and maintain benchmarks and survey control points from disturbance during construction.
- C. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Locate and clearly flag trees and vegetation to remain or to be relocated.
- E. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain from damage.
- B. Protect bench marks, survey control points, and existing structures from damage or displacement.

### 3.4 CLEARING

- A. Clear areas required for access to Site and execution of Work to minimum depth of 6 inches.
- B. Remove trees and shrubs within areas indicated on the plans. Remove stumps, main root ball, root system to depth of 18 inches, and surface rock.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Use only hand methods for grubbing within drip line of remaining trees.

### 3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from Site.
- B. Remove paving, curbs, and concrete, as indicated.
- C. Partially remove paving, curbs, and concrete as indicated. Neatly saw cut edges at right angle to surface.
- D. Remove abandoned utilities. Indicated removal termination point for underground utilities on record documents.
- E. Continuously clean-up and remove waste materials from Site. Do not allow materials to accumulate on Site.
- F. Do not burn or bury materials on Site. Leave Site in clean condition.

END OF SECTION 311000



## SECTION 312213 - ROUGH GRADING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Excavating topsoil.
2. Excavating subsoil.
3. Cutting, grading, filling, rough contouring, and compacting, Site for Site structures, building pads, parking areas, and drives.

#### 1.2 SUBMITTALS

A. Product data, if applicable.

1. Drainage fabric.
2. Geosynthetics.

B. Materials Source: Name of imported materials suppliers, if applicable.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Test Reports: Submit test reports indicating suitability of all materials proposed to be supplied from off-site.

#### 1.3 CLOSEOUT SUBMITTALS

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

#### 1.4 QUALITY ASSURANCE

A. Perform Work according to ASTM C136, ASTM D2419, and ASTM D2434.

B. Perform Work according to SCDOT standards, within road right-of-way.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

A. Topsoil: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.

- B. Subsoil Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.
- C. Structural Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify survey bench mark and intended elevations for Work are as indicated.

#### 3.2 PREPARATION

- A. Call local utility line information service at 811 not less than three (3) working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility owner to remove and/or relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

#### 3.3 TOPSOIL EXCAVATION

- A. Remove sod and grass before stripping topsoil.
- B. Excavate topsoil from entire Site without mixing with foreign materials for use in finish grading.
- C. Do not excavate wet topsoil.
- D. Stockpile in area designated on Site to depth not exceeding ten (10) feet and protect from erosion.
- E. Do not remove topsoil from Site.

### 3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from Site.
- E. Benching Slopes: Horizontally bench existing slopes greater than 4:1 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.

### 3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact according to schedule at end of this Section.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 percent slope for minimum distance of 10 feet, unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Repair or replace items indicated to remain damaged by excavation or filling.
- G. Install Work according to SCDOT standards, within road right-of-way.

### 3.6 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.7 APPROVAL OF SUBGRADE

- A. Notify Architect and Testing Agency when excavations have reached required subgrade.
- B. If Architect or Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Proof roll subgrade with heavy pneumatic-tired equipment with a minimum loaded weight of 25 tons to identify soft pockets and areas in excess yielding. Do not proof roll wet or saturated subgrades.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities and retest, as directed by Architect.

### 3.8 FIELD QUALITY CONTROL

- A. Perform laboratory material tests according to ASTM D698.
- B. Perform in place compaction tests according to following:
  1. Density Tests: ASTM D1556, ASTM D2167, and/or ASTM D2922, as applicable.
  2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: once per lift of backfill.

### 3.9 SCHEDULES

- A. Structural Fill (within limits of building pad):
  1. To subgrade elevation at 6" thick lifts.
  2. Compact uniformly to minimum 98 percent of maximum density.
- B. Structural Fill (outside limits of building pad):
  1. To subgrade elevation at 6" thick lifts.
  2. Compact uniformly to minimum 95 percent of maximum density.
- C. Subsoil Fill:
  1. To subgrade elevation at 8" thick lifts.
  2. Compact uniformly to minimum 95 percent of maximum density.
- D. Topsoil Fill:
  1. To finished grade at 6" thick.
  2. Compact uniformly to minimum 90 percent of maximum density.

END OF SECTION 312213

## SECTION 312316 - EXCAVATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for building foundations.
3. Excavating for paving, roads, and parking areas.
4. Excavating for slabs on grade.
5. Excavating for Site structures.
6. Excavating for landscaping.

#### 1.2 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to SCDOT standards, within road right-of-way.
- B. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of South Carolina.

### PART 2 - PRODUCTS

- 2.1 EXPLOSIVES: Remove identified and discovered rock during excavation with explosives per Section 312316.26 – Rock Removal.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

A. Utility Service Locator:

1. Call local utility service-line information at 811 not less than three (3) working days before performing Work.

2. Request that underground utilities be located and marked within and immediately surrounding Site.
  3. Identify required lines, levels, contours, and data.
- B. Existing Utilities:
1. Notify utility owner to remove and/or relocate utilities.
  2. Protect from damage utilities indicated to remain.
- B. Protect plant life, lawns, and other features designated to remain as portion of final landscaping.
- C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.2 SOIL DENSIFICATION BY VIBRO-COMPACTION

- A. Description:
1. Vibro-compact substrates below footing bearing surfaces for footings as indicated before excavating Site.
  2. Densify existing subsoils with relative density rating of "compact to dense" to attain relative density rating of "very dense."
  3. Densify subsoils to depth, as directed by a Geotechnical Engineer.
- B. Equipment:
1. Depth Vibrator: Poker type with follower tubes with visible marking every 12 inches to enable insertion depth measurement.
  2. Motion: radial in horizontal plane.
  3. Eccentric Force, as directed by a Geotechnical Engineer.
  4. Data Acquisition System: Record amps or pressure of vibrator motor over time and depth.
- C. Procedure:
1. Perform densification in presence of Geotechnical Engineer.
  2. Perform densification directly under each footing with vibrator inserted in grid pattern at maximum 6 feet o.c.
  3. Arrange compaction grid for each footing for maximum number of insertion points, and with outermost insertion points within bearing area of footings.
  4. Adjust compaction grid arrangement and spacing as directed by Geotechnical Engineer to achieve required densification.
  5. Insert vibrator to maximum specified depth, densify soils for 30 seconds or other time as directed by Geotechnical Engineer, and withdraw vibrator every 12 inches while repeating densification at each increment.
  6. If subsurface obstruction prevents vibrator insertion to specified depth, request instructions from Geotechnical Engineer to compensate for obstruction.

- D. Tolerances:
  - 1. Maximum Deviation from Center of Completed Compaction: 8 inches from indicated position.
  - 2. Maximum Deviation from Vertical: 4 degrees during vibrator insertion.

### 3.3 EXCAVATION

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, contractor shall replace with satisfactory soil materials at no additional cost to the Owner.
- B. Underpin adjacent structures which may be damaged by excavation Work.
- C. Excavate subsoil to accommodate building foundations, slabs on grade, paving, Site structures, and construction operations.
- D. Excavate to working elevation for piling Work.
- E. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity, as specified in Section 312323 – Fill, and Section 312316.13 – Trenching.
- F. Slope banks with machine to angle of repose or less until shored.
- G. Do not interfere with 45-degree bearing splay of foundations.
- H. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- I. Trim excavation and remove loose matter.
- J. Removal of Deleterious Materials:
  - 1. Remove lumped subsoil, boulders, and rock up to 1 cu. yd. measured by volume.
  - 2. Remove larger material as specified in Section 312323 – Fill.
- K. Notify Engineer of unexpected subsurface conditions.
- L. Correct over-excavated areas with structural fill Type as specified in Section 312323 – Fill.
- M. Remove excavated material from Site not intended for reuse.
- N. Repair or replace items indicated to remain that have been damaged by excavation.

### 3.4 EXCAVATION FOR STRUCTURES

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

### 3.5 EXCAVATION FOR WALKS AND PAVEMENTS

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

### 3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide a working 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 on each side of pipe or conduit, unless otherwise indicated.
- C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
  - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Engineer.
  - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.



3.8 FIELD QUALITY CONTROL

- A. Request visual inspection of bearing surfaces by Geotechnical Engineer and/or Engineer before installing subsequent Work.

3.9 PROTECTION

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

END OF SECTION 312316



## SECTION 312316.13 - TRENCHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5-ft outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

#### 1.2 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Product Data: Geotextile fabric indicating fabric and construction.
- C. Materials Source: Name of imported fill materials suppliers, if applicable.
- D. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to SCDOT standards within road right-of-way.
- B. Prepare excavation protection plan under direct supervision of professional engineer experienced in design of this Work and licensed in State of South Carolina.

#### 1.4 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.5 COORDINATION

- A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

## PART 2 - PRODUCTS

### 2.1 FILL MATERIALS

- A. Subsoil Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.
- B. Structural Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.
- C. Granular Fill: Aggregates as specified in Section 310516 – Aggregates for Earthwork.
- D. Concrete:
  - 1. Structural concrete as specified in Section 033000 – Cast-In-Place Concrete with compressive strength of 4,000 psi.

### 2.2 ACCESSORIES

- A. Geotextile Fabric: Non-biodegradable, non-woven.

## PART 3 - EXECUTION

### 3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated.
  - 1. Engineer may make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

### 3.2 PREPARATION

- A. Call local utility line information service at 811 not less than 3 working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

### 3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up of 1/6 cu yd, measured by volume. Remove larger material as specified in Section 312316 – Excavation.
- C. Perform excavation within 24 inches of existing utility service according to utility owners' requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- F. Excavate bottom of trenches maximum 24 inches wider than outside diameter of pipe.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.
- H. Do not interfere with 45-degree bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 24 inches above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this Section.
- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Geotechnical Engineer until suitable material is encountered.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Geotechnical Engineer.
- N. Remove excess subsoil not intended for reuse, from Site.

### 3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation Work.
- D. Repair damage caused by failure of sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

### 3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place geotextile fabric as directed by Geotechnical Engineer.
- D. Place fill material in continuous layers and compact according to schedule at end of this Section.
- E. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, and other site features.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Do not leave any trench open at end of working day.

### 3.6 TOLERANCES

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

### 3.7 FIELD QUALITY CONTROL

- A. Perform laboratory material tests according to ASTM D698.

- B. Perform in place compaction tests according to following:
  - 1. Density Tests: ASTM D1556, ASTM D2167, and/or ASTM D2922, as applicable.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- D. Frequency of Tests: Once per lift of backfill.

### 3.8 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

### 3.9 SCHEDULE

- A. Storm and Sanitary Piping:
  - 1. Cover pipe and bedding with structural fill: To subgrade elevation. 6" thick.
  - 2. Compact uniformly to minimum 95 percent of maximum density.
- B. Duct Bank:
  - 1. Cover duct and bedding with structural fill: To subgrade elevation. 6" thick.
  - 2. Compact uniformly to minimum 95 percent of maximum density.

END OF SECTION 312316.13





## SECTION 312316.26 - ROCK REMOVAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Removing identified and discovered rock during excavation.
2. Expansive tools and Explosives to assist rock removal.

#### 1.2 DEFINITIONS

- A. Site Rock: Solid mineral material with volume in excess of 1 cu yd or solid material that cannot be removed with 3/4 cu yd capacity excavator without drilling or blasting. Refer to Section 310513 – Soils for Earthwork for additional information.
- B. Trench Rock: Solid mineral material with volume in excess of 3/4 cu yd or solid material that cannot be removed with 3/4 cu yd capacity excavator without drilling or blasting. Refer to Section 310513 – Soils for Earthwork for additional information.

#### 1.3 SUBMITTALS

- A. Shop Drawings: Indicate proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock removal method.
- B. Survey Report: Conditions of buildings near locations of rock removal.

#### 1.4 QUALITY ASSURANCE

- A. Seismic Survey Firm: Licensed company specializing in seismic surveys with five years' experience.
- B. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years' experience.

#### 1.5 PROJECT CONDITIONS

- A. Conduct survey and document conditions of buildings near locations of rock removal, prior to blasting, and photograph existing conditions identifying existing irregularities.

- B. Advise owners of adjacent buildings or structures in writing, prior to executing seismographic survey. Explain planned blasting and seismic operations.
- C. Obtain seismic survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties or other Work.

## 1.6 SCHEDULING

- A. Schedule Work to avoid disruption to occupied buildings nearby.
- B. Conduct blasting operations between hours of 9:00 AM and 4:00 PM only.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
- B. Delay Device: Type recommended by explosives firm.
- C. Blast Mat Materials: Type recommended by explosives firm.
- D. Mechanical Disintegration Compound: Type recommended by explosives firm.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify Site conditions and note subsurface irregularities affecting Work of this section.

### 3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.

### 3.3 ROCK REMOVAL BY MECHANICAL METHOD

- A. Excavate and remove rock by mechanical method.
  - 1. Drill holes and use expansive tools, wedges and/or mechanical disintegration compound to fracture rock.
- B. Cut away rock at bottom of excavation to form level bearing.

- C. Remove shaled layers to provide sound and unshattered base for footings and foundations.
- D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- E. Remove excavated materials from Site.
- F. Correct unauthorized rock removal according to backfilling and compacting requirements of Section 312323 – Fill.

### 3.4 ROCK REMOVAL BY EXPLOSIVE METHODS

- A. When rock is uncovered requiring explosives method for rock disintegration, notify Engineer.
- B. Provide seismographic monitoring during progress of blasting operations.
- C. Drill blasting holes within 12 feet of finished slope.
- D. Disintegrate rock and remove from excavation.
- E. Remove rock at excavation bottom to form level bearing.
- F. Remove shaled layers to provide sound and unshattered base for footings and foundations.
- G. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- H. Remove excavated material from Site.
- I. Correct unauthorized rock removal according to backfilling and compacting requirements of Section 312323 – Fill.

### 3.5 FIELD QUALITY CONTROL

- A. Request visual inspection of foundation bearing surfaces by Geotechnical Engineer and/or Engineer before installing subsequent Work.

END OF SECTION 312316.26



## SECTION 312319 - DEWATERING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Surface water control system.
2. System operation and maintenance.
3. Water disposal.

#### 1.2 DEFINITIONS

A. Dewatering:

1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations, trenches, tunnels, and shafts.
2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations, trenches, tunnels, and shafts.
3. Disposing of removed water.

B. Piezometer: A tube inserted into a vessel or pipe to indicate the height (pressure) that a liquid can rise in the tube.

C. Pitometer: A measuring device that transforms a differential pressure into an electrical output current proportional to the flow rate.

D. Surface Water Control: The removal of surface water within open excavations.

#### 1.3 SUBMITTALS

A. Product Data:

1. Submit sizes, capacities, priming method, and motor characteristics for dewatering pumps.
2. Submit pumping equipment for control of surface water within excavation.

B. Shop Drawings:

1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
2. Indicate primary and standby power system location and capacity.

3. Indicate layout and depth of monitoring wells, piezometers, and flow measuring devices for system performance measurement.
  4. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.
  5. Include description of emergency procedures to follow when problems arise.
- C. Delegated Design Submittals:
1. Submit signed and sealed Shop Drawings.
  2. Indicate design values, analyses, assumptions, and calculations to support design.
  3. Include description and profile of geology, soil, and ground water conditions.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

#### 1.5 QUALITY ASSURANCE

- A. Comply with authorities having jurisdiction for following:
1. Drilling and abandoning of wells used for dewatering systems.
  2. Water discharge and disposal from pumping operations.
- B. Obtain permit from SCDHEC under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from Site.
- C. Perform Work according to SCDOT standards within road right-of-way.

### PART 2 - PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

- A. Furnish dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
- B. Provide monitoring wells and monitoring equipment to obtain meaningful observations of conditions affecting excavation, adjacent structures, and adjacent water wells.

- C. Furnish standby equipment stored at Project Site and ready for immediate use upon failure of dewatering equipment.

## 2.2 PERFORMANCE AND DESIGN CRITERIA

### A. Design:

1. Lower water table within areas of excavation to minimum 5 feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.
2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.
3. Prevent damage to adjacent properties, buildings, structures, utilities, and other facilities from construction operations.
4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
5. Maintain stability of sides and bottoms of excavations and trenches.
6. Surface Water Control System: Collect and remove surface water and seepage entering excavation.

## 2.3 DEWATERING EQUIPMENT

- A. Select dewatering equipment to meet specified performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Conduct additional borings and investigations to supplement subsurface investigations, as required to complete dewatering system design.
- B. Utility Service Locator:
  1. Call local utility service-line information at 811 not less than 3 working days before performing Work.
  2. Request that underground utilities be located and marked within and immediately surrounding Site.

### 3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, and improvements from damage that may be caused by dewatering operations.

### 3.3 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area.
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels, storm drains and/or settling basins in accordance with requirements of authorities having jurisdiction.
- C. Control and remove unanticipated water seepage into excavation.

### 3.4 SYSTEM OPERATION AND MAINTENANCE

- A. Operate dewatering system continuously until backfilling is complete.
- B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.
- C. If dewatering system cannot control water within excavation, notify Engineer and stop excavation work.
- D. Modify dewatering and surface water control systems if operation causes or threatens to cause damage to new construction, existing Site improvements, adjacent property, or adjacent water wells.
- E. Do not discontinue dewatering operations without approval of Engineer.

### 3.5 WATER DISPOSAL

- A. Discharge water into storm sewer system, drainage channels and or settling basins.

### 3.6 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Remove piezometers and monitoring wells.
- C. Fill abandoned wells with sand.
- D. Abandoned Wells:
  - 1. Cut off and cap abandoned wells minimum 36 inches below completed subgrade elevation.
  - 2. Fill abandoned piping with grout.



- E. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

### 3.7 FIELD QUALITY CONTROL

#### A. Testing:

- 1. After dewatering system is installed, perform pumping test to determine at what point selected pumping rate lowers water level in well below pump intake.
- 2. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

#### B. Monitoring and Recording:

##### 1. Daily:

- a. Note average discharge flow rate for each deep well, eductor header, well point, and ground water elevation.
- b. Continue monitoring daily until steady state conditions occur, then monitor and record conditions twice each week.

##### 2. Sand Content:

- a. Monitor ground water discharge for sand content.
- b. Sample and test water from each well bi-weekly for sand content.
- c. Maximum Permitted Sand Content: 5 ppm.

##### 3. Contaminates:

- a. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites.
- b. Sample and test water bi-weekly for contaminants.

##### 4. Existing Adjacent Buildings, Structures, and Improvements:

- a. Survey bi-weekly during dewatering to detect movement in comparison to original elevations.
- b. Notify Engineer immediately of measured movement.

END OF SECTION 312319



## SECTION 312323 - FILL

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling Site structures to subgrade elevations.
3. Fill under slabs on grade.
4. Fill under paving.
5. Fill for over-excavation.

#### 1.2 SUBMITTALS

- A. Product Data: Geotextile fabric indicating fabric and construction.
- B. Materials Source: Submit name of imported materials suppliers, if applicable.
- C. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to SCDOT standards within road right-of-way.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Subsoil Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.
- B. Structural Fill: Satisfactory soils as specified in Section 310513 – Soils for Earthwork.
- C. Granular Fill: Aggregates as specified in Section 310516 – Aggregates for Earthwork.
- D. Concrete:
1. Structural as specified in Section 033000 – Cast-In-Place Concrete with compressive strength of 4,000 psi.

## 2.2 ACCESSORIES

- A. Geotextile Fabric: As specified in Section 310519.13 – Geotextiles for Earthwork.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subdrainage, dampproofing, and waterproofing installations have been inspected.
- B. Verify that underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- C. Verify structural integrity of unsupported walls to support loads imposed by fill.

### 3.2 PREPARATION

- A. Compact subgrade to specified density requirements for subsequent backfill materials.
- B. Soft Subgrade:
  - 1. Cut out soft areas of subgrade not capable of compaction in place.
  - 2. Backfill with structural fill and compact to density equal to or greater than specified requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 6 inches.

### 3.3 BACKFILLING

- A. Backfill areas to contours and elevations.
- B. Systematically backfill to allow maximum time for natural settlement.
- C. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces, and do not backfill with frozen materials.
- D. Maximum Compacted Depths:
  - 1. Place material in continuous layers to following depths:
    - a. Subsoil Fill: 8 inches.
    - b. Structural Fill: 6 inches.
    - c. Granular Fill: 6 inches.
- E. Use placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, or other site features.

- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Structures:
  - 1. Backfill against supported foundation walls.
  - 2. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
  - 3. Slope grade away from building minimum 2 percent slope for minimum distance of 10 feet.
- H. Make gradual grade changes, and blend slope into level areas.
- I. Remove surplus backfill materials from Site.

### 3.4 TOLERANCES

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

### 3.5 FIELD QUALITY CONTROL

- A. Perform laboratory material tests according to ASTM D698.
- B. In-Place Compaction Testing:
  - 1. Density Tests: ASTM D1556/D1556M, ASTM D2167, and/or ASTM D6938, as applicable.
  - 2. Moisture Tests: ASTM D6031/6031M.
- C. If tests indicate that Work does not meet specified requirements, remove Work, replace, compact, and retest.
- D. Testing Frequency: Once per lift of backfill.
- E. Proof-roll compacted fill surfaces under slabs on grade and all paving areas. Refer to Section 3.7 of Rough Grading Specification (312213) for additional information.

### 3.6 PROTECTION

- A. Reshape and recompact fills subjected to vehicular traffic during construction.

END OF SECTION 312323



## SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Rock Energy Dissipator.
  - 2. Paved Energy Dissipator.
  - 3. Rock Barriers.
  - 4. Sediment Traps.

#### 1.2 SUBMITTALS

- A. Product Data: Joint filler, Joint sealer, Admixtures, Curing compounds, Geotextile.
- B. Proposed Mix Design: Furnish design of each class of concrete for review prior to commencement of Work.
- C. Test Reports: Indicate certified tests results for precast concrete at manufacturing facility, cast-in-place concrete in field, and granular backfill.
- D. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to requirements of Section 310513 – Soils for Earthwork, Section 310516 – Aggregates for Earthwork, Section 312323 – Fill, Section 311000 – Site Clearing, Section 312316 – Excavation, Section 334200 – Stormwater Conveyance, Section 329119 – Landscape Grading, and Section 329219 – Seeding.
- B. Perform Work according to SCDHEC standards.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not place grout when air temperature is below freezing.
- B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## PART 2 - PRODUCTS

### 2.1 ROCK AND GEOTEXTILE MATERIALS

#### A. Rock:

1. As specified in Section 310516 – Aggregates for Earthwork.

#### B. Geotextile Fabric:

1. As specified in Section 310519.13 – Geotextiles for Earthwork.

### 2.2 CONCRETE MATERIALS AND REINFORCEMENT

#### A. Cement:

1. Type 1, grey, as specified in Section 033000 – Cast-In-Place Concrete.

#### B. Fine and Coarse Aggregates:

1. As specified in Section 033000 – Cast-In-Place and Section 310516 – Aggregates for Earthwork.

#### C. Water: Clean and not detrimental to concrete.

#### D. Admixtures:

1. Air Entrainment: Comply with ASTM C260.
2. Chemical:
  - a. Type A, as specified in Section 033000 – Cast-In-Place Concrete.

3. Fly Ash or Calcined Pozzolan:

- a. As specified in Section 033000 – Cast-In-Place Concrete.

4. Plasticizing:

- a. As specified in Section 033000 – Cast-In-Place Concrete.

#### E. Aggregate, Sand, Water, Admixtures: Precast: Determined by precast fabricator, as appropriate to design requirements and PCI MNL-116S.

#### F. Reinforcement Steel:

1. Deformed bars, galvanized, as specified in Section 321313 – Concrete Paving.



G. Welded Steel Wire Fabric:

1. Deformed Type, flat sheets, unfinished, as specified in Section 321313 – Concrete Paving.

2.3 BLOCK, STONE, AGGREGATE, AND SOIL MATERIALS

A. Precast Solid Concrete Block:

1. Furnish according to SCDOT standards, and in accordance with Plans.

B. Stone:

1. Granite, Limestone.
2. Furnish according to SCDOT standards, and in accordance with Plans.

C. Coarse Aggregate:

1. As specified in Section 310516 – Aggregates for Earthwork.

D. Soil Backfill: As specified in Section 310513 – Soils for Earthwork. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

2.4 PLANTING MATERIALS

A. Seeding and Soil Supplements:

1. As specified in Section 329219 - Seeding.
2. Furnish according to SCDHEC standards.

B. Mulch:

1. As specified in Section 329219 - Seeding.
2. Furnish according to SCDHEC standards.

2.5 PIPE MATERIALS

A. Pipe:

1. Corrugated PE, as specified in Section 334200 – Stormwater Conveyance.
2. Concrete, as specified in Section 334200 – Stormwater Conveyance.
3. Plastic, as specified in Section 334200 – Stormwater Conveyance.

2.6 ACCESSORIES

A. Joint Sealers:

1. As specified in Section 033000 – Cast-In-Place Concrete.

- B. Joint Filler:
  - 1. As specified in Section 033000 – Cast-In-Place Concrete.
- C. Grout:
  - 1. As specified in Section 033000 – Cast-In-Place Concrete.
- D. Steel Plate Anti-Vortex Device:
  - 1. Furnish according to SCDHEC standards, and in accordance with Drawings.
- E. Welding Material:
  - 1. Furnish according to SCDHEC standards, and in accordance with Drawings.
- F. Anti-Seep Collar:
  - 1. Furnish according to SCDHEC standards, and in accordance with Drawings.
- G. Trash Rack:
  - 1. Furnish according to SCDHEC standards, and in accordance with Drawings.

## 2.7 MIXES

- A. Concrete:
  - 1. 3000 psi, as specified in Section 033000 – Cast-In-Place Concrete.
  - 2. Furnish according to SCDHEC standards, and in accordance with Plans.

## 2.8 SOURCE QUALITY CONTROL (AND TESTS)

- A. Perform tests on cement, aggregates, and mixes to ensure conformance with specified requirements.
- B. Test samples according to ACI 301.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify compacted subgrade, granular base, stabilized soil is acceptable and ready to support devices and imposed loads.

- B. Verify gradients and elevations of base or foundation for other Work are correct.

### 3.2 ROCK ENERGY DISSIPATOR

- A. Excavate to indicated depth of rock lining or nominal placement thickness as follows. Remove loose, unsuitable material below bottom of rock lining, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
  - 1. Nominal Placement Thickness per NCSA Class:
    - a. R8: 48 Inches
    - b. R7: 36 Inches
    - c. R6: 30 Inches
    - d. R5: 24 Inches
    - e. R4: 18 Inches
    - f. R3: 12 Inches
- B. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope. Provide a minimum overlap of 3 feet. Offset adjacent roll ends a minimum of 5 feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than four weeks.
- C. Carefully place rock on geotextile fabric to produce an even distribution of pieces, with minimum of voids and without tearing geotextile.
- D. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and to avoid displacement of underlying material. Arrange individual rocks for uniform distribution.
  - 1. Saturate rock with water. Fill voids between pieces with grout, for at least top 6 inches. Sweep surface with stiff broom to remove excess grout.
  - 2. Moist cure grouted rock for at least three days after grouting, using water saturated burlap according to Section 033000 – Cast-In-Place Concrete.
- E. Install Work according to SCDHEC standards.

### 3.3 PAVED ENERGY DISSIPATOR

- A. Excavate to required paving depth. Remove loose, unsuitable material below bottom of paving, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
- B. Place forms and reinforcement according to Section 321313 – Concrete Paving. Hold reinforcement firmly in position during placing of concrete.
- C. Mix, place, finish, and cure concrete, as specified in Section 321313 Concrete Paving.

- D. Embed stones or blocks 3 inches in plastic concrete at indicated separation on slopes and channel bottom.
- E. Pave in uniform 10 foot lengths or sections.
- F. Pave in shorter sections as necessary for closures or curves.
- G. Place premolded expansion joint filler, 1/2 inch thick, cut to conform to paving cross sections, at ends of curved sections at intervals of not more than 100 feet, at end of day's work, and where paving is adjacent to rigid structure. Use joint filler with depth of 1/2 inch less than paving depth and press firmly against adjacent concrete.
- H. Form intermediate joints between sections, with two thicknesses of bituminous paper cut neatly to paving cross section.
- I. Seal joint top with joint sealer.
- J. Install Work according to SCDOT standards.

#### 3.4 ROCK BARRIER

- A. Determine length required for ditch or depression slope and excavate, compact and foundation area to firm, even surface.
- B. Produce an even distribution of rock pieces, with minimum voids to indicated shape, height and slope.
- C. Construct coarse aggregate filter blanket against upstream face of rock barrier to indicated thickness.
- D. Install Work according to SCDHEC standards.

#### 3.5 SEDIMENT TRAPS

- A. Clear Site, as specified in Section 311000 – Site Clearing.
- B. Construct trap by excavating and forming embankments as specified in Section 312316 – Excavation, and Section 312323 – Fill.
- C. Place coarse aggregate or rock at outlet as indicated on Drawings.
- D. Place geotextile fabric, as specified for rock energy dissipator.
- E. When required, obtain borrow excavation for formation of embankment, as specified in Section 312316 – Excavation.
- F. On entire sediment trap area, apply soil supplements and sow seed as specified in Section 329219 – Seeding.

- G. Mulch seeded areas with hay as specified in Section 329219 – Seeding.
- H. Install Work according to SCDHEC standards.

### 3.6 SITE STABILIZATION

- A. Incorporate indicated erosion control devices into Project at earliest practicable time.
- B. Construct, stabilize and activate erosion controls before Site disturbance within tributary areas of those controls.
- C. Stockpile and waste pile heights shall not exceed 10 feet. Slope stockpile sides at 4:1 or flatter.
- D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 14 days.
  - 1. During non-germinating periods, apply mulch at recommended rates.
  - 2. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year according to Section 329219 permanent seeding specifications.
- E. Stabilize sediment traps, and stockpiles immediately.

### 3.7 FIELD QUALITY CONTROL

- A. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.
- B. Field test concrete according to Section 033000 – Cast-In-Place Concrete.
- C. Compaction Testing: As specified in Section 312323 – Fill.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Compaction Testing: One for each lift.

### 3.8 CLEANING

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

- D. Clean channels when depth of sediment reaches approximately one-half channel depth.

### 3.9 PROTECTION

- A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit construction traffic over paving for seven days minimum after finishing.
- C. Protect paving from elements, flowing water, or other disturbance until curing is completed.

END OF SECTION 312500

## SECTION 321623 - SIDEWALKS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Concrete paving for sidewalks.

#### 1.2 SUBMITTALS

- A. Product Data:

1. Information regarding concrete materials, joint filler, admixtures, and curing compounds.
2. Mix Design:
  - a. Concrete mix design for each concrete strength prior to commencement of Work.
  - b. Separate mix designs if admixtures are required for hot- and cold-weather concrete Work.
  - c. Identify mix ingredients and proportions, including admixtures.
3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

- B. Manufacturer's Certificate: Products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to ACI301.
- B. Obtain cementitious materials from same source throughout.
- C. Manufacturer Qualifications: Manufacturer of ready-mixed concrete projects complying with ASTM C 94 requirements for production facilities and equipment.
- D. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

## 1.5 AMBIENT CONDITIONS

- A. Minimum Conditions: Do not place concrete if base surface temperature is less than 40 deg. F, or if surface is wet or frozen.
- B. Subsequent Conditions: Maintain minimum 50 deg. F, for not less than 72 hours after placing, and at a temperature above freezing for remainder of curing period.

## 1.6 EXISTING CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Forms:
  1. Material:
    - a. Wood: Straight and free from warping, twisting, loose knots, splits, or other defects.
    - b. Steel: Channel-formed sections.
  2. Profile: To suit conditions.
  3. Joint Filler:
    - a. Material: Asphalt-impregnated fiberboard or felt.
    - b. Comply with ASTM D1751.
    - c. Thickness: 1/2 inch.
- B. Reinforcement:
  1. Deformed Reinforcing:
    - a. Steel: Comply with ASTM A615/A615M.
    - b. Yield Grade: 60 ksi.
    - c. Billet Bars: Deformed.
    - d. Finish: Uncoated. Use galvanized finish only where shown on plans.
  2. Deformed Bar Mats:



- a. Description: Steel bars.
  - b. Comply with ASTM A184/A184M.
  - c. Fabrication: Comply with ASTM A706/A706M.
  - d. Yield Strength: 60 ksi.
  - e. Finish: Uncoated.
3. Welded Plain-Wire Fabric:
    - a. Comply with ASTM A1064/A1064M.
    - b. Configuration: Flat sheets.
    - c. Finish: Uncoated.
  4. Dowels:
    - a. Description: Plain steel bars.
    - b. Comply with ASTM A615/A615M.
    - c. Yield Strength: 60 ksi.
    - d. Length: As indicated.
    - e. Ends: Square, with burrs removed.
    - f. Finish: Uncoated.
  5. Tie Wire:
    - a. Type: Annealed.
    - b. Minimum Size: 16 gage.
    - c. Finish: Uncoated.
  6. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.
- C. Concrete:
1. Cement:
    - a. Comply with ASTM C150/C150M.
    - b. Type: I portland.
    - c. Color: Gray.
  2. Fine and Coarse Aggregates:
    - a. Comply with ASTM C33/C33M.
    - b. Class: 4M.
    - c. Coarse Aggregate Maximum Size: 3/4 inch.
  3. Water:
    - a. Description: Potable.
    - b. Comply with ASTM C94/C94M.
  4. Air Entrainment: Comply with ASTM C260/C260M.
  5. Chemical Admixtures:

- a. Comply with ASTM C494/C494M.
  - b. Type: A.
6. Fly Ash:
- a. Comply with ASTM C618.
  - b. Class: F or C.
7. Slag:
- a. Description: Ground-granulated blast-furnace slag.
  - b. Comply with ASTM C989/C989M.
  - c. Grade: 100 or 120.
8. Plasticizing:
- a. Comply with ASTM C1017/C1017M.
  - b. Type: I or II.

## 2.2 FABRICATION

### A. Reinforcing:

- 1. Comply with CRSI Manual of Practice.

### B. Hooks:

- 1. As indicated.
- 2. Type:
  - a. Standard 90-degree bends.
  - b. Seismic.

## 2.3 MIXES

### A. Concrete:

- 1. Comply with ASTM C94/C94M, Option A.
- 2. Mix Design:
  - a. Compressive Strength: 3000 PSI at 28 days, or as noted on plans.
  - b. Slump: 3 inch maximum.
  - c. Maximum Water/Cement Ratio: 0.45.
  - d. Air Entrainment:
    - 1) Comply with ASTM C94/C94M.
    - 2) Exposure Condition: Moderate.
    - 3) Maximum Variation from Required Air Content: 1.5 percent.

3. Limit following cementitious materials to maximum percentage by weight of combined cementitious materials:
  - a. Fly Ash and Blast-Furnace Slag: 50 percent.
4. Admixtures:
  - a. Use accelerating admixtures in cold weather only if approved by Engineer in writing.
  - b. Use of admixtures will not relax cold-weather placement requirements.
  - c. Use calcium chloride only if approved by Engineer in writing.
  - d. Use set-retarding admixtures during hot weather only if approved by Engineer in writing.

## 2.4 ACCESSORIES

### A. Curing Compound:

1. Comply with ASTM C1315.
2. Type: I.
3. Class: A.

### B. Surface Retarder:

1. Waterborne monomolecular film forming, manufactured for application to fresh concrete.

### C. Joint Sealers:

1. Hot Applied:
  - a. Comply with ASTM D6690.
  - b. Type: I.

## 2.5 SOURCE QUALITY CONTROL

- A. Testing: Comply with ASTM C94/C94M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify that gradients and elevations of subgrade are as indicated.
- C. Verify reinforcing placement for proper size, spacing, location, and support.

### 3.2 PREPARATION

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

### 3.3 INSTALLATION

#### A. Forms:

- 1. Clean forms and coat with form oil each time before concrete is placed.
- 2. Wood Forms: Thoroughly wet with water before concrete is placed.

#### B. Reinforcement:

- 1. Place reinforcing as indicated on drawings.
- 2. Interrupt reinforcing at expansion joints.
- 3. Place dowels reinforcing to achieve indicated paving alignment as detailed.
- 4. Provide doweled joints at 15-inch spacing at transverse joints or interruptions of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

#### C. Placing Concrete:

- 1. According to ACI 301.
- 2. Place concrete in forms in one layer.
- 3. Place concrete continuously over full width of panel and between predetermined construction joints.
- 4. Do not break or interrupt successive pours such that cold joints occur.
- 5. Place concrete to pattern as indicated.

#### D. Joints:

- 1. Place continuous transverse expansion and contraction joints as indicated on drawings.
- 2. Filler:
  - a. Place joint filler between paving components and building or other appurtenances.
  - b. Recess top of filler 1/4 inch for sealant installation.
- 3. Provide scored joints at 3-foot intervals between sidewalks and curbs.
- 4. Saw-cut contraction joints 1/4 inch wide at optimum time after finishing, cutting one-third into depth of slab.
- 5. Seal joints as indicated on drawings.

#### E. Finishing:

- 1. Wood float unless directed otherwise by Owner or in drawings.
- 2. Ramps and stair steps: Broom perpendicular to slope.

3. Place curing compound on exposed concrete surfaces immediately after finishing.
  4. Edges and Joints:
    - a. Edger Radius: 1/4 inch.
    - b. Spalled Corners and Edges: Clean and fill with mortar mixture and finish.
- F. Curing:
1. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  2. Membrane Curing:
    - a. Apply membrane-curing compound uniformly to exposed surface after free water has disappeared from finished surface and before concrete has dried.
    - b. Apply compound in two coats, with second coat applied perpendicular to first coat.
    - c. If concrete has dried, moisten dried surface and apply curing compound as soon as free water disappears.
- G. Backfilling: After curing, backfill, grade, and compact adjacent disturbed area as indicated.

### 3.4 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
- B. Maximum Variation from True Position: 1/4 inch.
- C. Line and Grade for Forms: 1/8 inch in any 10-foot-long section.

### 3.5 FIELD QUALITY CONTROL

- A. Inspection and Testing:
  1. Comply with ASTM C94/C94M.
  2. Samples:
    - a. Sampling Procedures: Comply with ASTM C172/C172M.
    - b. Cylinder Molding and Curing Procedures: Comply with ASTM C31/C31M, field cured.
    - c. Sample concrete and make one set of three cylinders for every 75 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area paving.
    - d. Make one additional cylinder during cold-weather concreting, and field cure.

3. Cylinder Compressive Strength:
  - a. Comply with ASTM C39/C39M.
  - b. Acceptance:
    - 1) Average Compressive Strength of Three Consecutive Tests:  
Maximum 500 psi less than specified compressive strength.
  - c. Test one cylinder at seven days, and two cylinders at 28 days.
  - d. Dispose of remaining cylinders if testing is not required.
4. Slump, Temperature, and Air Content:
  - a. Measure for each compressive-strength concrete sample.
  - b. Slump: Comply with ASTM C143/C143M.
  - c. Air Content: Comply with ASTM C173/C173M and C231/C231M.
  - d. Temperature: Comply with ASTM C1064/C1064M.
5. Records:
  - a. Maintain records of placed concrete items.
  - b. Record date, location of pour, quantity, air temperature, number of test samples taken.

### 3.6 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, rain and flowing water, and mechanical injury.
- B. Do not permit traffic over paving for minimum 14 days after finishing.
- C. Damaged Concrete:
  1. Remove and reconstruct concrete that has been damaged for entire length between scheduled joints.
  2. Refinishing damaged portion is not acceptable.
  3. Dispose of damaged portions.

END OF SECTION 321623

## SECTION 329113 - SOIL PREPARATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Preparation of subsoil.
  - 2. Soil testing.
  - 3. Placing topsoil.

#### 1.2 SUBMITTALS

- A. Minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- B. Test Reports: Indicate topsoil nutrient and pH levels with recommended soil supplements and application rates.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to SCDOT, SCDHEC, and local municipality standards.

#### 1.4 COORDINATION

- A. Coordinate with installation of underground sprinkler system piping and watering heads.

### PART 2 - PRODUCTS

#### 2.1 SOIL MATERIALS

- A. Topsoil: As specified in Section 310513 – Soils for Earthwork.
- B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained Site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

#### 2.2 ACCESSORIES

- A. Edging: As specified in plans.

## 2.3 SOURCE QUALITY CONTROL

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, limestone, soluble salt content, organic matter content, and pH value.
- B. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- C. Testing not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify prepared soil base is ready to receive Work of this Section.

### 3.2 PREPARATION OF SUBSOIL

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.
- C. Scarify subsoil to depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

### 3.3 PLACING TOPSOIL

- A. Spread topsoil to minimum depth of 4 to 6 inches as specified in plan over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install edging at periphery of seeded areas in straight lines to consistent depth.

END OF SECTION 329113



## SECTION 329119 - LANDSCAPE GRADING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Final grade topsoil for finish landscaping.

#### 1.2 SUBMITTALS

- A. Samples: In air-tight containers, 10 lb. sample of each type of fill to testing laboratory.
- B. Materials Source: Furnish name of imported materials source.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.3 QUALITY ASSURANCE

- A. Furnish each topsoil material from single source throughout Work.
- B. Perform Work according to SCDOT, SCDHEC, and local municipality standards.

### PART 2 - PRODUCTS

#### 2.1 MATERIAL

- A. Topsoil: As specified in Section 310513 – Soils for Earthwork.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify building and trench backfilling have been inspected.
- B. Verify substrate base has been contoured and compacted.

#### 3.2 PREPARATION

- A. Protect landscaping and other features remaining as final Work.
- B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

### 3.3 SUBSTRATE PREPARATION

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove contaminated subsoil.
- C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

### 3.4 PLACING TOPSOIL

- A. Place topsoil in areas where seeding, sodding, and planting is indicated and to thickness as scheduled. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to plant material, building, walkway, pavement, and curbs to prevent damage.
- E. Lightly compact and roll placed topsoil.
- F. Remove surplus subsoil and topsoil from Site.
- G. Leave stockpile area and Site clean and raked, ready to receive landscaping.

### 3.5 TOLERANCES

- A. Top of Topsoil: Plus or minus 1/2 inch.

### 3.6 PROTECTION OF INSTALLED WORK

- A. Prohibit construction traffic over topsoil.

### 3.7 SCHEDULES

- A. Compacted topsoil thicknesses:
  - 1. Seeded Grass: 6 inches.
  - 2. Sod: 4 inches.
  - 3. Shrub Beds: 18 inches.
  - 4. Flower Beds: 12 inches.
  - 5. Planter Boxes: To within 3 inches of box rim.

END OF SECTION 329119

## SECTION 329219 - SEEDING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fertilizing.
  - 2. Seeding.
  - 3. Hydroseeding.
  - 4. Mulching.
  - 5. Maintenance.

#### 1.2 DEFINITIONS

- A. Weeds: Include dandelion, jimsonweed, quack grass, horsetail, morning glory, rush grass, mustard, lamb's quarters, chickweed, cress, crabgrass, Canadian thistle, nut grass, poison oak, blackberry, tansy ragwort, Bermuda grass, Johnson grass, poison ivy, nut sedge, nimble will, bindweed, bent grass, wild garlic, perennial sorrel, and brome grass.

#### 1.3 SUBMITTALS

- A. Product Data: Seed mix, fertilizer, mulch, and other accessories.
- B. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

#### 1.5 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- B. Perform Work according to SCDOT, SCDHEC, and local municipality standards.
- C. Seed Supplier: Company specializing in manufacturing products specified in this Section with three years' experience.

- D. Installer: Company specializing in performing Work of this Section and with a record of successful grass establishment.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

#### 1.7 MAINTENANCE SERVICE

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits vigorous growing condition, but not less than 60 days after the date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 SEED MIXTURE

- A. Grass Seed: Fresh, clean, dry, Blue-Tag certified seed complying with the Official Crop Certifying Agency of South Carolina.
- B. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules in Plans.

#### 2.2 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil, as indicated in soil analysis from a qualified soil-testing agency. If soil testing is not conducted, provide soil amendments within the parameters documented in Section 3.7.
- C. Lime: ASTM C602, Class T agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.
- E. Erosion Fabric: As specified in Plans.
- F. Herbicide: EPA registered and approved, of type recommended by manufacturer.

- G. Stakes: Softwood lumber, chisel pointed.
- H. String: Inorganic fiber.

### 2.3 SOURCE QUALITY CONTROL

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- C. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify prepared soil base is ready to receive Work of this Section.

### 3.2 FERTILIZING

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

### 3.3 SEEDING

- A. Apply seed at rate indicated in the planting schedule, evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: As recommended by manufacturer.
- D. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

- E. Roll seeded area with roller not exceeding 112 lb./linear ft.
- F. Immediately following seeding and compacting, apply mulch to thickness of 1/8 inch. Maintain clear of shrubs and trees.
- G. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

### 3.4 HYDROSEEDING

- A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 35 lb. per 1,000 sq ft evenly in one pass.
- B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels 2 to 4 inches.

### 3.5 SEED PROTECTION

- A. Identify seeded areas with stakes and string around area periphery. Set string height to 6 inches. Space stakes at 60 inches.
- B. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- C. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.
- D. Secure outside edges and overlaps at 36 inch intervals with stakes.
- E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

### 3.6 MAINTENANCE

- A. Mow grass at regular intervals to maintain at maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at each mowing. Perform first mowing when seedlings are 40 percent higher than desired height.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.

- F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.
- G. Immediately reseed areas showing bare spots.
- H. Repair washouts or gullies.
- I. Protect seeded areas with warning signs during maintenance period.

### 3.7 PLANTING SOIL AMENDMENTS SCHEDULE

- A. Lawns: Provide soil amendments required to provide planting medium within the following parameters:
  - 1. Soil pH range: 5.8 – 6.2.
  - 2. Phosphorus index of 50; equivalent to 60 ppm P (137 ppm P205).
  - 3. Potassium index of 50; equivalent to 100 ppm K (120 ppm K20).
  - 4. Calcium equivalent to 40 – 60 percent of Cation Exchange Capacity (CEC) ( $Ca\% = (Ca/CEC)$ ).
  - 5. Magnesium equivalent to 8 – 15 percent of CEC ( $Mg\% = (Mg/CEC)$ ).
  - 6. Base Sat equivalent to 60 – 80 percent of CEC ( $BS\% = ((Ca + Mg + K)/CEC)$ ).
  - 7. Manganese Index Mn-I 25 equivalent to 4.0 ppm.
  - 8. Zinc Index Zn-I 25 equivalent to 1.0 ppm Zn.
  - 9. Copper Index Cu-I 25 equivalent to 0.5 ppm Cu.

END OF SECTION 329219





## SECTION 331100 - WATER DISTRIBUTION SYSTEMS

*NOTE: CONTRACTOR SHALL COMPLY WITH THE STANDARD WATER SPECIFICATIONS FOR THE LOCAL MUNICIPALITY. CONTRACTOR TO ONLY USE THIS SECTION OF SPECIFICATIONS TO ADDRESS THOSE ITEMS NOT COVERED IN THE LOCAL MUNICIPALITY SPECIFICATIONS.*

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Pipe and fittings.
- B. Valves.
- C. Hydrants.
- D. Underground pipe markers.
- E. Precast concrete vault.
- F. Bedding and cover materials.

#### 1.2 RELATED SECTIONS

- A. Section 033000 – Cast-In-Place Concrete  
Section 312316.13 – Trenching

#### 1.3 SUBMITTALS

- A. Product Data: Submit technical data and installation instructions on pipe materials, pipe fittings, valves and accessories.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- C. Hydrostatic Testing:
  - 1. Submit Schedule of hydrostatic testing seven days prior to testing.
  - 2. Submit proposed method of disposal of wastewater from hydrostatic testing and disinfection water.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

## 1.5 QUALITY ASSURANCE

- A. Qualifications: At least 3 years of successful installation experience on projects with potable water piping work similar to that required for project.
- B. Codes and Standards
  - 1. Plumbing Code Compliance
    - a. Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of potable water system materials and products.
  - 2. Water Purveyor Compliance
    - a. Comply with requirements of Purveyor supplying water to project. Obtain required permits and inspection.
  - 3. SCDHEC Compliance
    - a. Comply with State Primary Drinking Water Regulations.
- C. All material or products which come into contact with drinking water shall be third party certified as meeting the specifications of the American National Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The American National Standards Institute shall accredit the certifying party.
- D. Steel pipe and asbestos cement pipe shall not be used in potable water systems.
- E. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water.
- F. Lubricants that will support microbiological growth shall not be used for slip-on joints. The use of vegetable shortening is prohibited.
- G. The use of solvent-weld PVC pipe and fittings in water mains 4-inch and larger is prohibited.
- H. Any pipe, solder, or flux which is used in the installation or repair of any public water system, used in any plumbing, which provides water through connection to a public water system, for human consumption, shall be lead free. Lead free, for solder and flux, means those containing not more than 0.2% lead. Lead free, for pipes and pipe fittings, means those containing not more than 8.0% lead. Leaded joints necessary for the repair of CIP shall be exempt from the above.
- I. No flushing device shall be directly connected to any sewer.
- J. Chambers, pits or manholes containing valves, blow-offs, meters, air relief valves, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer.

- K. All pipe, fittings, packing, jointing materials, valves and fire hydrants shall conform to Section C of the AWWA Standards.
- L. Water mains which have been previously used for conveying potable water may be reused provided they meet applicable criteria from AWWA Section C, ANSI/NSF 61, and ASTM D 1785 or D 2241. The mains must be thoroughly cleaned and restored practically to their original condition.
- M. All water mains shall be provided with a minimum of 30 inches of cover, unless pipe material is ductile iron, or other approved materials, and if exposed should be insulated to prevent freezing.
- N. Valves: Manufacturer's name and pressure rating marked on valve body.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.
- B. Equipment and spare parts must be properly protected against any damage during a prolonged period at the site.
- C. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built and securely bolted.
- D. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- E. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.
- F. Each box or package shall be properly marked to show its net weight in addition to its contents.

## 1.7 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment will be made for Water Utility Distribution Piping. Payment will be made in accordance with the lump sum price to which it pertains as listed on the Bid Form.

## PART 2 PRODUCTS

### 2.1 WATER PIPING

- A. Polyethylene Tubing: Pipe smaller than 2 inches shall be polyethylene tubing, SDR 7.3, and shall conform to ASTM D2737.
  - 1. Fittings: AWWA C901, molded.
  - 2. Joints: Butt fusion.

- B. Ductile Iron Pipe (DIP): (Pipe 3 inches through 48 inches)
  - 1. Pressure Class 350. Designed in accordance with AWWA C150 and C151.
  - 2. Fittings: Ductile iron, 350 psi working pressure and equal thickness as joining pipe.
  - 3. Joints: AWWA C111, rubber gasket.
  - 4. Linings: Cement lining per AWWA C104.
  - 5. Coatings: Asphaltic coating, as per AWWA C151, approximately 1 mil thick.
  
- C. Polyvinyl Chloride (PVC) Pipe:
  - 1. Pipe less than 4 inches, conform to ASTM D1785, Schedule 80:
    - a. Fittings: ASTM D2466, PVC.
    - b. Joints: ASTM D2855, solvent weld.
  - 2. Pipe 2 inches through 4 inches, conform to ASTM D2241
    - a. SDR 21 with minimum pressure rating of 200 psi at 73.4 degrees F
    - b. Hydrostatically test as AWWA C900
    - c. Joints shall be integral bell type and shall conform to ASTM D3139
  - 3. Pipe 4 inches through 12 inches, conform to AWWA C900 Class 200:
    - a. Fittings: AWWA C111, cast iron.
    - b. Joints: ASTM D3139 compression gasket ring.
  - 4. Pipe 12 inches through 48 inches, conform to AWWA C905 Class 200:
    - a. Fittings: AWWA C111, cast iron.
    - b. Joints: ASTM D3139 compression gasket ring.
  - 5. Conform to cast iron outside diameter (CIOD) size dimensions.
  - 6. Conform to National Sanitation Foundation (NSF) Standard 14 and be marked "NSF Approved" on the pipe.
  
- D. Steel Piping: All steel waterline pipe shall conform to the requirements of AWWA C200 or ASTM A53 or A120.
  
- E. High Density Polyethylene (HDPE) Pipe: HDPE waterline pipe, 4 inches through 63 inches, shall conform to the requirements of AWWA C906.
  
- F. Joints connecting pipe of differing materials shall be made in accordance with manufacturer's recommendation.
  
- G. All pipe material, solder and flux shall be lead free (less than 0.2 percent lead in solder and flux and less than 8.0 percent lead in pipes and fittings).
  
- H. Thermoplastic pipe shall not be used above grade.

## 2.2 FITTINGS

- A. Ductile Iron (3 Inch – 48 Inches): ANSI/AWWA C 110/A 21.10. Note: Compact Ductile Iron Fittings (ANSI/AWWA C 153/A 21.53) may be substituted only in conditions with space limitations and with the concurrence of the Owner's Representative.
  
- B. Joints: Match pipe furnished.
  
- C. Coating and Lining:
  - 1. Outside Coating: Bituminous enamel, minimum thickness 1 mil.
  - 2. Inside Lining: Cement mortar; ANSI/AWWA C 104/A 21.4.

## 2.3 FLEXIBLE EXPANSION JOINTS

- A. Single ball flexible expansion joint designed for protection against bending moments.
- B. Construction:
  - 1. Manufactured of 65-45-12 ductile iron conforming to the material requirements of ASTM A 536 and ANSI/AWWA C 153/A 21.53.
  - 2. Working Pressure: 350 psi for flexible joints 3 inch through 24 inch in size; 250 psi for flexible joints 30 inch and over in size.
  - 3. Expansion joint designed and cast as an integral part of a ball and socket type flexible joint; 4 inch minimum expansion capability.
  - 4. Each ball and socket capable of at least 15 degrees deflection.
  - 5. Coating and Lining:
    - a. Outside Coating: Coat tar epoxy, minimum thickness 5 mils.
    - b. Inside Lining and Seal Contact Surfaces: NSF approved fusion-bonded epoxy conforming to the material requirements of and tested in accordance with ANSI/AWWA C 213.
  - 6. Joints (Mechanical Joint or Flanged Ends): Match joints of pipe furnished.
  - 7. Pressure tested against its own restraint at rated working pressure.
- C. Acceptable Manufacturer: EBAA Iron Sales, Inc., P.O. Box 857, Eastland, TX 76448.

## 2.4 GATE VALVES

- A. 2-1/2 inches and Smaller: Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, extension box.
- B. 3 inches and Larger: AWWA C509, Iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, control rod, post indicator, extension box and valve key.
- C. Gate valves shall be designed for a minimum working pressure of 250 psi (unless otherwise noted on plans).
- D. Connections shall be as required for piping
- E. Valves shall opened by turning counterclockwise and have a clear waterway equal to the full nominal diameter of the valve.
- F. Operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.
- G. All gate valves shall be Underwriters Laboratories listed and Factory Mutual approved.
- H. Provide one T-handle operator for each ten buried valves with nut operator.

## 2.5 COUPLINGS

- A. Mechanical Couplings:

1. Sleeve type providing a tight flexible joint under conditions, such as pipe movements caused by expansion, contraction, slight settling of or shifting in the ground, minor variations in trench gradients, and traffic violations.
2. Couplings shall be of strength not less than the adjoining pipeline.
3. Sleeve type couplings shall consist of one steel middle ring, two steel followers, two gaskets, and the necessary steel bolts and nuts to compress the gaskets.
4. As manufactured by Dresser Manufacturing, Bradford, PA Style 138.

## 2.6 UNDERGROUND PIPE MARKERS

- A. All water mains shall be detectable within 3 feet with electronic locating equipment.
- B. Iron Pipe: Bright colored plastic ribbon type, continuously printed, minimum 4 inches wide by 4 mil thick, manufactured for direct burial service. Shall be buried at a depth of 1-1/2 feet from finished grade.
- C. Plastic Pipe: Continuous 12-gauge, blue insulated, copper tracer wire. Shall be buried a minimum of 6" above top of water main.

## 2.7 PRECAST CONCRETE VAULT

- A. Precast vault designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.
- B. Manufactured by Tindall or approved equal.

## 2.8 SERVICE CLAMPS

- A. Furnish with a pressure rating not less than that of the pipe.
- B. Double flattened strap type.
- C. Clamps shall have a galvanized malleable iron body with cadmium plated straps and nuts
- D. Clamps shall have rubber gasket cemented to the body.
- E. Furnish Smith-Bleir 313 or approved equal.

## 2.9 CORPORATION STOPS

- A. Conform to AWWA C800 with copper alloy body and tapered threads

## 2.10 SERVICE STOPS

- A. Service stops shall be waterworks inverted ground key type, oval or round flow way, tee handle, without drain. Pipe connections shall be suitable for the type of service

pipe used. All parts shall be bronze with female iron pipe size connections or hydrostatic test pressure not less than 200 psi.

## 2.11 GOOSENECKS

- A. Use Polyethylene piping at higher pressure rating than connecting pipe. Length of cable and connections shall be in accordance with standard practice.

## 2.12 TAPPING SLEEVE AND VALVE

- A. Tapping Sleeves:
  - 1. The ductile iron split sleeve type with flanged or grooved outlet, and with bolts, follower rings and gaskets on each end of the sleeve.
  - 2. Construction shall be suitable for a maximum working pressure of 200 psi.
  - 3. Bolts shall have square heads and hexagonal nuts.
- B. Tapping Valves
  - 1. Material shall be compatible with tapping sleeve and shall conform to the requirements for gate valves above.
  - 2. Joints shall be flanged for the tapping sleeve and mechanical joint for the pipe end.

## 2.13 METER BOXES

- A. Meter boxes shall be installed around valves with additional sections stacked above as required to bring the cover to existing grade level. All boxes shall be jumbo size meter boxes with heavy-duty lids as approved by the engineer.
- B. The bottom box section shall be set on a firm bed of pea rock, which shall extend down at least 6-inches below the pipe.
- C. Meter boxes shall be Carson-Brooks Model 1419-12 or equal. Cover shall be Carson-Brooks Model 1419-T or equal. Coat cover with two (2) shop coats bitumastic paint.

## 2.14 AIR RELIEF VALVES

- A. Air Relief Valves shall be Crispin model number PL10 with ¼ inch orifice, or approved equal.
- B. Provide heavy duty cast iron meter box to house valve.

## 2.15 FIRE HYDRANTS & POST HYDRANTS

- A. General: Fire hydrants shall be provided as shown on the plans and as specified herein. Fire hydrants shall only be installed on 6" and larger pipelines capable of supporting fire flows of 500 GPM in addition to 1/5 maximum instantaneous demand. All pipelines 6" and larger shall be terminated with a fire hydrant for flushing purposes. 4" pipelines shall be terminated with a post type flushing hydrant with a single 2 ½"

nozzle. All hydrants shall be equipped with an isolation valve to allow for servicing without interruption of system flows. All potable water appurtenances that contact potable water shall bear the National Sanitation Foundation (NSF) seal of approval stating compliance with ANSI/NSF Standard 61. Post type hydrants shall not be used to support or provide fire flows.

- B. Materials: Shop drawings and related data shall be submitted to the ENGINEER for review.
1. Fire Hydrants shall be the cast iron, compression type, opening against pressure, and shall conform to ANSI/AWWA C502. Hydrants shall have a minimum 6" restrained mechanical joint connections with a minimum 5-1/4" main valve. Each fire hydrant shall have two 2-1/2" hose nozzles and one 4-1/2" pumper nozzle. Post type flushing hydrant shall be equipped with a single 2-1/2" nozzle. Hose connections shall have NST threads and comply with ANSI B26, but will not have chains attaching the caps to the upper barrel. Barrel lengths shall be for a 3-1/2 FT bury, except where other lengths are necessitated by the hydrant location and approved by the Engineer. Threads and operating nuts shall be identical to that of existing hydrants on the system.
  2. Hydrants shall be furnished with an O-ring sealed reservoir located in the bonnet so that all threaded and bearing surfaces are automatically lubricated when the hydrant is operated. Hydrant nozzles shall be O-ring sealed, threaded in place, and retained by stainless steel set screws or clips. Hydrant shall have a bronze seat ring that threads into a bronze drain ring. All working parts shall be removable without disconnecting the hydrant.
  3. Hydrants shall be furnished with a breakable feature designed to break cleanly upon impact and consisting of a two-part breakable safety flange or breakable lugs with a breakable stem coupling.
  4. All retaining bolts and hardware shall be 316 stainless steel.
  5. Upper and lower main stem rods shall be 316 stainless steel.
  6. All bronze or brass internal working parts in contact with service water shall be a maximum of 16% in zinc content and 79% minimum in copper.
  7. EPDM rubber shall be provided on all hydrant main valves.
  8. Interior coating shall be two part thermosetting or fusion bonded epoxy coated, holiday free to a minimum thickness of 4 mil, and conforming to "AWWA C550 protective interior coating for valves and hydrants."
  9. Exterior casting shall indicate type, main valve size, design, date of manufacture, and location of manufacture.
  10. Exterior coating shall be factory coated as follows:
    - a. Hydrant barrel, caps and bonnet shall be painted Safety Yellow (Shermann Williams – Steel Master line #9500 Code- Safety Yellow B56Y300) or as required by local authority. Exterior hydrant parts below ground shall be coated with fusion bond epoxy coating, coated holiday free to a minimum thickness of 4 mil.
    - b. Developer may choose a different fire hydrant color if developer maintains fire hydrant, and color is approved by the Engineer.
  11. All fire hydrant installations on paved roadways shall be provided with industry standard "blue hydrant reflector" installed in the center of the closet travel lane. Reflectors shall be SCDOT approved.
  12. Fire hydrants drains shall not be connected to or located within 10 feet of sewer system.



## 2.16 YARD HYDRANTS

- A. Yard hydrants shall be anti-freezing and equipped with the following:
  - 1. Double - ball check valve on the drain that is vented to atmospheric air and has Teflon balls for zero percent water absorption.
  - 2. Vacuum breaker permanently attached to the outlet that prevents unwanted back-siphonage from an attached hose.
  - 3. Acceptable Model: Model BFH M-100 as manufactured by Murdock, Inc., Cincinnati, Ohio 45204.

## 2.17 THRUST RESTRAINTS

- A. Mega-Lug restraints manufactured by EBBA.
- B. Thrust restraints shall be used on all tees, bends, and plugs on lines 2.5 inches in diameter and larger, for all post hydrants on lines 3 inches in diameter and larger, and for all hydrants on lines 6 inches in diameter and larger.

## 2.18 TAPS

- A. Where indicated or required, pipe or fittings shall be aped to receive small pipe or special fittings. Required taps shall be furnished as part of this work. Tap shall include all bosses or other fittings as necessary to provide the size tap needed.

## 2.19 BEDDING AND COVER MATERIALS

- A. Bedding: as specified in municipality specification for material and compaction requirements
- B. Cover: See municipality specification for proper material and compaction requirements.
- C. Soil Backfill from Above Pipe to Finish Grade: Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter. Initial Backfill and final backfill shall be as specified in municipality specification.

## 2.20 VALVE BOXES

- A. Provide at each buried valve.
- B. Cast iron extension type, suitable for minimum cover of 3'6" over the pipe.
- C. Minimum inside diameter at the top of 5", minimum wall thickness 3/16".
- D. Have the word "WATER," etc., as applicable, cast into the cover.
- E. Provide Tyler Series 6850.

- F. Where depth requires more than a two-piece box, use adjustable cast iron extensions.
- G. Coat box and cover with two (2) shop coats of bitumastic paint.

## 2.21 VALVE BOX PROTECTION RING

- A. Provide at each valve box a precast concrete protection ring.
- B. Provide two rings of No. 3 reinforcing steel, one 14" in diameter, and one 23" in diameter.
- C. Inside dimensions to be 9-1/4".
- D. Outside diameter to be 27".
- E. Provide 5" thickness at interior with a continuous slope to 2" thickness at the outside.
- F. Minimum weight of 10 pounds.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Precautions:
  - 1. Pipe shall be installed at the locations shown on plans and to the position, alignment and grade shown on the drawings.
  - 2. Pipe and accessories shall be handled so as to insure delivery to the trench in sound, undamaged condition.
  - 3. Particular care shall be taken not to damage the pipe coating or lining.
  - 4. If the coating or lining of any pipe or fitting is damaged, the repair shall be made as recommended by pipe manufacturer at the Contractor's expense.
  - 5. No other pipe or material of any kind shall be placed inside a pipe or fitting after the coating has been applied.
  - 6. Pipe shall be carried into position and not dragged.
  - 7. Use of the pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe.
  - 8. The interior of the pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method.
  - 9. Before installation, the pipe shall be inspected for defects.
  - 10. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Owner.
  - 11. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.
  - 12. Polyvinyl chloride and fittings shall be handled and stored in accordance with the manufacturers recommendations.
  - 13. Storage facilities shall be classified and marked in accordance with NFPA 704 with classification as indicated in NFPA 49 and NFPA 325M.

14. Coated and wrapped steel pipe shall be handled in conformance with AWWA C203.
- B. Cutting of Pipe
    1. Cutting of pipe shall be done in a neat and clean manner without damage to the pipe.
    2. Cutting shall be done with an approved type mechanical cutter.
    3. Wheel cutter shall be used when practicable.
    4. Copper tubing shall be cut square and all burrs shall be removed.
    5. Squeeze type mechanical cutters shall not be used for ductile iron.
    6. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
  - C. Remove scale and dirt on inside and outside before assembly.
  - D. Prepare pipe connections to equipment with flanges or unions.

### 3.2 BEDDING

- A. Excavate pipe trench in accordance with municipality specification for work of this Section.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth; compact to 95 percent maximum density.
- C. Backfill around sides and to top of pipe in accordance with municipality specification.
- D. Maintain optimum moisture content of fill material to attain required compaction density.
- E. Place fill material in accordance with municipality specification.

### 3.3 PIPE INSTALLATION

- A. Separation of Water Mains and Sewers: SCDHEC State Primary Drinking Water Regulation 61-58 [R.61-58.4.d, (12) (a)-(f)]
  1. Parallel Installation: Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Department may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.
  2. Crossings: Water mains crossing sewers shall be laid to provide a minimum vertical separation of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case whether the water main is either above or below the sewer line. Whenever possible, the water main shall be located above the sewer line. Where a new water main crosses a new sewer line,

- a full length of pipe shall be used for both the water main and sewer line and the crossing shall be arranged so that the joints of each line will be as far as possible from the point of crossing and each other. Where a new water main crosses an existing sewer line, one full length of water pipe shall be located so both joints will be as far from the sewer line as possible. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the water main.
3. Water mains shall be located out of contaminated areas, unless using pipe materials that will protect the quality of the water. The line should be rerouted if at all possible.
  4. If water mains are installed above grade, the pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair and/or replacement.
  5. Underwater Crossings – If water mains are to be placed underwater, a minimum of 2 feet cover shall be provided over the pipe. When crossing water courses that are greater than 15 feet in width, the following shall be provided:
    - a. The pipe material and joints shall be designed appropriately.
    - b. Valves shall be located so the section can be isolated for testing or repair and the valves on both sides of the crossing shall be easily accessible and not subject to flooding.
    - c. A blow-off shall be provided on the side opposite the supply service sized in accordance with SC Regulation Section R.61-58.4 (D)(7).
    - d. Use DIP with mechanical joints for any lines being installed in rock.
  6. Special Conditions: When it is impossible to obtain the distances specified in R.61-58.4(D)(12)(a) and (b) the Department may allow an alternative design. Any alternative design shall:
    - a. maximize the distances between the water main and sewer line and the joints of each;
    - b. use materials which meet the requirements R.61-58.4(D)(1) for the sewer line; and,
    - c. Allow enough distance to make repairs to one of the lines without damaging the other.
  7. Force Mains: There shall be at least a 10 foot horizontal separation between water mains and sanitary sewer force mains. There shall be an 18 inch vertical separation at crossing as required in R.61-58.4(D)(12)(a) and (b).
  8. Sewer Manholes: No water pipe shall pass through or come in contact with any part of a sewer manhole. Water lines may come in contact with storm sewers or catch basins if there is no other practical alternative, provided that ductile iron is used, no joints of the water line are within the storm sewer or catch basin and the joints are located as far as possible from the storm sewer or catch basin.
  9. Drain-fields and Spray-fields: Potable water lines shall not be laid less than 25 feet horizontally from any portion of a waste-water tile-field or spray-field, or shall be otherwise protected by an acceptable method approved by the Department.
- B. All visible leaks shall be repaired regardless of the amount of leakage.
- C. Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electrical wiring.

- D. Nonferrous Metallic Piping: Where nonferrous metallic pipe, e.g., copper tubing, crosses any ferrous piping material, a minimum vertical separation of 12 inches must be maintained between pipes.
- E. Placing and laying pipe:
1. Carefully lower pipe and accessories into the trench. Do not drop or dump into the trench.
  2. Avoid abrasion of the pipe coating.
  3. Lay pipe with bell ends facing in the direction of laying.
  4. Rest pipe solidly upon the pipe bed; with recesses for bells, couplings, and joints.
  5. Relay pip if grade or joint has been disturbed.
  6. Do not lay pipe in water or when trench conditions are unsuitable for work.
  7. Keep water out of the trench until joining is complete.
  8. Securely close open ends, of pipe, fittings, and valves when work is not in progress.
  9. Repair damaged coating or lining according to manufacturer's instructions at Contractor's expense.
  10. Valve, plug, or cap, and anchor pipe ends left for future connections.
- F. Joint Deflection:
1. Ductile Iron Pipe: The maximum allowable deflection will be as given in AWWA C600.
    - a. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
  2. Flexible Plastic Pipe: Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturers and approved by Engineer, but in no case shall it exceed 5 degrees.
- G. Connections:
1. Structures:
    - a. Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 wall sleeves
    - b. Annular space between walls and sleeves shall be filled with rich cement mortar.
    - c. Annular space between pipe and sleeves shall be filled with mastic.
  2. New and existing mains:
    - a. Use specials and fittings to suit actual conditions.
    - b. Under pressure, connections shall be approved by Engineer.
- H. Joining:
1. Copper Tubing: Joints shall be made with flared fittings. The flared end tube shall be pulled tightly against the tapered part of the fitting by a nut which is part of the fitting, so there is metal to metal contact.
  2. Galvanize Pipe: Screw joints shall be made tight with stiff mixture of graphite and oil; inert filler and oil, or with an approved graphite compound applied with a brush to the male threads only. Do not use compounds containing lead.
  3. Ductile Iron Pipe:
    - a. Mechanical and push-on type joints shall be installed in accordance with AWWA C600 for buried lines.

- b. Clean socket and plain end thoroughly, removing mud, gravel, or other foreign matter.
  - c. Insert gasket into the gasket recess of the socket, large end of the gasket entering first. After gasket is in place at the bottom, the top of the gasket is positioned into the gasket recess. Warm gaskets to be installed in cold weather.
  - d. Apply a thin film of lubricant to the outside pipe surface between the stripe and the end of the pipe and also the inside surface of the gasket.
  - e. Do not allow pipe to touch ground or trench side after lubricating.
  - f. Insert plain end in the socket. Keep pipe in reasonably straight alignment. Push pipe until spigot end meets the full insertion mark.
4. PVC Pipe – Push-On
- a. Bevel ends for push-on to facilitate assembly and mark to indicate when the pipe is fully seated.
  - b. Clean ring and spigot. Wipe the gasket, groove, and pipe free from foreign material.
  - c. Install gasket with the flat surface facing inside the coupling, and the rounded edge facing the coupling entrance.
  - d. Lower into trench slowly.
  - e. Apply lubricant to gasket surface that is exposed, to the pipe spigot from the end to the full insertion mark, and the rounded edge and taper.
5. Connections between different types of pipe and accessories shall be made with transition fittings.
- I. Place thrust restraints at each elbow or change of direction of pipe main.
  - J. Establish elevations of buried piping with not less than 3 ft of cover.
  - K. Install plastic ribbon tape continuous over top of pipe, 1-1/2 feet below finished grade.
  - L. Backfill trench in accordance with municipality specification.
  - M. Installation of water mains and appurtenances shall be conducted in accordance with Section C of the AWWA Standards and/or manufacturer's recommended installation procedures.

### 3.4 CROSS CONNECTION CONTROL (BACKFLOW PREVENTION DEVICES)

- A. There shall be no connection between the water distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system.
- B. No by-passes shall be allowed unless the by-pass is also equipped with an equal approved backflow prevention device.
- C. High hazard cross connections shall require an air gap separation or approved reduced pressure backflow preventer.
- D. Reduced Pressure Principle Backflow Preventer
  1. General:

- a.  $\frac{3}{4}$ " through 2": Use Febco Model B25Y reduced pressure backflow preventer, or approved equal.
- b. 2  $\frac{1}{2}$ " through 10": Use Febco Model B25YD reduced pressure backflow preventer, or approved equal.
- c. Must be on the approved list published by SCDHEC and tested by a certified tester before placing into service and two (2) copies provided to Owner.
- d. Bypasses not allowed unless equipped with an equal backflow protection.
2.  $\frac{3}{4}$ " through 2" reduced pressure backflow preventers to consist of the following:
  - a. Two (2) independently operating, spring-loaded, "Y" pattern check valves and one (1) hydraulically dependent differential relief valve.
  - b. Designed to automatically reduce the pressure in the zone between check valves to at least 5 psi lower than inlet pressure.
  - c. The differential relief valve will open and maintain proper differential should differential between upstream and the zone to drop to 2 psi.
  - d. Mainline valve body and caps including relief valve body and cover to be Bronze, ASTM B584-78.
  - e. Center stem guided check valve moving member.
  - f. All springs to be stainless steel, 300 series.
  - g. Internally locate all hydraulic sensing passages within mainline relief valve bodies and relief valve cover.
  - h. Diaphragm to seal area ratio to be 10:1 minimum, nitrile, fabric reinforced.
  - i. Removable seat ring on relief valve.
  - j. Construct check valve and relief valve components so they may be serviced without removing the valve body from the line.
  - k. Reversible, nitrile ASTM D-2000 seats.
  - l. Full ported ball valves for shut-off valves and test locks.
  - m. Rate assembly to 175 psi water working pressure and water temperature range from 32°F to 180°F.
  - n. Assemblies to meet requirements of ASSE Standard 1013; AWWA Standard Code C511-92, or latest revision; and USC Foundation of Cross Connection Control and Hydraulic Research, latest edition.
3. 2  $\frac{1}{2}$ " through 10" reduced pressure backflow preventers to consist of the following:
  - a. Two (2) independent "Y" configured check valves and one (1) differential relief valve.
  - b. To automatically reduce pressure in zone between check valves. Should differential between zone and upstream pressure drop to 2 psi, differential relief valve will open, maintaining proper zone differential.
  - c. Series 300 stainless steel internal parts containing no dissimilar metals.
  - d. Reversible elastomeric seat discs on check valves and relief valves. Seat rings to be B-61 Bronze or Series 300 stainless steel.
  - e. Check assembly to be center stem guided at seat ring with replaceable non-corrosive bushings at the cover.
  - f. Series 300 stainless steel relief valve spring.
  - g. Design with ductile iron ASTM A-536, Grade 65-45-12 valve bodies and cover to withstand a 10:1 safety factor over rated cold water working pressure.
  - h. Flanged ductile iron bodies, ANSI B16-1, Class 125, epoxy coated internally 10-20 mils.
  - i. Located all orifices of the pressure sensing passages out of the normal debris flow path or settling areas.
  - j. Copper, ASTM B-280 external sensing tubing.

- k. Assemblies must be flanged, full port resilient wedge shut-off valves and four vandal resistant ball valve test cocks, integral to assemblies.
  - l. Factory-assembly and backflow test all assemblies.
  - m. Construct assemblies so all internal parts, including seat rings, can be serviced from the top or side removed while assemblies are in line.
  - n. Assemblies to be rated 175 MWWP (32°F - 140°F).
- E. Double-Check Backflow Preventer
- 1. General:
    - a. 2 ½" through 10": Use Febco Model 805YD double-check backflow preventer, or approved equal.
    - b. Must be on the approved list published by SCDHEC and tested by a certified tester before placing into service and two (2) copies provided to Owner.
    - c. Bypasses not allowed unless equipped with an equal backflow protection.
  - 2. 2 ½" through 10" double-check backflow preventers to consist of the following:
    - a. Two independent "Y" configured check valves.
    - b. Must be spring-loaded, center stem guided type.
    - c. Series 300 stainless steel integral parts.
    - d. Elastomeric seat disc must be reversible.
    - e. Bronze, ASTM B-61 or series 300 stainless steel seat rings bolted to valves bodies incorporating an o-ring to facilitate field removal and replacement.
    - f. Guide double-check assemblies at the seat ring and at the cover by replaceable non-corrosive bushings to assure positive check seating.
    - g. Head loss through assemblies not to exceed 5.5 psi at velocities from 0, up to and including 7.5 fps.
    - h. Document flow curves by independent laboratory testing.
    - i. Design ductile iron ASTM A536, Grade 65-45-12 valve bodies and cover to withstand 10:1 safety factor over rated cold water working pressure.
    - j. Ductile iron bodies flanged, ANSI B16-1, Class 125, epoxy coated internally 10-20 mils and prime coated externally.
    - k. Assemblies to include flanged, full port resilient wedge shut-off valves and four vandal-resistant full port ball valve test cocks, considered integral to assemblies.
    - l. Factory-assemble and backflow test all assemblies.
    - m. Construct double-check assemblies so all internal parts, including seat rings, can be serviced while in line.
    - n. Assemblies to be rated 175 MWWP (32°F - 140°F).
    - o. Assemblies to meet requirements of ASSE Standard 1015; AWWA Standard Code C510-92, or latest revision; and USC Foundation of Cross Connection Control and Hydraulic Research, latest edition.
- F. Installation of Reduce Pressure Principle Backflow Preventer
- 1. General:
    - a. Minimum clearance of 12" and a maximum clearance of 30" between port and floor or grade.
    - b. Install where no discharge is objectionable and can be positively drained away.
    - c. Must be easily accessible for testing and maintenance and protected from freezing.
    - d. Eliminate excessive pressure situations to avoid possible damage to system and assemblies.



- G. Installation of Double-Check Backflow Preventer
  - 1. Maintain adequate clearance and easy accessibility for testing and maintenance.

### 3.5 VALVE INSTALLATION

- A. Set valves on compacted soil.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Locate valves outside the area of roads, driveways, and streets.
- D. Carefully tamp earth fill around each valve box to a distance of 4 feet on all sides of the box, or the undisturbed trench face if less than 4 feet.
- E. Valves after delivery shall be drained to prevent freezing and shall have interiors cleaned of all foreign matter before installation.
- F. Stuffing boxes shall be tightened and the valve shall be fully opened and fully closed to insure that all parts are in working condition.
- G. Installation of air release valves shall be at the high point of the line as indicated in the field.
- H. The Contractor shall raise or lower existing and new valve boxes to the grades indicated on the drawings or relative to the surrounding finish grade. The frames and covers of the valve boxes which are not in paved areas or concrete areas shall be set approximately 0.1 foot above the surrounding grade within 10 feet of the valve box and the ground shall be sloped down and away from the elevation of the cover to points 10 feet from the valve box.
- I. Replace any valve boxes damaged during the Work.

### 3.6 FIRE HYDRANT AND POST HYDRANT INSTALLATION

- A. Fire hydrants shall, in general, be set well back of the curb or ditch line at the property line, with the break ring approximately 2" above finished grade or pavement elevation.
- B. Fire hydrants shall not be lifted in a manner as to damage the factory-applied coatings. Fire hydrants damaged during installation shall be rejected.
- C. Each hydrant shall be connected to an individual hydrant gate valve attached to a hydrant tee on the main line. Mechanical joint restraints shall be used on all fittings. Restraint rods or thrust blocking shall not be used unless approved by the Engineer.
- D. Pipeline from hydrant tee and gate valve assembly to fire hydrant shall be a minimum of 6-inch diameter and constructed of ductile iron.
- E. A minimum of 2 cubic feet of crushed stone shall be placed under and around the bottom of each hydrant to facilitate drainage. Crushed stone for the hydrant foundation shall be #57 stone.

- F. Hydrant drains shall not be connected or installed within 10 feet of sanitary sewer systems.
- G. Raise or lower existing and new hydrants, hydrant laterals, and shut-off valves (including boxes) as required, shown, or directed. Position the steamer connections facing the road.
- H. Set hydrants plumb with steamer and nozzle centerline elevations 20 inches above finished grade, or match gradeline indicated on barrel of hydrants with finished grade. Provide thrust blocks and fill in around the drip or waste outlet at the bottom of each hydrant with not less than 5 cubic feet of crushed stone. At least one half of the stone shall be below the drip or outlet and compact additional fill around the hydrant to maintain hydrant stability and to insure against shock injury to the connections.
- I. Adjust hydrant laterals, if required, to provide a minimum cover of 48 inches to finished grade.
- J. Provide new stand pipe extension pieces as approved and alter or provide new stems. Provide concrete thrust blocks, gaskets, and straps as required.
- K. Clean and paint all parts of the hydrants showing above the ground with two coats of paint.
- L. Adjust valve boxes as required.

### 3.7 YARD HYDRANT INSTALLATION

- A. Install yard hydrant in accordance with manufacturer's instructions and recommendations.
- B. Provide thrust blocks as indicated. Backfill with 2 cubic feet of crushed stone around the waste or drip outlet with 1/2 of the stone below the outlet. Arrange remaining balance of stone around hydrant to prevent damage to the connections from mechanical shock and to insure hydrant stability.

### 3.8 HYDROSTATIC TESTS

- A. Perform hydrostatic tests at least 5 days after installation of the concrete thrust blocking. The method proposed for disposal of wastewater from hydrostatic tests and disinfection shall be submitted to Engineer for prior approval to performing hydrostatic tests.
- B. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct, in presence of Engineer, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.
- C. Provide equipment required to perform leakage and hydrostatic pressure tests.
- D. Leakage Test

1. Conduct concurrently with or after the pressure tests have been satisfactorily completed.
2. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to 150 psi pressure or 1.5 times maximum working pressure which ever is greater.
3. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

Ductile Iron:

$$L = [SD(P)^{1/2}] \div 133,200$$

L = allowable leakage (gals./hr)  
S = length of the pipeline tested (feet)

D = diameter of pipe (inches)  
P = average test pressure (psig)

PVC:

$$L = [ND(P)^{1/2}] \div 7,400$$

L = allowable leakage (gals./hr)  
N = # of joints in pipeline being tested

D = diameter of pipe (inches)  
P = average test pressure (psig)

4. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.
5. Repair all visible leaks regardless of test results.

#### E. Pressure Test

1. Conduct hydrostatic test for at least two-hour duration.
2. No pipeline installation will be approved when pressure varies by more than 5 psi at completion of hydrostatic pressure test.
3. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks and plug resulting piping openings.
4. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.
5. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.
6. The requirement for the joints to remain exposed for the hydrostatic tests may be waived by the Engineer when one or more of the following conditions is encountered:
  - a. Wet or unstable soil conditions in the trench.
  - b. Heavily used area that would require continuous surveillance to assure safe conditions.
  - c. Maintaining the trench in an open condition would delay completion of the contract.
7. An unforeseeable cause which would result in excess cost.

### 3.9 FIELD QUALITY CONTROL

- A. Compaction Testing for Bedding: In accordance with municipality specification.

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

### 3.10 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with municipality specification.

### 3.11 CLEANUP

- A. Upon completion of the installation of the water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

END OF SECTION 331100

## SECTION 333000 - SANITARY SEWER SYSTEMS

*NOTE: CONTRACTOR SHALL COMPLY WITH THE STANDARD SANITARY SEWER SPECIFICATIONS FOR THE LOCAL MUNICIPALITY. CONTRACTOR TO ONLY USE THIS SECTION OF SPECIFICATIONS TO ADDRESS THOSE ITEMS NOT COVERED IN THE LOCAL MUNICIPALITY SPECIFICATIONS.*

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SECTION INCLUDES

- A. Sanitary sewerage system outside the building to include piping, fittings, and accessories.
- B. Connection of building sanitary sewer system to Utility Service/Municipality.
- C. Monolithic concrete manholes with modular precast concrete or masonry transitions to lid frames, covers, anchorages, and accessories.
- D. Modular precast concrete manhole sections, with tongue-and-groove joints, with modular precast concrete or masonry transitions to lid frames, covers, anchorages, and accessories.
- E. Masonry manholes with masonry transitions to lid frames, covers, anchorages, and accessories.
- F. Cleanout Access and Accessories.

#### 1.3 RELATED SECTIONS

- A. Section 31 2213 – Rough Grading.
- B. Section 31 2316.13 – Trenching.

#### 1.4 DEFINITIONS

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

- B. NPS: Nominal Pipe Size (Diameter).
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. EPDM: Ethylene-propylene-diene-monomer rubber.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.
- B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

#### 1.6 SUBMITTALS

- A. See Division 1 Specification Sections for additional submittal procedures.
- B. Product Data: For the following:
  - 1. Pipe and Accessories: Provide data including all types of piping, pipe accessories, joints, and fittings to be used.
  - 2. Precast Manholes: Provide data for manhole covers (lids and frames), component construction, features, configuration, joints, inserts, and dimensions.
  - 3. Backwater valves and cleanouts.
- C. Shop Drawings: Include locations, plans, elevations, details, piping with sizes and elevations of penetrations, and attachments for the following:
  - 1. Precast concrete manholes, including frames and covers.
  - 2. Cast-in-place concrete manholes and other structures, including frames and covers.
  - 3. Masonry manholes and other structures, including frames and covers.
- D. Coordination Drawings: Show manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
- E. Coordination Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1-inch equals 50-feet and vertical scale of not less than 1-inch equals 5-feet. Indicate underground structures and pipe. Show types, sizes, materials, and elevations of other utilities crossing system piping.

- F. Design Mix Reports and Calculations: For each class of cast-in-place concrete.
- G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- H. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- I. Manufacturer's Certificate: Certify that products meet or exceed requirements of these specifications and authorities having jurisdiction.
- J. Project Record Documents:
  - 1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations in subsoil conditions or discovery of uncharted utilities.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

#### 1.8 REGULATORY REQUIREMENTS

- A. Conform to all applicable local and State codes for materials and installation of the Work of this Section.
- B. Conform to the conditions and requirements of the SCDHEC Construction Permit.
- C. Maintain materials and surrounding air temperature to minimum 50-degrees F prior to, during, and 48-hours after completion of masonry work.
- D. Cold Weather Requirements: IMIAWC – Cold Weather Masonry Construction Guide – Specifications and Recommended Practices.
- E. Comply with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health DHHS (NIOSH) Publication No. 87-113, "A Guide to Safety in Confined Spaces" for all work within, or entries into, confined spaces.

#### 1.9 PROTECTION OF EXISTING UTILITIES

- A. Site Information: The approximate locations of known utilities are shown on the Drawings.
- B. Site Investigation: Perform site survey, research public utility records, and verify existing utility locations. Locate the exact locations of shown utilities, and locations of any unknown utilities, within the work area using electronic pipe finder equipment or other approved methods.
- C. Carefully excavate and expose existing underground utilities ahead of trenching operations.
- D. Locate existing structures and piping to be closed and abandoned.
- E. 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 the Architect/Engineer not less than two (2) days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without the Architect/Engineer's written permission.
  - 3. Repair or replace any damaged utility lines or structures to original condition at no additional cost to the Owner.

#### 1.10 PROJECT CONDITIONS

- A. Verify existing pipe sizes and invert elevations at tie-in points before commencing installation of pipe. Notify the Architect/Engineer immediately upon discovering any discrepancies from inverts shown on the Drawings.
- B. Coordinate the Work with termination of sanitary sewer connections outside building, connections to Utility Service/Municipality, and trenching.

### PART 2 - PRODUCTS

#### 2.1 PIPES AND FITTINGS

- A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A74, Extra Heavy or Service type, gray iron, inside nominal diameter of 4 to 12 inches, bell and spigot ends, for gasketed joints. {For use only under buildings or future building locations, unless specifically noted otherwise on the Drawings.}
  - 1. Gaskets: ASTM C564, rubber, compression type, thickness to match class of pipe.
  - 2. Cast-Iron pipe and joints shall comply with ANSI A21.1, A21.6, A21.8, A21.10, and/or A21.11.



- B. Ductile-Iron Sewer Pipe: ASTM A746, Pressure Class 350, with cement-mortar lining, inside nominal diameter of bell and spigot ends, for push-on joints.
  - 1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
  - 2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
  - 3. Gaskets: AWWA C111, rubber.
  
- C. Stainless-Steel Drainage Pipe and Fittings: ASME A112.3.1; ASTM A666, Type 304, stainless steel; with socket and spigot ends for gasketed joints.
  - 1. Couplings for NPS 6 to NPS 12: Stainless steel, mechanical type, with seal.
    - a. Seal Material for General Applications: EPDM, unless otherwise indicated.
    - b. Seal Material for Fluids Containing Gasoline or Oil: Nitrile-rubber compound, unless otherwise indicated.
  
- D. ABS Sewer Pipe and Fittings: ASTM D2751, bell and spigot ends, for solvent-cemented or gasketed joints.
  - 1. Wall Thickness for NPS 6 to NPS 12: SDR 42.
  - 2. Gaskets: ASTM F477, elastomeric seals.
  
- E. PVC Pressure Pipe: AWWA C900, Class 150, for gasketed joints.
  - 1. PVC Pressure Fittings: AWWA C907, for gasketed joints.
  - 2. Gaskets for PVC Piping: ASTM F 477, elastomeric seals.
  - 3. Ductile-Iron, Compact Fittings: AWWA C153, for push-on joints.
  - 4. Gaskets for Ductile-Iron Fittings: AWWA C111, rubber.
  
- F. PVC Sewer Pipe and Fittings: According to the following:
  - 1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D3034, SDR 35, for solvent-cemented or gasketed joints.
    - a. Gaskets: ASTM F477, elastomeric seals.

## 2.2 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Pressure-Type Pipe Couplings: AWWA C219, iron-body sleeve assembly matching OD of pipes to be joined, with AWWA C111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.
  
- B. Ductile-Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated. Include PE film, pipe encasement.

- C. Ductile-Iron Deflection Fittings: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for up to 15 degrees deflection. Include PE film, pipe encasement.
- D. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for expansion indicated. Include PE film, pipe encasement.

### 2.3 PE FILM, PIPE ENCASEMENT

- A. ASTM A674 or AWWA C105; PE film, tube, or sheet; 8-mil thickness.

### 2.4 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: ASTM C478, precast, reinforced concrete, of depth indicated, with provisions for rubber gasketed joints.
  - 1. Diameter: 48-inches minimum, 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. Gaskets: ASTM C443, rubber.
  - 7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.
  - 8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
  - 9. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
  - 10. Steps: ASTM C478, individual steps or ladder. Omit steps for manholes less than 60-inches deep.
  - 11. Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section.

- B. Heavy-Traffic Precast Concrete Manholes: ASTM C913; designed according to ASTM C890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.
1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
  2. Gaskets: ASTM C443, rubber.
  3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.
  4. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
  5. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
  6. Steps: ASTM C478, individual steps or ladder. Omit steps for manholes less than 60-inches deep.
  7. Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section.
- C. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C890 for A-16, heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
1. Ballast: Increase thickness of concrete, as required to prevent flotation.
  2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.
  3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
  4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60-inches deep.
- D. Manhole Frames and Covers: ASTM A536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 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 "SANITARY SEWER" cast into cover.
- E. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.
1. Type: Solid.

## 2.5 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
  - 1. Cement: ASTM C150, Type II.
  - 2. Fine Aggregate: ASTM C33, sand.
  - 3. Coarse Aggregate: ASTM C33, crushed gravel.
  - 4. Water: Potable.
- B. Portland Cement Design Mix: 4,000-psi minimum, with 0.45 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A615, Grade 60, deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4,000-psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
  - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: 1-percent minimum through manhole.
  - 2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: 4-percent minimum.
- D. Ballast and Pipe Supports: Portland cement design mix, 3,000-psi minimum, with 0.58 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A615, Grade 60, deformed steel.

## 2.6 MASONRY FOR MANHOLES

- A. Concrete Brick Units: ASTM C55, Grade N, Type I–Moisture Controlled, Type II–Nonmoisture Controlled; normal weight, medium weight; nominal modular size of 2-1/4 x 3-5/8 x 7-5/8 –inches.
- B. Mortar and Grout: Type S.
- C. Reinforcement: Formed steel wire, 10/10 gage thick, galvanized finish.

## 2.7 PROTECTIVE COATINGS

- A. Description: One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:

1. Concrete Manholes: On interior surface.
2. Manhole Frames and Covers: On entire surfaces.

## 2.8 BACKWATER VALVES

- A. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
  1. Horizontal Type: With swing check valve and hub-and-spigot ends.
  2. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.
  3. Terminal Type: With bronze seat, swing check valve, and hub inlet.
- B. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

## 2.9 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside call or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
  1. Light Duty: In earth or grass foot-traffic areas.
  2. Medium Duty: In paved foot-traffic areas.
  3. Heavy Duty: In vehicle-traffic service areas.
  4. Extra-Heavy Duty: In roads.
  5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.10 PIPE ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6-inches wide and 4-mils thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6-inches wide and 4-mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30-inches deep; colored as follows:

1. Green: Sanitary Sewer systems.

## 2.11 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Sections 31 2323 – Fill and 31 2316.13 – Trenching.
- B. Cover: As specified in Sections 31 2323 – Fill and 31 2316.13 – Trenching.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. See Sections 31 1000 – Site Grading and 31 2316.13 – Trenching for additional requirements.
- B. Hand trim excavations for accurate placement of pipe to elevations indicated.
- C. All sewer piping shall be installed with a minimum of 3-foot of cover.
- D. Backfill around sides and to top of pipe with cover fill, tamp in-place and compact, and then complete backfilling.

### 3.2 SEWER LINE SEPARATION GUIDELINES

- A. The location of Sanitary Sewer Lines in relation to Water Lines and Other Utilities shall comply with the requirements established by SCDHEC and “Ten State Standards”.
- B. When Sanitary Sewers are proposed adjacent to any existing or proposed Potable Water Supply facilities, the following shall apply:
  1. Potable Water Supply Interconnections:
    - a. There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which may permit the passage of any sewage or polluted water into the potable water supply.
    - b. No potable water pipes shall pass through or come into contact with any part of a sewer manhole.
  2. Horizontal and Vertical Separation from Potable Water Mains:
    - a. Sanitary Sewers shall be laid at least 10-feet horizontally from any existing or proposed Potable Water Line.
    - b. In cases where it is not practical to maintain a 10-foot horizontal separation, complying with one of the following conditions may allow, upon agency approval, installation of the Sanitary Sewer closer to a Potable Water Line:

- 1) The Potable Water Line is installed in a separate trench.
  - 2) The Potable Water Line is installed on an undisturbed earth shelf located on one side of the Sanitary Sewer and at an elevation so that the bottom of the Potable Water Line is at least 18-inches above the top of the Sanitary Sewer Line.
3. Crossing:
- a. Sanitary Sewers crossing Potable Water Lines shall be laid to provide a minimum vertical separation of 18-inches between the outside of the Potable Water Line and the Sanitary Sewer Line.
  - b. Whenever possible, the Potable Water Line shall be located above the Sanitary Sewer Line.
  - c. Where a new Sanitary Sewer Line crosses a new Potable Water Line, a full length of pipe shall be used for both the Sanitary Sewer Line and the Potable Water Line and the crossing shall be arranged such that the joints of each line shall be as far as possible from the point of crossing and from each other.
  - d. Where a Potable Water Line crosses under a Sanitary Sewer Line, adequate structural support shall be provided for the Sanitary Sewer Line to prevent damage to the Potable Water Line while maintaining line and grade.

### 3.3 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for all underground sanitary sewer piping. Locate below finished grade, directly over piping. See Section 31 1000 – Site Grading for underground warning tapes.
  1. Use warning tape or detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground structures.
- B. Install warning tape a minimum of 12-inches below finish grade and directly above line of pipe.

### 3.4 PIPING APPLICATIONS

- A. General: Include watertight joints.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
- C. Gravity-Flow Piping: The following piping can be used for the appropriate sizes:
  1. Cast-Iron Soil Pipe and Fittings; Hub-and-spigot; Extra-Heavy class, gaskets, and gasketed joints.

- a. Acceptable for Pipe Sizes NPS 4 to NPS 15.
  2. Cast-Iron Soil Pipe and Fittings; Hub-and-spigot; Service class, gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 4 to NPS 15.
  3. Ductile-Iron Sewer Pipe; standard-pattern, ductile-iron fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 4 to NPS 24.
  4. Stainless-Steel Drainage Pipe and Fittings; gaskets, and gasketed joints. Use EPDM-compound gaskets, unless otherwise indicated. Use nitrile-rubber-compound gaskets for wastes containing gasoline or oil.
    - a. Acceptable for Pipe Sizes NPS 4 to NPS 12.
  5. ABS, SDR 42, Sewer Pipe and Fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 8 to NPS 12.
  6. PVC Sewer Pipe and Fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 4 and NPS 15.
  7. PVC Sewer Pipe and Fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 18 to NPS 24.
- D. Force-Main Piping: Use the following:
1. Ductile-Iron Sewer Pipe; standard- or compact-pattern, ductile-iron fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 3 to NPS 12.
  2. PVC Pressure Pipe, PVC Pressure Fittings; gaskets, and gasketed joints.
    - a. Acceptable for Pipe Sizes NPS 4 to NPS 12.

### 3.5 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
1. Use pressure-type pipe couplings for force-main joints. Include PE film, pipe encasement.
- B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.



### 3.6 INSTALLATION, GENERAL

- A. Verify existing pipe sizes and invert elevations at tie-in points before commencing installation of sanitary sewer piping. Notify Architect/Engineer immediately upon discovering any discrepancies from inverts shown on the Drawings.
- B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- C. Verify that trench cut and excavation base is ready to receive Work and excavations, dimensions, and elevations are as indicated on the Drawings.
- D. Protect pipe, fittings, and accessories during handling against impacts and free falls. Remove extraneous materials from interior of pipe.
- E. 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 piping, gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in pipeline, and pull past each joint as it is completed.
- F. Lay each pipe to slope gradients shown on the Drawings in a manner to ensure a uniform slope gradient; with a maximum variation from true slope of 1/16-inch in 10-feet.
- G. Before joining pipe, make sure all contact surfaces are clean and dry. Use gasket lubricants as recommended by pipe manufacturer.
- H. Place, fit, join and adjust joints to obtain watertight seal.
- I. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- J. Cut-off pipe at manholes flush with interior face of manhole wall to match the shape of the manhole wall.
- K. Use 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.
- L. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
  - 1. Install piping pitched down in direction of flow, at minimum slope of 2-percent, unless otherwise indicated.
  - 2. Install piping with 36-inch minimum cover.

- M. Terminate sanitary sewer piping 5'-0" from building exterior wall in location(s) indicated. Provide temporary pipe plug for piping extending into building to be completed under Division 15 Work.
- N. Install force-main piping between and connect to building's sanitary-drainage force main and termination point indicated.
  - 1. Install piping with restrained joints at horizontal and vertical changes in direction. Use cast-in-place concrete supports and anchors or corrosion-resistant rods and clamps.
  - 2. Install piping with 36-inch minimum cover.
- O. Install ductile-iron, force-main piping according to AWWA C600.
- P. Install PVC force-main piping according to AWWA M23.
- Q. Install force-main piping between and connect to packaged sewage pump station outlet and termination point indicated.
- R. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

### 3.7 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated.
- B. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: With rubber gaskets, according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook." Use gaskets that match class of pipe and fittings.
  - 1. Install PE film, pipe encasement over hub-and-spigot, cast-iron soil pipe and fittings according to ASTM A674 or AWWA C105.
- C. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
  - 1. Install PE film, pipe encasement over ductile-iron sewer pipe and ductile-iron fittings according to ASTM A674 or AWWA C105.
- D. Stainless-Steel Drainage Piping: According to ASME A112.3.1 and manufacturer's written instructions.
- E. ABS Pipe and Fittings: As follows:
  - 1. Join pipe and gasketed fittings with gaskets according to ASTM D2321.
  - 2. Install according to ASTM D2321.
- F. PE Pipe and Fittings: As follows:
  - 1. Join pipe, tubing, and gasketed fittings with gaskets for watertight joints according to ASTM D2321 and manufacturer's written instructions.
  - 2. Install according to ASTM D2321 and manufacturer's written instructions.

3. Install corrugated piping according to the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
- G. PVC Pressure Pipe and Fittings: Join and install according to AWWA M23.
- H. PVC Sewer Pipe and Fittings: As follows:
  1. Join pipe and gasketed fittings with gaskets according to ASTM D2321.
  2. Join profile sewer pipe fittings with gaskets according to ASTM D2321 and manufacturer's written instructions.
  3. Install according to ASTM D2321.
- I. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
- J. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- K. Install with top surfaces of components, except piping, flush with finished surface.

### 3.8 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- D. Place concrete base pad, trowel top surface level and smooth.
- E. Place manhole section plumb and level, trim to correct elevations, and anchor to base.
- F. Install precast concrete manhole sections with gaskets according to ASTM C891. Provide rubber joint gaskets complying with ASTM C443 at joints and sections. Apply bituminous mastic coating at joints of sections.
- G. Construct cast-in-place manholes as indicated.
- H. Form and place manhole cylinder plumb and level, to correct dimensions and elevations. As work progresses, build in fabricated metal items and accessories.
- I. Cut and fit for pipe, conduits, sleeves, and other penetrations. Seal interface between manholes and piping (and pipe opening patch material) with epoxy bonding compound.

- J. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- K. Set cover frames and covers level with tipping, to correct elevations.
- L. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3-inches above finished surface elsewhere, unless otherwise indicated.
- M. Install fiberglass manholes according to manufacturer's written instructions.

### 3.9 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

### 3.10 BACKWATER VALVE INSTALLATION

- A. Install horizontal units in piping where indicated.
- B. Install combination units in piping and in structures where indicated.
- C. Install terminal units on end of piping and in structures where indicated. Secure units to structure walls.

### 3.11 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Form bottom of excavation clean and smooth to correct elevation.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 x 18 x 12-inches deep. Set with tops 1-inch above surrounding grade.
- E. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.
- F. Mount lid and frame level in grout, secured to top cone section.

### 3.12 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.

- B. Use 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 with 28-day compressive strength of 3,000-psi.
- C. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6-inches of concrete with 28-day compressive strength of 3,000-psi.
- D. Make branch connections from side into existing piping, NPS 21 or larger, or to underground structures by cutting opening into existing unit large enough to allow 3-inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6-inches of concrete for minimum length of 12-inches to provide additional support of collar from connection to undisturbed ground.
  - 1. Use concrete that will attain minimum 28-day compressive strength of 3,000-psi, unless otherwise indicated.
  - 2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.13 FIELD QUALITY CONTROL

- A. Perform Field Inspection and Testing in accordance with Division 1 Specification Sections.
- B. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
  - 1. Place plug in end of incomplete piping at end of day and when work stops.
  - 2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- C. 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 92.5 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.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and re-test at no additional cost to the Owner.
- E. General Testing and Inspection:
  1. All sewers will be visually inspected, tested, and gauged for infiltration and/or exfiltration.
  2. All visible leaks shall be repaired even if infiltration is within allowable limits.
  3. Broken or cracked pipe, mislaid pipe, and other defects shall be corrected.
  4. All repairs, re-laying of sewers, etc., required to bring the sewers to specified status shall be made at no additional cost to the Owner.
  5. Clean and prepare for inspection each block or section of sewer upon completion, or at such other time as directed by the Architect/Engineer.
  6. Each section of pipe between manholes shall show a full circle of light when viewed from either end.
  7. All testing is to be performed in the presence of the Architect/Engineer or other Owner Representative. Give at least three (3) day advance notice before performing tests.
  8. All expenses for testing shall be borne by the Contractor.
  9. In the event that the sewer line does not pass all testing, the Contractor shall make all necessary repairs, by a method approved by the Architect/Engineer, at no additional expense to the Owner.
- F. Pressure Test: Test in accordance with SCDHEC and Municipal Authority and the following requirements:
  1. When groundwater is less than 4-feet (1.2 m) above the top of the sewer pipe, sewers and appurtenances shall successfully pass an air test prior to acceptance.
    - a. Plug all wyes, tees, stubs, and service connections with gasket caps of plugs securely fastened or blocked to withstand the internal pressure test. Such plugs or caps shall be removable, and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
    - b. Furnish all necessary testing equipment and perform the test in a manner satisfactory to the Architect/Engineer. Any arrangement of equipment that will provide observable and accurate measurements of an air leakage under the specified condition will be permitted.
    - c. Testing of sections of the constructed sanitary sewer, for acceptance, will not be performed until all service connections, manholes, and

- backfilling, and associated compaction, are completed between the stations to be tested.
- d. Air Testing Procedure: After the plugs are in place and securely blocked, introduce air slowly into the pipe section to be tested until the internal air pressure reaches 4.0 psi greater than the average backpressure of any groundwater that may submerge the pipe. Allow a minimum of 2-minutes for the air pressure to stabilize. Determine the height of the groundwater table at the time of the test.
    - 1) The pipe and joints shall be considered satisfactory when the time required, in seconds, for the pressure to decrease from 3.5 psi to 2.5 psi greater than the average backpressure of any groundwater that may submerge the pipe in not less than that computed in accordance with the following formulas:
      - a)  $T = (\text{Pipe Diameter}) (0.15)$   
 $T = \text{Time per 100 feet}$
    - 2) Conduct Air Tests complying with ASTM C828 or C924.
  - e. Subsequent Failure: Infiltration of groundwater in an amount greater than specified under Infiltration Testing, following a successful Air Test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipe has occurred.
- G. Infiltration Test: Test in accordance with SCDHEC and Municipal Authority and the following requirements:
1. When groundwater is at least 4-feet above the top of the sewer pipe, an infiltration test will be used to determine the integrity of the sewer line.
    - a. If no leakage is observed, it can be assumed that the line passes the test.
    - b. If leakage is observed, conduct test using a V-notch sharp crested weir in a wood frame tightly secured to the manhole at the low end of the gravity sewer, or by direct measure, prior to allowing sewage flows in the line.
      - 1) Close the end of the sewer at upstream structures sufficiently to prevent the entrance of water.
      - 2) Discontinue the use of well points or other groundwater pumping operations at least three (3) days prior to testing.
      - 3) Infiltration into the entire system of new sewers, or any one trunk, interceptor or outfall sewer, including connecting laterals, or any stretch of sewer shall not exceed:
        - a) 200 gal/day/inch of pipe diameter/mile of pipe.
- H. Deflection Test: Test in accordance with SCDHEC and Municipal Authority and the following requirements:

1. Perform deflection test on all PVC sewer pipe.
  2. No pipe to exceed a deflection of 5-percent.
  3. Conduct deflection testing after the final backfill, and compaction thereof, has been in-place at least thirty (30) days and prior to placing the sewer line into operation.
  4. Conduct Go/No Go deflection test using a rigid ball or mandrel have a diameter equal to 95-percent of the inside diameter of the pipe.
  5. Do not use mechanical pulling devices for the deflection tests.
- I. 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 reports for each test.
  5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
    - a. Sanitary Sewerage: Perform hydrostatic test.
      - 1) Allowable leakage is a maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.
      - 2) Close openings in system and fill with water.
      - 3) Purge air and refill with water.
      - 4) Disconnect water supply.
      - 5) Test and inspect joints for leaks.
      - 6) Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig.
    - b. Sanitary Sewerage: Perform air test according to UNI-B-6.
      - 1) Option: Test concrete piping according to ASTM C 924.
    - c. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than one and one-half times maximum system operating pressure, but not less than 150 psig.
      - 1) Ductile-Iron Piping: Test according to AWWA C600, Section "Hydraulic Testing."
      - 2) PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
  6. Manholes: Perform hydraulic test according to ASTM C 969.
  7. Leaks and loss in test pressure constitute defects that must be repaired.
  8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.



3.14 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is completed.

END OF SECTION 333000



## SECTION 334200 - STORMWATER CONVEYANCE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Stormwater drainage piping.
  - 2. Manholes.
  - 3. Catch basins.
  - 4. Cleanouts.
  - 5. Bedding and cover materials.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer information describing pipe, pipe accessories, pre-cast concrete catch basins and manholes and clean-outs.
- B. Manufacturer's Certificate: Products meet or exceed specified requirements.
- C. Manufacturer Instructions: Special procedures required to install specified products.

#### 1.3 CLOSEOUT SUBMITTALS

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

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to SCDOT and local municipality standards.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

## 1.6 EXISTING CONDITIONS

### A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 STORM DRAINAGE PIPING

#### A. Ductile-Iron Piping:

1. Pipe:
  - a. Comply with ASTM A746, Class 50.
  - b. Type: Extra heavy.
  - c. Ends: Bell and spigot.
2. Fittings: Ductile iron.
3. Joints:
  - a. Comply with ASTM A746.
  - b. Joint Devices: Rubber gasket.

#### B. Reinforced Concrete Piping:

1. Pipe:
  - a. Comply with ASTM C76, Class III and IV, with Wall Type B.
  - b. Reinforcement: Mesh.
  - c. Inside Nominal Diameter: As noted on plans.
  - d. End Connections: Tongue and groove.
2. Fittings: Reinforced concrete.
3. Joints:
  - a. Comply with ASTM C443.
  - b. Gaskets: Rubber, compression and "o" ring.

#### C. PVC Piping (Roof and channel drain connectors only):

1. Pipe:
  - a. Comply with ASTM D2680, D3034; SDR 35.
  - b. Inside Nominal Diameter: As noted on plans.
  - c. Style: Bell and spigot with rubber-ring sealed gasket joint.
2. Fittings: PVC.
3. Joints:

- a. Comply with ASTM F477.
  - b. Gaskets: Elastomeric.
- D. Corrugated PE Piping:
- 1. Pipe:
    - a. Comply with ASTM F405, ASTM F667/F667M, AASHTO M252 and AASHTO M294.
    - b. Type: Perforated and Smooth interior.
    - c. Inside Nominal Diameter: As noted on plan.
  - 2. Fittings: PE.
  - 3. Joints: Comply with ASTM F405, ASTM F667/F667M, AASHTO M252, and AASHTO M294.

## 2.2 MANHOLES

- A. Manhole Sections:
- 1. Materials:
    - a. Reinforced Precast Concrete: Comply with SCDOT standards.
    - b. Joints: Rubber gasketed. Comply with SCDOT standards.
- B. Mortar and Grout:
- 1. Comply with SCDOT standards.
- C. Shaft and Eccentric Cone Top Sections:
- 1. Pipe Sections: Reinforced precast concrete. Comply with SCDOT standards.
  - 2. Joints:
    - a. Rubber gasketed. Comply with SCDOT standards.
  - 3. Sleeved to receive pipe and/or conduit sections.
- D. Frames and Covers:
- 1. Materials: Cast iron, heavy duty service.
  - 2. Furnish materials according to SCDOT standards.

## 2.3 CATCH BASINS

- A. Basins:
- 1. Material: Reinforced precast concrete, heavy traffic, structural loading. Comply with SCDOT standards.

2. Joints: Rubber gasketed. Comply with SCDOT standards.
3. Steps: Comply with SCDOT standards.
4. Pipe Connectors: Comply with SCDOT standards.

B. Grates and Frames:

1. Materials: Cast iron, heavy duty service.
2. Furnish materials according to SCDOT standards.

## 2.4 CLEANOUTS

A. Shaft and Top Section:

1. Material: PVC pipe sections, riser, and fittings.
2. Joints: Bell and spigot with rubber-ring sealed gasket.

B. Cleanout Lids:

1. Materials: PVC, same material as pipe.
2. Lid: Threaded plug

## 2.5 MATERIALS

A. Bedding and Cover:

1. Bedding: Comply with SCDOT standards.
2. Cover: Fill as specified in Section 310516 – Aggregates for Earthwork.
3. Soil Backfill from above Pipe to Finish Grade: Soil Type as specified in Section 310513 – Soils for Earthwork.
4. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

## 2.6 MIXES

A. Grout: Comply with SCDOT standards.

## 2.7 FINISHES

A. Steel Galvanizing:

1. Comply with ASTM A123/A123M.
2. Hot-dip galvanized after fabrication.

B. Galvanizing for Nuts, Bolts, and Washers: Comply with ASTM A153/A153M.

## 2.8 ACCESSORIES

- A. Geotextile Filter Fabric: As specified in Section 310519.13 – Geotextiles for Earthwork.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that trench cut and excavation base is ready to receive Work of this Section.
- B. Verify that excavations, dimensions, and elevations are as indicated.

### 3.2 PREPARATION

- A. Correct over-excavation with fine aggregate or coarse aggregate as specified in Section 310516 – Aggregates for Earthwork.
- B. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

### 3.3 INSTALLATION

- A. Excavation and Bedding:
  - 1. Excavate trench as specified in Section 312316 – Excavation and 312316.13 – Trenching.
  - 2. Hand trim excavation for accurate placement of piping to indicated elevations.
  - 3. Maintain optimum moisture content of bedding material to attain required compaction density.
  - 4. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.
  - 5. Place geotextile fabric over compacted bedding, if required.
- B. Piping:
  - 1. Pipe, Fittings, and Accessories: Comply with ASTM D2321.
  - 2. Seal joints watertight.
  - 3. Place pipe on minimum 4-inch-deep bed of No.57 filter aggregate.
  - 4. Cradle bottom 20 percent of pipe diameter to avoid point load.
  - 5. Install aggregate at sides and over top of pipe.
  - 6. Install top cover to minimum compacted thickness of 12 inches, and compact to 95 percent maximum density.
  - 7. Backfilling and Compaction: As specified in Section 312323 – Fill.
  - 8. Connect to municipal storm sewer system.

9. Install Site storm drainage system piping to within 5 feet of building or as shown in plans.

C. Catch Basins and Cleanouts:

1. Form bottom of excavation clean and smooth, and to indicated elevation.
2. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.
3. Level top surface of base pad.
4. Sleeve concrete shaft sections to receive storm sewer pipe sections.
5. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
6. Mount lid and frame level in grout, secured to top section to indicated elevation.

D. Precast Concrete Manholes:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Assembly:
  - a. Assemble multi-section manholes and structures by lowering each section into excavation.
  - b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
  - c. Lower, set level, and firmly position base section before placing additional sections.
4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
5. Maintain alignment between sections by using guide devices affixed to lower section.
6. Joint sealing materials may be installed on Site or at manufacturer's plant.
7. Verify that installed manholes and structures meet required alignment and grade.
8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
9. Cut pipe flush with interior of structure.
10. Shape inverts through manhole and structures as indicated.
11. Set frames using mortar and masonry to indicated elevation.

### 3.4 TOLERANCES

- A. Maximum Variation from Indicated Pipe Slope: 1/8 inch in 10 feet.



### 3.5 FIELD QUALITY CONTROL

#### A. Inspection:

1. Request inspection by Engineer prior to and immediately after placing aggregate cover over pipe.

#### B. Testing:

1. Do not enclose, cover, or put into service before inspection and approval.
2. Compaction Test:
  - a. Comply with ASTM D1557, ASTM D698, and/or ASTM D6938 as applicable.
  - b. Testing Frequency: In accordance with authorities having jurisdiction.
3. Piping Systems:
  - a. In accordance with authorities having jurisdiction.
  - b. Schedule tests and inspections by authorities having jurisdiction with at least 24 hour's advanced notice.
4. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

### 3.6 PROTECTION

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

END OF SECTION 334200









**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

Date: 07-03-2024

SUBMITTAL:  Schematic  Design Development  Construction Document

SC CODE EDITION: 2021 ICC CODE EDITION: 2021 ICC A117.1 EDITION: 2017 OSF GUIDE EDITION: 2023  
 OTHER CODES/STANDARDS & EDITIONS: BUILDING - 2021 SCFC, ELECTRICAL - 2020 NEC W/ SC AMEND., MECHANICAL - 2021 SCMC PLUMBING - 2021 SCPC, ENERGY - 2009 SCECC, IEBC 2018

PROJECT DESCRIPTION: [Brief Scope of Work & Include project delivery method (i.e. CMR, etc.)]  
 New Construction of a 2,160 sq Greenhouse, Bld.

#### BASIC BUILDING CODE INFORMATION

DESIGNATED AREAS OF BUILDING	Building Code	Area 1	Area 2	Area 3	Area 4	Area 5
CONSTRUCTION CLASSIFICATION TYPE	Section 602	<input type="checkbox"/> SCBC <input type="checkbox"/> SCBC	<input type="checkbox"/> SCBC <input type="checkbox"/> SCBC	<input type="checkbox"/> SCBC <input type="checkbox"/> SCBC	<input type="checkbox"/> SCBC <input type="checkbox"/> SCBC	<input type="checkbox"/> SCBC <input type="checkbox"/> SCBC
OCCUPANCY GROUP (indicate all)	Section 302	U				
MOST RESTRICTIVE OCCUPANCY GROUP	Tables 504.3, 504.4 & 506.2	U				
Does building require Incidental Use Area Separation?	Section 509	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Does building have Accessory Occupancy (ies)?	Section 508.2	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
What is the aggregate square footage of the accessory occupancy (ies)?	Section 508.2	0 SF	SF	SF	SF	SF
What percent of the story is the aggregate of the accessory occupancy (ies)?	Section 508.2	0 %	%	%	%	%
Mixed Occupancy	Section 508	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Nonseparated <input type="checkbox"/> Separated	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Nonseparated <input type="checkbox"/> Separated	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Nonseparated <input type="checkbox"/> Separated	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Nonseparated <input type="checkbox"/> Separated	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Nonseparated <input type="checkbox"/> Separated

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### EXISTING BUILDING CODE INFORMATION [SCBC]

DESIGNATED AREAS OF BUILDING	Area 1	Area 2	Area 3
Method of Compliance: (Check only one Option and all items that apply under that Option.)	<input type="checkbox"/> Option 1: Prescriptive Compliance Method (Ch. 3, 5) <input type="checkbox"/> Alteration <input type="checkbox"/> Addition <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Historic Building	<input type="checkbox"/> Option 1: Prescriptive Compliance Method (Ch. 3, 5) <input type="checkbox"/> Alteration <input type="checkbox"/> Addition <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Historic Building	<input type="checkbox"/> Option 1: Prescriptive Compliance Method (Ch. 3, 5) <input type="checkbox"/> Alteration <input type="checkbox"/> Addition <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Historic Building
Original Building Code and Edition Applicable at the time of Construction:			
Existing Sprinkler System?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Existing Fire Alarm System?	<input type="checkbox"/> Manual <input type="checkbox"/> Auto	<input type="checkbox"/> Manual <input type="checkbox"/> Auto	<input type="checkbox"/> Manual <input type="checkbox"/> Auto
Seismic Evaluation Required?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

Change of Occupancy:  YES  NO  
 Existing Occupancy Class(s):  YES  NO  
 New Occupancy Classification(s):  YES  NO

Historic Building:  Preservation  Rehabilitation  Restoration  Reconstruction

#### EXISTING BUILDING CODE INFORMATION [SCBC]

DESIGNATED AREAS OF BUILDING	Area 4	Area 5
Method of Compliance: (Check only one Option and all items that apply under that Option.)	<input type="checkbox"/> Option 1: Prescriptive Compliance Method (Ch. 3, 5) <input type="checkbox"/> Alteration <input type="checkbox"/> Addition <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Historic Building	<input type="checkbox"/> Option 1: Prescriptive Compliance Method (Ch. 3, 5) <input type="checkbox"/> Alteration <input type="checkbox"/> Addition <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Historic Building
Original Building Code and Edition Applicable at the time of Construction:		
Existing Sprinkler System?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Existing Fire Alarm System?	<input type="checkbox"/> Manual <input type="checkbox"/> Auto	<input type="checkbox"/> Manual <input type="checkbox"/> Auto
Seismic Evaluation Required?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

Original Building Code and Edition Applicable at the time of Construction:

Existing Fire Alarm System?  Manual  Auto

Seismic Evaluation Required?  YES  NO

Change of Occupancy:  YES  NO

Historic Building:  Preservation  Rehabilitation  Restoration  Reconstruction

#### SUMMARY - BUILDING DESIGN OCCUPANT LOAD

DESIGNATED AREAS OF BUILDING	Area 1	Area 2	Area 3	Area 4	Area 5
1 <sup>st</sup> FLOOR	21				
2 <sup>nd</sup> FLOOR					
3 <sup>rd</sup> FLOOR					
4 <sup>th</sup> FLOOR					
TOTAL	21	0	0	0	0

Note: Per SC Building Code Chapter 10, list individual spaces occupant load on life safety plan. Double Click to Edit Table.

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### ALLOWABLE BUILDING AREA

DESIGNATED AREAS OF BUILDING	Area 1	Area 2	Area 3	Area 4	Area 5
A. Tabular allowable area factor (NS, S1, S1R or SM as applicable) in accordance with IBC Table 506.2	A <sub>a</sub> = 9,000 SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF
Allowable Area Increase (Equations 5-1 through 5-5, as applicable)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
IBC Section 506.2.2 Equation 5-4 where:	L <sub>a</sub> = N/A	L <sub>a</sub> =	L <sub>a</sub> =	L <sub>a</sub> =	L <sub>a</sub> =
W = (L <sub>1</sub> x w <sub>1</sub> + L <sub>2</sub> x w <sub>2</sub> + L <sub>3</sub> x w <sub>3</sub> + ...) / F	w <sub>a</sub> = N/A	w <sub>a</sub> =	w <sub>a</sub> =	w <sub>a</sub> =	w <sub>a</sub> =
W = Width of public way or open space	W = N/A	W =	W =	W =	W =
L <sub>a</sub> Length of a portion of the exterior perimeter wall.	F = N/A	F =	F =	F =	F =
w <sub>a</sub> Width (= 20 feet) of public way or open space associated with that portion of the exterior perimeter wall.	P = N/A	P =	P =	P =	P =
F Building perimeter that fronts on a public way or open space having a width of 20 feet or more	I <sub>r</sub> = N/A	I <sub>r</sub> =	I <sub>r</sub> =	I <sub>r</sub> =	I <sub>r</sub> =
IBC Section 506.3 Equation 5-5 where:					
I <sub>r</sub> = [P/P - 0.25] W/30					
I <sub>r</sub> = Area factor increase factor due to frontage					
F Building perimeter that fronts on a public way or open space having a width of 20 feet or more.					
P Perimeter of entire building (feet).					
W Width of public way or open space in accordance with Equation 5-4					

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

Allowable building area per story in square feet as calculated by Equations 5-1 through 5-3. (Indicated equation used.)

IBC Section 506.2.1 Equation 5-1  
A<sub>a</sub> = A<sub>a</sub> + (N<sub>a</sub> x I<sub>r</sub>)

IBC Section 506.2.3 Equation 5-2  
A<sub>a</sub> = [A<sub>a</sub> + (N<sub>a</sub> x I<sub>r</sub>)] x S<sub>a</sub>

IBC Section 506.2.4 Equation 5-3  
A<sub>a</sub> = [A<sub>a</sub> + (N<sub>a</sub> x I<sub>r</sub>)]

N<sub>a</sub> Tabular allowable area factor in accordance with Table 506.2 for a non-sprinklered building (regardless of whether the building is sprinklered)

S<sub>a</sub> Actual number of building stories above grade plane, not to exceed three (3). For buildings equipped throughout with automatic sprinkler system installed in accordance with SCBC Section 903.3.1.2, use the actual number of building stories above grade plane, not to exceed four (4).

DESIGNATED AREAS OF BUILDING	Area 1	Area 2	Area 3	Area 4	Area 5
N <sub>a</sub> = N/A	N <sub>a</sub> =	N <sub>a</sub> =	N <sub>a</sub> =	N <sub>a</sub> =	N <sub>a</sub> =
S <sub>a</sub> = N/A	S <sub>a</sub> =	S <sub>a</sub> =	S <sub>a</sub> =	S <sub>a</sub> =	S <sub>a</sub> =
A <sub>a</sub> = N/A SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF	A <sub>a</sub> = SF
MAXIMUM AREA PER STORY	9,000 SF	SF	SF	SF	SF
AREA AS DESIGNATED PER STORY (Repeat for each story)	2,160 SF	SF	SF	SF	SF

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### BUILDING HEIGHT

DESIGNATED AREAS OF BUILDING	Area 1	Area 2	Area 3
HEIGHT	DESIGNED ALLOWED	DESIGNED ALLOWED	DESIGNED ALLOWED
In Feet	Table 504.3 15' - 8"	40' - 0"	
In Stories	Table 504.4 1	1	

Note: Allowable Building Height & Number of Stories Above Grade Plane

#### BUILDING HEIGHT

DESIGNATED AREAS OF BUILDING	Area 4	Area 5
HEIGHT	DESIGNED ALLOWED	DESIGNED ALLOWED
In Feet	Table 504.3	
In Stories	Table 504.4	

Note: Allowable Building Height & Number of Stories Above Grade Plane

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### GENERAL FIRE PROTECTION REQUIREMENTS

DESIGNATED AREAS OF BUILDING	Building Code	Area 1	Area 2	Area 3	Area 4	Area 5
SEPARATIONS						
Fire Wall Required	Section 706	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fire Barrier Required	Section 707	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fire Partition Required	Section 708	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Smoke Barriers Required	Section 709	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Smoke Partitions Required	Section 710	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fireblocking	Section 718.2	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Draftstopping	Sections 718.3 & 718.4	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Incidental Use Area						
One hour fire barrier	Section 509.4	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Sprinkler system plus smoke resistance		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
ALARM & DETECTION						
Fire Alarm and Detection System		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fire Alarm	SCFC Section 907	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Mass Notification		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Emergency voice/alarm comm.		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Emergency Alarm Systems Required	SCFC Section 908	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
SUPPRESSION						
Automatic Sprinkler System Provided	SCFC Section 903	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### OTHER FIRE AND LIFE SAFETY FEATURES

DESIGNATED AREAS OF BUILDING	Building Code	Area 1	Area 2	Area 3	Area 4	Area 5
Alternative Automatic Fire Extinguishing						
Kitchen Hoods	SCFC Section 904	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Other		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Standpipes Required	SCFC Section 905	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Portable extinguishers required		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
General Building	SCFC Section 906	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Kitchen		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Labs		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Smoke Control System	Section 909	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Smoke & Heat Removal Required	SCFC 910	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fire Department Connections	Section 912	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Carbon Monoxide Detection	Section 915	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Gas Detection Systems	Section 916	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Emergency Responder Radio Coverage	Section 918	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Fire Apparatus Access and Water Line	SCFC 903 & 507	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
2-way Communication Required	Section 1009.8	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Area of Refuge (e.g. Separation, Two-Way Communication, and Instructions)	Sections 1009.6, 1009.9, 1009.10 & 1009.11	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Exterior Area for Assisted Rescue (e.g. Separation, Openness, and Instructions)	Sections 1009.7, 1009.9, 1009.10 & 1009.11	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Safe Dispersal Area (Add others as needed)	Section 1028.5	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
(Add others as needed)		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

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**SOUTH CAROLINA STATE DEPARTMENT OF EDUCATION**

### Form F3 – Building Code Analysis

#### FIRE RESISTANCE RATING OF BUILDING ELEMENTS

DESIGNATED AREAS OF BUILDING	Building Code	Area 1	Area 2	Area 3	Area 4	Area 5
Primary Structural Frame	Table 601	0				
As Required, Hrs		0				
As Designed, Hrs		0				
Testing Agency & Design No.(UL, FM, etc)		N/A				
Wall/Partition Key Code		N/A				
Bearing Walls, Exterior	Table 601	0				
As Required, Hrs		0				
As Designed, Hrs		0				
Testing Agency & Design No.(UL, FM, etc)		N/A				
Wall/Partition Key Code		N/A				
Bearing Walls, Interior	Table 601	0				
As Required, Hrs		0				
As Designed, Hrs		0				
Testing Agency & Design No.(UL, FM, etc)		N/A				







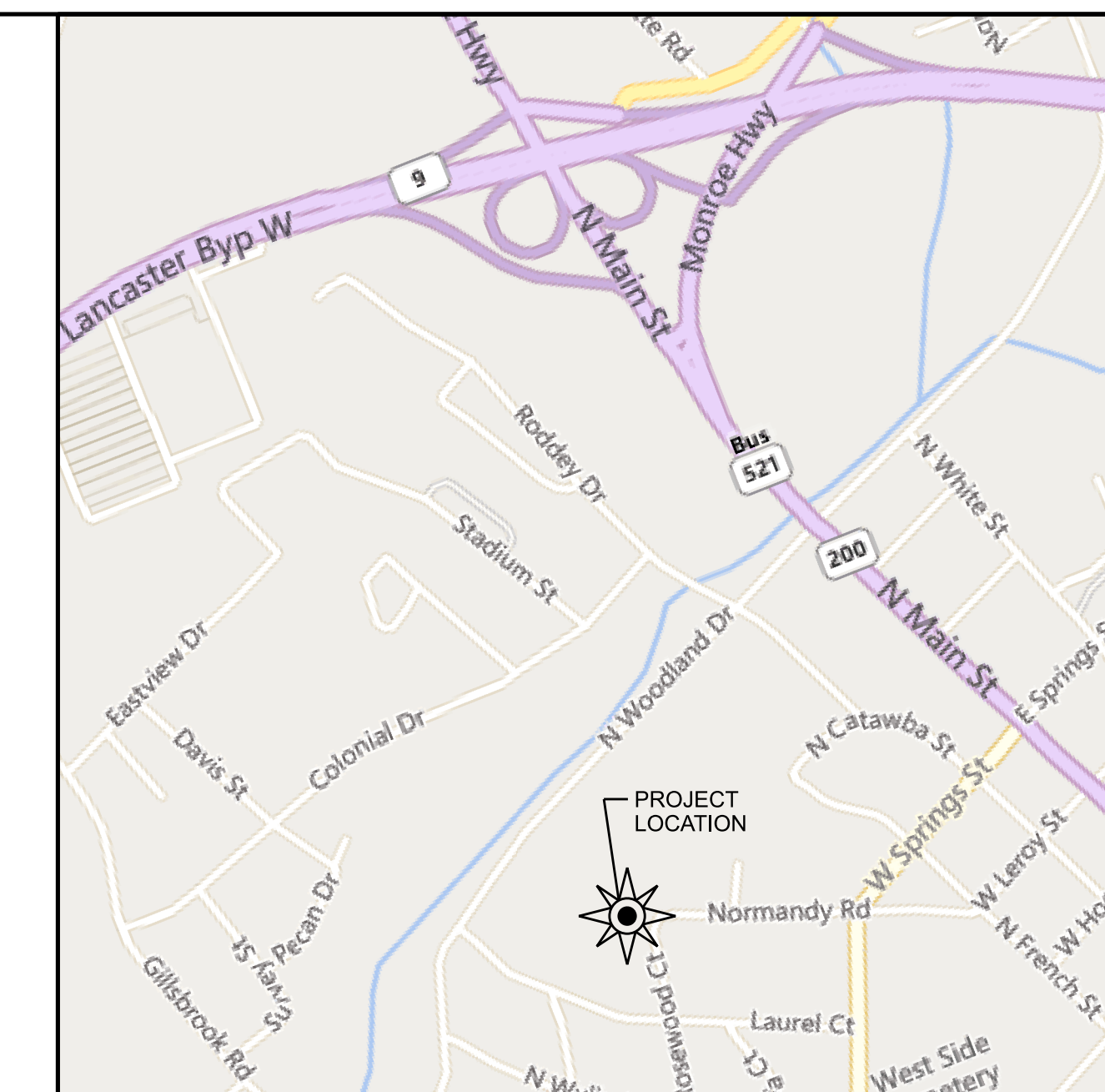




PROJECT:

# LANCASTER COUNTY SCHOOL DISTRICT CAREER CENTER GREENHOUSE

625 NORMANDY ROAD  
LANCASTER, SC 29720



PROJECT LOCATION MAP  
SCALE: NTS



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LANCASTER COUNTY  
SCHOOL DISTRICT  
CAREER CENTER  
GREENHOUSE

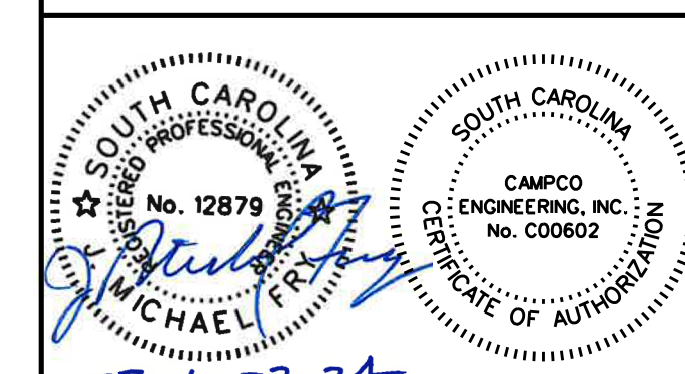
625 NORMANDY RD,  
LANCASTER, SC 29720



REVISIONS

NO.	DATE	DESCRIPTION

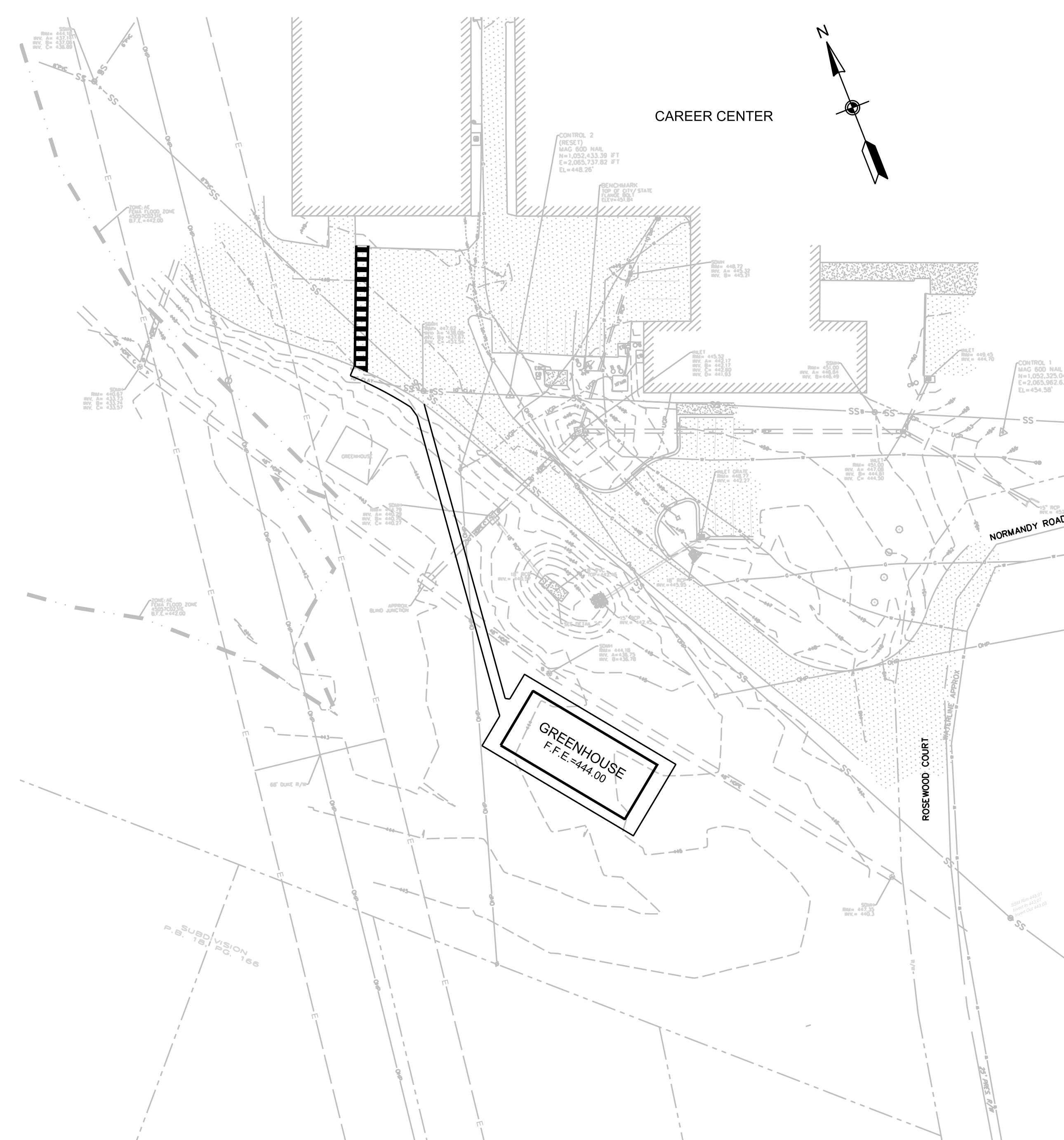
COVER SHEET



07-10-2024

CE: 9901 ISSUED: 07-10-2024  
SCALE: 1"=40' CAD FILE: 9901CVC100

C100



KEY MAP  
SCALE: 1"=40'

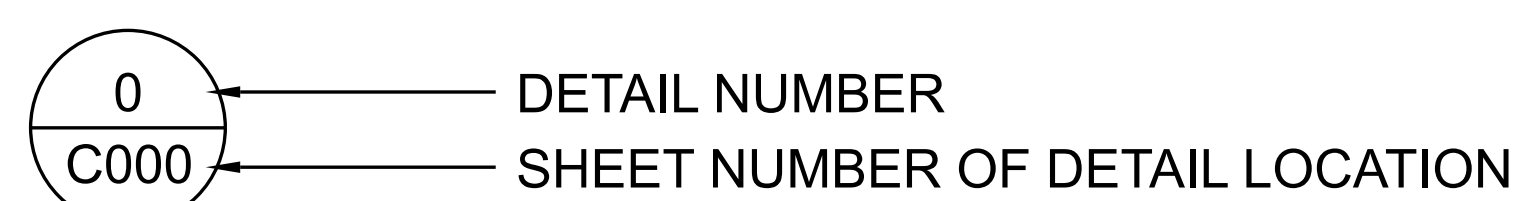
### OWNER

LANCASTER COUNTY SCHOOL DISTRICT  
300 S. CATAWBA STREET  
LANCASTER, SC 29720  
P: (803) 416-8806  
WWW.LANCASTERCSD.COM

### CIVIL ENGINEER

CAMPCO ENGINEERING, INC  
156 OAKLAND AVENUE, SUITE 100  
ROCK HILL, SC 29730  
P: (803) 327-7121  
WWW.CAMPCOENGINEERING.COM

### DETAIL REFERENCE SYMBOL



### CIVIL PLAN INDEX

- C100 COVER SHEET
- C200 SURVEY PLAN
- C300 SITE PLAN
- C301 SITE DETAILS
- C400 GRADING/ DRAINAGE PLAN
- C500 EROSION CONTROL PLAN
- C501 EROSION CONTROL DETAILS
- C502 EROSION CONTROL DETAILS
- C600 WATER & SANITARY SEWER SERVICE PLAN
- C601 WATER & SANITARY SEWER SERVICE DETAILS

### GENERAL CONSTRUCTION NOTES

1. EXISTING PLANIMETRIC AND TOPOGRAPHIC INFORMATION WAS OBTAINED FROM SURVEY BY DONALDSON GARRETT & ASSOCIATES, INC. DATED FEBRUARY 22, 2024.
2. THE CONTRACTOR SHALL VERIFY THE EXISTING CONDITIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES IN THE FIELD OR ON THE PLANS.
3. MAINTENANCE OF TRAFFIC DURING CONSTRUCTION SHALL BE CONDUCTED IN ACCORDANCE WITH SCDOT STANDARDS AND SPECIFICATIONS.
4. ALL CONSTRUCTION SHALL COMPLY WITH THE APPLICABLE SAFETY STANDARDS AND REQUIREMENTS.
5. ALL EXISTING UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE, AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR BEFORE BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL CONTACT SOUTH CAROLINA 811 AT WWW.SC811.COM OR CALL 811 - 72 HOURS PRIOR TO DIGGINGS.
6. THE CONTRACTOR SHALL COORDINATE RELOCATION/REMOVAL OF EXISTING UTILITIES WITH THE UTILITY OWNER AS APPLICABLE.
7. THE CONTRACTOR SHALL REPAIR ALL EXISTING CONDITIONS DAMAGED BY CONSTRUCTION TO THE ORIGINAL CONDITION.
8. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS FOR THE PROJECT AND THE REQUIREMENTS OF CITY OF LANCASTER, SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (SCDHEC), AND THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION (SCDOT), WHERE APPLICABLE.
9. FOR SCDOT STANDARD DRAWINGS REFERENCED IN THE CONSTRUCTION PLANS SEE THE SCDOT STANDARD DRAWING MANUAL.
10. ALL MATERIALS, CONSTRUCTION, AND PLANS ARE TO COMPLY WITH CURRENT CITY OF LANCASTER STANDARD SPECIFICATIONS AND DETAILS.
11. THE DESIGN OF ALL EROSION CONTROL AND STORMWATER MANAGEMENT FEATURES FOR WATER QUALITY AND WATER QUANTITY AND OTHER BMPs, STORM DRAIN PIPING AND MANHOLES, CULVERTS, DITCHES, SWALES AND OTHER CHANNELS, ALL OUTFALLS TO THEIR RECEIVING WATERS, IN ADDITION TO ALL ROAD INFRASTRUCTURE, SANITARY SEWER AND WATER UTILITIES, AS PRESENTED HEREIN, HAS BEEN COMPLETED FROM FIELD SURVEY INFORMATION PREPARED BY A LICENSED SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR.









**Campo Engineering, Inc.**  
Consulting Engineers since 1974

156 OAKLAND AVENUE, ROCK HILL, SC 29730  
(803) 327-7121 WWW.CAMPOENGINEERING.COM

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# LANCASTER COUNTY SCHOOL DISTRICT CAREER CENTER GREENHOUSE

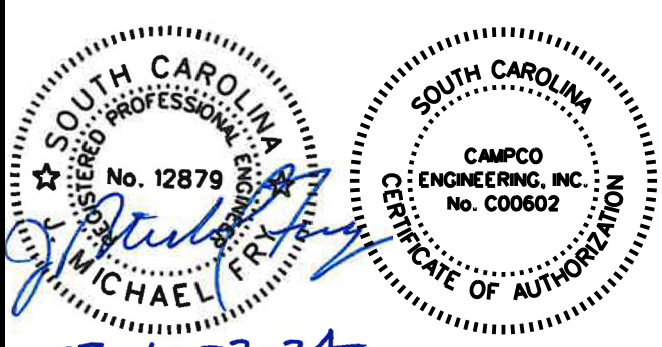
625 NORMANDY RD,  
LANCASTER, SC 29720



### REVISIONS

NO.	DATE	DESCRIPTION

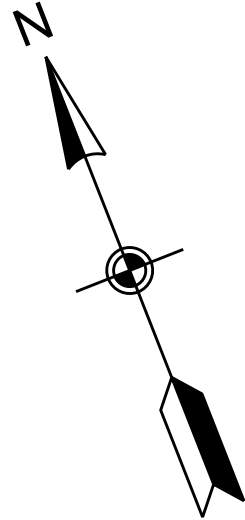
## SITE PLAN



07-10-2024

CE: 9901 ISSUED: 07-10-2024  
SCALE: 1"=20' CAD FILE: 9901STC300

# C300

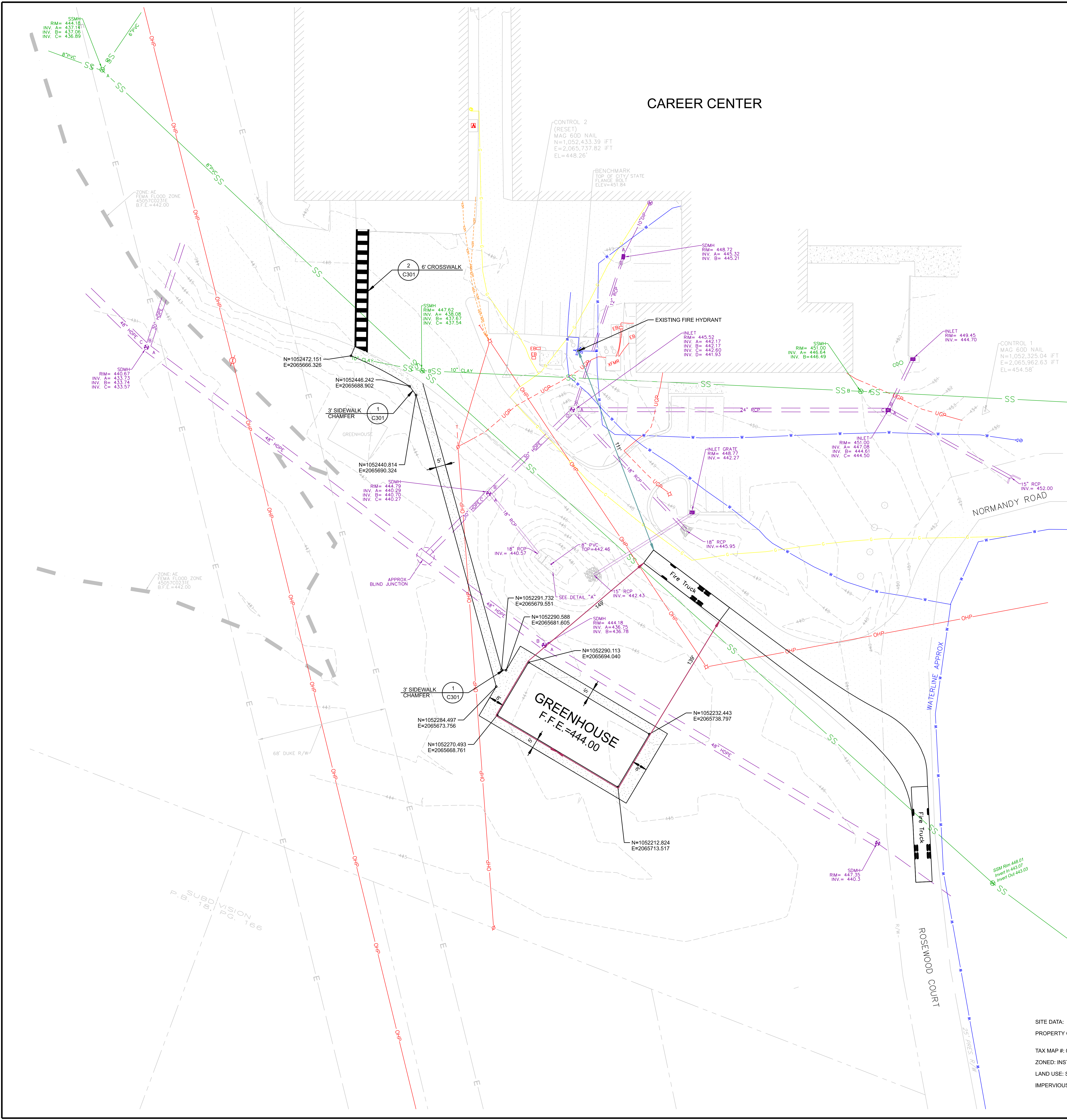


## CAREER CENTER

CONTROL 2 (RESET)  
MAG 60D NAIL  
N=1,052,433.39 FT  
E=2,065,737.82 FT  
EL=448.26'

BENCHMARK  
TOP OF CITY STATE  
FLANGE BOT  
ELEV=451.84

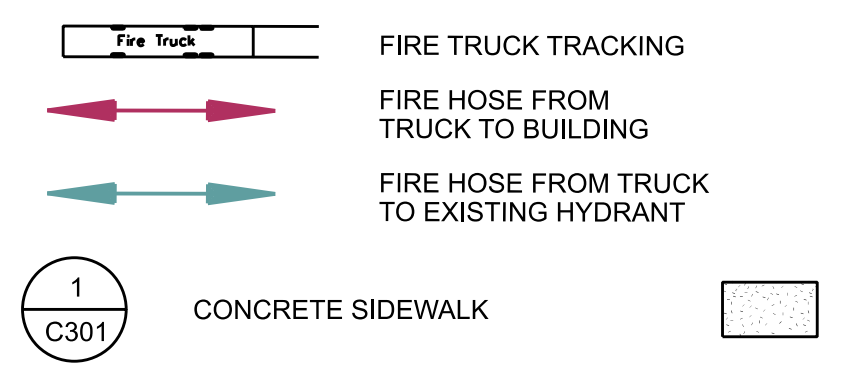
CONTROL 1  
MAG 60D NAIL  
N=1,052,325.04 FT  
E=2,065,962.63 FT  
EL=454.58'



### STAKING NOTES:

1. ALL DIMENSIONS ARE TO BACK OF CURB WHERE CURB AND GUTTER IS SHOWN, TO FACE OF BUILDING, TO EDGE OF PAVEMENT, OR TO PROPERTY LINE UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS ARE 90 DEGREES UNLESS OTHERWISE NOTED.
3. ALL RADII ARE 3 FEET UNLESS OTHERWISE NOTED.
4. REFER TO ARCHITECTURAL PLANS FOR ALL BUILDING DIMENSIONS.
5. COORDINATE CONSTRUCTION AND LOCATION OF SIDEWALKS AND ACCESS DOORS WITH ARCHITECTURAL PLANS.

### LEGEND



SITE DATA:  
PROPERTY OWNER: LANCASTER COUNTY BOARD OF EDUCATION  
TAX MAP #: 0067L-0D-013.00  
ZONED: INSTITUTIONAL  
LAND USE: SCHOOL  
IMPERVIOUS CALCULATIONS: BUILDING- 2,336 S.F.  
CONCRETE- 2,399 S.F.



SCALE: 1" = 20'





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LANCASTER COUNTY  
SCHOOL DISTRICT  
CAREER CENTER  
GREENHOUSE

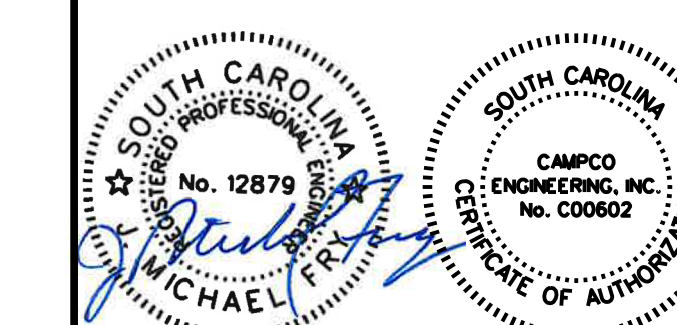
625 NORMANDY RD,  
LANCASTER, SC 29720



REVISIONS

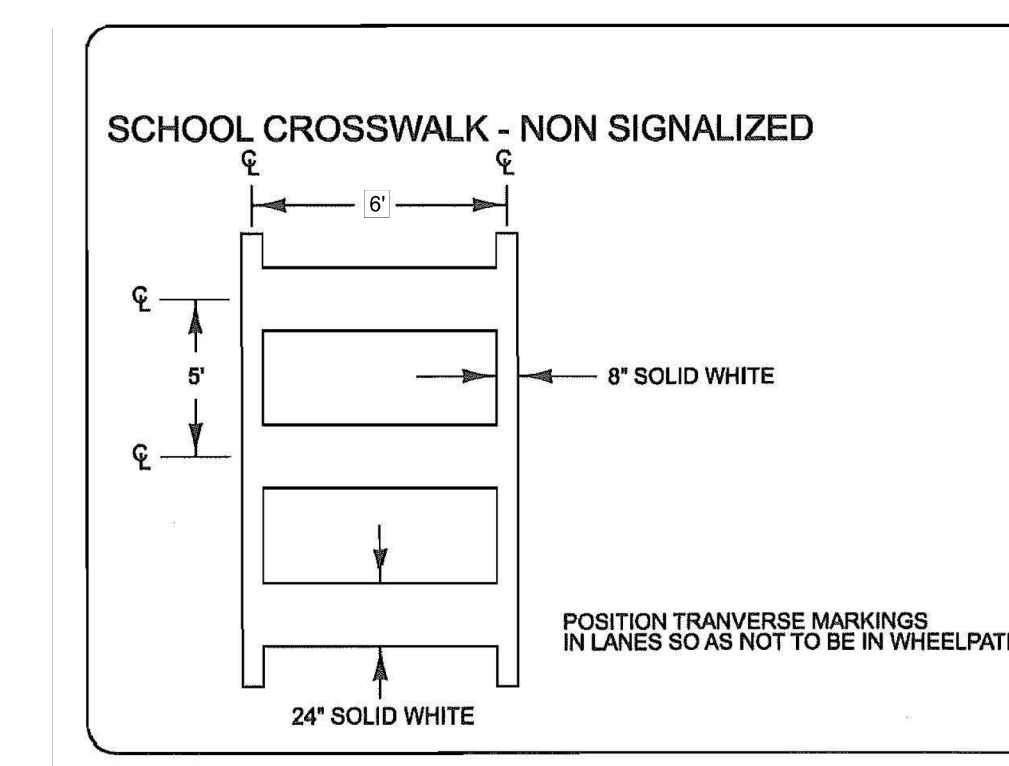
NO.	DATE	DESCRIPTION

SITE DETAILS

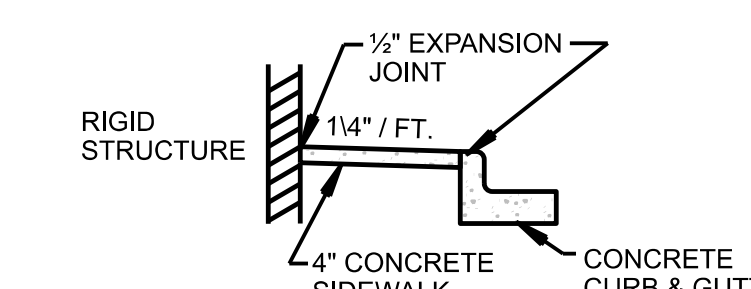
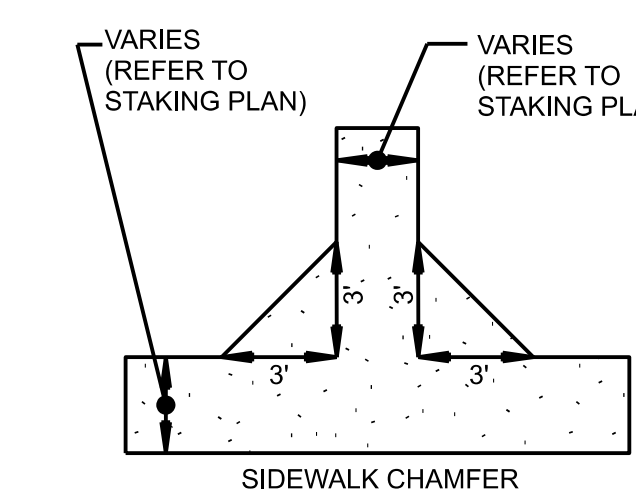
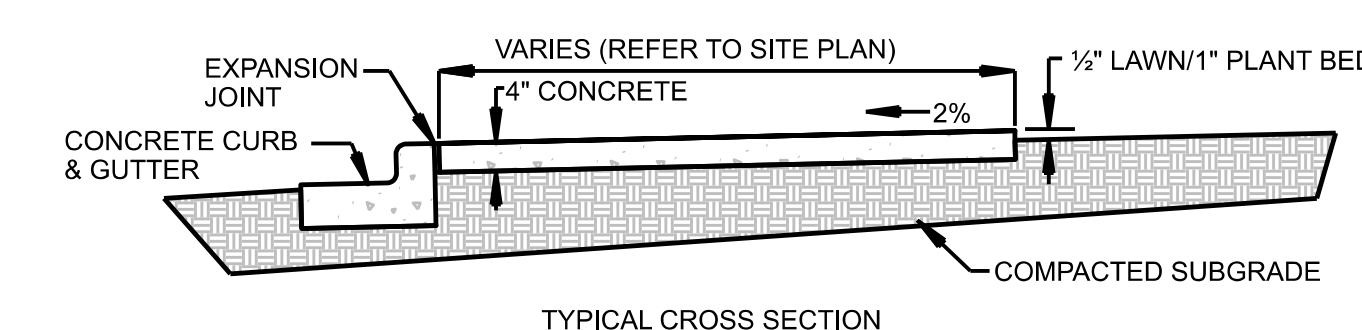
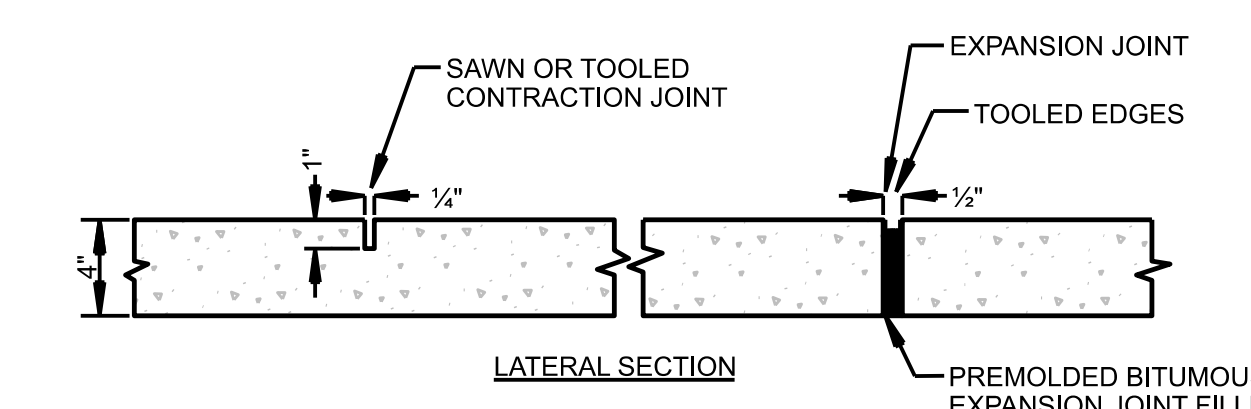
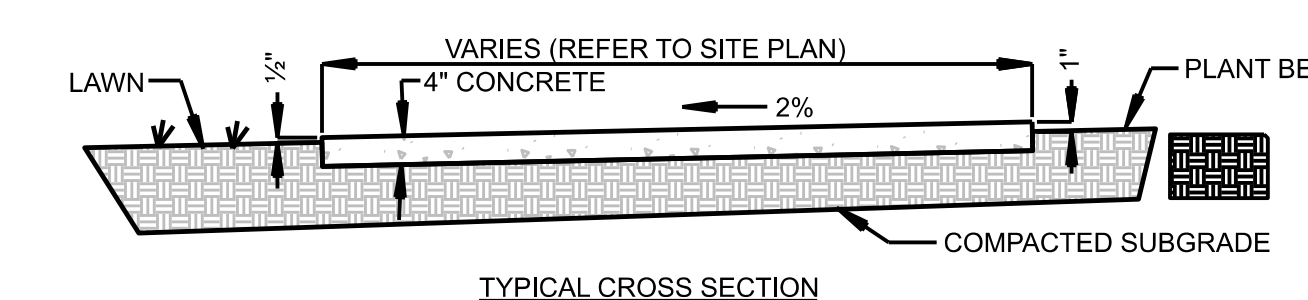


CE: 9901      ISSUED: 07-10-2024  
SCALE: NA      CAD FILE: 9901DTC301

C301



2  
C301 NTS 6' CROSSWALK



GENERAL NOTES:  
1. A GROOVE JOINT 1" DEEP WITH A 1/8" RADI SHALL BE REQUIRED IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT IS REQUIRED AT 45' INTERVALS. A 1/2" EXPANSION JOINT IS REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.  
2. CONCRETE SHALL BE 3000 P.S.I. IN 28 DAYS.

1  
C301 NTS CONCRETE WALK

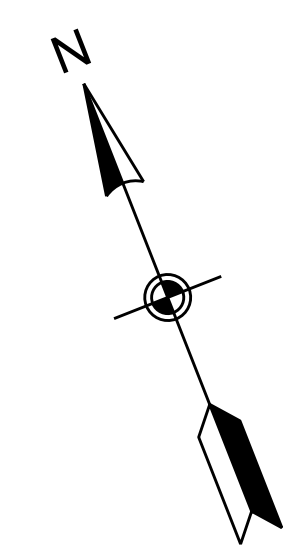




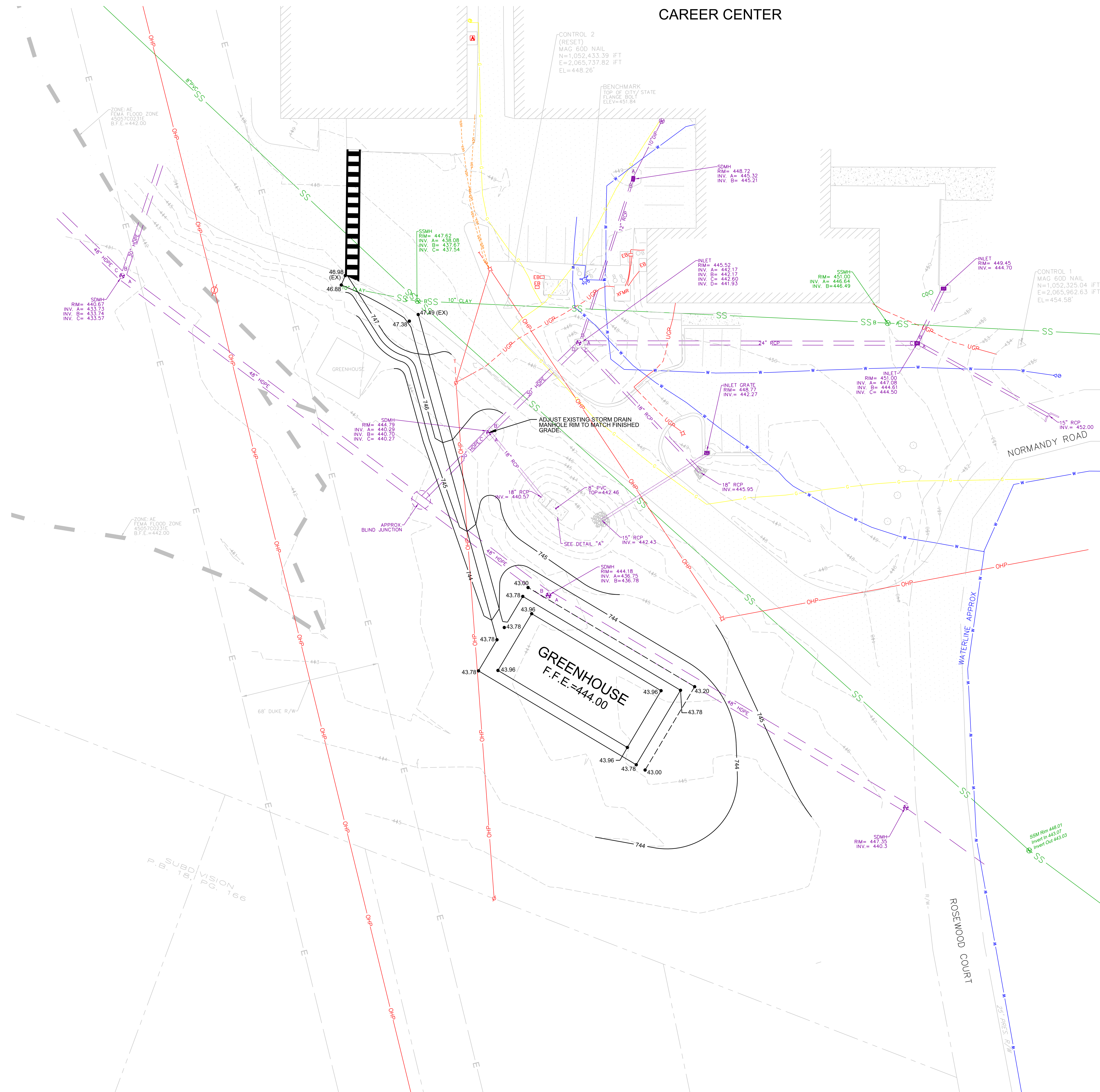
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### CAREER CENTER



### LANCASTER COUNTY SCHOOL DISTRICT CAREER CENTER GREENHOUSE

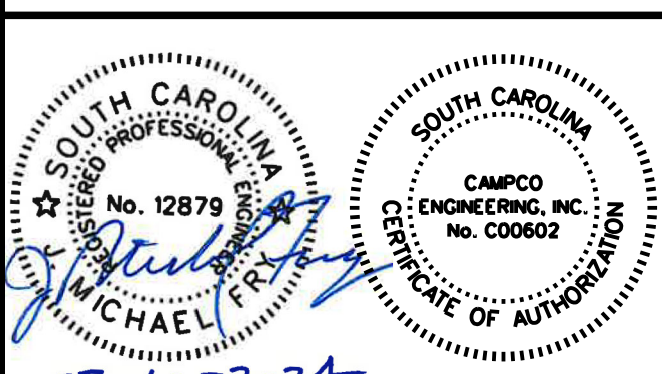
625 NORMANDY RD,  
LANCASTER, SC 29720



#### REVISIONS

NO.	DATE	DESCRIPTION

### GRADING/STORM DRAINAGE PLAN



- GRADING NOTES:
1. CONTOURS ARE TO FINISH GRADE.
  2. GRADE AND FINISH AREAS SUCH THAT POSITIVE DRAINAGE OCCURS AS DESIGNED.
  3. FINISHED GRADE SPOT ELEVATIONS ARE IDENTIFIED AS ●.
  4. ADD 400 TO ALL SPOT ELEVATIONS UNLESS OTHERWISE NOTED.

CE: 9901      ISSUED: 07-10-2024  
SCALE: 1"=20'      CAD FILE: 9901GPDRC400



# C400

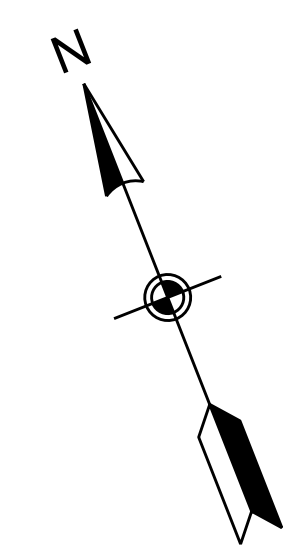




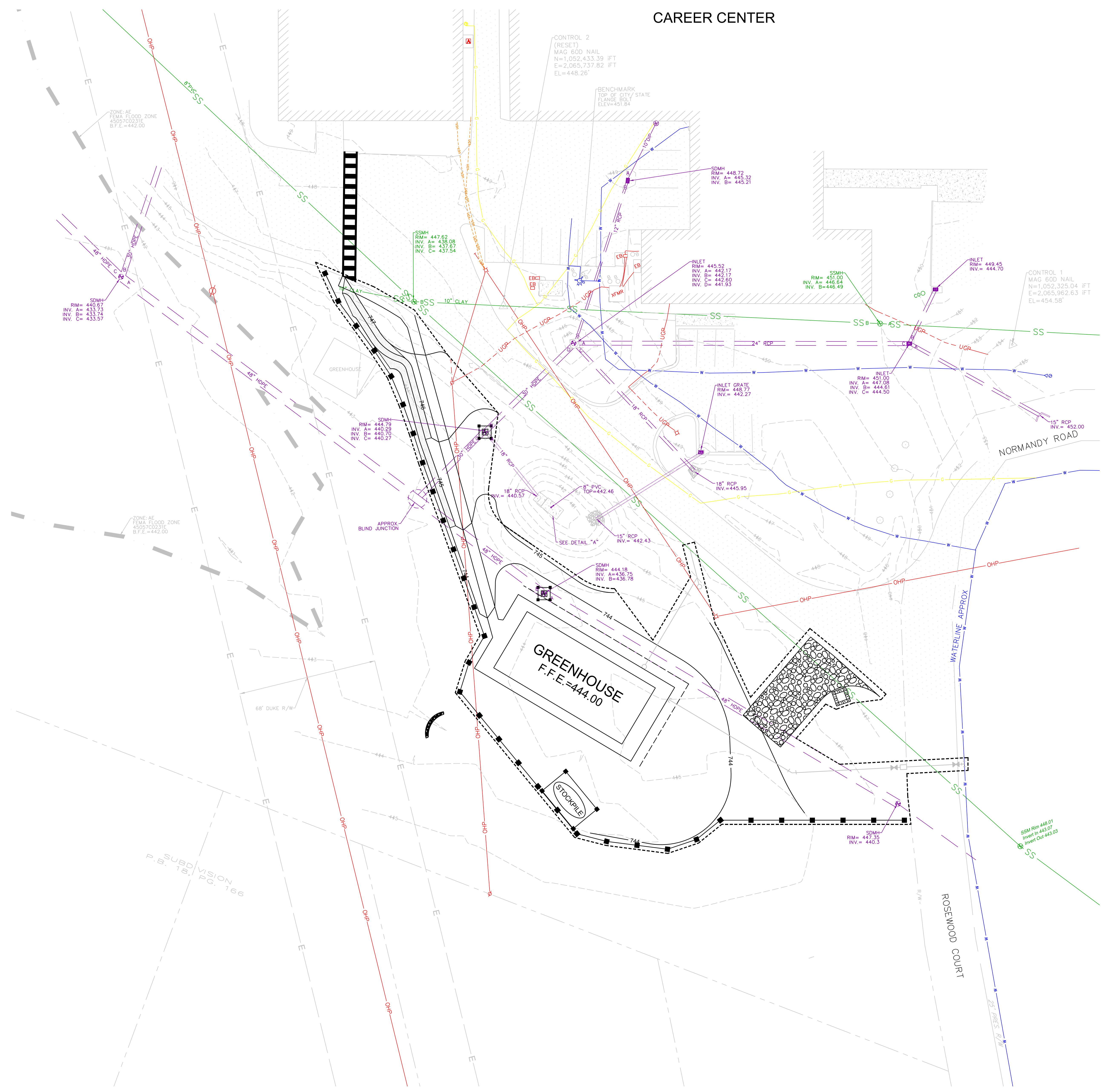
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### CAREER CENTER



#### MAINTENANCE NOTES

1. INSPECT SEDIMENT FENCE EVERY 7 CALENDAR DAYS AND WITHIN 24-HOURS AFTER EACH RAINFALL EVENT THAT PRODUCES 1/2-INCHES OR MORE OF PRECIPITATION. CHECK FOR SEDIMENT BUILDUP AND FENCE INTEGRITY. CHECK WHERE RUNOFF HAS ERODED A CHANNEL BENEATH THE FENCE, OR WHERE THE FENCE HAS SAGGED OR COLLAPSED BY FENCE OVERTOPPING.
2. IF THE SEDIMENT FENCE FABRIC TEARS, BEGINS TO DECOMPOSE, OR IN ANY WAY BECOMES INEFFECTIVE, REPLACE THE SECTION OF FENCE IMMEDIATELY.
3. REMOVE SEDIMENT ACCUMULATED ALONG THE FENCE WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE, ESPECIALLY IF HEAVY RAINS ARE EXPECTED.
4. REMOVE TRAPPED SEDIMENT FROM THE SITE OR STABILIZE IT ON SITE.
5. REMOVE SILT FENCE WITHIN 30 DAYS AFTER FINAL STABILIZATION IS ACHIEVED.
6. PERMANENTLY STABILIZE DISTURBED AREAS RESULTING FROM FENCE REMOVAL.

#### EROSION CONTROL NOTES:

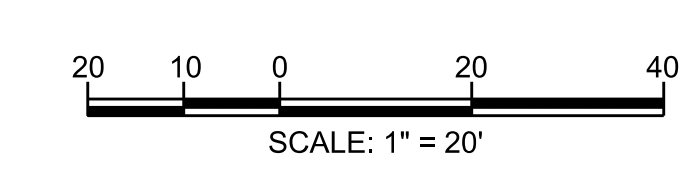
1. LOCATION OF EXISTING UTILITIES AND OTHER SITE FEATURES SHALL BE FIELD VERIFIED PRIOR TO INITIATING CONSTRUCTION ACTIVITIES. THE ENGINEER SHALL BE NOTIFIED WITH ANY DISCREPANCIES.
2. AREA OF DISTURBANCE: 0.60 ACRES
3. REFER TO SHEET C501 AND SPECIFICATIONS FOR GRASSING REQUIREMENTS.
4. EROSION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE SCDHEC STORM WATER MANAGEMENT BMP HANDBOOK.
5. CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES TO CONTROL EROSION AND/OR OFF-SITE SEDIMENT AS REQUIRED BY SCDHEC AND/OR THE LOCAL GOVERNING AGENCY.
6. REFER TO ACCOMPANYING PROJECT MANUAL FOR ADDITIONAL INFORMATION. THIS SHEET FOR EROSION CONTROL, CONSTRUCTION SCHEDULE, AND SHEET C501 FOR EROSION CONTROL MAINTENANCE SCHEDULE/STANDARD NOTES.
7. THERE IS NO FLOOD PLAN PRESENT ON THIS SITE. FIRM PANEL NO. 45057CO231E / 45057CO232E, COMMUNITY: CITY OF LANCASTER, DATED: 05/15/2017 / 05/16/2017
8. SLOPE PROTECTION MATTING SHALL BE SC 150 AS MANUFACTURED BY NORTH AMERICAN GREEN OR APPROVED EQUAL. MATTING SHALL BE INSTALLED ON ALL SLOPES 4:1 AND STEEPER IN ACCORDANCE TO THE MANUFACTURERS REQUIREMENTS.
9. UNSUITABLE / TOPSOIL STOCKPILE(S) SHALL BE CONSTRUCTED WITHIN THE AREA IDENTIFIED ON THE PLANS AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE. FINAL GRADES OF STOCKPILE SHALL BE UNIFORM AND STABILIZED AT A MAXIMUM HEIGHT OF 10' AND 4:1 SIDE SLOPES.
10. WITHIN SEVEN CALENDAR DAYS, TEMPORARY STABILIZATION MEASURES SHALL BE COMPLETED ON TOPSOIL STOCKPILES. THE BURIAL OF ANY CELLULOSE DEBRIS WILL NEED TO BE PLATTED. THE REMOVAL OF SOIL OR WASTE FROM THE PROPOSED SITE WILL NEED TO BE TAKEN TO A PERMITTED LANDFILL OR ANOTHER PERMITTED SITE WITH A VALID LAND DISTURBANCE PERMIT. THE ASSOCIATED SITE WOULD ALSO BE REQUIRED TO PROVIDE THE APPROPRIATE EROSION AND SEDIMENT CONTROL NECESSARY TO RETAIN SEDIMENT ON SITE (WITHIN THE LIMITS OF DISTURBANCE PERMITTED).

#### EROSION CONTROL CONSTRUCTION SCHEDULE

1. OBTAIN SEDIMENT AND EROSION CONTROL PERMIT FROM SCDHEC. SCHEDULE A PRE-CONSTRUCTION MEETING TO CONTACT THE SCDHEC EDC REGIONAL OFFICE 48 HOURS PRIOR TO BEGINNING LAND DISTURBING ACTIVITIES.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCES/ EXITS.
3. CLEAR AND GRUB AREAS FOR INSTALLATION OF PERIMETER CONTROLS.
4. INSTALL SEDIMENT PROTECTION FOR FENCES, TUBES, AND INLETS.
5. SCHEDULE AN ON-SITE CONFERENCE WITH THE OWNER'S REPRESENTATIVE AND SCDHEC REPRESENTATIVE, IF REQUIRED BY THE PERMIT.
6. CLEAR AND GRUB REMAINDER OF SITE. STRIP TOPSOIL AND STORE IN LOCATION SHOWN ON PLANS. INSTALL SILT FENCE AROUND TOPSOIL STOCKPILE ON ALL SIDES AND STABILIZE AS SOON AS POSSIBLE.
7. BEGIN SITE GRADING. GRADE SITE TO MAINTAIN EXISTING DRAINAGE PATTERNS.
8. GRADE BUILDING PAD.
9. COMPLETE SITE GRADING. CONSTRUCT ADDITIONAL PERIMETER CONTROLS AS NECESSARY FOR CONSTRUCTION STAGING.
10. APPLY STABILIZATION MEASURES (TEMPORARY OR PERMANENT SEEDING) AS SOON AS GRADING IS COMPLETE. (REFER TO MAINTENANCE SCHEDULE.)
11. INSTALL WATER & SEWER SERVICES, AND SIDEWALK.
12. AFTER SITE IS STABILIZED, REMOVE ALL REMAINING TEMPORARY EROSION CONTROL MEASURES AND REPAIR AND STABILIZE DISTURBED AREAS. ACQUIRE PERMISSION FROM OWNER'S REPRESENTATIVE AND SCDHEC REPRESENTATIVE, PRIOR TO REMOVAL OF EROSION AND SEDIMENT CONTROL MEASURES.

#### LEGEND

- SC-07  
C502 TYPE A - FABRIC INLET PROTECTION
- SC-05  
C502 SEDIMENT TUBE
- SC-03  
C501 SILT FENCE
- RC-07  
C501 CONCRETE WASHOUT
- 1  
C502 SLOPE PROTECTION MATTING (REFER TO NOTE 8)
- SC-08  
C501 STABILIZED CONSTRUCTION ENTRANCE
- SC-10  
C501 STOCKPILE AREA WITH SURROUNDING SILT FENCE (REFER TO NOTE 9)
- CONSTRUCTION LIMITS



## LANCASTER COUNTY SCHOOL DISTRICT CAREER CENTER GREENHOUSE

625 NORMANDY RD,  
LANCASTER, SC 29720



#### REVISIONS

NO.	DATE	DESCRIPTION

## EROSION CONTROL PLAN

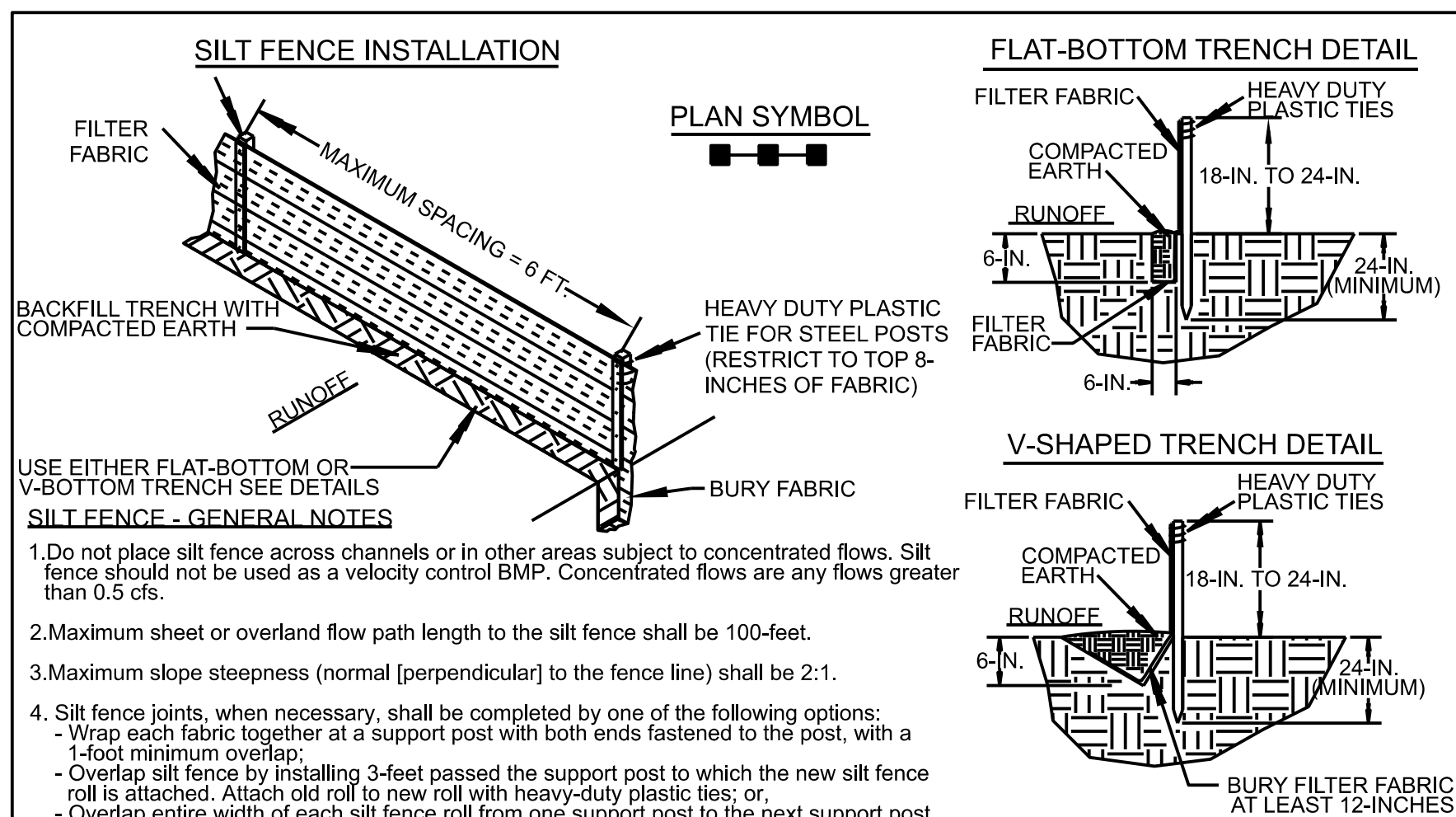


07-10-2024

CE: 9901 ISSUED: 07-10-2024  
SCALE: 1"=20' CAD FILE: 9901ECC500

# C500





**SILT FENCE - GENERAL NOTES**

- Do not place silt fence across channels or in other areas subject to concentrated flows. Silt fence should not be used as a velocity control BMP. Concentrated flows are any flows greater than 0.5 cfs.
- Maximum sheet or overland flow path length to the silt fence shall be 100-feet.
- Maximum slope steepness (normal [perpendicular] to the fence line) shall be 2:1.
- Silt fence joints, when necessary, shall be completed by one of the following options:
  - Wrap each fabric together at a support post with both ends fastened to the post, with a 3-foot minimum overlap;
  - Overlap silt fence by installing 3-feet passed the support post to which the new silt fence roll is attached. Attach old roll to new roll with heavy-duty plastic ties; or
  - Overlap entire width of each silt fence roll from one support post to the next support post.
- Attach filter fabric to the steel posts using heavy-duty plastic ties that are evenly spaced within the top 8-inches of the fabric.
- Install the silt fence perpendicular to the direction of the stormwater flow and place the silt fence the proper distance from the toe of steep slopes to provide sediment storage and access for maintenance and removal.
- Install Silt Fence Checks (Tie-Backs) every 50-100 feet, dependent on slope, along silt fence that is installed with slope and where concentrated flows are expected or are documented along the proposed/installed silt fence.

**SILT FENCE - POST REQUIREMENTS**

- Silt Fence posts must be 48-inch long steel posts that meet, at a minimum, the following physical characteristics:
  - Composed of a high strength steel with a minimum yield strength of 50,000 psi.
  - Include a standard "T" section with a nominal face width of 1.38-inches and a nominal "T" length of 1.48-inches.
  - Weight 1.25 pounds per foot (± 8%).
- Posts shall be equipped with projections to aid in fastening of filter fabric.
- Steel posts may need to have a metal soil stabilization plate welded near the bottom when installed along steep slopes or installed in loose soils. The plate should have a minimum cross section of 17-square inches and be composed of 1/2 gauge steel, at a minimum. The metal soil stabilization plate should be completely buried.
- Install posts to a minimum of 24-inches. A minimum height of 1- to 2-inches above the fabric shall be maintained, and a maximum height of 3 feet shall be maintained above the ground.
- Post spacing shall be at a maximum of 6-feet on center.

**SILT FENCE - FABRIC REQUIREMENTS**

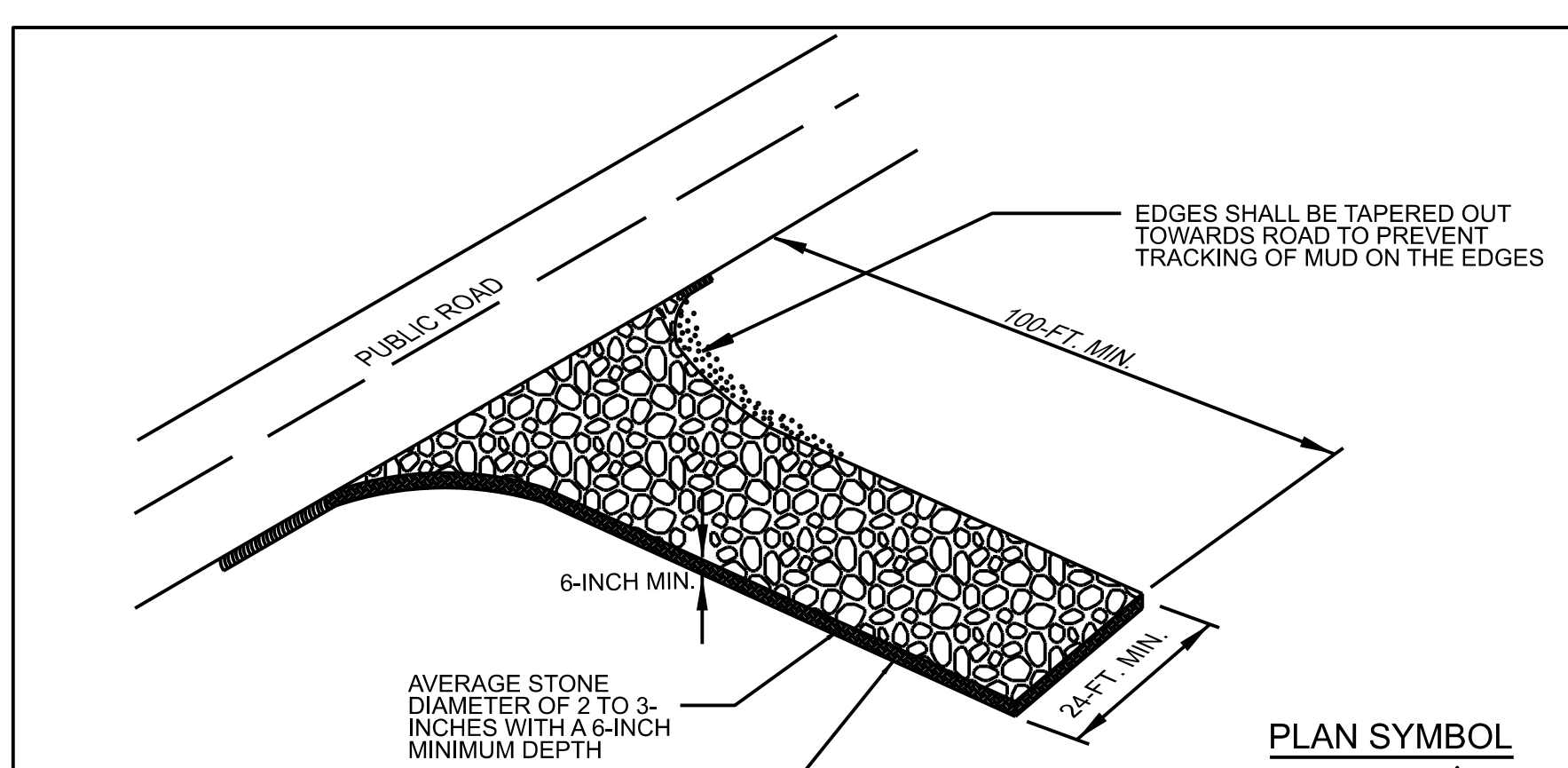
- Silt fence must be composed of woven geotextile filter fabric that consists of the following requirements:
  - Composed of fibers consisting of long chain synthetic polymers of at least 85% by weight of polyolefins, polyesters, or polyamides that are formed into a network such that the filaments or yarns retain dimensional stability relative to each other.
  - Free of any treatment or coating which might adversely affect its physical properties after installation.
  - Free of any defects or flaws that significantly affect its physical and/or filtering properties; and
  - Have a minimum width of 36-inches.
- Use only fabric appearing on SC DOT's Qualified Products Listing (QPL), Approval Sheet #34, meeting the requirements of the most current edition of the SC DOT Standard Specifications for Highway Construction.
- 12-inches of the fabric should be placed within excavated trench and toed in when the trench is backfilled.
- Filter fabric shall be purchased in continuous rolls and cut to the length of the barrier to avoid joints.
- Filter Fabric shall be installed at a minimum of 24-inches above the ground.
- Wire backed silt fence is required where contributing slope exceeds 3%.

South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-03 Page 1 of 2  
 FEBRUARY 2014 DATE  
 NOT TO SCALE

**SILT FENCE - INSPECTION & MAINTENANCE**

- The key to functional silt fence is weekly inspections, routine maintenance, and regular sediment removal.
- Regular inspections of silt fence shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
- Attention to sediment accumulations along the silt fence is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
- Remove accumulated sediment when it reaches 1/3 the height of the silt fence.
- Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
- Check for areas where stormwater runoff has eroded a channel beneath the silt fence, or where the fence has sagged or collapsed due to runoff overtopping the silt fence. Install checks/tie-backs and/or reinstall silt fence, as necessary.
- Check for tears within the silt fence, areas where silt fence has begun to decompose, and for any other circumstance that may render the silt fence ineffective. Remove damaged silt fence and reinstall new silt fence immediately.
- Silt fence should be removed within 30 days after final stabilization is achieved and once it is removed, the resulting disturbed area shall be permanently stabilized.

South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-03 PAGE 2 of 2  
 FEBRUARY 2014 DATE  
 GENERAL NOTES



**CONSTRUCTION ENTRANCE - GENERAL NOTES**

- Stabilized construction entrances should be used at all points where traffic will egress/ingress a construction site onto a public road or any impervious surfaces, such as parking lots.
- Install a non-woven geotextile fabric prior to placing any stone.
- Install a culvert pipe across the entrance when needed to provide positive drainage.
- The entrance shall consist of 2-inch to 3-inch D50 stone placemat a minimum depth of 6-inches.
- Minimum dimensions of the entrance shall be 24-feet wide by 100-feet long, and may be modified as necessary to accommodate site constraints.
- The edges of the entrance shall be tapered out towards the road to prevent tracking at the edge of the entrance.
- Divert all surface runoff and drainage from the stone pad to a sediment trap or basin or other sediment trapping structure.
- Limestone may not be used for the stone pad.

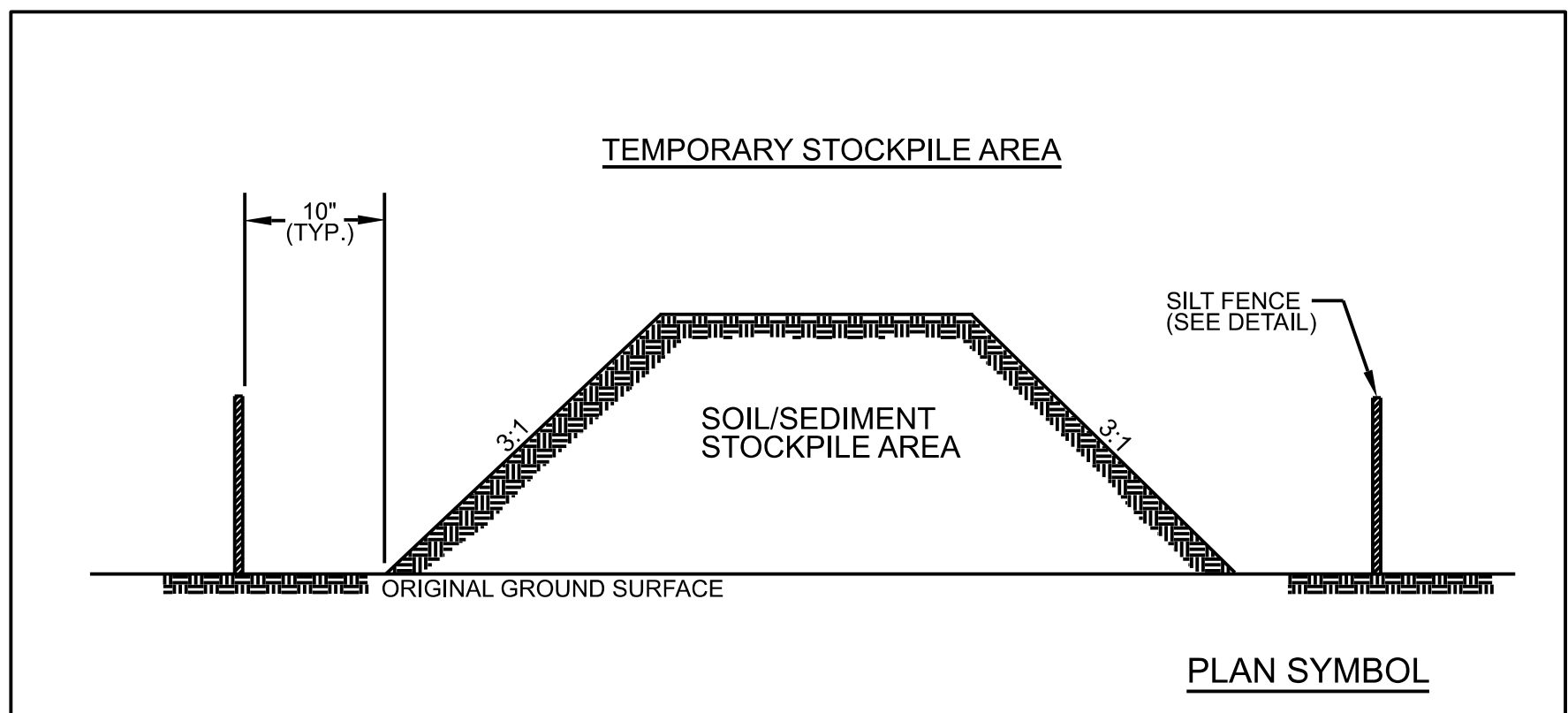
SPECIFICATION	SIZE
ROCK PAD THICKNESS	6 INCHES
ROCK PAD WIDTH	24 FEET
ROCK PAD LENGTH	100 FEET
ROCK PAD STONE SIZE	D = 2-3 INCHES

South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-06 PAGE 1 of 2  
 FEBRUARY 2014 DATE  
 CONSTRUCTION ENTRANCE  
 NOT TO SCALE

**CONSTR. ENTRANCE - INSPECTION & MAINTENANCE**

- The key to functional construction entrances is weekly inspections, routine maintenance, and regular sediment removal.
- Regular inspections of construction entrances shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
- During regular inspections, check for mud and sediment buildup and pad integrity. Inspection frequencies may need to be more frequent during long periods of wet weather.
- Reshape the stone pad as necessary for drainage and runoff control.
- Wash or replace stones as needed and as directed by site inspector. The stone in the entrance should be washed or replaced whenever the entrance fails to reduce headsm of mud being carried off-site by vehicles. Frequent washing will extend the useful life of stone pad.
- Immediately remove mud and sediment tracked or washed onto adjacent impervious surfaces by brushing or sweeping. Flushing should only be used when the water can be discharged to a sediment trap or basin.
- During maintenance activities, any broken pavement should be repaired immediately.
- Construction entrances should be removed after the site has reached final stabilization. Permanent vegetation should replace areas from which construction entrances have been removed, unless areas will be converted to an impervious surface to serve post-construction.

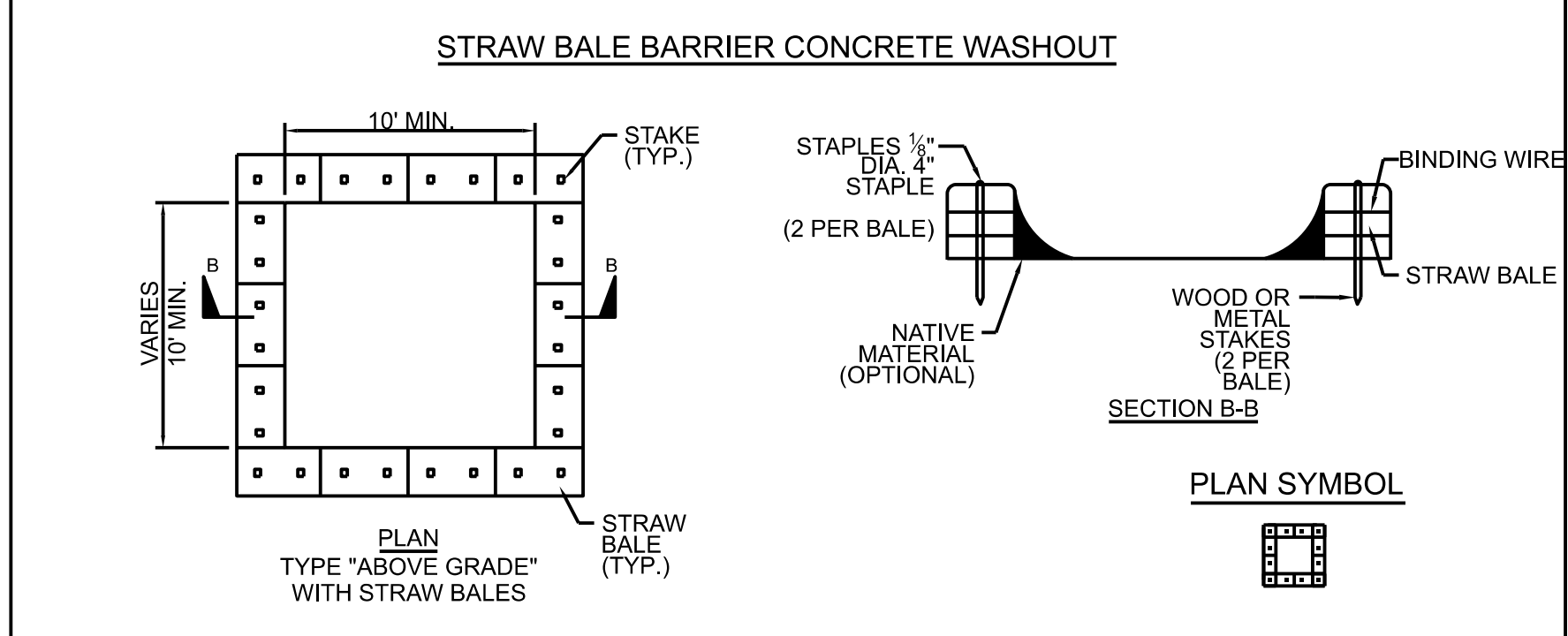
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 STANDARD DRAWING NO. SC-06 PAGE 2 of 2  
 FEBRUARY 2014 DATE  
 CONSTRUCTION ENTRANCE  
 GENERAL NOTES



South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-15 PAGE 1 of 1  
 FEBRUARY 2014 DATE  
 TEMPORARY STOCKPILE  
 NOT TO SCALE

**TEMPORARY STOCKPILE**

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



South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-07 PAGE 1 of 1  
 FEBRUARY 2014 DATE  
 CONCRETE WASHOUT  
 NOT TO SCALE

**CONCRETE WASHOUT**

- ACTUAL LAYOUT DETERMINED IN FIELD.
- INSTALL CONCRETE WASHOUT SIGN (24" X 24" MINIMUM) WITHIN 30' OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
- TEMPORARY WASHOUT AREA MUST BE AT LEAST 50' FROM A STORM DRAIN, CREEK BANK OR PERIMETER CONTROL.
- CLEAN OUT CONCRETE WASHOUT AREA WHEN 50% FULL.
- THE KEY TO FUNCTIONAL CONCRETE WASHOUTS IS WEEKLY INSPECTIONS, ROUTINE MAINTENANCE, AND REGULAR CLEAN OUT.
- SILT FENCE SHALL BE INSTALLED AROUND PERIMETER OF CONCRETE WASHOUT AREA EXCEPT FOR THE SIDE UTILIZED FOR ACCESSING THE WASHOUT.
- A ROCK CONSTRUCTION ENTRANCE MAY BE NECESSARY ON ONE SIDE OF THE WASHOUT TO PROVIDE VEHICLE ACCESS.

SEEDBED PREPARATION NOTES:

- SURFACE WATER CONTROL MEASURES TO BE INSTALLED ACCORDING TO PLAN.
- AREAS TO BE SEEDED SHALL BE RIPPED AND SPREAD WITH AVAILABLE TOPSOIL 3-INCHES DEEP. TOTAL SEEDBED PREPARED DEPTH SHALL BE 4-INCHES TO 6-INCHES DEEP.
- LOOSE ROCKS, ROOTS AND OTHER OBSTRUCTIONS SHALL BE REMOVED FROM THE SURFACE SO THAT THEY WILL NOT INTERFERE WITH ESTABLISHMENT AND MAINTENANCE OF VEGETATION. SURFACE FOR FINAL SEEDBED PREPARATION AT FINISHED GRADES SHOWN, SHALL BE REASONABLY SMOOTH AND UNIFORM.
- FERTILIZER AND LIME TO BE APPLIED UNIFORMLY AND MIXED WITH SOIL DURING SEEDBED PREPARATION.
- GRASS SEED SHALL BE "REBEL" FESCUE MIXTURE WITH A 97% MINIMUM PURITY AND 85% MINIMUM GERMINATION AND BE FREE OF NOXIOUS WEED SEEDS.

SEEDING REQUIREMENTS: (SEED IN ACCORDANCE WITH THE FOLLOWING APPLICATION RATES)

Species	Lbs/Ac	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
350 LBS./AC REBEL FESCUE	4000 LBS./AC AGRICULTURAL LIME												
1000 LBS./AC 10-10-10 FERTILIZER	500 LBS./AC 0-20-0 SUPERPHOSPHATE												
1-1/2" IAC STRAW MULCH	225 GAL./AC ASPHALT TIE-DOWN												
WORK LIME FERTILIZER INTO SOIL 3" TO 4" DEEP.													

NOTE: IN AREAS THAT WILL NOT BE WELL MAINTAINED, ALSO ADD 50 LBS./AC UNSCARIFIED SERICEA LESPEDEZA (AUGUST THROUGH NOVEMBER) OR 40 LBS./AC SCARIFIED SERICEA LESPEDEZA (DECEMBER THROUGH JULY).

South Carolina Department of Health and Environmental Control  
 STANDARD DRAWING NO. SC-06 PAGE 2 of 2  
 FEBRUARY 2014 DATE  
 PERMANENT SEEDING SPECIFICATIONS

SEEDBED PREPARATION NOTES:

- SURFACE WATER CONTROL MEASURES TO BE INSTALLED ACCORDING TO PLAN.
- AREAS TO BE SEEDED SHALL BE RIPPED AND SPREAD WITH AVAILABLE TOPSOIL 3-INCHES DEEP. TOTAL SEEDBED PREPARED DEPTH SHALL BE 4-INCHES TO 6-INCHES DEEP.
- LOOSE ROCKS, ROOTS AND OTHER OBSTRUCTIONS SHALL BE REMOVED FROM THE SURFACE SO THAT THEY WILL NOT INTERFERE WITH ESTABLISHMENT AND MAINTENANCE OF VEGETATION. SURFACE FOR FINAL SEEDBED PREPARATION AT FINISHED GRADES SHOWN, SHALL BE REASONABLY SMOOTH AND UNIFORM.
- FERTILIZER AND LIME TO BE APPLIED UNIFORMLY AND MIXED WITH SOIL DURING SEEDBED PREPARATION.

SCDHEC SEEDING SCHEDULE:

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80 LBS./AC TALL FESCUE												
4000 LBS./AC AGRICULTURAL LIME												
1000 LBS./AC 10-10-10 FERTILIZER												
500 LBS./AC 0-20-0 SUPERPHOSPHATE												
1-1/2" IAC STRAW MULCH												
225 GAL./AC ASPHALT TIE-DOWN												
30 LBS./AC RYE GRASS (NOVEMBER THROUGH FEBRUARY)												
WORK LIME FERTILIZER INTO SOIL 3" TO 4" DEEP.												

FOR PERMANENT SEEDING REQUIREMENTS: REFER TO THE LANDSCAPING PLANS IN THE ARCHITECTURAL PLAN SET.

NOTE: IN AREAS THAT WILL NOT BE WELL MAINTAINED, ALSO ADD 50 LBS./AC UNSCARIFIED SERICEA LESPEDEZA (AUGUST THROUGH NOVEMBER) OR 40 LBS./AC SCARIFIED SERICEA LESPEDEZA (DECEMBER THROUGH JULY).

2 C501 TEMPORARY SEEDING SPECIFICATIONS

1. IF NECESSARY, SLOPES WHICH EXCEED EIGHT (8) FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS. IN ADDITION TO HYDROSEEDING, IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINING 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 EVERY SEVEN (7) DAYS AND WITHIN 24 HOURS AFTER EACH RAINFALL OCCURRENCE THAT EXCEEDS ONE-HALF (0.5) INCH. IF SITE INSPECTIONS OR OTHER INFORMATION IDENTIFY BMP'S THAT ARE DAMAGED, INAPPROPRIATELY OR INCORRECTLY INSTALLED, OR NOT OPERATING EFFECTIVELY, THEN MAINTENANCE MUST BE PERFORMED AS SOON AS PRACTICAL, OR AS REASONABLY POSSIBLE AND NO LESS THAN 48 HOURS FROM THE TIME OF IDENTIFICATION (PREFERABLY BEFORE THE NEXT STORM EVENT).

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 ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY STORMWATER SYSTEMS, WATER COURSES, AND WATERS OF THE STATE (WWS) OR WATERS OF THE UNITED STATES (WU.S.).

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 OFF-SITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETED AND THE SITE IS STABILIZED.

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO THE PAVED ROADWAYS) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONTRUCTION. 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 WWS OR WU.S., INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CANNOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WWS AND A 130-FOOT MINIMUM BUFFER FOR WU.S. A 25-FOOT NO DISTURBANCE ZONE SHALL BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WWS AND A MINIMUM 50-FOOT NO DISTURBANCE ZONE FOR WU.S. BUFFERS AND NO DISTURBANCE ZONES SHALL BE MEASURED FROM TOP OF CREEK BANK.

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 (INCLUDING CIVIL CONSTRUCTION PLANS AND SUPPORTING DOCUMENTS), 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 SEVEN (7) CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE AND STOCKPILE TOPSOIL FOR REUSE.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMP'S (SEDIMENT BASIN, FILTER BAY, ETC.).

16. WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FROM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS, FUELS, OILS, OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMP'S NEED TO BE MODIFIED OR IF ADDITIONAL BMP'S ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC'S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMP'S MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

20. CONCRETE TRUCKS SHALL NOT TYPICALLY BE WASHED OUT ON SITE. IF CONCRETE TRUCK WASHOUT IS PERMITTED ON SITE, COORDINATE LOCATION AND BMP'S WITH SITE INSPECTOR.

21. DO NOT DISPOSE OF CONCRETE TRUCK WASHOUT WASTE BY DUMPING INTO A SANITARY SEWER, STORM DRAIN OR ONTO SOIL OR PAVEMENT THAT CARRIES STORM WATER RUNOFF.

22. CONCRETE TRUCK WASHOUT SHALL BE DISPOSED OF IN ACCORDANCE WITH THE FOLLOWING:

- DESIGNATED AREA THAT WILL LATER BE BACKFILLED (SLURRY PIT).
- DESIGNATED AREA WHERE CONCRETE WASH CAN HARDEN AND BE DISPOSED OF AS SOLID WASTE.
- LOCATION THAT IS NOT SUBJECT TO WATER RUNOFF, AND MORE THAN 50- FEET AWAY FROM A STORM DRAIN, OPEN DITCH, OR RECEIVING WATER WAY.
- PUMP EXCESS CONCRETE IN CONCRETE PUMP BIN BACK INTO CONCRETE MIXER TRUCK.
- CONCRETE WASHOUT FROM CONCRETE PUMPER BINS CAN BE WASHED INTO CONCRETE PUMPER TRUCKS AND DISCHARGED INTO DESIGNATED WASHOUT AREA OR PROPERLY DISPOSED OF OFF-SITE.

23. 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.

24. ALL CHEMICAL SPILLS, OIL SPILLS, OR FISH KILLS MUST BE REPORTED TO SCDHEC LAND & WASTE MANAGEMENT EMERGENCY RESPONSE, CALL THE 24-HOUR EMERGENCY RESPONSE LINE AT 1-888-481-0125.

25. TEMPORARY TOILET FACILITIES SHALL BE PROVIDED FOR ALL CONSTRUCTION WORKERS AND SITE VISITORS IN ACCORDANCE WITH 2006 INTERNATIONAL PLUMBING CODE GENERAL REGULATION SECTION 311. PORTABLE FACILITIES SHALL BE PLACED ON LEVEL GROUND AND AWAY FROM STORM DRAINAGE SYSTEMS (DITCHES, CATCH BASINS, ETC.), DISPOSAL AND HANDLING OF SANITARY WASTE MUST COMPLY WITH SCDHEC REQUIREMENTS.

26. FINAL GRADES FOR GRASSED AND LANDSCAPED AREAS SHALL REQUIRE A MINIMUM OF 4"-6" OF CLEAN TOPSOIL, FREE OF DEBRIS AND CONTAMINANTS, AND PREPARED OF NATIVE ORIGIN.

27. SEDIMENT WILL BE REMOVED FROM BEHIND THE SEDIMENT FENCE AND AT THE INLET PROTECTION SEDIMENT FENCE WHEN IT BECOMES ABOUT 0.5- FEET DEEP AT THE FENCE. THE SEDIMENT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN A BARRIER.

28. ALL SEEDED AREAS SHALL BE FERTILIZED, RE-SEEDED AS NECESSARY AND MULCHED ACCORDING TO SPECIFICATIONS TO MAINTAIN A VIGOROUS, DENSE VEGETATION COVER.

29. THE CONTRACTOR SHALL DILIGENTLY AND CONTINUOUSLY MAINTAIN ALL EROSION CONTROL DEVICES AND STRUCTURES TO MINIMIZE EROSION.

1 C501 EROSION CONTROL MAINTENANCE SCHEDULE/STANDARD NOTES



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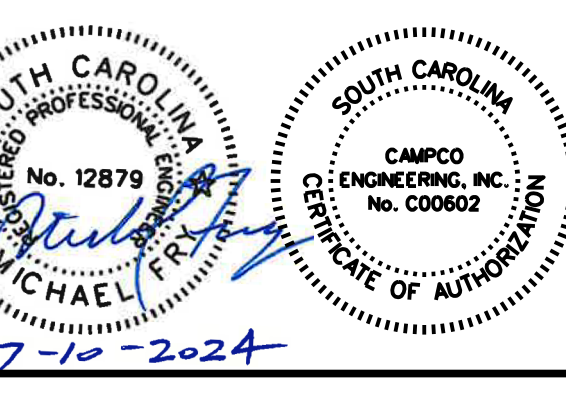
LANCASTER COUNTY SCHOOL DISTRICT CAREER CENTER GREENHOUSE

625 NORMANDY RD, LANCASTER, SC 29720



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EROSION CONTROL DETAILS



CE: 9901 ISSUED: 07-10-2024  
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C501





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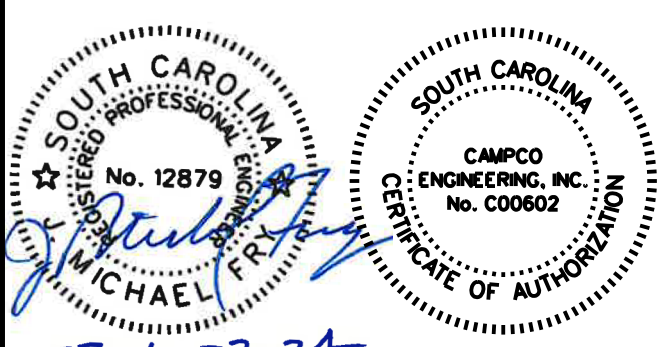
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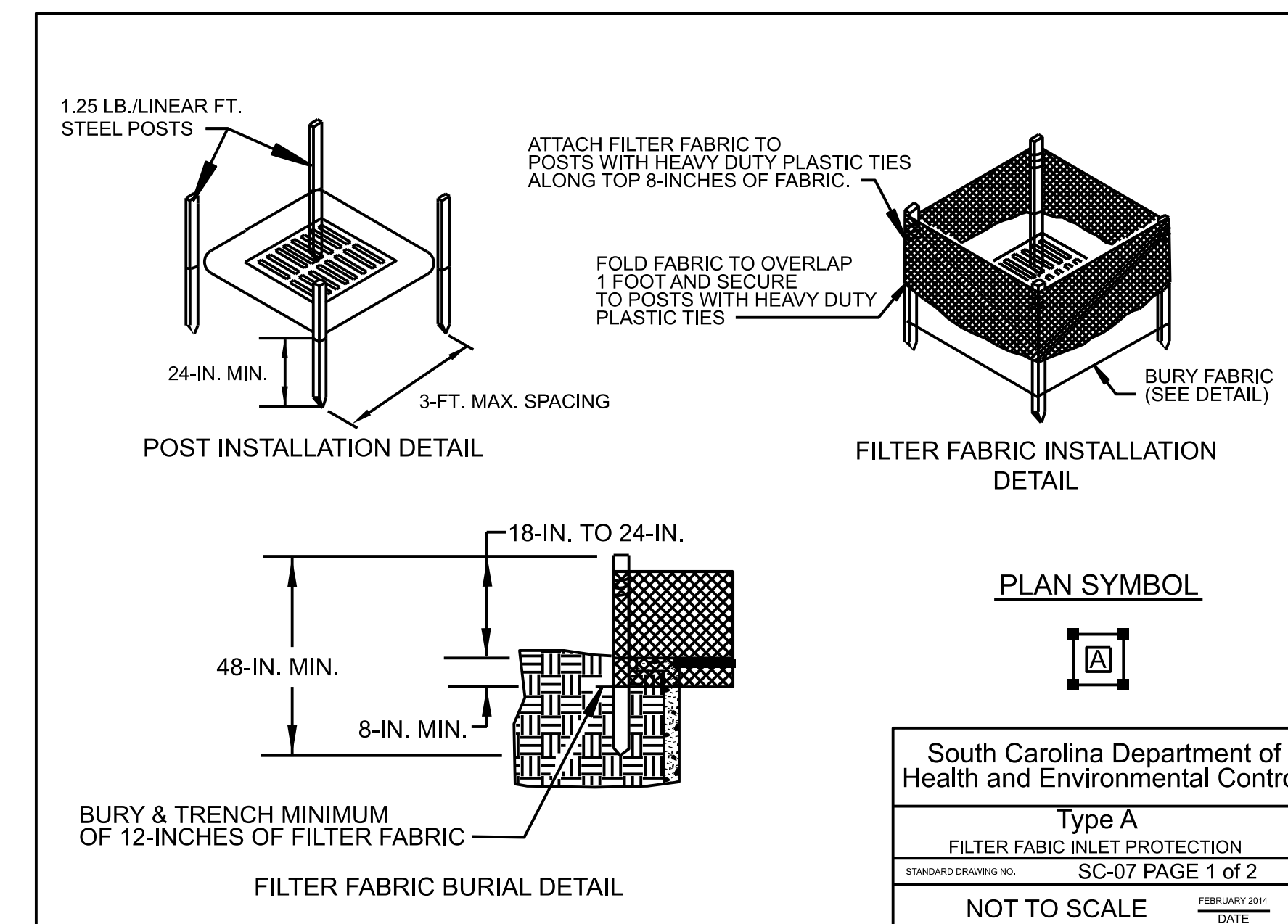
EROSION CONTROL  
DETAILS



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South Carolina Department of Health and Environmental Control  
Type A  
FILTER FABRIC INLET PROTECTION  
SC-07 PAGE 1 of 2  
NOT TO SCALE

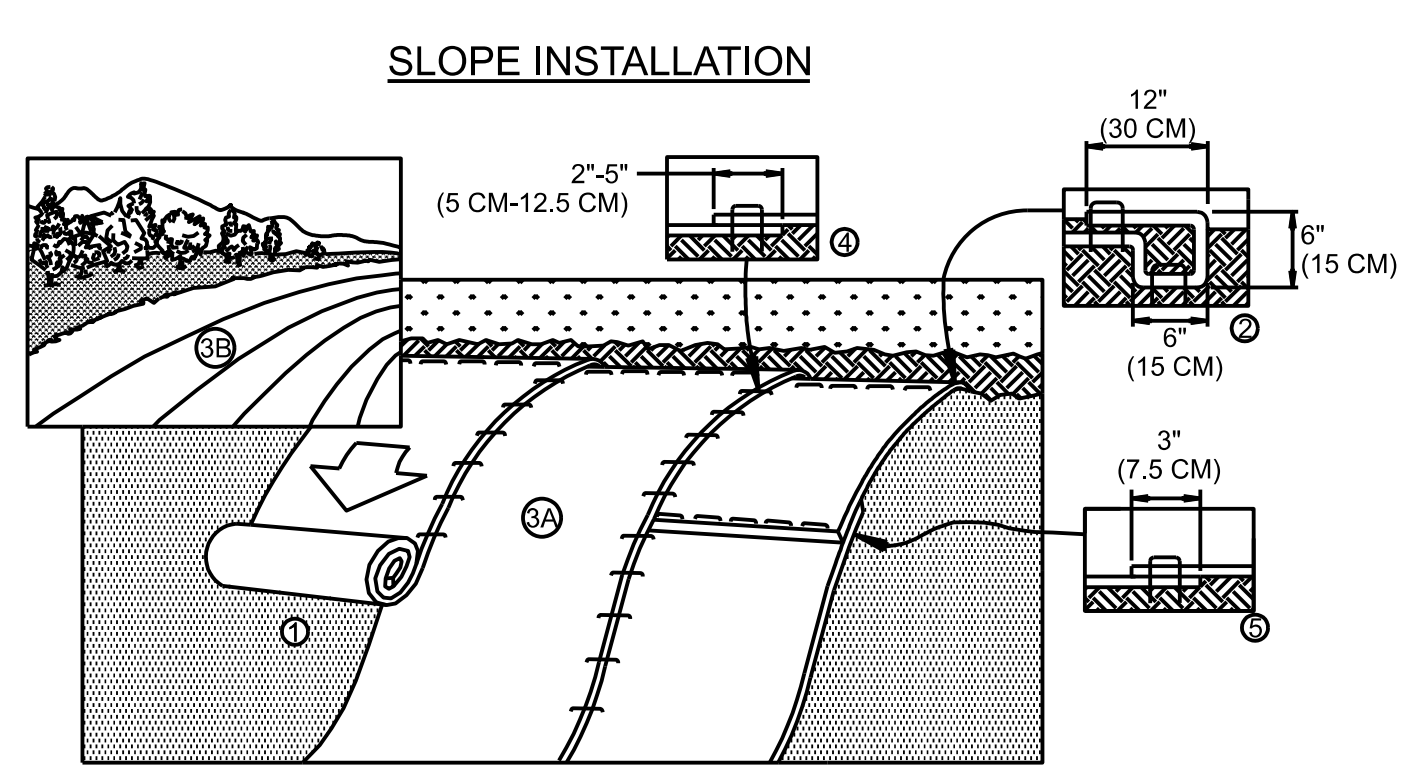
- TYPE A - FILTER FABRIC REQUIREMENTS**
- Silt fence must be composed of woven geotextile filter fabric that consists of the following requirements:
    - Composed of fibers consisting of long chain synthetic polymers of at least 85% by weight of polyolefins, polyesters, or polyamides that are formed into a network such that the filaments or yarns retain dimensional stability relative to each other.
    - Free of any treatment or coating which might adversely alter its physical properties after installation.
    - Free of any defects or flaws that significantly affect its physical and/or filtering properties; and.
    - Have a minimum width of 36-inches.
  - Use only fabric appearing on SC DOT's Qualified Products Listing (QPL), Approval Sheet #34, meeting the requirements of the most current edition of the SC DOT Standard Specifications for Highway Construction.
  - 12-inches of the fabric should be placed within excavated trench and toed in when the trench is backfilled.
  - Filter Fabric shall be purchased in continuous rolls and cut to the length of the barrier to avoid joints.
  - Filter Fabric shall be installed at a minimum of 24-inches above the ground.
- TYPE A - POST REQUIREMENTS**
- Silt Fence posts must be 48-inch long steel posts that meet, at a minimum, the following physical characteristics:
    - Composed of a high strength steel with a minimum yield strength of 50,000 psi.
    - Include a standard "T" section with a nominal face width of 1.38-inches and a nominal "T" length of 1.48-inches.
    - Weigh 1.25 pounds per foot (± 8%)
  - Posts shall be equipped with projections to aid in fastening of filter fabric.
  - Install posts to a minimum of 24-inches. A minimum height of 1-to 2-inches above the fabric shall be maintained, and a maximum height of 3 feet shall be maintained above the ground.
  - Post spacing shall be at a maximum of 3-feet on center.
- TYPE A - INSPECTION & MAINTENANCE**
- The key to functional inlet protection is weekly inspections, routine maintenance, and regular sediment removal.
  - Regular inspections of inlet protection shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
  - Attention to sediment accumulations along the filter fabric is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
  - Remove accumulated sediment when it reaches 1/3 the height of the filter fabric. When a sump is installed in front of the fabric, sediment should be removed when it fills approximately 1/3 the depth of the sump.
  - Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
  - Check for areas where stormwater runoff has eroded a channel beneath the filter fabric, or where the fabric has sagged or collapsed due to runoff overtopping the inlet protection.
  - Check for tears within the filter fabric, areas where fabric has begun to decompose, and for any other circumstance that may render the inlet protection ineffective. Removed damaged fabric and reinstall new filter fabric immediately.
  - Inlet protection structures should be removed after all the disturbed areas are permanently stabilized. Remove all construction material and sediment, and dispose of them properly. Grade the disturbed area to the elevation of the drop inlet structure crest. Stabilize all bare areas immediately.

South Carolina Department of Health and Environmental Control  
Type A  
FILTER FABRIC INLET PROTECTION  
SC-07 PAGE 2 of 2  
GENERAL NOTES



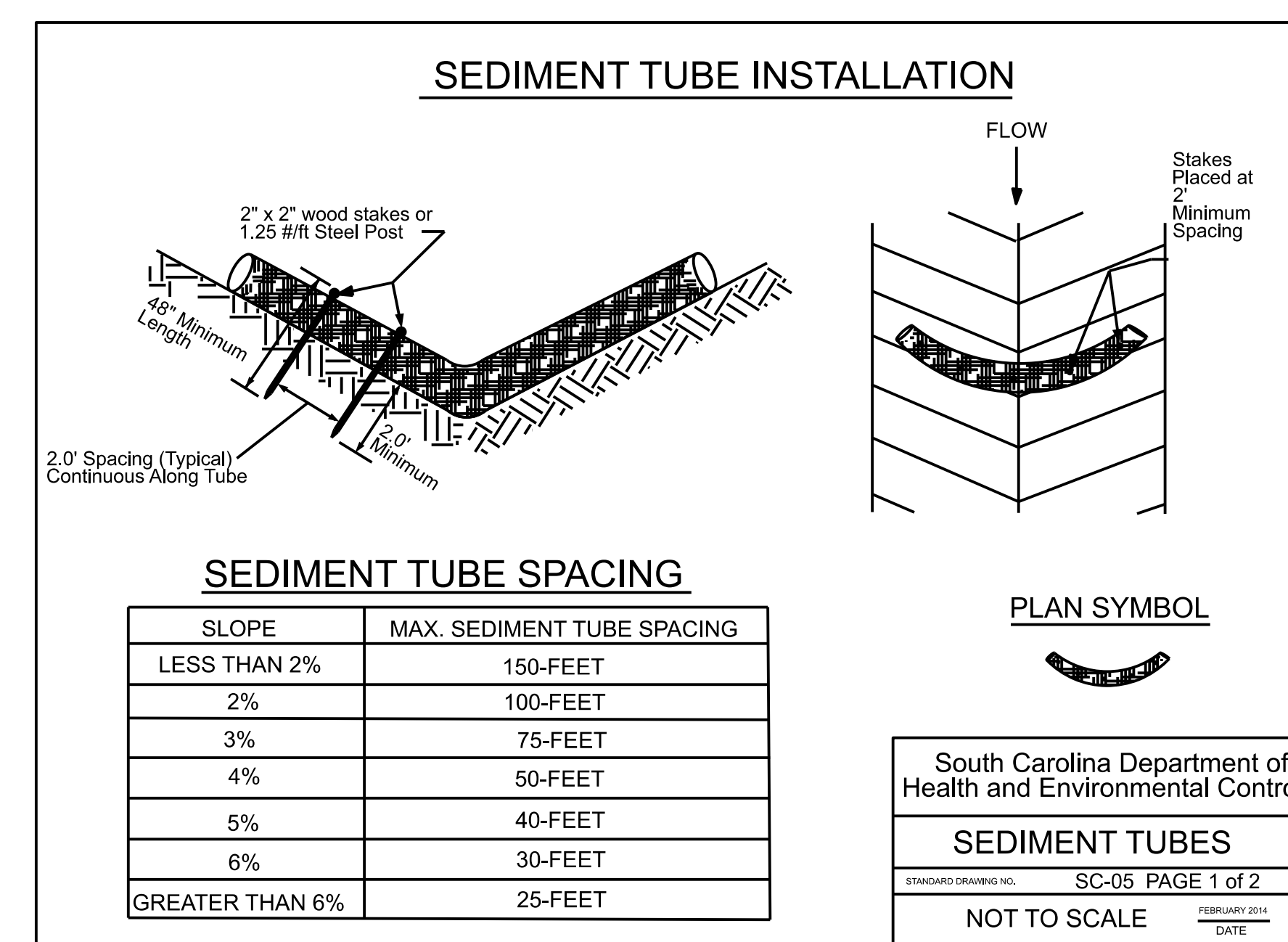
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- NOTES:**
- PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPS), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED PAPER SIDE DOWN.
  - BEGIN AT THE TOP OF THE SLOPE ANCHORING THE RECPS IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECPS EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECPS WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECPS BACK OVER SEED AND COMPACTED SOIL. SECURE RECPS OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECPS.
  - ROLL THE RECPS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECPS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
  - THE EDGES OF PARALLEL RECPS MUST BE STAPLED WITH APPROXIMATELY 2"-5" (5 CM-12.5 CM) OVERLAP DEPENDING ON RECPS TYPE.
  - CONSECUTIVE RECPS SPICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECPS WIDTH.
- NOTE: IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO SECURE THE RECPS.

1  
C502 NTS  
**SLOPE PROTECTION MATTING INSTALLATION**



**SEDIMENT TUBE SPACING**

SLOPE	MAX. SEDIMENT TUBE SPACING
LESS THAN 2%	150-FEET
2%	100-FEET
3%	75-FEET
4%	50-FEET
5%	40-FEET
6%	30-FEET
GREATER THAN 6%	25-FEET

South Carolina Department of Health and Environmental Control  
SEDIMENT TUBES  
SC-05 PAGE 1 of 2  
NOT TO SCALE

- SEDIMENT TUBES - GENERAL NOTES**
- Sediment tubes may be installed along contours, in drainage conveyance channels, and around inlets to help prevent off-site discharge of sediment-laden stormwater runoff.
  - Sediment tubes are elongated tubes of compacted geotextiles, curfex-excelsior wood, natural coconut fiber, or hardwood mulch. Straw, pine needles, and leaf mulch-filled sediment tubes are not permitted.
  - The outer netting of the sediment tube should consist of seamless, high-density polyethylene photodegradable materials treated with ultraviolet stabilizers or a seamless, high-density polyethylene non-degradable material.
  - Sediment tubes, when used as checks within channels, should range between 18-inches and 24-inches depending on channel dimensions. Diameters outside this range may be allowed when necessary when approved.
  - Curled excelsior wood, or natural coconut products that are rolled up to create a sediment tube are not allowed.
  - Sediment tubes should be staked using wooden stakes (2-inch X 2-inch) or steel posts (standard "U" or "T" sections with a minimum weight of 1.25 pounds per foot) at a minimum of 48-inches in length placed on 2-foot centers.
  - Install all sediment tubes to ensure that no gaps exist between the soil and the bottom of the tube. Manufacturer's recommendations should always be consulted before installation.
  - The ends of adjacent sediment tubes should be overlapped 6-inches to prevent flow and sediment from passing through the field joint.
  - Sediment tubes should not be stacked on top of one another, unless recommended by manufacturer.
  - Each sediment tube should be installed in a trench with a depth equal to 1/5 the diameter of the sediment tube.
  - Sediment tubes should continue up the side slopes a minimum of 1-foot above the design flow depth of the channel.
  - Install stakes at a diagonal facing incoming runoff.
- SEDIMENT TUBES - INSPECTION & MAINTENANCE**
- The key to functional sediment tubes is weekly inspections, routine maintenance, and regular sediment removal.
  - Regular inspections of sediment tubes shall be conducted once every calendar week and, as recommended, within 24-hours after each rainfall event that produces 1/2-inch or more of precipitation.
  - Attention to sediment accumulations in front of the sediment tube is extremely important. Accumulated sediment should be continually monitored and removed when necessary.
  - Remove accumulated sediment when it reaches 1/3 the height of the sediment tube.
  - Removed sediment shall be placed in stockpile storage areas or spread thinly across disturbed area. Stabilize the removed sediment after it is relocated.
  - Large debris, trash, and leaves should be removed from in front of tubes when found.
  - If erosion causes the edges to fall to a height equal to or below the height of the sediment tube, repairs should be made immediately to prevent runoff from bypassing tube.
  - Sediment tubes should be removed after the contributing drainage area has been completely stabilized. Permanent vegetation should replace areas from which sediment tubes have been removed.

South Carolina Department of Health and Environmental Control  
SEDIMENT TUBES  
SC-05 PAGE 2 of 2  
GENERAL NOTES









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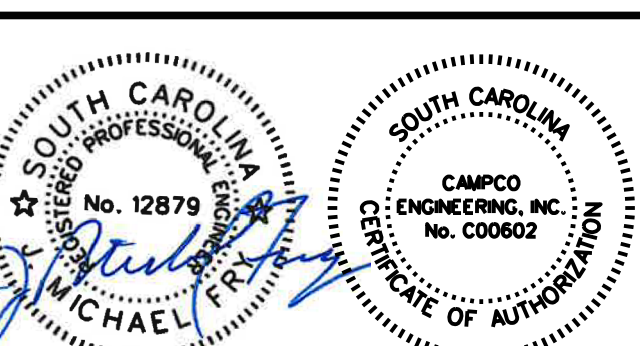
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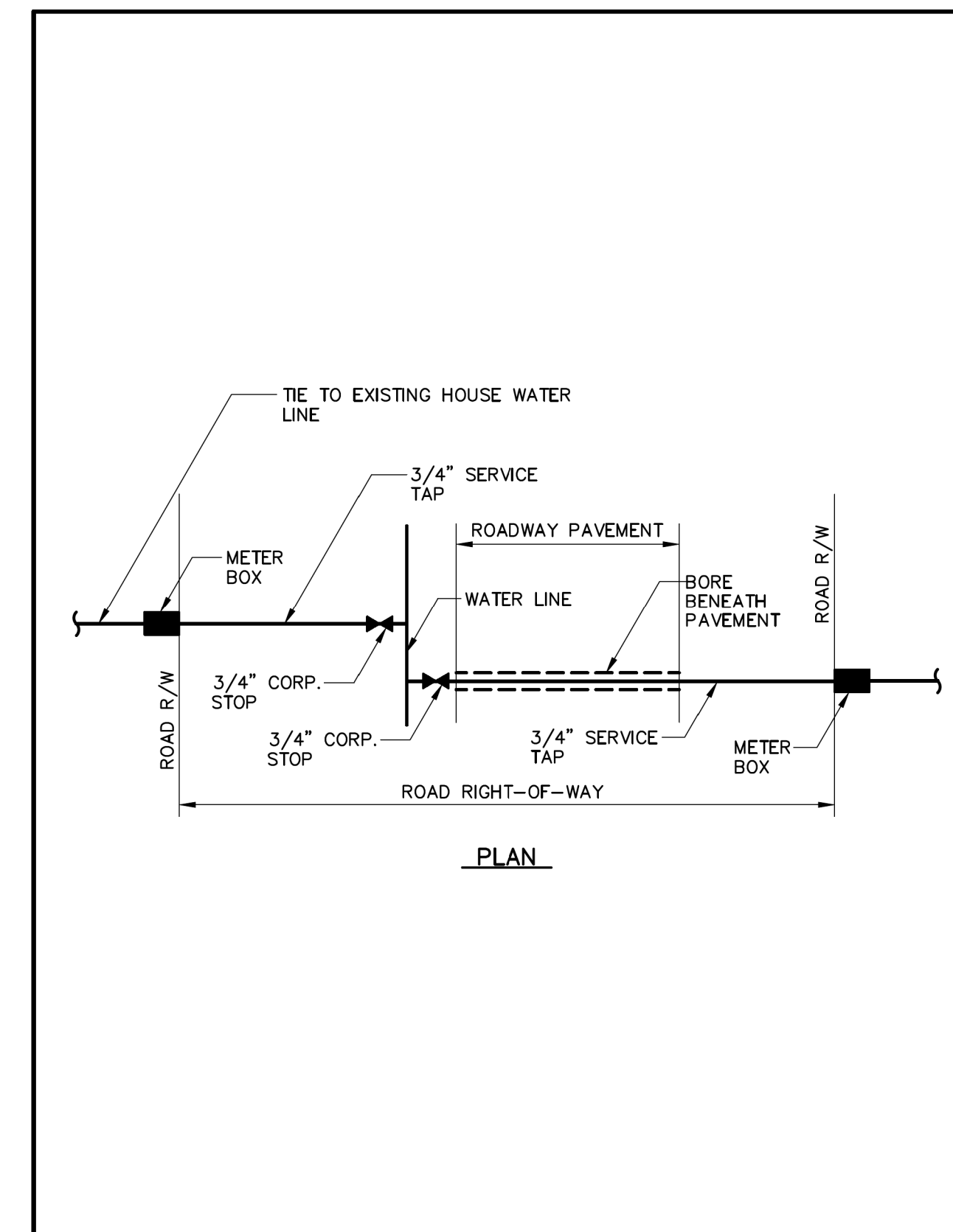
**WATER & SANITARY SEWER DETAILS**



07-10-2024

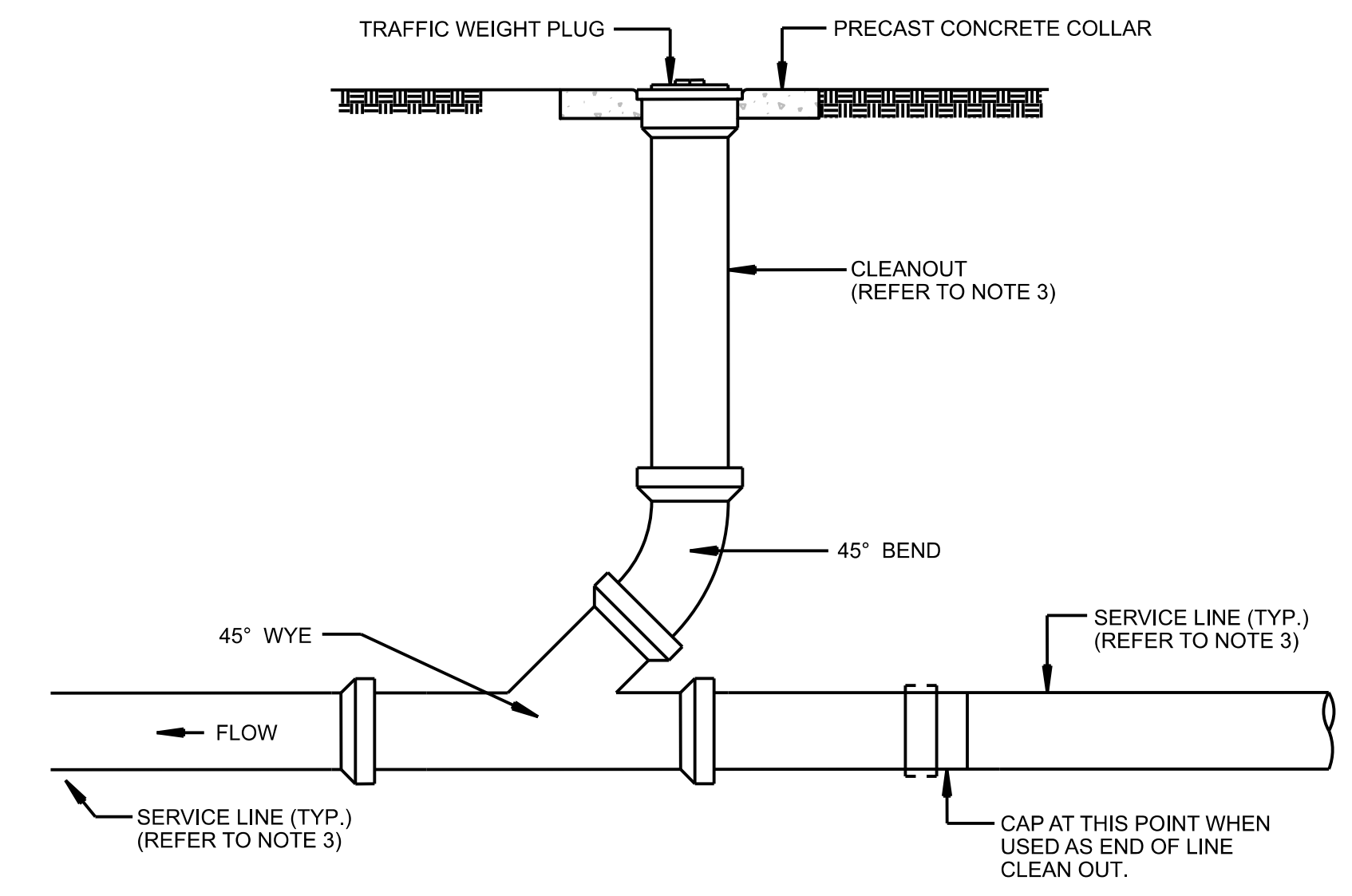
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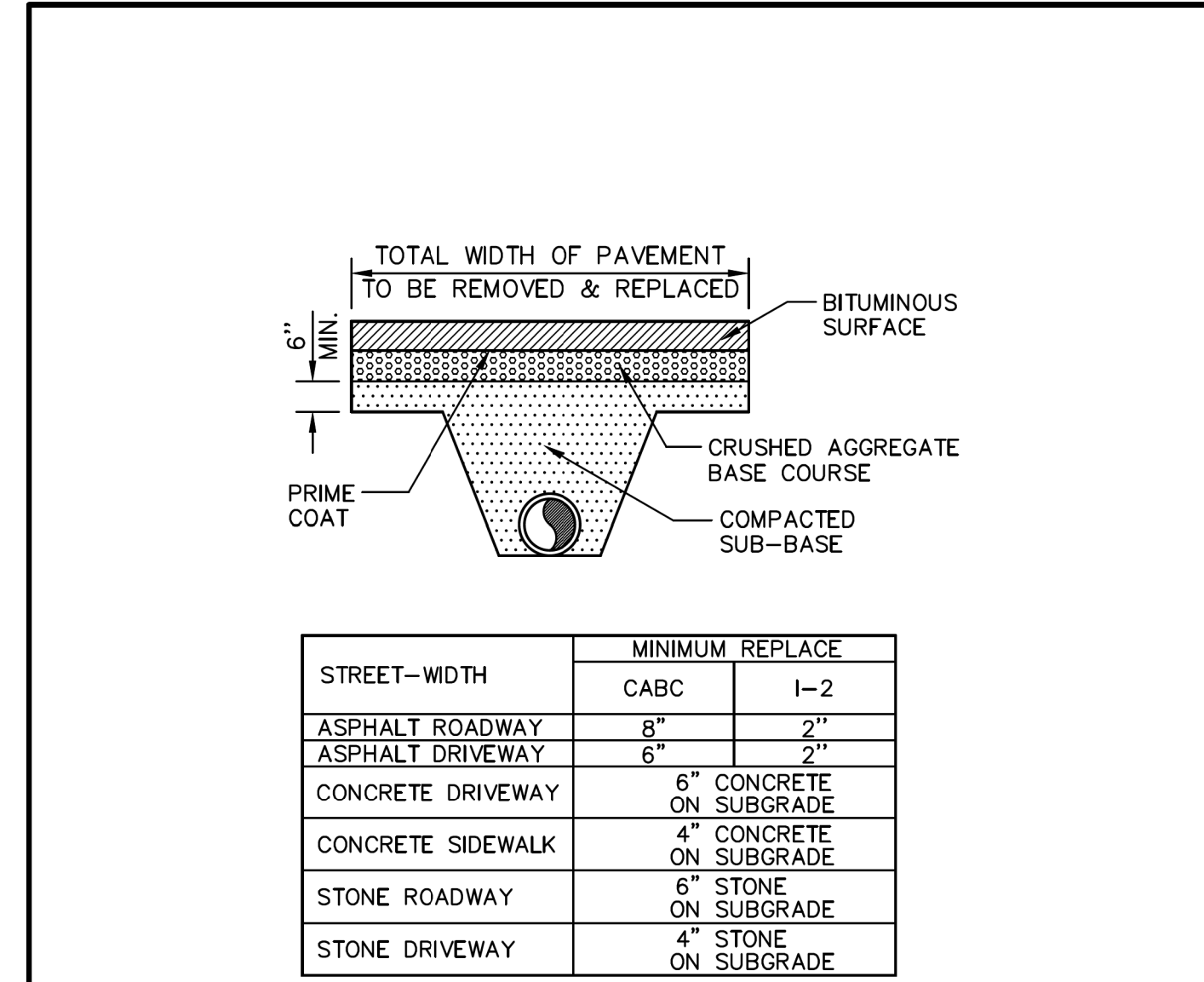
DATE: JANUARY 2008	STANDARD DETAIL	CITY OF LANCASTER
DRAWN BY: WJD		LANCASTER COUNTY, S.C.
SCALE: NONE	TYPICAL SERVICE INSTALLATION	FILE NO: WL-8

**2 SERVICE INSTALLATION**  
C601 NTS



- NOTES:
1. CONCRETE COLLAR NOT NEEDED WHEN CLEANOUT OCCURS IN CONCRETE PAVEMENT.
  2. CLEANOUT PLUG SHALL BE BRASS AND INSTALLED FLUSH WITH FINISHED GRADE WHEN CLEANOUT OCCURS IN PAVEMENT.
  3. PIPE SIZE & TYPE VARIES, REFER TO UTILITY PLAN.

**4 SANITARY SEWER CLEANOUT**  
C601 NTS

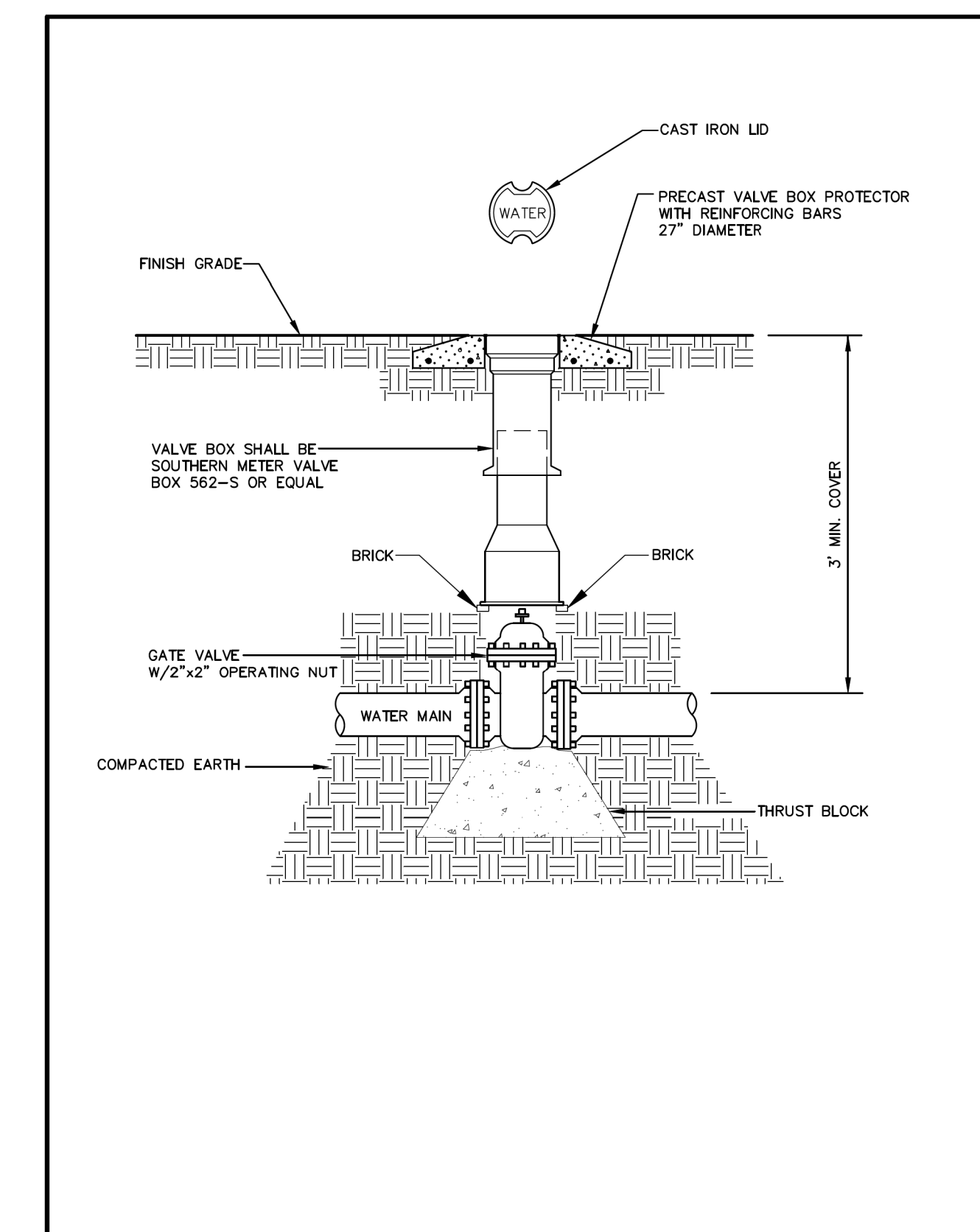


STREET-WIDTH	MINIMUM REPLACE	
	CABC	I-2
ASPHALT ROADWAY	8"	2"
ASPHALT DRIVEWAY	6"	2"
CONCRETE DRIVEWAY	6" CONCRETE ON SUBGRADE	
CONCRETE SIDEWALK	4" CONCRETE ON SUBGRADE	
STONE ROADWAY	6" STONE ON SUBGRADE	
STONE DRIVEWAY	4" STONE ON SUBGRADE	

- NOTES:
1. ALL BACKFILL LOCATED WITHIN THE VEHICULAR LOAD ZONE IS TO BE PLACED IN LIFTS NOT TO EXCEED 6" AND COMPACTED TO 95% OF STANDARD PROCTOR TEST (ASTM D698).
  2. ALL BACKFILL OUTSIDE THE VEHICULAR LOAD ZONE BUT LOCATED IN THE RIGHT OF WAY IS TO BE COMPACTED TO 95% OF STANDARD PROCTOR TEST (ASTM D698).
  3. THE LACK OF PROPER COMPACTION EQUIPMENT OR THE USE OF IMPROPER COMPACTION METHODS SHALL BE CAUSE FOR THE IMMEDIATE SHUTDOWN OF THE WORK BY THE ENGINEER.

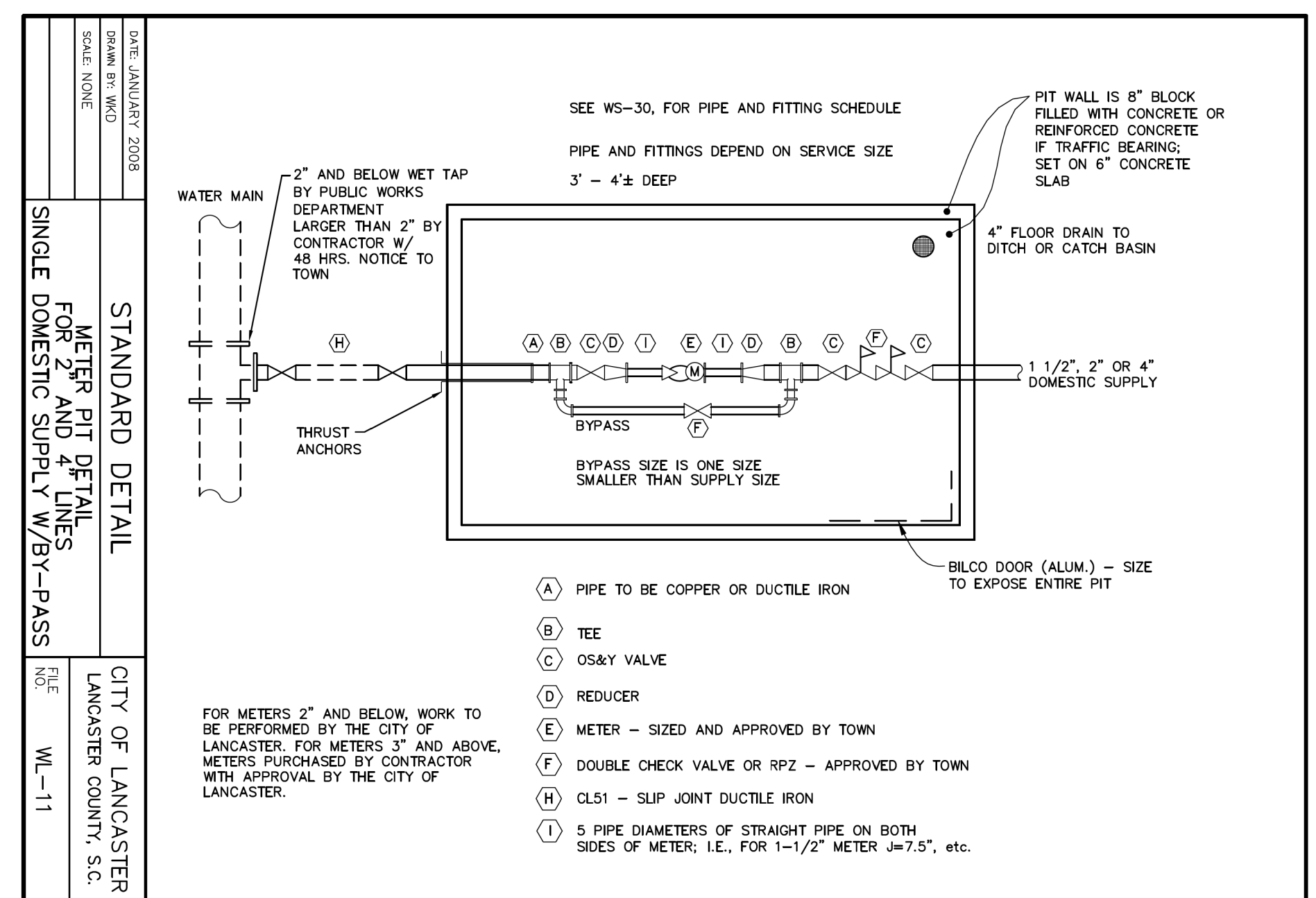
DATE: JANUARY 2008	STANDARD DETAIL	CITY OF LANCASTER
DRAWN BY: WJD		LANCASTER COUNTY, S.C.
SCALE: NONE	TYPICAL PAVEMENT REPAIR FOR UTILITY CUT	FILE NO: WS-3

**6 TYPICAL PAVEMENT REPAIR FOR UTILITY CUT**  
C601 NTS



DATE: JANUARY 2008	STANDARD DETAIL	CITY OF LANCASTER
DRAWN BY: WJD		LANCASTER COUNTY, S.C.
SCALE: NONE	VALVE AND VALVE BOX	FILE NO: WL-3

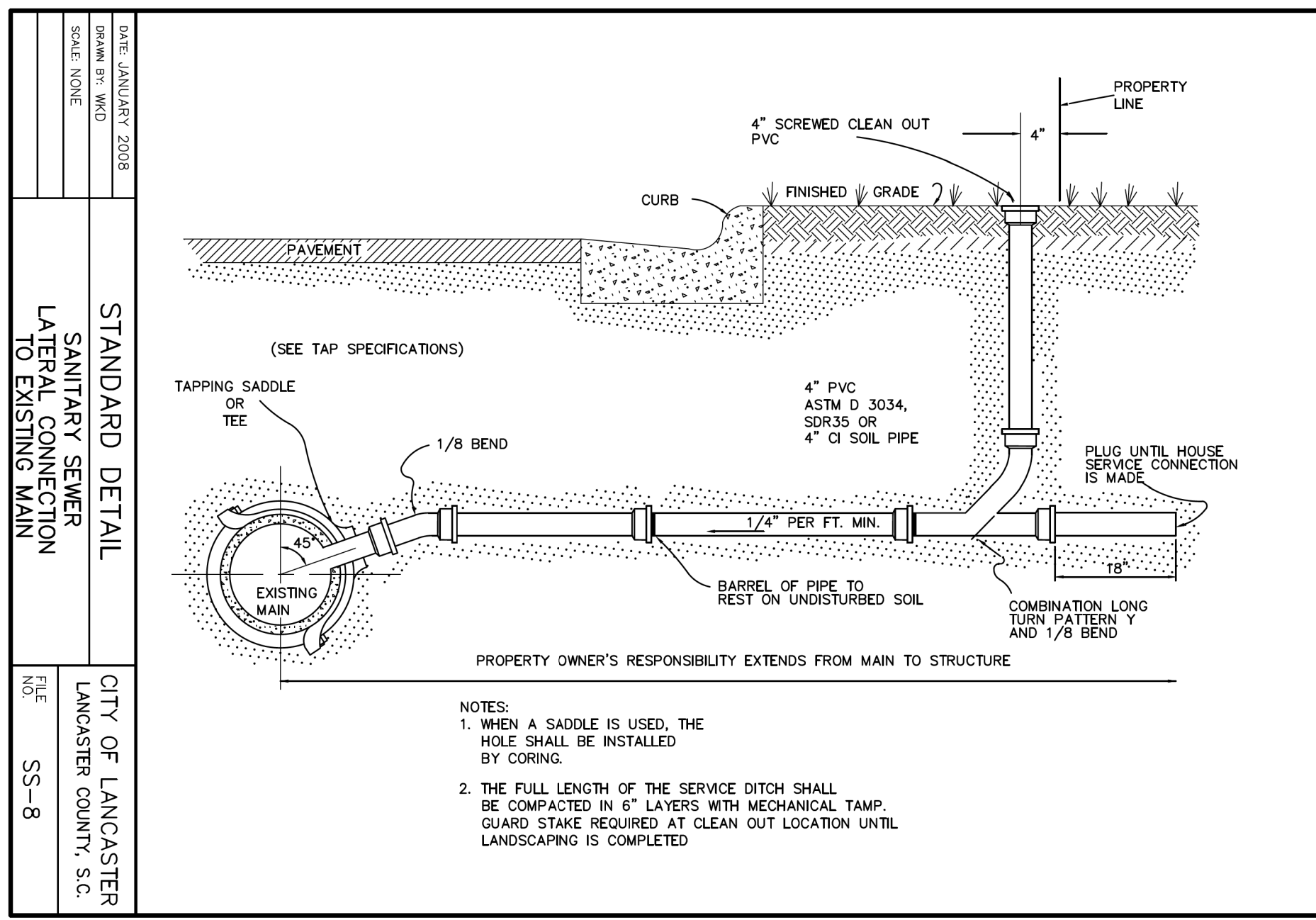
**1 VALVE AND VALVE BOX**  
C601 NTS



- SEE WS-30, FOR PIPE AND FITTING SCHEDULE  
PIPE AND FITTINGS DEPEND ON SERVICE SIZE  
3" - 4" DEEP
- (A) PIPE TO BE COPPER OR DUCTILE IRON
  - (B) TEE
  - (C) OS&Y VALVE
  - (D) REDUCER
  - (E) METER - SIZED AND APPROVED BY TOWN
  - (F) DOUBLE CHECK VALVE OR RP2 - APPROVED BY TOWN
  - (H) CL51 - SLIP JOINT DUCTILE IRON
  - (I) 5 PIPE DIAMETERS OF STRAIGHT PIPE ON BOTH SIDES OF METER; I.E. FOR 1-1/2" METER = 7.5", etc.
- FOR METERS 2" AND BELOW, WORK TO BE PERFORMED BY THE CITY OF LANCASTER. FOR METERS 3" AND ABOVE, METERS PURCHASED BY CONTRACTOR WITH APPROVAL BY THE CITY OF LANCASTER.

DATE: JANUARY 2008	STANDARD DETAIL	CITY OF LANCASTER
DRAWN BY: WJD		LANCASTER COUNTY, S.C.
SCALE: NONE	METER PIT	FILE NO: WL-11

**3 METER PIT**  
C601 NTS



- NOTES:
1. WHEN A SADDLE IS USED, THE HOLE SHALL BE INSTALLED BY CORING.
  2. THE FULL LENGTH OF THE SERVICE DITCH SHALL BE COMPACTED IN 6" LAYERS WITH MECHANICAL TAMP. GUARD STAKE REQUIRED AT CLEAN OUT LOCATION UNTIL LANDSCAPING IS COMPLETED.

DATE: JANUARY 2008	STANDARD DETAIL	CITY OF LANCASTER
DRAWN BY: WJD		LANCASTER COUNTY, S.C.
SCALE: NONE	SANITARY SEWER LATERAL CONNECTION TO EXISTING MAIN	FILE NO: SS-8

**5 SANITARY SEWER LATERAL CONNECTION TO EXISTING MAIN**  
C601 NTS



































