

PROJECT MANUAL

USC Greenhouse Construction State Project No: H27-Z090



UNIVERSITY OF SOUTH CAROLINA

October 23, 2013

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CA Project # 577945



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DIVISION 0

PROCUREMENT AND CONTRACTING REQUIREMENTS

SE-310 REQUEST FOR ADVERTISEMENT

2011 Edition
Rev. 7/20/2011

PROJECT NAME: USC Greenhouse Construction

PROJECT NUMBER: H27-Z090

PROJECT LOCATION: Columbia, SC

Contractor may be subject to performance appraisal at close of project

BID SECURITY REQUIRED? Yes ☒ No ☐

PERFORMANCE & PAYMENT BONDS REQUIRED? Yes ☒ No ☐

CONSTRUCTION COST RANGE: \$200,000-\$300,000

DESCRIPTION OF PROJECT: Construction of greenhouse. Small and minority business participation is encouraged

A/E NAME: Chao and Associates, Inc

A/E CONTACT: Gerald A. Lee

A/E ADDRESS: Street/PO Box: 7 Clusters Court

City: Columbia

State: SC ZIP: 29210-

EMAIL: geraldl@chaoinc.com

TELEPHONE: 803-772-8420

FAX: 803-772-9120

All questions & correspondence concerning this Invitation shall be addressed to the A/E.

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: purchasing.sc.edu (See Facilities Construction Solicitations & Awards)

PLAN DEPOSIT AMOUNT: _____ IS DEPOSIT REFUNDABLE? Yes ☐ No ☒

Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders rely on copies of Bidding Documents/Plans obtained from any other source at their own risk.

BIDDING DOCUMENTS/PLANS ARE ALSO ON FILE FOR VIEWING PURPOSES ONLY AT *(list name and location for each plan room or other entity):*

It is the contractor's responsibility to download plans, specifications, addenda, award, etc., from the purchasing website.
http://purchasing.sc.edu

PRE-BID CONFERENCE? Yes ☒ No ☐ MANDATORY ATTENDANCE? Yes ☐ No ☒

DATE: 12/18/2013 TIME: 10 am PLACE: 743 Greene Street, Conference Room 53, Columbia, SC 29208

AGENCY: University of South Carolina

NAME OF AGENCY PROCUREMENT OFFICER: Juaquana Brookins

ADDRESS: Street/PO Box: 743 Greene Street

City: Columbia

State: SC ZIP: 29208-

EMAIL: jbrookins@fmc.sc.edu

TELEPHONE: 803-777-3596

FAX: 803-777-7334

BID CLOSING DATE: 1/7/2014 TIME: 2 pm LOCATION: 743 Greene Street, Conf Room 53, Columbia, SC 29208

BID DELIVERY ADDRESSES:

HAND-DELIVERY:

Attn: Juaquana Brookins

University of South Carolina

743 Greene Street

Columbia, SC 29208

MAIL SERVICE:

Attn: Juaquana Brookins

University of South Carolina

743 Greene Street

Columbia, SC 29208

IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? (Agency *MUST* check one) Yes ☒ No ☐

APPROVED BY (Office of State Engineer): _____

DATE: _____

INSTRUCTIONS TO BIDDERS

AIA Document A701, 1997 Edition, Instructions to Bidders is incorporated into these contract documents by reference.

Copies of the Instructions to Bidders are available for examination at the offices of Chao and Associates, Inc.

OSE FORM 00201**STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

OWNER: University of South Carolina**PROJECT NUMBER:** H27-Z090**PROJECT NAME:** USC Greenhouse Construction**PROJECT LOCATION:** Columbia, SC**PROCUREMENT OFFICER:** Juaquana Brookins**1. STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

1.1. These Standard Supplemental Instructions To Bidders amend or supplement Instructions To Bidders (AIA Document A701-1997) and other provisions of Bidding and Contract Documents as indicated below.

1.2. Compliance with these Standard Supplemental Instructions is required by the Office of State Engineer (OSE) for all State projects when competitive sealed bidding is used as the method of procurement.

1.3. All provisions of A701-1997, which are not so amended or supplemented, remain in full force and effect.

1.4. Bidders are cautioned to carefully examine the Bidding and Contract Documents for additional instructions or requirements.

2. MODIFICATIONS TO A701-1997

2.1. *Delete Section 1.1 and insert the following:*

1.1 Bidding Documents, collectively referred to as the **Invitation for Bids**, include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement, Instructions to Bidders (A-701), Supplementary Instructions to Bidders, the bid form (SE-330), the Intent to Award Notice (SE-370), and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of the Contract, and other documents set forth in the Bidding Documents. Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

2.2. *In Section 1.8, delete the words “and who meets the requirements set forth in the Bidding Documents”.*

2.3. *In Section 2.1, delete the word “making” and substitute the word “submitting.”*

2.4. *In Section 2.1.1:*

After the words “Bidding Documents,” delete the word “or” and substitute the word “and.”

Insert the following at the end of this section:

Bidders are expected to examine the Bidding Documents and Contract Documents thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements. Failure to do so will be at the Bidder's risk. Bidder assumes responsibility for any patent ambiguity that Bidder does not bring to the Owner's attention prior to bid opening.

2.5. *In Section 2.1.3, insert the following after the term “Contract Documents” and before the period:*

and accepts full responsibility for any pre-bid existing conditions that would affect the Bid that could have been ascertained by a site visit. As provided in Regulation 19-445.2042(B), A bidder's failure to attend an advertised pre-bid conference will not excuse its 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 State.

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2.6. *Insert the following Sections 2.2 through 2.6:*

2.2 CERTIFICATION 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 bid, the bidder certifies that—

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

- (i) Those prices;
- (ii) The intention to submit an bid; or
- (iii) The methods or factors used to calculate the prices offered.

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder 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 bidder to induce any other concern to submit or not to submit an bid for the purpose of restricting competition.

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

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid, 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 bidder'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 bidder's organization responsible for determining the prices offered in this bid];

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

2.3 DRUG FREE WORKPLACE

By submitting a bid, the Bidder certifies that Bidder will maintain a drug free workplace in accordance with the requirements of Title 44, Chapter 107 of South Carolina Code of Laws, as amended.

2.4 CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS

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

(i) Bidder 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 bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in

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STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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 bids; 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) Bidder has not, within a three-year period preceding this bid, 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) Bidder shall provide immediate written notice to the Procurement Officer if, at any time prior to contract award, Bidder learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) If Bidder is unable to certify the representations stated in paragraphs (a)(1), Bid must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the Bidder's responsibility. Failure of the Bidder to furnish additional information as requested by the Procurement Officer may render the Bidder nonresponsible.

(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 Bidder 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 Bidder knowingly or in bad faith rendered an erroneous certification, in addition to other remedies available to the State, the Procurement Officer may terminate the contract resulting from this solicitation for default.

2.5 ETHICS CERTIFICATE

By submitting a bid, the bidder certifies that the bidder 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 state 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.

2.6 RESTRICTIONS APPLICABLE TO BIDDERS & GIFTS

Violation of these restrictions may result in disqualification of your bid, suspension or debarment, and may constitute a violation of the state Ethics Act. (a) After issuance of the solicitation, ***bidder agrees not to discuss this procurement activity in any way with the Owner or its employees, agents or officials.*** All communications must be solely with the Procurement Officer. This restriction may be lifted by express written permission from the Procurement Officer. This restriction expires once a contract has been formed. (b) Unless otherwise approved in writing by the Procurement

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Officer, *bidder agrees not to give anything to the Owner, any affiliated organizations, or the employees, agents or officials of either, prior to award.* (c) Bidder acknowledges that the policy of the State is that a governmental body should not accept or solicit a gift, directly or indirectly, from a donor if the governmental body has reason to believe the donor has or is seeking to obtain contractual or other business or financial relationships with the governmental body. Regulation 19-445.2165(C) broadly defines the term donor.

2.7. *Delete Section 3.1.1 and substitute the following:*

3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement in the number and for the deposit sum, if any, stated therein. If so provided in the Advertisement, the deposit will be refunded to all plan holders who return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

2.8. *Delete the language of Section 3.1.2 and insert the word "Reserved."*

2.9. *In Section 3.1.4, delete the words "and Architect may make" and substitute the words "has made."*

2.10. *Insert the following Section 3.1.5*

3.1.5 All persons obtaining Bidding Documents from the issuing office designated in the Advertisement shall provide that office with Bidder's contact information to include the Bidder's name, telephone number, mailing address, and email address.

2.11. *In Section 3.2.2:*

Delete the words "and Sub-bidders"

Delete the word "seven" and substitute the word "ten"

2.12. *In Section 3.2.3:*

In the first Sentence, insert the word "written" before the word "Addendum."

Insert the following at the end of the section:

As provided in Regulation 19-445.2042(B), nothing stated at the pre-bid conference shall change the Bidding Documents unless a change is made by written Addendum.

2.13. *Insert the following at the end of Section 3.3.1:*

Reference in the Bidding Documents to a designated material, product, thing, or service by specific brand or trade name followed by the words "or equal" and "or approved equal" shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

2.14. *Delete Section 3.3.2 and substitute the following:*

3.3.2 No request to substitute materials, products, or equipment for materials, products, or equipment described in the Bidding Documents and no request for addition of a manufacturer or supplier to a list of approved manufacturers or suppliers in the Bidding Documents will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids established in the Invitation for Bids. Any subsequent extension of the date for receipt of Bids by addendum shall not extend the date for receipt of such requests unless the addendum so specifies. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

2.15. *Delete Section 3.4.3 and substitute the following:*

3.4.3 Addenda will be issued no later than 120 hours prior to the time for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

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2.16. *Insert the following Sections 3.4.5 and 3.4.6:*

3.4.5 When the date for receipt of Bids is to be postponed and there is insufficient time to issue a written Addendum prior to the original Bid Date, Owner will notify prospective Bidders by telephone or other appropriate means with immediate follow up with a written Addendum. This Addendum will verify the postponement of the original Bid Date and establish a new Bid Date. The new Bid Date will be no earlier than the fifth (5th) calendar day after the date of issuance of the Addendum postponing the original Bid Date.

3.4.6. If an emergency or unanticipated event interrupts normal government processes so that bids cannot be received at the government office designated for receipt of bids by the exact time specified in the solicitation, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal government processes resume. In lieu of an automatic extension, an Addendum may be issued to reschedule bid opening. If state offices are closed at the time a pre-bid or pre-proposal conference is scheduled, an Addendum will be issued to reschedule the conference. Useful information may be available at: http://www.scemd.org/scgovweb/weather_alert.html

2.17. *In Section 4.1.1, delete the word “forms” and substitute the words “SE-330 Bid Form.”***2.18.** *Delete Section 4.1.2 and substitute the following:*

4.1.2 Any blanks on the bid form to be filled in by the Bidder shall be legibly executed in a non-erasable medium. Bids shall be signed in ink or other indelible media.

2.19. *Delete Section 4.1.3 and substitute the following:*

4.1.3 Sums shall be expressed in figures.

2.20. *Insert the following at the end of Section 4.1.4:*

Bidder shall not make stipulations or qualify his bid in any manner not permitted on the bid form. An incomplete Bid or information not requested that is written on or attached to the Bid Form that could be considered a qualification of the Bid, may be cause for rejection of the Bid.

2.21. *Delete Section 4.1.5 and substitute the following:*

4.1.5 All requested Alternates shall be bid. The failure of the bidder to indicate a price for an Alternate shall render the Bid non-responsive. Indicate the change to the Base Bid by entering the dollar amount and marking, as appropriate, the box for “ADD TO” or “DEDUCT FROM”. If no change in the Base Bid is required, enter “ZERO” or “No Change.” For add alternates to the base bid, Subcontractor(s) listed on page BF-2 of the Bid Form to perform Alternate Work may be used for both Alternates and Base Bid Work if Alternates are accepted.

2.22. *Delete Section 4.1.6 and substitute the following:*

4.1.6 Pursuant to Title 11, Chapter 35, Section 3020(b)(i) of the South Carolina Code of Laws, as amended, Section 7 of the Bid Form sets forth a list of subcontractor specialties for which Bidder is required to list only the subcontractors Bidder will use to perform the work of each listed specialty. Bidder must follow the Instructions in the Bid Form for filling out this section of the Bid Form. Failure to properly fill out Section 7 may result in rejection of Bidder’s bid as non-responsive.

2.23. *Delete Section 4.1.7 and substitute the following:*

4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

2.24. *Delete Section 4.2.1 and substitute the following:*

4.2.1 If required by the Invitation for Bids, each Bid shall be accompanied by a bid security in an amount of not less than five percent of the Base Bid. The bid security shall be a bid bond or a certified cashier’s check. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

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2.25. Delete Section 4.2.2 and substitute the following:

4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney. The bid bond shall:

- .1** Be issued by a surety company licensed to do business in South Carolina;
- .2** Be issued by a surety company having, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty", which company shows a financial strength rating of at least five (5) times the contract price.
- .3** Be enclosed in the bid envelope at the time of Bid Opening, either in paper copy or as an electronic bid bond authorization number provided on the Bid Form and issued by a firm or organization authorized by the surety to receive, authenticate and issue binding electronic bid bonds on behalf the surety.

2.26. Delete Section 4.2.3 and substitute the following:

4.2.3 By submitting a bid bond via an electronic bid bond authorization number on the Bid Form and signing the Bid Form, the Bidder certifies that an electronic bid bond has been executed by a Surety meeting the standards required by the Bidding Documents and the Bidder and Surety are firmly bound unto the State of South Carolina under the conditions provided in this Section 4.2.

2.27. Insert the following Section 4.2.4:

4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and performance and payment bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

2.28. Delete Section 4.3.1 and substitute the following:

4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall, unless hand delivered by the Bidder, be addressed to the Owner's designated purchasing office as shown in the Invitation for Bids. The envelope shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail or special delivery service (UPS, Federal Express, etc.), the envelope should be labeled "BID ENCLOSED" on the face thereof. Bidders hand delivering their Bids shall deliver Bids to the place of the Bid Opening as shown in the Invitation for Bids. Whether or not Bidders attend the Bid Opening, they shall give their Bids to the Owner's procurement officer or his/her designee as shown in the Invitation for Bids prior to the time of the Bid Opening.

2.29. Insert the following Section 4.3.6 and substitute the following:

4.3.5 The official time for receipt of Bids will be determined by reference to the clock designated by the Owner's procurement officer or his/her designee. The procurement officer conducting the Bid Opening will determine and announce that the deadline has arrived and no further Bids or bid modifications will be accepted. All Bids and bid modifications in the possession of the procurement officer at the time the announcement is completed will be timely, whether or not the bid envelope has been date/time stamped or otherwise marked by the procurement officer.

2.30. Delete Section 4.4.2 and substitute the following:

4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be withdrawn in person or by written notice to the party receiving Bids at the place designated for receipt of Bids. Withdrawal by written notice shall be in writing over the signature of the Bidder.

2.31. In Section 5.1, delete everything following the caption "OPENING OF BIDS" and substitute the following:

5.1.1 Bids received on time will be publicly opened and will be read aloud. Owner will not read aloud Bids that Owner determines, at the time of opening, to be non-responsive. .

5.1.2 At bid opening, Owner will announce the date and location of the posting of the Notice of Intended Award.

5.1.3 Owner will send a copy of the final Bid Tabulation to all Bidders within ten (10) working days of the Bid Opening.

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5.1.4 If Owner determines to award the Project, Owner will, after posting a Notice of Intended Award, send a copy of the Notice to all Bidders.

5.1.5 If only one Bid is received, Owner will open and consider the Bid.

2.32. *In Section 5.2, insert the section number “5.2.1” before the words of the “The Owner” at the beginning of the sentence.*

2.33. *Insert the following Sections 5.2.2 and 5.2.3:*

5.2.2 The reasons for which the Owner will reject Bids include, but are not limited to:

- .1** Failure by a Bidder to be represented at a Mandatory Pre-Bid Conference or site visit;
- .2** Failure to deliver the Bid on time;
- .3** Failure to comply with Bid Security requirements, except as expressly allowed by law;
- .4** Listing an invalid electronic Bid Bond authorization number on the bid form;
- .5** Failure to Bid an Alternate, except as expressly allowed by law;
- .6** Failure to list qualified Subcontractors as required by law;
- .7** Showing any material modification(s) or exception(s) qualifying the Bid;
- .8** Faxing a Bid directly to the Owner or their representative; or
- .9** Failure to include a properly executed Power-of-Attorney with the bid bond.

5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line 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 Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

2.34. *Delete Section 6.1 and substitute the following:*

6.1 CONTRACTOR'S RESPONSIBILITY

Owner will make a determination of Bidder's responsibility before awarding a contract. Bidder shall provide all information and documentation requested by the Owner to support the Owner's evaluation of responsibility. Failure of Bidder to provide requested information is cause for the Owner, at its option, to determine the Bidder to be non-responsive

2.35. *Delete the language of Section 6.2 and insert the word “Reserved.”*

2.36. *Delete the language of Sections 6.3.2, 6.3.3, and 6.3.4 and insert the word “Reserved” after each Section Number.*

2.37. *Insert the following Section 6.4*

6.4 CLARIFICATION

Pursuant to Section 11-35-1520(8), the Procurement Officer may elect to communicate with a Bidder after opening for the purpose of clarifying either the Bid or the requirements of the Invitation for Bids. Such communications may be conducted only with Bidders who have submitted a Bid which obviously conforms in all material aspects to the Invitation for Bids and only in accordance with Appendix D (Paragraph A(6)) to the Manual for Planning and Execution of State Permanent Improvement, Part II. Clarification of a Bid must be documented in writing and included with the Bid. Clarifications may not be used to revise a Bid or the Invitation for Bids. [Section 11-35-1520(8); R.19-445.2080]

2.38. *Delete Section 7.1.2 and substitute the following:*

7.1.2 The performance and payment bonds shall conform to the requirements of Section 11.4 of the General Conditions of the Contract. If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid.

2.39. *Delete the language of Section 7.1.3 and insert the word “Reserved.”*

2.40. *In Section 7.2, insert the words “CONTRACT, CERTIFICATES OF INSURANCE” into the caption after the word “Delivery.”*

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2.41. Delete Section 7.2.1 and substitute the following:

7.2.1 After expiration of the protest period, the Owner will tender a signed Contract for Construction to the Bidder and the Bidder shall return the fully executed Contract for Construction to the Owner within seven days thereafter. The Bidder shall deliver the required bonds and certificate of insurance to the Owner not later than three days following the date of execution of the Contract. Failure to deliver these documents as required shall entitle the Owner to consider the Bidder's failure as a refusal to enter into a contract in accordance with the terms and conditions of the Bidder's Bid and to make claim on the Bid Security for re-procurement cost.

2.42. Delete the language of Section 7.2.2 and insert the word "Reserved."**2.43. Delete the language of Article 8 and insert the following:**

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on South Carolina Modified AIA Document A101, 2007, Standard Form of Agreement Between Owner and Contractor as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor.

2.44. Insert the following Article 9:**ARTICLE 9 MISCELLANEOUS****9.1 NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING
IMPORTANT TAX NOTICE - NONRESIDENTS ONLY**

Withholding Requirements for Payments to Nonresidents: Section 12-8-550 of the South Carolina Code of Laws requires persons hiring or contracting with a nonresident conducting a business or performing personal services of a temporary nature within South Carolina to withhold 2% of each payment made to the nonresident. The withholding requirement does not apply to (1) payments on purchase orders for tangible personal property when the payments are not accompanied by services to be performed in South Carolina, (2) nonresidents who are not conducting business in South Carolina, (3) nonresidents for contracts that do not exceed \$10,000 in a calendar year, or (4) payments to a nonresident who (a) registers with either the S.C. Department of Revenue or the S.C. Secretary of State and (b) submits a Nonresident Taxpayer Registration Affidavit - Income Tax Withholding, Form I-312 to the person letting the contract.

For information about other withholding requirements (e.g., employee withholding), contact the Withholding Section at the South Carolina Department of Revenue at 803-898-5383 or visit the Department's website at: www.sctax.org

This notice is for informational purposes only. This Owner does not administer and has no authority over tax issues. All registration questions should be directed to the License and Registration Section at 803-898-5872 or to the South Carolina Department of Revenue, Registration Unit, Columbia, S.C. 29214-0140. All withholding questions should be directed to the Withholding Section at 803-898- 5383.

PLEASE SEE THE "NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING" FORM (FORM NUMBER I-312) LOCATED AT:
<http://www.sctax.org/Forms+and+Instructions/withholding/default.htm>.

9.2 CONTRACTOR LICENSING

Contractors and Subcontractors listed in Section 7 of the Bid Form who are required by the South Carolina Code of Laws to be licensed, must be licensed at the time of bidding.

9.3 SUBMITTING CONFIDENTIAL INFORMATION

For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that Bidder contends contains information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in Section 11-35-410. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that Bidder contends is protected by 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. Do not mark your entire bid as confidential, trade secret, or protected! If your bid, or any part thereof, is improperly marked as confidential or trade

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secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page. By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page 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, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (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. In determining whether to release documents, the State will detrimentally rely on Bidders's marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED". By submitting a response, Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

9.4 POSTING OF INTENT TO AWARD

Notice of Intent to Award, SE-370, will be posted at the following location:

Room or Area of Posting: Lobby

Building Where Posted: Facilities

Address of Building: 743 Greene Street, Columbia, SC 29208

WEB site address (if applicable): <http://purchasing.sc.edu>

Posting date will be announced at bid opening. In addition to posting the notice, the Owner will promptly send all responsive bidders a copy of the notice of intent to award and the final bid tabulation

9.5 PROTEST OF SOLICITATION OR AWARD

Any prospective bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the solicitation of a contract shall protest within fifteen days of the date of issuance of the applicable solicitation document at issue. Any actual bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the intended award or award of a contract shall protest within ten days of the date notification of intent to award is posted in accordance with Title 11, Chapter 35, Section 4210 of the South Carolina Code of Laws, as amended. A protest shall be in writing, shall set forth the grounds of the protest and the relief requested with enough particularity to give notice of the issues to be decided, and must be received by the State Engineer within the time provided.

Any protest must be addressed to the CPO, Office of State Engineer, and submitted in writing:

(a) by email to protest-ose@mmo.sc.gov,

(b) by facsimile at 803-737-0639, or

(c) by post or delivery to 1201 Main Street, Suite 600, Columbia, SC 29201.

By submitting a protest to the foregoing email address, you (and any person acting on your behalf) consent to receive communications regarding your protest (and any related protests) at the e-mail address from which you sent your protest.

9.6 SOLICITATION INFORMATION FROM SOURCES OTHER THAN OFFICIAL SOURCE

South Carolina Business Opportunities (SCBO) is the official state government publication for State of South Carolina solicitations. Any information on State agency solicitations obtained from any other source is unofficial and any reliance placed on such information is at the bidder's sole risk and is without recourse under the South Carolina Consolidated Procurement Code.

9.7 BUILDER'S RISK INSURANCE

Bidder's are directed to Article 11.3 of the South Carolina Modified AIA Document A201, 2007 Edition, which, unless provided otherwise in the bid documents, requires the contractor to provide builder's risk insurance on the project.

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9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS

Pursuant to Section 12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The taxpayer is eligible to claim the credit for 10 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. 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. Taxpayers must maintain evidence of work performed for a State contract by the minority subcontractor. 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. The subcontractor must be certified as to the criteria of a "Minority Firm" by the Governor's Office of Small and Minority Business Assistance (OSMBA). Certificates are issued to subcontractors upon successful completion of the certification process. 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. Reference: SC §11-35-5010 – Definition for Minority Subcontractor & SC §11-35-5230 (B) – Regulations for Negotiating with State Minority Firms.

§ 9.9 OTHER SPECIAL CONDITIONS OF THE WORK

END OF DOCUMENT

SE-330 – LUMP SUM BID BID FORM

2011 Edition
Rev. 9/21/2011

Bidders shall submit bids on only Bid Form SE-330.

BID SUBMITTED BY: _____
(Bidder's Name)

BID SUBMITTED TO: _____
(Owner's Name)

FOR PROJECT: PROJECT NAME USC Greenhouse Construction
PROJECT NUMBER H27-Z090

OFFER

§ 1. In response to the Invitation for Construction Bids and in compliance with the Instructions to Bidders for the above-named Project, the undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with the Owner on the terms included in the Bidding Documents, and to perform all Work as specified or indicated in the Bidding Documents, for the prices and within the time frames indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

§ 2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, Bidder has submitted Bid Security as follows in the amount and form required by the Bidding Documents:

☐ Bid Bond with Power of Attorney ☐ Electronic Bid Bond ☐ Cashier's Check

(Bidder check one)

§ 3. Bidder acknowledges the receipt of the following Addenda to the Bidding Documents and has incorporated the effects of said Addenda into this Bid:

ADDENDUM No: _____

§ 4. Bidder accepts all terms and conditions of the Invitation for Bids, including, without limitation, those dealing with the disposition of Bid Security. Bidder agrees that this Bid, including all Bid Alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of 60 Days following the Bid Date, or for such longer period of time that Bidder may agree to in writing upon request of the Owner.

§ 5. Bidder herewith offers to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fees, permits, licenses and applicable taxes necessary to complete the following items of construction work:

§ 6.1 **BASE BID WORK** *(as indicated in the Bidding Documents and generally described as follows):* Construction of Greenhouse.

_____, which sum is hereafter called the Base Bid.
(Bidder - insert Base Bid Amount on line above)

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§ 6.2 BID ALTERNATES - as indicated in the Bidding Documents and generally described as follows:

ALTERNATE # 1 (Brief Description): Furnish all labor and materials to install approximately 70 sf of paver stone in the university president's rear yard to connect existing paver stone area to entrance to greenhouse. Paver stones to match existing.

☐ ADD TO or ☐ DEDUCT FROM BASE BID: _____

(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)

ALTERNATE # 2 (Brief Description): Provide alternate pricing to purchase and install new bricks in lieu of the reclaimed bricks being furnished by the University.

☐ ADD TO or ☐ DEDUCT FROM BASE BID: _____

(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)

ALTERNATE # 3 (Brief Description): _____

☐ ADD TO or ☐ DEDUCT FROM BASE BID: _____

(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)

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§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED – (See *Instructions on the following page BF-2A*)

Bidder shall use the below-listed Subcontractors in the performance of the Subcontractor Specialty work listed:

| SUBCONTRACTOR SPECIALTY By License Classification and/or Subclassification (Completed by Owner) | SUBCONTRACTOR'S PRIME CONTRACTOR'S NAME (Must be completed by Bidder) BASE BID | SUBCONTRACTOR'S PRIME CONTRACTOR'S SC LICENSE NUMBER |
|--|---|---|
| Site Work | | |
| Electrical | | |
| | | |
| | | |
| ALTERNATE 1 | | |
| N/A | | |
| | | |
| | | |
| | | |
| ALTERNATE 2 | | |
| N/A | | |
| | | |
| | | |
| | | |
| ALTERNATE 3 | | |
| N/A | | |
| | | |
| | | |
| | | |

If a Bid Alternate is accepted, Subcontractors listed for the Bid Alternate shall be used for the work of both the Alternate and the Base Bid work.

INSTRUCTIONS FOR SUBCONTRACTOR LISTING

- 1.** Section 7 of the Bid Form sets forth a list of subcontractor specialties for which bidder is required to identify by name the subcontractor(s) Bidder will use to perform the work of each listed specialty. Bidder must identify only the subcontractor(s) who will perform the work and no others.
- 2.** For purposes of subcontractor listing, a Subcontractor is an entity who will perform work or render service to the prime contractor to or about the construction site. Material suppliers, manufacturers, and fabricators that will not perform physical work at the site of the project but will only supply materials or equipment to the bidder or proposed subcontractor(s) are not subcontractors and Bidder should not insert their names in the spaces provided on the bid form. Likewise, Bidder should not insert the names of sub-subcontractors in the spaces provided on the bid form but only the names of those entities with which bidder will contract directly.
- 3.** Bidder must only insert the names of subcontractors who are qualified to perform the work of the listed specialties as specified in the Bidding Documents and South Carolina Licensing Laws.
- 4.** If under the terms of the Bidding Documents, Bidder is qualified to perform the work of a specialty listed and Bidder does not intend to subcontract such work but to use Bidder's own employees to perform such work, the Bidder must insert its own name in the space provided for that specialty.
- 5.** If Bidder intends to use multiple subcontractors to perform the work of a single specialty listing, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word **“and”**. If Bidder intends to use both his own employees to perform a part of the work of a single specialty listing and to use one or more subcontractors to perform the remaining work for that specialty listing, bidder must insert his own name and the name of each subcontractor, preferably separating the name of each with the word **“and”**.
- 6.** Bidder may not list subcontractors in the alternative nor in a form that may be reasonably construed at the time of bid opening as a listing in the alternative. A listing that requires subsequent explanation to determine whether or not it is a listing in the alternative is non-responsive. If bidder intends to use multiple entities to perform the work for a single specialty listing, bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word **“and”** between the name of each entity listed for that specialty. Owner will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word **“or”**, a virgule (that is a /), or any separator that the Owner may reasonably interpret as a listing in the alternative.
- 7.** If Bidder is awarded the contract, bidder must, except with the approval of the owner for good cause shown, use the listed entities to perform the work for which they are listed.
- 8.** If bidder is awarded the contract, bidder will not be allowed to substitute another entity as subcontractor in place of a subcontractor listed in Section 7 of the Bid except for one or more of the reasons allowed by the SC Code of Laws.
- 9.** Bidder's failure to insert a name for each listed specialty subcontractor will render the Bid non-responsive.

SE-330 – LUMP SUM BID BID FORM

§ 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY): Pursuant to instructions in the Invitation for Bids, if any, Bidder will provide to Owner upon the Owner's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that this list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements of SC Code Ann § 11-35-3020(b)(i).

§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES

a. **CONTRACT TIME:** Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work within 90 calendar days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b. **LIQUIDATED DAMAGES:** Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the sum of \$250.00 for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This sum is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

§ 10. AGREEMENTS

- a. Bidder agrees that this bid is subject to the requirements of the law of the State of South Carolina.
- b. Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.
- c. Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.

§ 11. ELECTRONIC BID BOND

By signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal and Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, Bid Bond, included in the Bidding Documents.

Electronic Bid Bond Number: _____

Signature and Title: _____

**SE-330 – LUMP SUM BID
BID FORM**

2011 Edition
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BIDDER'S TAXPAYER IDENTIFICATION

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER: _____

OR

SOCIAL SECURITY NUMBER: _____

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS

Classification(s) & Limits: _____

Subclassification(s) & Limits: _____

SC Contractor's License Number(s): _____

BY SIGNING THIS BID, THE PERSON SIGNING REAFFIRMS ALL REPRESENTATIONS AND CERTIFICATIONS MADE BY BOTH THE PERSON SIGNING AND THE BIDDER, INCLUDING WITHOUT LIMITATION, THOSE APPEARING IN ARTICLE 2 OF THE INSTRUCTIONS TO BIDDER. THE INVITATION FOR BIDS, AS DEFINED IN THE INSTRUCTIONS TO BIDDERS, IS EXPRESSLY INCORPORATE BY REFERENCE.

SIGNATURE

BIDDER'S LEGAL NAME: _____

ADDRESS: _____

BY: _____
(Signature)

DATE: _____

TITLE: _____

TELEPHONE: _____

EMAIL: _____

FORM OF AGREEMENT

AIA Document A101, 2007 Edition, Standard Form of Agreement Between Owner and Contractor shall be the form of agreement and is incorporated into these contract documents by reference.

Copies of the Form of Agreement are available for examination at the offices of Chao and Associates, Inc.

OSE FORM 00501

STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

OWNER: University of South Carolina

PROJECT NUMBER: H27-Z090

PROJECT NAME: USC Greenhouse Construction

1. STANDARD MODIFICATIONS TO AIA A101-2007

1.1. These Standard Modifications amend or supplement the *Standard Form of Agreement Between Owner and Contractor* (AIA Document A101-2007) and other provisions of Bidding and Contract Documents as indicated below.

1.2. All provisions of A101-2007, which are not so amended or supplemented, remain in full force and effect.

2. MODIFICATIONS TO A101

2.1. *Insert the following at the end of Article 1:*

Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

2.2. *Delete Section 3.1 and substitute the following:*

3.1 The Date of Commencement of the Work shall be the date fixed in a Notice to Proceed issued by the Owner. The Owner shall issue the Notice to Proceed to the Contractor in writing, no less than seven days prior to the Date of Commencement. Unless otherwise provided elsewhere in the contract documents, and provided the contractor has secured all required insurance and surety bonds, the contractor may commence work immediately after receipt of the Notice to Proceed.

2.3. *Delete Section 3.2 and substitute the following:*

3.2 The Contract Time shall be measured from the Date of Commencement as provided in Section 9(a) of the Bid Form (SE-330) for this Project. Contractor agrees that if the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Owner shall be entitled to withhold or recover from the Contractor liquidated damages in the amounts set forth in Section 9(b) of the Bid Form (SE-330), subject to adjustments of this Contract Time as provided in the Contract Documents.

2.4. *In Section 5.1.1, insert the words “and Owner” after the phrase “Payment submitted to the Architect.”*

2.5. *Delete Section 5.1.3 and substitute the following:*

5.1.3 The Owner shall make payment of the certified amount to the Contractor not later than 21 days after receipt of the Application for Payment.

2.6. *In Section 5.1.6, Insert the following after the phrase “Subject to other provisions of the Contract Documents”:*

and subject to Title 12, Chapter 8, Section 550 of the South Carolina Code of Laws, as amended
(Withholding Requirements for Payments to Non-Residents)

In the spaces provided in Sub-Sections 1 and 2 for inserting the retainage amount, insert “three and one-half percent (3.5%).”

OSE FORM 00501**STANDARD MODIFICATIONS TO AGREEMENT BETWEEN
OWNER AND CONTRACTOR**

2.7. *In Section 5.1.8, delete the word “follows” and the colon and substitute the following:*

set forth in S.C. Code Ann. § 11-35-3030(4).

2.8. *In Section 5.1.9, delete the words “Except with the Owner’s prior approval, the” before the word “Contractor.”*

2.9. *In Section 5.2.2, delete the number 30 and substitute the number 21, delete everything following the words “Certificate for Payment” and place a period at the end of the resulting sentence.*

2.10. *Delete the language of Sections 6.1 and 6.2 and substitute the word “Reserved” for the deleted language of each Section .*

2.11. *Delete the language of Section 8.2 and substitute the word “Reserved.”*

2.12. *In Section 8.3, make the word “Representative” in the title plural, delete everything following the title, and substitute the following:*

8.3.1 Owner designates the individual listed below as its Senior Representative (“Owner's Senior Representative”), which individual has the responsibility for and, subject to Section 7.2.1 of the General Conditions, the authority to resolve disputes under Section 15.6 of the General Conditions:

Name: Tom Opal

Title: Senior Project Manager

Address: 743 Greene Street; Columbia, SC 29223

Telephone: 803-777-7076 **FAX:** _____

Email: tnopal@fmc.sc.edu

8.3.2 Owner designates the individual listed below as its Owner's Representative, which individual has the authority and responsibility set forth in Section 2.1.1 of the General Conditions:

Name: Lekita Hargrave

Title: Project Manager

Address: 743 Greene Street; Coulmbia, SC 29223

Telephone: 803-777-5818 **FAX:** _____

Email: hargrave@sc.edu

2.13. *In Section 8.4, make the word “Representative” in the title plural, delete everything following the title, and substitute the following:*

8.4.1 Contractor designates the individual listed below as its Senior Representative (“Contractor's Senior Representative”), which individual has the responsibility for and authority to resolve disputes under Section 15.6 of the General Conditions:

Name: _____

Title: _____

Address: _____

Telephone: _____ **FAX:** _____

Email: _____

**STANDARD MODIFICATIONS TO AGREEMENT BETWEEN
OWNER AND CONTRACTOR**

8.4.2 Contractor designates the individual listed below as its Contractor's Representative, which individual has the authority and responsibility set forth in Section 3.1.1 of the General Conditions:

Name: _____

Title: _____

Address: _____

Telephone: _____ **FAX:** _____

Email: _____

- 2.14.** *Add the following Section 8.6.1:*

8.6.1 The Architect's representative:

Name: Gerald A. Lee

Title: Director of Civil Engineering

Address: 7 Clusters Court, Columbia, SC 29210

Telephone: 803-772-8420 **FAX:** 803-772-9120

Email: geraldl@chaoinc.com

- 2.15.** *In Section 9.1.7, Sub-Section 2, list the following documents in the space provided for listing documents:*

Invitation for Construction Bids (SE-310)

Instructions to Bidders (AIA Document A701-1997)

Standard Supplemental Instructions to Bidders (OSE Form 00201)

Contractor's Bid (Completed SE-330)

Notice of Intent to Award (Completed SE-370)

Certificate of procurement authority issued by the SC Budget & Control Board

- 2.16.** *In Article 10, delete everything after the first sentence.*

END OF DOCUMENT

FORM OF AGREEMENT

AIA Document A101, 2007 Edition, Standard Form of Agreement Between Owner and Contractor shall be the form of agreement and is incorporated into these contract documents by reference.

Copies of the Form of Agreement are available for examination at the offices of Chao and Associates, Inc.

INSTRUCTIONS TO BIDDERS

AIA Document A701, 1997 Edition, Instructions to Bidders is incorporated into these contract documents by reference.

Copies of the Instructions to Bidders are available for examination at the offices of Chao and Associates, Inc.

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

AIA Document A201, 2007 Edition, General Conditions of the Contract for Construction is incorporated into these contract documents by reference.

Copies of the Form of Agreement are available for examination at the offices of Chao and Associates, Inc.

**USCA Pedestrian Bridge
State Project No: H29-9545
PLAN SHEET ENUMERATION**

000 Title Sheet

CIVIL DRAWINGS

- C1.0 Existing Conditions**
- C2.0 Overall Bridge Plan and Profile**
- C3.0 Layout Plan – North Ramp**
 - C3.1 Grading Detail – North Ramp**
 - C3.2 Sediment and Erosion Control – North Ramp**
 - C3.3 Centerline Stair Section – North Ramp**
 - C3.4 Ramp Sections – North Ramp**
- C4.0 Layout Plan – South Ramp**
 - C4.1 Grading Detail – South Ramp**
 - C4.2 Sediment and Erosion Control – South Ramp**
- C5.0 MSE Wall Elevations**
 - C5.1 MSE Rib Wall and Relief Detail**
- C6.0 Miscellaneous Details**
 - C6.1 Miscellaneous Details**

STRUCTURAL DRAWINGS

- S0.0 General Notes**
- S1.0 Typical Plan and Elevation**
 - S1.1 Typical Plans**
 - S1.2 Elevation View**
 - S1.3 End Elevations**
- S2.0 Details**
- S3.0 Foundations Plans**
 - S3.1 Foundation Sections and Details**
 - S3.2 Sections and Details**

ARCHITECTURAL DRAWINGS

- A1.0 Bridge and Tower Plans**
- A2.0 Elevations and Precast Panels**
- A3.0 Sections and Details**
- A4.0 Signage Panels**

ELECTRICAL DRAWINGS

- E001 Electrical Symbols, Schedules and Details**
- E002 Electric Details**
- E101 Electrical Site/Floor Plans**

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

OWNER: University of South Carolina

PROJECT NUMBER: H27-Z090

PROJECT NAME: USC Greenhouse Construction

1 GENERAL CONDITIONS

The *General Conditions of the Contract for Construction*, AIA Document A201, 2007 Edition, Articles 1 through 15 inclusive, is a part of this Contract and is incorporated as fully as if herein set forth. For brevity, AIA Document A201 is also referred to in the Contract Documents collectively as the "General Conditions."

2 STANDARD SUPPLEMENTARY CONDITIONS

2.1 The following supplements modify, delete and/or add to the General Conditions. Where any portion of the General Conditions is modified or any paragraph, Section or clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of the General Conditions shall remain in effect.

2.2 Unless otherwise stated, the terms used in these Standard Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

3 MODIFICATIONS TO A201-2007

3.1 *Insert the following at the end of Section 1.1.1:*

Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

3.2 *Delete the language of Section 1.1.8 and substitute the word "Reserved."*

3.3 *Add the following Section 1.1.9:*

1.1.9 NOTICE TO PROCEED

Notice to Proceed is a document issued by the Owner to the Contractor, with a copy to the Architect, directing the Contractor to begin prosecution of the Work in accordance with the requirements of the Contract Documents. The Notice to Proceed shall fix the date on which the Contract Time will commence.

3.4 *Insert the following at the end of Section 1.2.1:*

In the event of patent ambiguities within or between parts of the Contract Documents, the contractor shall 1) provide the better quality or greater quantity of Work, or 2) comply with the more stringent requirement, either or both in accordance with the Architect's interpretation.

3.5 *Delete Section 1.5.1 and substitute the following:*

1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as a violation of the Architect's or Architect's consultants' reserved rights.

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3.6 *Delete Section 2.1.1 and substitute the following:*

2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization, except as provided in Section 7.1.2. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's Representative. [Reference § 8.2 of the Agreement.]

3.7 *Delete Section 2.1.2 and substitute the following:*

2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to post Notice of Project Commencement pursuant to Title 29, Chapter 5, Section 23 of the South Carolina Code of Laws, as amended..

3.8 *Delete Section 2.2.3 and substitute the following:*

2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Subject to the Contractor's obligations, including those in Section 3.2, the Contractor shall be entitled to rely on the accuracy of information furnished by the Owner pursuant to this Section but shall exercise proper precautions relating to the safe performance of the Work.

3.9 *Replace the period at the end of the last sentence of Section 2.2.4 with a semicolon and insert the following after the inserted semicolon:*

"however, the Owner does not warrant the accuracy of any such information requested by the Contractor that is not otherwise required of the Owner by the Contract Documents. Neither the Owner nor the Architect shall be required to conduct investigations or to furnish the Contractor with any information concerning subsurface characteristics or other conditions of the area where the Work is to be performed beyond that which is provide in the Contract Documents."

3.10 *Delete Section 2.2.5 and substitute the following:*

2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor with ten copies of the Contract Documents. The Contractor may make reproductions of the Contract Documents pursuant to Section 1.5.2. All copies of the drawings and specifications, except the Contractor's record set, shall be returned or suitably accounted for to the Owner, on request, upon completion of the Work.

3.11 *Add the following Sections 2.2.6 and 2.2.7:*

2.2.6 The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor based on information made available by the Owner.

2.2.7 The Owner shall obtain, at its own cost, general building and specialty inspection services as required by the Contract Documents. The Contractor shall be responsible for payment of any charges imposed for reinspections.

3.12 *Delete Section 2.4 and substitute the following:*

2.4 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect, including but not limited to providing necessary resources, with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Directive shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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3.13 *Insert the following at the end of Section 3.2.1:*

The Contractor acknowledges that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph 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 Owner.

3.14 *In the third sentence of Section 3.2.4, insert the word “latent” before the word “errors.”***3.15** *In the last sentence of Section 3.3.1, insert the words “by the Owner in writing” after the word “instructed.”***3.16** *Delete the third sentence of Section 3.5 and substitute the following sentences:*

Work, materials, or equipment not conforming to these requirements shall be considered defective. Unless caused by the Contractor or a subcontractor at any tier, the Contractor’s warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

3.17 *Insert the following at the end of Section 3.6:*

The Contractor shall comply with the requirements of Title 12, Chapter 9 of the South Carolina Code of Laws, as amended, regarding withholding tax for nonresidents, employees, contractors and subcontractors.

3.18 *In Section 3.7.1, delete the words “the building permit as well as for other” and insert the following sentence at the end of this section:*

Pursuant to Title 10, Chapter 1, Section 180 of the South Carolina Code of Laws, as amended, no local general or specialty building permits are required for state buildings.

3.19 *Delete the last sentence of Section 3.7.5 and substitute the following:*

Adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 7.3.3.

3.20 *Delete the last sentence of Section 3.8.2.3 and substitute the following:*

The amount of the Change Order shall reflect the difference between actual costs, as documented by invoices, and the allowances under Section 3.8.2.1.

3.21 *In Section 3.9.1, insert a comma after the word “superintendent” in the first sentence and insert the following after the inserted comma:*

acceptable to the Owner,

3.22 *Delete Section 3.9.2 and substitute the following:*

3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner the name and qualifications of a proposed superintendent. The Owner may reply within 14 days to the Contractor in writing stating (1) whether the Owner has reasonable objection to the proposed superintendent or (2) that the

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Owner requires additional time to review. Failure of the Owner to reply within the 14-day period shall constitute notice of no reasonable objection.

3.23 *After the first sentence in Section 3.9.3, insert the following sentence:*

The Contractor shall notify the Owner, in writing, of any proposed change in the superintendent, including the reason therefore, prior to making such change.

3.24 *Delete Section 3.10.3 and substitute the following:*

3.10.3 Additional requirements, if any, for the constructions schedule are as follows:
(Check box if applicable to this Contract))

☐ The construction schedule shall be in a detailed precedence-style critical path management (CPM) or primavera-type format satisfactory to the Owner and the Architect that shall also (1) provide a graphic representation of all activities and events that will occur during performance of the work; (2) identify each phase of construction and occupancy; and (3) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner and the Architect of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents and attached to the Agreement as Exhibit "A." If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. Whenever the approved construction schedule no longer reflects actual conditions and progress of the work or the Contract Time is modified in accordance with the terms of the Contract Documents, the Contractor shall update the accepted construction schedule to reflect such conditions. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

3.25 *Add the following Section 3.10.4:*

3.10.4 Owner's review and acceptance of Contractor's schedule is not conducted for the purpose of either determining its accuracy and completeness or approving the construction means, methods, techniques, sequences or procedures. The Owner's approval shall not relieve the Contractor of any obligations. Unless expressly addressed in a Modification, the Owner's approval of a schedule shall not change the Contract Time.

3.26 *Add the following Section 3.12.5.1:*

3.12.5.1 The fire sprinkler shop drawings shall be prepared by a licensed fire sprinkler contractor and shall accurately reflect actual conditions affecting the required layout of the fire sprinkler system. The fire sprinkler contractor shall certify the accuracy of his shop drawings prior to submitting them for review and approval. The fire sprinkler shop drawings shall be reviewed and approved by the Architect's engineer of record who, upon approving the sprinkler shop drawings will submit them to the State Fire Marshal or other authorities having jurisdiction for review and approval. The Architect's engineer of record will submit a copy of the State Fire Marshal's approval letter to the Contractor, Architect, and OSE. Unless authorized in writing by OSE, neither the Contractor nor subcontractor at any tier shall submit the fire sprinkler shop drawings directly to the State Fire Marshal or other authorities having jurisdiction for approval.

3.27 *In the fourth sentence of Section 3.12.10, after the comma following the words "licensed design professional," insert the following:*

who shall comply with reasonable requirements of the Owner regarding qualifications and insurance and

3.28 *In Section 3.13, insert the section number "3.13.1" before the opening words "The Contractors shall."*

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3.29 Add the following Sections 3.13.2 and 3.13.3:

3.13.2 Protection of construction materials and equipment stored at the Project site from weather, theft, vandalism, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall perform the work in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

3.13.3 The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

3.30 *In the first sentence of Section 3.18.1, after the parenthetical “...(other than the Work itself),...” and before the word “...but...”, insert the following:*

including loss of use resulting therefrom,

3.31 *Delete Section 4.1.1 and substitute the following:*

4.1.1 The Architect is that person or entity identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

3.32 *Insert the following at the end of Section 4.2.1:*

Any reference in the Contract Documents to the Architect taking action or rendering a decision with a “reasonable time” is understood to mean no more than fourteen days, unless otherwise specified in the Contract Documents or otherwise agreed to by the parties.

3.33 *Delete the first sentence of Section 4.2.2 and substitute the following:*

The Architect will visit the site as necessary to fulfill its obligation to the Owner for inspection services, if any, and, at a minimum, to assure conformance with the Architect’s design as shown in the Contract Documents and to observe the progress and quality of the various components of the Contractor’s Work, and to determine if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents.

3.34 *Delete the first sentence of Section 4.2.3 and substitute the following:*

On the basis of the site visits, the Architect will keep the Owner informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work.

3.35 *In Section 4.2.5, after the words “evaluations of the” and before the word “Contractor’s,” insert the following:*

Work completed and correlated with the

3.36 *Delete the first sentence of Section 4.2.11 and substitute the following:*

4.2.11 The Architect will, in the first instance, interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. Upon receipt of such request, the Architect will promptly provide the non-requesting party with a copy of the request.

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3.37 *Insert the following at the end of Section 4.2.12:*

If either party disputes the Architects interpretation or decision, that party may proceed as provided in Article 15. The Architect's interpretations and decisions may be, but need not be, accorded any deference in any review conducted pursuant to law or the Contract Documents.

3.38 *Delete Section 4.2.14 and substitute the following:*

The Architect will review and respond to requests for information about the Contract Documents so as to avoid delay to the construction of the Project. The Architect's response to such requests will be made in writing with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information. Any response to a request for information must be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. Unless issued pursuant to a Modification, supplemental Drawings or Specifications will not involve an adjustment to the Contract Sum or Contract Time.

3.39 *Delete Section 5.2.1 and substitute the following:*

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, within fourteen days after posting of the Notice of Intent to Award the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (excluding Listed Subcontractors but including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Owner may reply within 14 days to the Contractor in writing stating (1) whether the Owner has reasonable objection to any such proposed person or entity. Failure of the Owner to reply within the 14 day period shall constitute notice of no reasonable objection.

3.40 *Delete Section 5.2.2 and substitute the following:*

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner has made reasonable and timely objection. The Owner shall not direct the Contractor to contract with any specific individual or entity for supplies or services unless such supplies and services are necessary for completion of the Work and the specified individual or entity is the only source of such supply or services.

3.41 *In the first sentence of Section 5.2.3, delete the words "...or Architect..." in the two places they appear.***3.42** *Delete the words "...or Architect..." in the in the first sentence of Section 5.2.4 and insert the following sentence at the end of Section 5.2.4:*

The Contractor's request for substitution must be made to the Owner in writing accompanied by supporting information.

3.43 *Add the following Section 5.2.5:*

5.2.5 A Subcontractor identified in the Contractor's Bid in response the specialty subcontractor listing requirements of Section 7 of the Bid Form (SE-330) may only be substituted in accordance with and as permitted by the provisions of Title 11, Chapter 35, Section 3021 of the South Carolina Code of Laws, as amended. A proposed substitute for a Listed Subcontractor shall be subject to the Owner's approval as set forth in Section 5.2.3.

3.44 *In Section 5.3, delete everything following the heading "SUBCONTRACTUAL RELATIONS" and insert the following Sections 5.3.1, 5.3.2, 5.3.3, and 5.3.4:*

5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not

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prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise herein or in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 Without limitation on the generality of Section 5.3.1, each Subcontract agreement and each Sub-subcontract agreement shall include, and shall be deemed to include, the following Sections of these General Conditions: 3.2, 3.5, 3.18, 5.3, 5.4, 6.2.2, 7.3.3, 7.5, 7.6, 13.1, 13.12, 14.3, 14.4, and 15.1.6.

§ 5.3.3 Each Subcontract Agreement and each Sub-subcontract agreement shall exclude, and shall be deemed to exclude, Sections 13.2.1 and 13.6 and all of Article 15, except Section 15.1.6, of these General Conditions. In the place of these excluded sections of the General Conditions, each Subcontract Agreement and each Sub-subcontract may include Sections 13.2.1 and 13.6 and all of Article 15, except Section 15.1.6, of AIA Document A201-2007, Conditions of the Contract, as originally issued by the American Institute of Architects.

§ 5.3.4 The Contractor shall assure the Owner that all agreements between the Contractor and its Subcontractor incorporate the provisions of Subparagraph 5.3.1 as necessary to preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the work to be performed by Subcontractors so that the subcontracting thereof will not prejudice such rights. The Contractor's assurance shall be in the form of an affidavit or in such other form as the Owner may approve. Upon request, the Contractor shall provide the Owner or Architect with copies of any or all subcontracts or purchase orders.

3.45 *Delete the last sentence of Section 5.4.1.*

3.46 *Add the following Sections 5.4.4, 5.4.5 and 5.4.6:*

§ 5.4.4 Each subcontract shall specifically provide that the Owner shall only be responsible to the subcontractor for those obligations of the Contractor that accrue subsequent to the Owner's exercise of any rights under this conditional assignment.

§ 5.4.5 Each subcontract shall specifically provide that the Subcontractor agrees to perform portions of the Work assigned to the Owner in accordance with the Contract Documents.

§ 5.4.6 Nothing in this Section 5.4 shall act to reduce or discharge the Contractor's payment bond surety's obligations to claimants for claims arising prior to the Owner's exercise of any rights under this conditional assignment.

3.47 *Delete the language of Section 6.1.4 and substitute the word "Reserved."*

3.48 *Insert the following at the end of Section 7.1.2:*

If the amount of a Modification exceeds the limits of the Owner's Construction Change Order Certification (reference Section 9.1.7.2 of the Agreement), then the Owner's agreement is not effective, and Work may not proceed, until approved in writing by the Office of State Engineer.

3.49 *Delete Section 7.2.1 and substitute the following:*

7.2.1 A Change Order is a written instrument prepared by the Architect (using State Form SE-480 "Construction Change Order") and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1** The change in the Work;

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- .2** The amount of the adjustment, if any, in the Contract Sum; and
- .3** The extent of the adjustment, if any, in the Contract Time.

3.50 *Add the following Sections 7.2.2, 7.2.3, 7.2.4, and 7.2.5:*

7.2.2 If a Change Order provides for an adjustment to the Contract Sum, the adjustment must be calculated in accordance with Section 7.3.3.

7.2.3 At the Owner's request, the Contractor shall prepare a proposal to perform the work of a proposed Change Order setting forth the amount of the proposed adjustment, if any, in the Contract Sum; and the extent of the proposed adjustment, if any, in the Contract Time. Any proposed adjustment in the Contract sum shall be prepared in accordance with Section 7.2.2. The Owner's request shall include any revisions to the Drawings or Specifications necessary to define any changes in the Work. Within fifteen days of receiving the request, the Contractor shall submit the proposal to the Owner and Architect along with all documentation required by Section 7.6.

7.2.4 If the Contractor requests a Change Order, the request shall set forth the proposed change in the Work and shall be prepared in accordance with Section 7.2.3. If the Contractor requests a change to the Work that involves a revision to either the Drawings or Specifications, the Contractor shall reimburse the Owner for any expenditures associated with the Architects' review of the proposed revisions, except to the extent the revisions are accepted by execution of a Change Order.

7.2.5 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, any adjustments to the Contract Sum or the Contract Time.

3.51 *Delete 7.3.3 and substitute the following:***7.3.3 PRICE ADJUSTMENTS**

§ 7.3.3.1 If any Modification, including a Construction Change Directive, provides for an adjustment to the Contract Sum, the adjustment shall be based on whichever of the following methods is the most valid approximation of the actual cost to the contractor, with overhead and profit as allowed by Section 7.5:

- .1** Mutual acceptance of a lump sum;
- .2** Unit prices stated in the Contract Documents, except as provided in Section 7.3.4, or subsequently agreed upon;
- .3** Cost attributable to the events or situations under applicable clauses with adjustment of profits or fee, all as specified in the contract, or subsequently agreed upon by the parties, or by some other method as the parties may agree; or
- .4** As provided in Section 7.3.7.

§ 7.3.3.2 Consistent with Section 7.6, costs must be properly itemized and supported by substantiating data sufficient to permit evaluation before commencement of the pertinent performance or as soon after that as practicable. All costs incurred by the Contractor must be justifiably compared with prevailing industry standards. Except as provided in Section 7.5, all adjustments to the Contract Price shall be limited to job specific costs and shall not include indirect costs, overhead, home office overhead, or profit.

3.52 *Delete Section 7.3.7 and substitute the following:*

7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall make an initial determination, consistent with Section 7.3.3, of the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.5. In such case, and also under Section 7.3.3.1.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

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- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; and
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work.

3.53 *Delete Section 7.3.8 and substitute the following:*

7.3.8 Using the percentages stated in Section 7.5, any adjustment to the Contract Sum for deleted work shall include any overhead and profit attributable to the cost for the deleted Work.

3.54 *Add the following Sections 7.5 and 7.6:***7.5 AGREED OVERHEAD AND PROFIT RATES**

7.5.1 For any adjustment to the Contract Sum for which overhead and profit may be recovered, other than those made pursuant to Unit Prices stated in the Contract Documents, the Contractor agrees to charge and accept, as full payment for overhead and profit, the following percentages of costs attributable to the change in the Work. The percentages cited below shall be considered to include all indirect costs including, but not limited to: field and office managers, supervisors and assistants, incidental job burdens, small tools, and general overhead allocations. The allowable percentages for overhead and profit are as follows:

- .1 To the Contractor for work performed by the Contractor's own forces, 17% of the Contractor's actual costs.
- .2 To each Subcontractor for work performed by the Subcontractor's own forces, 17% of the subcontractor's actual costs.
- .3 To the Contractor for work performed by a subcontractor, 10% of the subcontractor's actual costs (not including the subcontractor's overhead and profit).

7.6 PRICING DATA AND AUDIT**§ 7.6.1 Cost or Pricing Data.**

Upon request of the Owner or Architect, Contractor shall submit cost or pricing data prior to execution of a Modification which exceeds \$500,000. Contractor shall certify that, to the best of its knowledge and belief, the cost or pricing data submitted is accurate, complete, and current as of a mutually determined specified date prior to the date of pricing the Modification. Contractor's price, including profit, shall be adjusted to exclude any significant sums by which such price was increased because Contractor furnished cost or pricing data that was inaccurate, incomplete, or not current as of the date specified by the parties. Notwithstanding Subparagraph 9.10.4, such adjustments may be made after final payment to the Contractor.

§ 7.6.2 Cost or pricing data means all facts that, as of the date specified by the parties, prudent buyers and sellers would reasonably expect to affect price negotiations significantly. Cost or pricing data are factual, not judgmental; and are verifiable. While they do not indicate the accuracy of the prospective contractor's judgment about estimated future costs or projections, they do include the data forming the basis for that judgment. Cost or pricing data are more than historical accounting data; they are all the facts that can be reasonably expected to contribute to the soundness of estimates of future costs and to the validity of determinations of costs already incurred.

§ 7.6.3 Records Retention.

As used in Section 7.6, the term "records" means any books or records that relate to cost or pricing data that Contractor is required to submit pursuant to Section 7.6.1. Contractor shall maintain records for three years from the date of final payment, or longer if requested by the chief procurement officer. The Owner may audit Contractor's records at reasonable times and places.

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3.55 Delete Section 8.2.2 and substitute the following:

8.2.2 The Contractor shall not knowingly commence operations on the site or elsewhere prior to the effective date of surety bonds and insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such surety bonds or insurance.

3.56 Delete Section 8.3.1 and substitute the following:

8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the control of the Contractor and any subcontractor at any tier; or by delay authorized by the Owner pending dispute resolution; or by other causes that the Architect determines may justify delay, then to the extent such delay will prevent the Contractor from achieving Substantial Completion within the Contract Time and provided the delay (1) is not caused by the fault or negligence of the Contractor or a subcontractor at any tier and (2) is not due to unusual delay in the delivery of supplies, machinery, equipment, or services when such supplies, machinery, equipment, or services were obtainable from other sources in sufficient time for the Contractor to meet the required delivery, the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

3.57 Insert the following at the end of Section 9.1:

All changes to the Contract Sum shall be adjusted in accordance with Section 7.3.3.

3.58 Delete Section 9.2 and substitute the following:**9.2 SCHEDULE OF VALUES**

9.2.1 The Contractor shall submit to the Architect, within ten days of full execution of the Agreement, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. As requested by the Architect, the Contractor and each Subcontractor shall prepare a trade payment breakdown for the Work for which each is responsible, such breakdown being submitted on a uniform standardized format approved by the Architect and Owner. The breakdown shall be divided in detail, using convenient units, sufficient to accurately determine the value of completed Work during the course of the Project. The Contractor shall update the schedule of values as required by either the Architect or Owner as necessary to reflect:

- .1** the description of Work (listing labor and material separately);
- .2** the total value;
- .3** the percent and value of the Work completed to date;
- .4** the percent and value of previous amounts billed; and
- .5** the current percent completed and amount billed.

9.2.2 Any schedule of values or trade breakdown that fails to include sufficient detail, is unbalanced, or exhibits "front-loading" of the value of the Work shall be rejected. If a schedule of values or trade breakdown is used as the basis for payment and later determined to be inaccurate, sufficient funds shall be withheld from future Applications for Payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Work.

3.59 Delete Section 9.3.1 and substitute the following:

Monthly, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require (such as copies of requisitions from Subcontractors and material suppliers) and shall reflect retainage and any other adjustments provided in Section 5 of the Agreement. If required by the Owner or Architect, the Application for Payment shall be accompanied by a current construction schedule.

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3.60 In Section 9.3.2, add the following words to the end of the second sentence:

provided such materials or equipment will be subsequently incorporated in the Work

Insert the following at the end of Section 9.3.2:

The Contractor shall 1) protect such materials from diversion, vandalism, theft, destruction, and damage, 2) mark such materials specifically for use on the Project, and 3) segregate such materials from other materials at the storage facility. The Architect and the Owner shall have the right to make inspections of the storage areas at any time.

3.61 *In Section 9.4.2, in the first sentence, after the words “Work has progressed to the point indicated,” insert the following:*

in both the Application for Payment and, if required to be submitted by the Contractor, the accompanying current construction schedule

In the last sentence, delete the third item starting with “(3) reviewed copies” and ending with “Contractor’s right to payment,”

3.62 *In Section 9.5.1, in the first sentence, delete the word “may” after the opening words “The Architect” and substitute the word “shall.”*

In Section 9.5.1, insert the following sentence after the first sentence:

The Architect shall withhold a Certificate of Payment if the Application for Payment is not accompanied by the current construction schedule required by Section 3.10.1.

3.63 *In Section 9.6.2, delete the word “The...” at the beginning of the first sentence and substitute the following:*

Pursuant to Chapter 6 of Title 29 of the South Carolina Code of Laws, as amended, the

3.64 *Delete Section 9.7 and substitute following:*

9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment to the Owner, through no fault of the Contractor, within seven days after receipt of the Contractor’s Application for Payment, or if the Owner does not pay the Contractor within seven days after the time established in the Contract Documents the amount certified by the Architect or awarded by a final dispute resolution order, then the Contractor may, upon seven additional days’ written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased, in accordance with the provisions of Section 7.3.3, by the amount of the Contractor’s reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

3.65 *Insert the following words at the end of the sentence in Section 9.8.1:*

and when all required occupancy permits, if any, have been issued and copies of same have been delivered to the Owner.

3.66 *In Section 9.8.2, insert the word “written” after the word “comprehensive” and before the word “list.”*

3.67 *Delete Section 9.8.3 and substitute the following:*

9.8.3.1 Upon receipt of the Contractor’s list, the Architect, with the Owner and any other person the Architect or the Owner choose, will make an inspection on a date and at a time mutually agreeable to the Architect, Owner, and Contractor, to determine whether the Work or designated portion thereof is substantially complete. The Contractor shall furnish access for the inspection and testing as provided in this Contract. The inspection shall include a

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demonstration by the Contractor that all equipment, systems and operable components of the Work function properly and in accordance with the Contract Documents. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. If more than one Substantial Completion inspection is required, the Contractor shall reimburse the Owner for all costs of reinspections or, at the Owner's option, the costs may be deducted from payments due to the Contractor.

9.8.3.2 If the Architect and Owner concur in the Contractor's assessment that the Work or a portion of the Work is safe to occupy, the Owner and Contractor may arrange for a Certificate of Occupancy Inspection by OSE. The Owner, Architect, and Contractor shall be present at OSE's inspection. Upon verifying that the Work or a portion of the Work is substantially complete and safe to occupy, OSE will issue, as appropriate, a Full or Partial Certificate of Occupancy.

3.68 *In the second sentence of Section 9.8.5, delete the words "and consent of surety, if any."*

3.69 *In the first sentence of Section 9.9.1, delete the words "Section 11.3.1.5" and substitute the words "Section 11.3.1.3."*

3.70 *Delete Section 9.10.1 and substitute the following:*

9.10.1 Unless the parties agree otherwise in the Certificate of Substantial Completion, the Contractor shall achieve Final Completion no later than thirty days after Substantial Completion. Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect, with the Owner and any other person the Architect or the Owner choose, will make an inspection on a date and at a time mutually agreeable to the Architect, Owner, and Contractor, and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. If more than one Final Completion inspection is required, the Contractor shall reimburse the Owner for all costs of reinspections or, at the Owner's option, the costs may be deducted from payments due to the Contractor. If the Contractor does not achieve final completion within thirty days after Substantial Completion or the timeframe agreed to by the parties in the Certificate of Substantial Completion, whichever is greater, the Contractor shall be responsible for any additional Architectural fees resulting from the delay.

3.71 *Delete the first sentence of Section 9.10.2 and substitute the following:*

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, (6) required Training Manuals, (7) equipment Operations and Maintenance Manuals, (8) any certificates of testing, inspection or approval required by the Contract Documents and not previously provided (9) all warranties and guarantees required under or pursuant to the Contract Documents, and (10) one copy of the Documents required by Section 3.11.

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- 3.72** Delete the first sentence of Section 9.10.3 and substitute the following:

If, after Substantial Completion of the Work, final completion thereof is delayed 60 days through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted.

- 3.73** Delete Section 9.10.5 and substitute the following:

§9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those specific claims in stated amounts that have been previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

- 3.74** Add the following Section 9.10.6:

9.10.6 If OSE has not previously issued a Certificate of Occupancy for the entire Project, the Parties shall arrange for a representative of OSE to participate in the Final Completion Inspection. Representatives of the State Fire Marshal's Office and other authorities having jurisdiction may be present at the Final Completion Inspection or otherwise inspect the completed Work and advise the Owner whether the Work meets their respective requirements for the Project.

- 3.75** Delete Section 10.3.1 and substitute the following:

10.3.1 If the Contractor encounters a hazardous material or substance which was not discoverable as provided in Section 3.2.1 and not required by the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons or serious loss to real or personal property resulting from such material or substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. Hazardous materials or substances are those hazardous, toxic, or radioactive materials or substances subject to regulations by applicable governmental authorities having jurisdiction, such as, but not limited to, the S.C. Department of Health and Environmental Control, the U.S. Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission.

- 3.76** Insert the following at the end of Section 10.3.2:

In the absence of agreement, the Architect will make an interim determination regarding any delay or impact on the Contractor's additional costs. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15. Any adjustment in the Contract Sum shall be determined in accordance with Section 7.3.3.

- 3.77** Delete Section 10.3.3 and substitute the following:

10.3.3 The Work in the affected area shall be resumed immediately following the occurrence of any one of the following events: (a) the Owner causes remedial work to be performed that results in the absence of hazardous materials or substances; (b) the Owner and the Contractor, by written agreement, decide to resume performance of the Work; or (c) the Work may safely and lawfully proceed, as determined by an appropriate governmental authority or as evidenced by a written report to both the Owner and the Contractor, which is prepared by an environmental engineer reasonably satisfactory to both the Owner and the Contractor.

- 3.78** In Section 10.3.5, delete the word "The" at the beginning of the sentence and substitute the following:

In addition to its obligations under Section 3.18, the

- 3.79** Delete the language of Section 10.3.6 and substitute the word "Reserved."

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3.80 *Insert the following at the end of Section 10.4:*

The Contractor shall immediately give the Architect notice of the emergency. This initial notice may be oral followed within five days by a written notice setting forth the nature and scope of the emergency. Within fourteen days of the start of the emergency, the Contractor shall give the Architect a written estimate of the cost and probable effect of delay on the progress of the Work.

3.81 *Delete 11.1.2 and substitute the following:*

11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified below or required by law, whichever coverage is greater. Coverages shall be written on an occurrence basis and shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

(1) COMMERCIAL GENERAL LIABILITY:

| | |
|--|--------------------|
| (a) General Aggregate (per project) | <u>\$1,000,000</u> |
| (b) Products/Completed Operations | <u>\$1,000,000</u> |
| (c) Personal and Advertising Injury | <u>\$1,000,000</u> |
| (d) Each Occurrence | <u>\$1,000,000</u> |
| (e) Fire Damage (Any one fire) | <u>\$50,000</u> |
| (f) Medical Expense (Any one person) | <u>\$5,000</u> |

(2) BUSINESS AUTO LIABILITY (including All Owned, Non-owned, and Hired Vehicles):

| | |
|---------------------------------|--------------------|
| (a) Combined Single Limit | <u>\$1,000,000</u> |
|---------------------------------|--------------------|

(3) WORKER'S COMPENSATION:

| | |
|-------------------------------|---|
| (a) State Statutory | |
| (b) Employers Liability | <u>\$100,000</u> Per Acc. |
| | <u>\$500,000</u> Disease, Policy Limit |
| | <u>\$100,000</u> Disease, Each Employee |

In lieu of separate insurance policies for Commercial General Liability, Business Auto Liability, and Employers Liability, the Contractor may provide an umbrella policy meeting or exceeding all coverage requirements set forth in this Section 11.1.2. The umbrella policy limits shall not be less than \$3,000,000.

3.82 *Delete Section 11.1.3 and substitute the following:*

11.1.3 Prior to commencement of the Work, and thereafter upon replacement of each required policy of insurance, Contractor shall provide to the Owner a written endorsement to the Contractor's general liability insurance policy that:

- (i) names the Owner as an additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations;
- (ii) provides that no material alteration, cancellation, non-renewal, or expiration of the coverage contained in such policy shall have effect unless all additional insureds have been given at least ten (10) days prior written notice of cancellation for non-payment of premiums and thirty (30) days prior written notice of cancellation for any other reason; and
- (iii) provides that the Contractor's liability insurance policy shall be primary, with any liability insurance of the Owner as secondary and noncontributory.

Prior to commencement of the Work, and thereafter upon renewal or replacement of each required policy of insurance, Contractor shall provide to the Owner a signed, original certificate of liability insurance (ACORD 25). Consistent with this Section 11.1, the certificate shall identify the types of insurance, state the limits of liability for each type of coverage, name the Owner a Consultants as Certificate Holder, provide that the general aggregate limit applies per project, and provide that coverage is written on an occurrence basis. Both the certificates and the

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endorsements must be received directly from either the Contractor's insurance agent or the insurance company. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, naming the Owner as an additional insured for claims made under the Contractor's completed operations, and otherwise meeting the above requirements, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

3.83 *Delete Section 11.1.4 and substitute the following:*

11.1.4 A failure by the Owner either (i) to demand a certificate of insurance or written endorsement required by Section 11.1, or (ii) to reject a certificate or endorsement on the grounds that it fails to comply with Section 11.1 shall not be considered a waiver of Contractor's obligations to obtain the required insurance.

3.84 *In Section 11.3.1, delete the first sentence and substitute the following:*

Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis.

3.85 *Delete the language of Section 11.3.1.2 and substitute the word "Reserved."*

3.86 *Delete the language of Section 11.3.1.3 and substitute the word "Reserved."*

3.87 *Delete Section 11.3.2 and substitute the following:*

11.3.2 BOILER AND MACHINERY INSURANCE

The Contractor shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall both be named insureds.

3.88 *Delete Section 11.3.3 and substitute the following:*

11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. To the extent any losses are covered and paid for by such insurance, the Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

3.89 *Delete Section 11.3.4 and substitute the following:*

11.3.4 If the Owner requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Contractor shall, if possible, include such insurance, and the cost thereof shall be charged to the Owner by appropriate Change Order.

3.90 *Delete the language of Section 11.3.5 and substitute the word "Reserved."*

3.91 *Delete Section 11.3.6 and substitute the following:*

11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Owner.

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3.92 Delete the first sentence of Section 11.3.7 and substitute the following:

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent the property insurance provided by the Contractor pursuant to this Section 11.3 covers and pays for the damage, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary.

3.93 Delete the first sentence of Section 11.3.8 and substitute the following:

A loss insured under the Contractor's property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10.

3.94 Delete Section 11.3.9 and substitute the following:

11.3.9 If required in writing by a party in interest, the Contractor as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor.

3.95 Delete Section 11.3.10 and substitute the following:

11.3.10 The Contractor as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Contractor's exercise of this power; if such objection is made, the dispute shall be resolved in the manner provided in the contract between the parties in dispute as the method of binding dispute resolution. The Contractor as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with a final order or determination issued by the appropriate authority having jurisdiction over the dispute..

3.96 Delete Section 11.4.1 and substitute the following:

11.4.1 Before commencing any services hereunder, the Contractor shall provide the Owner with Performance and Payment Bonds, each in an amount not less than the Contract Price set forth in Article 4 of the Agreement. The Surety shall have, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty". In addition, the Surety shall have a minimum "Best Financial Strength Category" of "Class V", and in no case less than five (5) times the contract amount. The Performance Bond shall be written on Form SE-355, "Performance Bond" and the Payment Bond shall be written on Form SE-357, "Labor and Material Payment Bond", and both shall be made payable to the Owner.

3.97 Delete Section 11.4.2 and substitute the following:

11.4.2 The Performance and Labor and Material Payment Bonds shall:

- .1** be issued by a surety company licensed to do business in South Carolina;
- .2** be accompanied by a current power of attorney and certified by the attorney-in-fact who executes the bond on the behalf of the surety company; and
- .3** remain in effect for a period not less than one (1) year following the date of Substantial Completion or the time required to resolve any items of incomplete Work and the payment of any disputed amounts, whichever time period is longer.

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3.98 *Add the following Sections 11.4.3 and 11.4.4:*

11.4.3 Any bonds required by this Contract shall meet the requirements of the South Carolina Code of Laws and Regulations, as amended.

11.4.4 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

3.99 *Delete Section 12.1.1 and substitute the following:*

12.1.1 If a portion of the Work is covered contrary to the requirements specifically expressed in the Contract Documents, including inspections of work-in-progress required by all authorities having jurisdiction over the Project, it must, upon demand of the Architect or authority having jurisdiction, be uncovered for observation and be replaced at the Contractor's expense without change in the Contract Time.

3.100 *In Section 12.2.2.1, delete the words "and to make a claim for breach of warranty" at the end of the third sentence.***3.101** *In Section 12.2.2.3, add the following to the end of the sentence:*

unless otherwise provided in the Contract Documents.

3.102 *Insert the following at the end of Section 12.2.4:*

If, prior to the date of Substantial Completion, the Contractor, a Subcontractor, or anyone for whom either is responsible, uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

3.103 *Delete Section 13.1 and substitute the following:***13.1 GOVERNING LAW**

The Contract, any dispute, claim, or controversy relating to the Contract, 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.

3.104 *Delete Section 13.2, including its Sub-Sections 13.2.1 and 13.2.2, and substitute the following:***13.2 SUCCESSORS AND ASSIGNS**

The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole, or in part, without written consent of the other and then only in accordance with and as permitted by Regulation 19-445.2180 of the South Carolina Code of Regulations, as amended. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

3.105 *Delete Section 13.3 and substitute the following:***13.3 WRITTEN NOTICE**

Unless otherwise permitted herein, all notices contemplated by the Contract Documents shall be in writing and shall be deemed given:

- .1** upon actual delivery, if delivery is by hand;
- .2** upon receipt by the transmitting party of confirmation or reply, if delivery is by electronic mail, facsimile, telex or telegram;
- .3** upon receipt, if delivery is by the United States mail.

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Notice to Contractor shall be to the address provided in Section 8.3.2 of the Agreement. Notice to Owner shall be to the address provided in Section 8.2.2 of the Agreement. Either party may designate a different address for notice by giving notice in accordance with this paragraph.

3.106 *In Section 13.4.1, insert the following at the beginning of the sentence:*

Unless expressly provided otherwise,

3.107 *Add the following Section 13.4.3:*

13.4.3 Notwithstanding Section 9.10.4, the 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:

1.5 Ownership and Use of Drawings, Specifications and Other Instruments of Service;

3.5 Warranty

3.17 Royalties, Patents and Copyrights

3.18 Indemnification

7.6 Cost or Pricing Data

11.1 Contractor's Liability Insurance

11.4 Performance and Payment Bond

15.1.6 Claims for Listed Damages

15.1.7 Waiver of Claims Against the Architect

15.6 Dispute Resolution

15.4 Service of Process

3.108 *Delete Section 13.6 and substitute the following:*

13.6 INTEREST

Payments due to the Contractor and unpaid under the Contract Documents shall bear interest only if and to the extent allowed by Title 29, Chapter 6, Article 1 of the South Carolina Code of Laws. Amounts due to the Owner shall bear interest at the rate of one percent a month or a pro rata fraction thereof on the unpaid balance as may be due.

3.109 *Delete the language of Section 13.7 and substitute the word "Reserved."*

3.110 *Add the following Sections 13.8 through 13.16:*

13.8 PROCUREMENT OF MATERIALS BY OWNER

The Contractor accepts assignment of all purchase orders and other agreements for procurement of materials and equipment by the Owner that are identified as part of the Contract Documents. The Contractor shall, upon delivery, be responsible for the storage, protection, proper installation, and preservation of such Owner purchased items, if any, as if the Contractor were the original purchaser. The Contract Sum includes, without limitation, all costs and expenses in connection with delivery, storage, insurance, installation, and testing of items covered in any assigned purchase orders or agreements. Unless the Contract Documents specifically provide otherwise, all Contractor warranty of workmanship and correction of the Work obligations under the Contract Documents shall apply to the Contractor's installation of and modifications to any Owner purchased items,.

13.9 INTERPRETATION OF BUILDING CODES

As required by Title 10, Chapter 1, Section 180 of the South Carolina Code of Laws, as amended, OSE shall determine the enforcement and interpretation of all building codes and referenced standards on state buildings. The Contractor shall refer any questions, comments, or directives from local officials to the Owner and OSE for resolution.

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13.10 MINORITY BUSINESS ENTERPRISES

Contractor shall notify Owner of each Minority Business Enterprise (MBE) providing labor, materials, equipment, or supplies to the Project under a contract with the Contractor. Contractor's notification shall be via the first monthly status report submitted to the Owner after execution of the contract with the MBE. For each such MBE, the Contractor shall provide the MBE's name, address, and telephone number, the nature of the work to be performed or materials or equipment to be supplied by the MBE, whether the MBE is certified by the South Carolina Office of Small and Minority Business Assistance, and the value of the contract.

13.11 SEVERABILITY

If any provision or any part of a provision of the Contract Documents shall be finally determined to be superseded, invalid, illegal, or otherwise unenforceable pursuant to any applicable Legal Requirements, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provision or parts of the provision of the Contract Documents, which shall remain in full force and effect as if the unenforceable provision or part were deleted.

13.12 ILLEGAL IMMIGRATION

Contractor certifies and agrees that it will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agrees to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or (b) that Contractor and its 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." Contractor agrees to include in any contracts with its subcontractors language requiring its 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. (An overview is available at www.procurement.sc.gov)

13.13 SETOFF

The Owner shall have all of its common law, equitable, and statutory rights of set-off.

13.14 DRUG-FREE WORKPLACE

The Contractor certifies to the Owner that Contractor will provide a Drug-Free Workplace, as required by Title 44, Chapter 107 of the South Carolina Code of Laws, as amended.

13.15 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.

13.16 NON-INDEMNIFICATION:

Any term or condition is void to the extent it requires the State to indemnify anyone. It is unlawful for a person charged with disbursements of state funds appropriated by the General Assembly to exceed the amounts and purposes stated in the appropriations. (§ 11-9-20) It is unlawful for an authorized public officer to enter into a contract for a purpose in which the sum is in excess of the amount appropriated for that purpose. It is unlawful for an authorized public officer to divert or appropriate the funds arising from any tax levied and collected for any one fiscal year to the payment of an indebtedness contracted or incurred for a previous year. (§ 11-1-40)

3.111 *Delete Section 14.1.1 and substitute the following:*

14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 45 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1** Issuance of an order of a court or other public authority having jurisdiction that requires substantially all Work to be stopped; or

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- .2** An act of government, such as a declaration of national emergency that requires substantially all Work to be stopped.
- .3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents and the Contractor has stopped work in accordance with Section 9.7

3.112 *Insert the following at the end of Section 14.1.3:*

Any adjustment to the Contract Sum pursuant to this Section shall be made in accordance with the requirements of Article 7.

3.113 *In Section 14.1.4, replace the word “repeatedly” with the word “persistently.”***3.114** *Delete Section 14.2.1 and substitute the following:*

14.2.1 The Owner may terminate the Contract if the Contractor

- .1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials, or otherwise fails to prosecute the Work, or any separable part of the Work, with the diligence, resources and skill that will ensure its completion within the time specified in the Contract Documents, including any authorized adjustments;
- .2** fails to make payment to Subcontractors for materials or labor in accordance with the Contract Documents and the respective agreements between the Contractor and the Subcontractors;
- .3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

3.115 *In Section 14.2.2, delete the parenthetical statement “, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action,” immediately following the word “Owner” in the first line.***3.116** *In Section 14.2.4, replace the words “Initial Decision Maker” with the word “Architect”***3.117** *Add the following Section 14.2.5:*

14.2.5 If, after termination for cause, it is determined that the Owner lacked justification to terminate under Section 14.2.1, or that the Contractor’s default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Owner under Section 14.4.

3.118 *Delete the second sentence of Section 14.3.2 and substitute the following:*

Any adjustment to the Contract Sum made pursuant to this section shall be made in accordance with the requirements of Article 7.3.3.

3.119 *Delete Section 14.4.1 and substitute the following:*

14.4.1 The Owner may, at any time, terminate the Contract, in whole or in part for the Owner’s convenience and without cause. The Owner shall give written notice of the termination to the Contractor specifying the part of the Contract terminated and when termination becomes effective.

3.120 *Delete Section 14.4.2 and substitute the following:*

14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner’s convenience, the Contractor shall

- .1** cease operations as directed by the Owner in the notice;
- .2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;

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- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders; and
- .4 complete the performance of the Work not terminated, if any.

3.121 *Delete Section 14.4.3 and substitute the following:*

14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, costs incurred by reason of such termination, and any other adjustments otherwise allowed by the Contract. Any adjustment to the Contract Sum made pursuant to this Section 14.4 shall be made in accordance with the requirements of Article 7.3.3.

3.122 *Add the following Sections 14.4.4, 14.4.5, and 14.5:*

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

14.4.5 Upon written consent of the Contractor, the Owner may reinstate the terminated portion of this Contract in whole or in part by amending the notice of termination if it has been determined that:

- .1 the termination was due to withdrawal of funding by the General Assembly, Governor, or Budget and Control Board or the need to divert project funds to respond to an emergency as defined by Regulation 19-445.2110(B) of the South Carolina Code of Regulations, as amended;
- .2 funding for the reinstated portion of the work has been restored;
- .3 circumstances clearly indicate a requirement for the terminated work; and
- .4 reinstatement of the terminated work is advantageous to the Owner.

14.5 CANCELLATION AFTER AWARD BUT PRIOR TO PERFORMANCE

Pursuant to Title 11, Chapter 35 and Regulation 19-445.2085 of the South Carolina Code of Laws and Regulations, as amended, this contract may be canceled after award but prior to performance.

3.123 *Insert the following sentence after the second sentence of Section 15.1.1:*

A voucher, invoice, payment application or other routine request for payment that is not in dispute when submitted is not a Claim under this definition.

3.124 *Delete Section 15.1.2 and substitute the following:***15.1.2 NOTICE OF CLAIMS**

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Architect. Such notice shall include sufficient information to advise the Architect and other party of the circumstances giving rise to the claim, the specific contractual adjustment or relief requested and the basis of such request. Claims by either party arising prior to the date final payment is due must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later except as stated for adverse weather days in Section 15.1.5.2. By failing to give written notice of a Claim within the time required by this Section, a party expressly waives its claim.

3.125 *Delete Section 15.1.3 and substitute the following:***15.1.3 CONTINUING CONTRACT PERFORMANCE**

Pending final resolution of a Claim, including any administrative review allowed under Section 15.6, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will issue Certificates for Payment in accordance with the initial decisions and determinations of the Architect.

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3.126 *Insert the following at the end of Section 15.1.5.1:*

Claims for an increase in the Contract Time shall be based on one additional calendar day for each full calendar day that the Contractor is prevented from working.

3.127 *Insert the following Sub-Sections at the end of Section 15.1.5.2:*

- .1** Claims for adverse weather shall be based on actual weather conditions at the job site or other place of performance of the Work, as documented in the Contractor's job site log.
- .2** For the purpose of this Contract, a total of five (5) calendar days per calendar month (non-cumulative) shall be anticipated as "adverse weather" at the job site, and such time will not be considered justification for an extension of time. If, in any month, adverse weather develops beyond the five (5) days, the Contractor shall be allowed to claim additional days to compensate for the excess weather delays only to the extent of the impact on the approved construction schedule. The remedy for this condition is for an extension of time only and is exclusive of all other rights and remedies available under the Contract Documents or imposed or available by law.
- .3** The Contractor shall submit monthly with their pay application all claims for adverse weather conditions that occurred during the previous month. The Architect shall review each monthly submittal in accordance with Section 15.5 and inform the Contractor and the Owner promptly of its evaluation. Approved days shall be included in the next Change Order issued by the Architect. Adverse weather conditions not claimed within the time limits of this Subparagraph shall be considered to be waived by the Contractor. Claims will not be allowed for adverse weather days that occur after the scheduled (original or adjusted) date of Substantial Completion.

3.128 *Delete Section 15.1.6 and substitute the following:***15.1.6 CLAIMS FOR LISTED DAMAGES**

Notwithstanding any other provision of the Contract Documents, including Section 1.2.1, but subject to a duty of good faith and fair dealing, the Contractor and Owner waive Claims against each other for listed damages arising out of or relating to this Contract.

15.1.6.1 For the Owner, listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) costs suffered by a third party unable to commence work, (vi) attorney's fees, (vii) any interest, except to the extent allowed by Section 13.6 (Interest), (viii) lost revenue and profit for lost use of the property, (ix) costs resulting from lost productivity or efficiency.

15.1.6.2 For the Contractor, listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) attorney's fees, (vi) any interest, except to the extent allowed by Section 13.6 (Interest); (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waived as against the Owner. Without limitation, this mutual waiver is applicable to all damages due to either party's termination in accordance with Article 14. Nothing contained in this Section shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

3.129 *Add the following Section 15.1.7:***15.1.7 WAIVER OF CLAIMS AGAINST THE ARCHITECT**

Notwithstanding any other provision of the Contract Documents, including Section 1.2.1, but subject to a duty of good faith and fair dealing, the Contractor waives all claims against the Architect and any other design professionals who provide design and/or project management services to the Owner, either directly or as independent contractors or subcontractors to the Architect, for listed damages arising out of or relating to this Contract. The listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v)

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attorney's fees, (vi) any interest; (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waived as against the Owner. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

3.130 *Delete the language of Sections 15.2, 15.3, and 15.4, including all Sub-Sections, and substitute the word "Reserved" for the deleted language of each Section and Sub-Section.*

3.131 *Add the following Sections 15.5 and 15.6 with their sub-sections:*

**15.5 CLAIM AND DISPUTES - DUTY OF COOPERATION, NOTICE, AND ARCHITECTS
INITIAL DECISION**

15.5.1 Contractor and Owner are fully committed to working with each other throughout the Project to avoid or minimize claims. To further this goal, Contractor and Owner agree to communicate regularly with each other and the Architect at all times notifying one another as soon as reasonably possible of any issue that if not addressed may cause loss, delay, and/or disruption of the Work. If claims do arise, Contractor and Owner each commit to resolving such claims in an amicable, professional, and expeditious manner to avoid unnecessary losses, delays, and disruptions to the Work.

15.5.2 Claims shall first be referred to the Architect for initial decision. An initial decision shall be required as a condition precedent to resolution pursuant to Section 15.6 of any Claim arising prior to the date of final payment, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered, or after all the Architect's requests for additional supporting data have been answered, whichever is later. The Architect will not address claims between the Contractor and persons or entities other than the Owner.

15.5.3 The Architect will review Claims and within ten days of the receipt of a Claim (1) request additional supporting data from the claimant or a response with supporting data from the other party or (2) render an initial decision in accordance with Section 15.5.5.

15.5.4 If the Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Architect when the response or supporting data will be furnished or (3) advise the Architect that all supporting data has already been provided. Upon receipt of the response or supporting data, the Architect will render an initial decision in accordance with Section 15.5.5.

15.5.5 The Architect will render an initial decision in writing; (1) stating the reasons therefor; and (2) notifying the parties of any change in the Contract Sum or Contract Time or both. The Architect will deliver the initial decision to the parties within two weeks of receipt of any response or supporting data requested pursuant to Section 16.4, or within such longer period as may be mutually agreeable to the parties. If the parties accept the initial decision, the Architect shall prepare a Change Order with appropriate supporting documentation for the review and approval of the parties and the Office of State Engineer. If either the Contractor, Owner, or both, disagree with the initial decision, the Contractor and Owner shall proceed with dispute resolution in accordance with the provisions of Section 15.6.

15.5.6 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

15.6 DISPUTE RESOLUTION

15.6.1 If a claim is not resolved pursuant to Section 15.5 to the satisfaction of either party, both parties shall attempt to resolve the dispute at the field level through discussions between Contractor's Representative and Owner's Representative. If a dispute cannot be resolved through Contractor's Representative and Owner's Representative, then the Contractor's Senior Representative and the Owner's Senior Representative, upon the request of either party, shall meet as soon as conveniently possible, but in no case later than twenty-one days after such a request is made, to attempt to resolve such dispute. Prior to any meetings between the Senior Representatives, the parties will exchange relevant information that will assist the parties in resolving their dispute. The meetings required by this Section are a condition precedent to resolution pursuant to Section 15.6.2.

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15.6.2 If after meeting in accordance with the provisions of Section 15.6.1, the Senior Representatives determine that the dispute cannot be resolved on terms satisfactory to both the Contractor and the Owner, then either party may submit the dispute by written request to South Carolina's Chief Procurement Officer for Construction (CPOC). Except as otherwise provided in Article 15, all claims, claims, or controversies relating to the Contract 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 in the absence of jurisdiction a federal court located in, Richland County, State of South Carolina. Contractor agrees that any act by the State regarding the Contract is not a waiver of either the State's sovereign immunity or the State's immunity under the Eleventh Amendment of the United State's Constitution.

15.6.3 If any party seeks resolution to a dispute pursuant to Section 15.6.2, the parties shall participate in non-binding mediation to resolve the claim. If the claim is governed by Title 11, Chapter 35, Article 17 of the South Carolina Code of Laws as amended and the amount in controversy is \$100,000.00 or less, the CPOC shall appoint a mediator, otherwise, the mediation shall be conducted by an impartial mediator selected by mutual agreement of the parties, or if the parties cannot so agree, a mediator designated by the American Arbitration Association ("AAA") pursuant to its Construction Industry Mediation Rules. The mediation will be governed by and conducted pursuant to a mediation agreement negotiated by the parties or, if the parties cannot so agree, by procedures established by the mediator.

15.6.4 Without relieving any party from the other requirements of Sections 15.5 and 15.6, either party may initiate proceedings in the appropriate forum prior to initiating or completing the procedures required by Sections 15.5 and 15.6 if such action is necessary to preserve a claim by avoiding the application of any applicable statutory period of limitation or repose.

15.6.5 SERVICE OF PROCESS

Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any claims, claims, or controversies relating to the Contract; 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 for the Contractor's Senior Representative 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.

3.132 Add the following Article 16:**ARTICLE 16 PROJECT-SPECIFIC REQUIREMENTS AND INFORMATION****16.1. Inspection Requirements:** *(Indicate the inspection services required by the Contract)*

- ☒ Special Inspections are required and are not part of the Contract Sum. *(see section 01400)*
☒ Building Inspections are required and are not part of the Contract Sum. *(see section 01400)*
☐ Building Inspections are required and are part of the Contract Sum. The inspections required for this Work are : *(Indicate which services are required and the provider)*

- ☐ Civil: _____
☐ Structural: _____
☐ Mechanical: _____
☐ Plumbing: _____
☐ Electrical: _____
☐ Gas: _____
☐ Other *(list)*: _____

Remarks: Owner will pay for first inspection. Cost for re-inspections, if the first inspection is failed, shall be paid by the Contractor..

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16.1.1 Contractor shall schedule and request inspections in an orderly and efficient manner and shall notify the Owner whenever the Contractor schedules an inspection in accordance with the requirements of Section 16.1. Contractor shall be responsible for the cost of inspections scheduled and conducted without the Owner's knowledge and for any increase in the cost of inspections resulting from the inefficient scheduling of inspections.

16.2 List Cash Allowances, if any. *(Refer to attachments as needed. If none, enter NONE)*

Purchase and installation of canvas awning over work space area- \$2,500.00

Purchase and installation of rolling barn door - \$1,500

also Refer to Specification Section 01210 - Allowances

16.3. Requirements for Record Drawings, if any. *(Refer to attachments as needed. If none, enter NONE)*

Refer to Specification Section 01770 - Project Closeout

16.4. Requirements for Shop Drawings and other submittals, if any, including number, procedure for submission, list of materials to be submitted, etc. *(Refer to attachments as needed. If none, enter NONE)*

-Pre-engineered greenhouse kit inclusive of all items listed in the greenhouse specification

-Canvas awning - construction, materials and color must be approved by owner

-Permeable pavers and lava rock floor treatments style and color must be approved by owner

-Brick color must be approved by owner if not using furnished brick

also Refer to Specification Section 01330 - Submittals

16.5. Requirements for signage, on-site office or trailer, utilities, restrooms, etc., in addition to the Contract, if any. *(Refer to attachments as needed. If none, enter NONE)*

Refer to Specification Section 01500 - Temporary Facilities

16.6. Requirements for Project Cleanup in addition to the Contract, if any. *(Refer to attachments as needed. If none, enter NONE)*

Refer to Specification Section 01740 - Cleaning

16.7. List all attachments that modify these General Conditions. *(If none, enter NONE)*

None

Performance Bond

KNOW ALL MEN BY THESE PRESENTS, that *(Insert full name or legal title and address of Contractor)*

Name: _____

Address: _____

hereinafter referred to as "Contractor", and *(Insert full name and address of principal place of business of Surety)*

Name: _____

Address: _____

hereinafter called the "surety", are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: University of South Carolina

Address: 743 Greene Street

Columbia, SC 29223

hereinafter referred to as "Agency", or its successors or assigns, the sum of _____ (\$ _____), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Agency to construct

State Project Name: USC Greenhouse Construction

State Project Number: H27-Z090

Brief Description of Awarded Work, as found on the SE-330, Bid Form: Construct Greenhouse

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*

Name: Chao and Associates, Inc

Address: 7 Clusters Court

Columbia, SC 29210

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this _____ day of _____, 2_____, BOND NUMBER _____
(shall be no earlier than Date of Contract)

CONTRACTOR

SURETY

By: _____
 (Seal)

By: _____
 (Seal)

Print Name: _____

Print Name: _____

Print Title: _____

Print Title: _____
 (Attach Power of Attorney)

Witness: _____

Witness: _____

(Additional Signatures, if any, appear on attached page)

Performance Bond

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency for the full and faithful performance of the contract, which is incorporated herein by reference

2. If the Contractor performs the contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

3. The Surety's obligation under this Bond shall arise after:

3.1 The Agency has notified the Contractor and the Surety at the address described in paragraph 10 below, that the Agency is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If the Agency, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Agency's right, if any, subsequently to declare a Contractor Default; or

3.2 The Agency has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract.

4. The Surety shall, within 15 days after receipt of notice of the Agency's declaration of a Contractor Default, and at the Surety's sole expense, take one of the following actions:

4.1 Arrange for the Contractor, with consent of the Agency, to perform and complete the Contract; or

4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Agency for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Agency and the contractor selected with the Agency's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the Agency the amount of damages as described in paragraph 7 in excess of the Balance of the Contract Sum incurred by the Agency resulting from the Contractor Default; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and:

4.4.1 After investigation, determine the amount for which it may be liable to the Agency and, within 60 days of waiving its rights under this paragraph, tender payment thereof to the Agency; or

4.4.2 Deny liability in whole or in part and notify the Agency, citing the reasons therefore.

5. Provided Surety has proceeded under paragraphs 4.1, 4.2, or 4.3, the Agency shall pay the Balance of the Contract Sum to either:

5.1 Surety in accordance with the terms of the Contract; or

5.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

5.3 The balance of the Contract Sum due either the Surety or another contractor shall be reduced by the amount of damages as described in paragraph 7.

6. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond 15 days after receipt of written notice from the Agency to the Surety demanding that the Surety perform its obligations under this Bond, and the Agency shall be entitled to enforce any remedy available to the Agency.

6.1 If the Surety proceeds as provided in paragraph 4.4, and the Agency refuses the payment tendered or the Surety has denied liability, in whole or in part, then without further notice the Agency shall be entitled to enforce any remedy available to the Agency.

6.2 Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the Dispute Resolution process defined in the Contract Documents and the laws of the State of South Carolina.

7. After the Agency has terminated the Contractor's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Agency shall be those of the Contractor under the Contract, and the responsibilities of the Agency to the Surety shall those of the Agency under the Contract. To a limit of the amount of this Bond, but subject to commitment by the Agency of the Balance of the Contract Sum to mitigation of costs and damages on the Contract, the Surety is obligated to the Agency without duplication for:

7.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract; and

7.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and

7.3 Damages awarded pursuant to the Dispute Resolution Provisions of the Contract. Surety may join in any Dispute Resolution proceeding brought under the Contract and shall be bound by the results thereof; and

7.4 Liquidated Damages, or if no Liquidated Damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. The Surety shall not be liable to the Agency or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Sum shall not be reduced or set-off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Agency or its heirs, executors, administrators, or successors.

9. The Surety hereby waives notice of any change, including changes of time, to the contract or to related subcontracts, purchase orders and other obligations.

10. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the address shown on the signature page.

11. Definitions

11.1 Balance of the Contract Sum: The total amount payable by the Agency to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts to be received by the Agency in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.

11.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform the Contract or otherwise to comply with the terms of the Contract.

SE-357

Labor and Material Payment Bond

KNOW ALL MEN BY THESE PRESENTS, that *(Insert full name or legal title and address of Contractor)*

Name: _____

Address: _____

hereinafter referred to as "Contractor", and *(Insert full name and address of principal place of business of Surety)*

Name: _____

Address: _____

hereinafter called the "surety", are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: University of South Carolina

Address: 743 Greene Street

Columbia, SC 29223

hereinafter referred to as "Agency", or its successors or assigns, the sum of _____ (\$ _____), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Agency to construct

Project Name: USC Greenhouse Construction

Project Number: H27-Z090

Brief Description of Awarded Work, as found on the SE-330, Bid Form: Construction of greenhouse

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*

Name: Chao and Associates, Inc

Address: 7 Clusters Court

Columbia, SC 29210

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Labor and Material Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this _____ day of _____, 2_____, BOND NUMBER _____
(shall be no earlier than Date of Contract)

CONTRACTOR

SURETY

By: _____
 (Seal)

By: _____
 (Seal)

Print Name: _____

Print Name: _____

Print Title: _____

Print Title: _____
 (Attach Power of Attorney)

Witness: _____

Witness: _____

(Additional Signatures, if any, appear on attached page)

SE-357**Labor and Material Payment Bond****NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency to pay for all labor, materials and equipment required for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to the Agency, this obligation shall be null and void if the Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and
 - 2.2 Defends, indemnifies and holds harmless the Agency from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. With respect to Claimants, and subject to the provisions of Title 29, Chapter 5 and the provisions of §11-35-3030(2)(c) of the SC Code of Laws, as amended, the Surety's obligation under this Bond shall arise as follows:
 - 4.1 Every person who has furnished labor, material or rental equipment to the Contractor or its subcontractors for the work specified in the Contract, and who has not been paid in full therefore before the expiration of a period of ninety (90) days after the date on which the last of the labor was done or performed by him or material or rental equipment was furnished or supplied by him for which such claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of such suit and to prosecute such action for the sum or sums justly due him.
 - 4.2 A remote claimant shall have a right of action on the payment bond upon giving written notice by certified or registered mail to the Contractor within ninety (90) days from the date on which such person did or performed the last of the labor or furnished or supplied the last of the material or rental equipment upon which such claim is made.
 - 4.3 Every suit instituted upon a payment bond shall be brought in a court of competent jurisdiction for the county or circuit in which the construction contract was to be performed, but no such suit shall be commenced after the expiration of one year after the day on which the last of the labor was performed or material or rental equipment was supplied by the person bringing suit.
5. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
 - 5.1 Send an answer to the Claimant, with a copy to the Agency, within sixty (60) days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 5.2 Pay or arrange for payment of any undisputed amounts.
 - 5.3 The Surety's failure to discharge its obligations under this paragraph 5 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a claim. However, if the Surety fails to discharge its obligations under this paragraph 5, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs to recover any sums found to be due and owing to the Claimant.
6. Amounts owed by the Agency to the Contractor under the

Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the Contractor furnishing and the Agency accepting this Bond, they agree that all funds earned by the contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Agency's prior right to use the funds for the completion of the Work.

7. The Surety shall not be liable to the Agency, Claimants or others for obligations of the Contractor that are unrelated to the Contract. The Agency shall not be liable for payment of any costs or expenses of any claimant under this bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

9. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the Agency or the contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

10. By the Contractor furnishing and the Agency accepting this Bond, they agree that this Bond has been furnished to comply with the statutory requirements of the South Carolina Code of Laws, as amended, and further, that any provision in this Bond conflicting with said statutory requirements shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

11. Upon request of any person or entity appearing to be a potential beneficiary of this bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

12. Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the laws of the State of South Carolina.

13. DEFINITIONS

13.1 Claimant: An individual or entity having a direct contract with the Contractor or with a Subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien might otherwise be asserted.

13.2 Remote Claimant: A person having a direct contractual relationship with a subcontractor of the Contractor or subcontractor, but no contractual relationship expressed or implied with the Contractor.

13.3 Contract: The agreement between the Agency and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

Project Name:

Project Number:

University of South Carolina

CONTRACTOR'S ONE YEAR GUARANTEE

STATE OF _____

COUNTY OF _____

WE _____
as General Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

[Name of Contracting Firm]

*By _____

Title _____

*Must be executed by an office of the Contracting Firm.

SWORN TO before me this
_____ day of _____, 2____ (seal)

_____ State

My commission expires _____

Engineers of Record
USC Greenhouse Construction
State Project No: H27-Z090

Project Manager
And Civil Engineer

Gerald A. Lee, PE
Chao and Associates, Inc.
7 Clusters Court
Columbia, SC 29210
Tel: 803-772-8420

Seal



COA



Structural Engineer

David Chao, PE, LEED AP
Chao and Associates, Inc.
7 Clusters Court
Columbia, SC 29210
Tel: 803-772-8420



Mechanical/Plumbing Engineer

Danny Wilds, PE
Mechanical Design Inc.
4403 Broad River Road
Columbia, SC 29210
Tel: 803-731-9834

Electrical Engineer

Kevin Belka, PE
Belka Engineering Associates, Inc.
7 Clusters Court, Suite 201
Columbia, SC 29210
Tel: 803-731-0650



PLAN SHEET ENUMERATION

**USC Greenhouse Construction
State Project No.: H27-Z090
In Richland County, SC**

Prepared For: University of South Carolina

By:

Chao & Associates, Inc.

October 23, 2013

Civil Drawings

C1.0 Existing Conditions/Demolition Plan

C2.0 Grading and Drainage Plan

C3.0 Greenhouse Elevations

C4.0 Greenhouse Layout

C5.0 Miscellaneous Details

Structural Drawings

S1.0 Foundation Plan

S2.0 Sections and Details

S2.1 Sections and Details

Mechanical Drawings

M1.0 HVAC Floor Plan

Plumbing Drawings

P1.0 Plumbing Plan

Electrical Drawings

E1.0 Electrical Layout

DIVISION 1
GENERAL REQUIREMENTS

SECTION 01110

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Construct foundation and infrastructure for installation of pre-engineered greenhouse and erection of the pre-engineered greenhouse and all appurtenances.

1.02 RELATED WORK

- A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections in Division 1 of these specifications.

1.03 SAFETY COMPLIANCE

- A. In addition to any detailed requirements of these specifications, the contractor shall meet the requirements of federal and state standards referenced in applicable publications, whichever is more restrictive. Matters of interpretation of these standards shall be submitted by the contractor to the respective administrative agency for resolution before starting work.

1.04 PRECAUTION AND SAFETY

SPECIAL REQUIREMENTS

- A. Accident Prevention and Safety: Comply with all applicable laws, ordinances, rules, regulations and orders of governing authorities having jurisdiction for the safety of persons and property to protect them from damage, injury or loss. Erect and maintain, as required by conditions and progress of the work, all necessary safeguards for safety and protection, including fences, railings, barricades, lighting, posting of danger signs and other warnings against hazards. Where prevention of construction accidents is not regulated by code or ordinances, comply with AGC's "Manual of Accident Prevention in Construction." Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Project. All scaffolds shall be built in accordance with all requirements of local, state and Federal laws and regulations.
- B. **Contractor/SubContractor's must stipulate that they are responsible for running a National Sex Offender Registry check on their employees who work in schools.**

By submitting a bid for this project, the bidder agrees to prohibit any employees or sub-contractor employees from performing work or services at USC if they are deemed to be Registered Sex Offenders, or pose a known criminal danger to children or staff. The bidder hereby agrees to run a National Sex Offender Registry check (<http://www.nsopr.gov/>) or equivalent on all employees or sub-contractor employees who may be in the proximity of students or staff. This check must be done by the contractor/vendor prior to performing any work or services at USC. Contractor/vendor to provide a signed affidavit indicating that the National Sex Offender Registry check has

SUMMARY OF WORK

been performed on all employees and subcontractor employees and stating that any new employee working on the site will also be checked (this includes temporary laborers, etc.).

1.05 COORDINATION OF WORK SEQUENCE

- A. Coordinate work for the various sections of the Specifications to ensure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
- B. Verify characteristics that elements of interrelated operating equipment are compatible; coordinate work of various sections having interdependent responsibilities for installing, connection to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.06 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. The Contract Performance Period shall be ninety (90) calendar days and commence upon written Notice to Proceed.
- B. Should the contractor fail to have all work completed within the time specified, the contractor shall be assessed Liquidated Damages in the amount of two hundred and fifty dollars (\$250.00) per calendar day.

1.07 FINAL INSPECTION AND PUNCH LIST:

- A. The contract has an established contract completion date. In order to avoid the assessment of liquidated damages, the contractor shall require in writing to the architect/engineer a final inspection on or prior to the established completion date. The contractor shall certify that all construction/installation is complete and has been checked out and is operating as designed. The architect/engineer shall notify the Owner in writing that the job is ready for inspection.
- B. The architect/engineer, Construction Manager, contractor, and all sub-contractors associated with the construction/installation of the building equipment shall be present during the final inspection to demonstrate the proper operations of the equipment. Removal/replacement of necessary covers for inspection shall be conducted by the contractor.

1.08 FINAL PUNCH LIST ITEMS:

- A. The contractor and sub-contractors shall have fourteen (14) calendar days from the date of final inspection to complete the repair of any and all items listed on the final punch list.
- B. If the contractor or his sub-contractor fails to complete all items on the final inspection punch list within the allocated fourteen calendar days, liquidated damages in the amount specified by the contract will be assessed retroactive to the contract completion date and will continue until all items on the punch list are completed. (Only exception shall be by recommendation of the architect/engineer and/or Construction Manager, and approval by the Owner, that lack of completion was due to circumstances beyond the control of the contractor.)

END OF SECTION

SECTION 01120

SCOPE OF WORK – SINGLE PRIME CONTRACT

1.0 **GENERAL**

1.1 **SPECIFICATIONS**

- 1.01 Furnish all labor, material, tools, taxes, insurance, equipment, supervision and all other incidentals necessary to completely furnish and install the following items of work.
- 1.02 Any item of work described or indicated in the Contract Documents and Specifications is to be performed by this Contractor.
- 1.03 The Single Prime Contractor shall include all sections.

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 2 - SITEWORK

DIVISION 3 - CONCRETE

DIVISION 5 - METALS

DIVISION 16 – ELECTRICAL

2.0 **ALLOWANCES – TO BE INCLUDED IN GENERAL CONTRACTORS BID**

2.01 General

2.02 Related Documents:

- A. Drawings and general provisions of Contract including General & Supplementary Conditions and other Division-1 specification sections, apply to work of this section.
- B. Specification Section 01210 – Cash Allowances

2.03 Scope: This section describes the allowances that are to be included in the Base Bid.

2.04 Allowance: The following allowances to be used as directed by Architect. Any unused portion of these allowances shall be credited to the Owner at the completion of the work. These allowances shall be considered actual costs and the contractor's profit, insurance, taxes, and installation cost will be figured in the bids, except as otherwise noted.

- A. None Noted

SCOPE OF WORK
SINGLE PRIME CONTRACT

SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: This section applies to situations in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees and field engineers, enter upon the Owner's property.
- B. Related Work: Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Promptly upon the award of the Contract, notify all pertinent personnel regarding requirements of this Section.
- B. Require that all personnel who will enter upon the Owner's property certify their awareness of and familiarity with the requirements of this section.

1.03 SUBMITTALS

- A. Maintain an accurate record of the names and identification of all visitors entering upon the Owner's property in connection with the work of this contract, including times of entering and times of leaving, and submit a copy of the record to the Owner weekly.

1.04 TRANSPORTATION FACILITIES

- A. Truck and equipment access: (1) To avoid traffic conflict with vehicles of the Owner's employees and customers, and to avoid over-loading of street and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the designated "Contractor's Entrance". (2) Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site.
- B. Contractor's vehicles: (1) Require contractor's vehicles, vehicles belonging to employees of the contractor, and all other vehicles entering the Owner's property in performance of the work the contract, to use only the designated Access Route. (2) Do not permit such vehicles to park on any street or other area of the Owner's property except in the areas to be designated.
- C. Refer to "USC Aiken Contractor Code of Conduct and Parking Expectations for Construction/Renovation Projects" and "Vehicle Expectations" included in this manual for additional restrictions and requirements.

1.05 SECURITY

- A. Restrict the access of all persons entering upon the Owner's property in connection with the work to the Contractor's Entrance and to the actual site of the work.

1.06 CONTRACTOR USE OF PREMISES

- A. Confine operations at site to area permitted by Owner and Contract Documents.
- B. Do not unreasonably encumber site with materials or equipment.
- C. Do not load structure with weight that will endanger structure.
- D. Assume full responsibility for protection and safekeeping of products stored on premises.
- E. Move any stored products, which interfere with operations of Owner.

1.07 OWNER OCCUPANCY

- A. Not applicable.

1.08 WORK IN, OR ADJACENT TO, EXISTING OR OCCUPIED AREAS

- A. Repair damage to existing structures, equipment or furnishings resulting from Contractor's use of premises.
- B. No construction materials shall be stored on the "school side" of temporary separation fences at any time. Coordinate all deliveries.
- C. No hoisting shall be allowed over any school building during normal school hours or other time when the building is occupied for school related or other activities.
- D. The contractor shall minimize construction noise where reasonably possible during school hours.
- E. Fire extinguishers are required in all construction areas.

1.09 CONTRACTOR CONDUCT

- A. The possession and/or use of drugs and alcohol on district property are prohibited.
- B. No improper language or fraternization by Contractor's employees with student and staff are allowed.

END OF SECTION

SECTION 01210

CASH ALLOWANCES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. To provide adequate budget and bonding to cover items not precisely determined by Owner prior to advertising for bids, allow within the proposed contract amount the sums described below.

1.02 RELATED WORK DESCRIBED ELSEWHERE

- A. Contractors are referred to the General Conditions, Article 3, for conditions governing the inclusion of allowances in the contract sum.

1.03 ESTABLISHED METHODS

- A. When a cash allowance is set for certain items or materials, it is understood that any savings under such allowance shall accrue to the Owner and if the material purchased costs more than the Allowance, such additional cost shall be borne by the Owner.

1.04 UNDESCRIBED ALLOWANCES

- A. Allowances and provisions not further described in these specification will be specified and bid at a later date
- B. Allowance shall include purchase and installation, delivery cost to the job, unloading and sales tax; does not include profit to the general contractor unless otherwise noted.
- C. After receipt of bids, as above mentioned, the successful subcontract shall become part of the scope of work of the general contractor at no additional cost to the Owner, except for the stipulated cash allowance as adjusted.
- D. This method established to allow general contractor to control scheduling of subcontractor so as to meet established completion date.

1.05 OWNER PURCHASED ITEMS

- A. The responsibilities of the contractor vary from item to item. Overall, the contractor is responsible for coordination and scheduling of all items to be installed. On certain specific items he is responsible for installation and protection of the finished product. On others, he is responsible for coordination of all rough-in. For items purchased by the Owner and installed by the successful bidder that require electrical, mechanical, and plumbing connections, the contractor is responsible for coordinating the necessary provisions.
- B. The Owner is responsible for furnishing the agreed upon items in a timely fashion. The names of all successful bidders shall be provided to the contractor. The contractor and successful bidders shall be responsible for scheduling and delivery of all Owner furnished items.

PART 2 PRODUCTS

- 2.01 A. Cash allowances are specified under each prime contractor's Scope of Work.

PART 3 EXECUTION

3.01 PROCEDURE

- A. After receipts of bids, as above mentioned, the successful subcontractor shall become part of the scope of work of general contractor at no additional cost to the Owner, except for the stipulated cash allowance as adjusted.
- B. This method established to allow general contractor to control scheduling of subcontractor so as to meet established completion date.

END OF SECTION

SECTION 01230

ALTERNATES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Includes: Provide alternative bid proposals as described in this Section.
- B. Related Documents:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and all applicable Sections in Division 1 of these Specifications.
- C. Procedures:
 - 1. Provide alternative bids to be added to or deducted from the amount of the Base Bid if the corresponding change in scope is accepted by the Owner.
 - 2. Include within the alternative bid prices all costs, including materials, submittals, installation, and fees to provide a complete, operable and finished system.
 - 3. Show the proposed alternative amounts opposite their proper description of the Bid Form.
 - 4. See Plans and Subparagraph 1.01.D of this specification for a description of alternates.
- D. Alternates:
 - 1. Definitions: Alternates are defined as alternate products, materials, equipment, installations or systems for the work, which may at the Owner's option and under terms established by Instructions to Bidders, be selected and recorded in the Contract (Owner-Contractor Agreement) to either supplement or displace corresponding basic requirements of contract documents. The Alternates are not in precise order of acceptance and may be accepted, rejected or deferred in any order.
 - 2. Notification: Immediately following award of Contract, prepare and distribute to each entity to be involved in performance of the work, a notification of status of each alternate. Indicate which alternates have been: 1) Accepted, 2) Rejected, and 3) Deferred for consideration at a later date as indicated. Include full description of negotiated modifications to alternates, if any.
 - 3. Alternate prices may be held 90-days beyond contract acceptance. Alternate prices listed below shall be good for ninety (90) days beyond the date of contract acceptance. The Owner may accept or reject any or all alternates within the above stated time frame.

ALTERNATES

- E. Alternative bid pricing is requested for the following:
None Noted

END OF SECTION

ALTERNATES

01230 - 2

SECTION 01250

CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. NO EXTRA WORK SHALL BE PERFORMED WITHOUT FIRST RECEIVING WRITTEN APPROVAL FROM THE OWNER (USC/COLUMBIA PROJECT MANAGER).
- B. Work included: Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Owner and the Architect/Engineer and issued after execution of the Contract, in accordance with provisions of this Section.
- C. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Changes in the Work are described further in Article 7 of the General Conditions.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.03 SUBMITTALS

- A. Make submittals directly to the Architect/Engineer at the address shown on the Project Directory in the Project Manual.
- B. Submit the number of copies called for under the various items listed in this Section along with appropriate back-up materials.

1.04 PROCESSING CHANGES INITIATED BY THE OWNER

- A. Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the USC/Columbia Project Manager will issue a Construction Change Directive to the Contractor.
 - 1. Construction Change Directives will be dated and will be numbered in sequence.
 - 2. The Construction Change Directives will describe the contemplated change, and will carry one of the following instructions to the Contractor:
 - a. Make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion;
 - b. Make the described change in the Work, and provide for a credit or cost

CHANGE ORDER PROCEDURES

to be determined in accordance with Article 7 of the General Conditions.

- c. Promptly advise the Construction Manager as to the credit or cost proposed for the described change. This will not be an authorization to proceed with the change.
- B. If the Contractor has been directed by the Construction Manager and/or Architect/Engineer to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Contractor wishes to make a claim for one or both of such changes, the Contractor shall proceed with the change and shall notify the Construction Manager and/or Architect/Engineer as provided for under subparagraphs 4.7.7 and 4.7.8 of the General Conditions.
- C. If the Contractor has been directed by the Construction Manager and/or Architect/Engineer to make the described change subject to later determination of cost or credit in accordance with Paragraph 7.3 of the General Conditions, the Contractor shall:
 - 1. Take such measures as needed to make the change;
 - 2. Consult with the Construction Manager and/or Architect/Engineer and reach agreement on the most appropriate method for determining credit or cost for the change.
- D. If the Contractor has been directed by the Construction Manager and/or Architect/Engineer to promptly advise him as to credit or cost proposed for the described change, the Contractor shall:
 - 1. Analyze the described change and its impact on costs and time;
 - 2. Secure the required information and forward it to the Construction Manager for review;
 - 3. Meet with the Construction Manager and/or Architect/Engineer as required to explain costs, and when appropriate, to determine other acceptable ways to achieve the desired objective;
 - 4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Construction Manager and/or Architect/Engineer in writing when avoidance no longer is practicable.

1.05 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

- A. Make written reply to the Construction Manager and/or Architect/Engineer in response to each Construction Change Directive.
 - 1. State proposed change in the Contract Sum, if any.
 - 2. State proposed change in the Contract Time of Completion, if any.
 - 3. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.

4. Include full backup data such as, subcontractor's letter of proposal or similar information.
 5. Submit this response in a single copy.
- B. When cost or credit for the change has been agreed upon by the Owner and the Contractor, or the Owner has directed that cost or credit be determined in accordance with provisions of Article 7 of the General Conditions, the Architect will issue a "Change Order" to the Contractor.

1.06 PROCESSING CHANGE ORDERS

- A. Change Orders will be dated and will be numbered in sequence.
- B. The Change Order will describe the change or changes, will refer to the Construction Change Directive(s) involved, and will be signed by the Owner and the Architect/Engineer.
- C. The Architect/Engineer will issue five copies of each Change Order to the Construction Manager for the remaining distribution and execution of all parties.
1. The Contractor shall promptly sign all five copies and return all five copies to the Construction Manager.
 2. The Construction Manager will then forward five copies to the Architect for his signature.
 3. The Architect will sign all five copies and then forward five copies to the Owner for his signature.
 4. The Owner will sign all five copies, retain one copy for his file and return the remaining four copies to the Construction Manager who will then forward fully executed copies to the Contractor, Architect/Engineer and the Office of School Planning and Building.
- D. Should the Contractor disagree with the stipulated change in Contract Sum or change in Contract Time of Completion, or both:
1. The Contractor promptly shall return three copies of the Change Order, unsigned by him, to the Architect/Engineer with copy to the Construction Manager with a letter signed by the Contractor, stating his disagreement.
 2. The Contractor's disagreement with the Change Order shall not in any way relieve the Contractor of his responsibility to proceed with the change as ordered under pertinent provisions of the Contract Documents.

END OF SECTION

SECTION 01270

UNIT PRICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements for unit prices.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and the Technical Specification Divisions 2 through 16 apply to this Section.

1.03 GENERAL DESCRIPTION

- A. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities or Work required by the Contract Documents are increased or decreased.
- B. The unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the kinds called for.
- C. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections and as listed on the Form of Proposal.
 - 1. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves the use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

END OF SECTION

SECTION 01290

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Comply with procedures described in this Section when applying for progress payments and final payment under the Contract.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. The Contract Sum and the schedule for payments are described in the Form of Agreement.
 - 3. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions and in Division I of these Specifications.
 - 4. The Construction Manager's and Architect/Engineer's approval of applications for progress payment and final payment may be contingent upon the Construction Manager's and Architect's approval of status of Project Record Documents.

1.02 QUALITY ASSURANCE

- A. Prior to approval of payment application number one, secure the Construction Manager's approval of the project schedule and schedule of values required to be submitted under Paragraph 9.2 of the General Conditions, and further described in Section 01291 of these Specifications.
- B. During progress of the Work, modify the schedule of values as approved by the Construction Manager to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.
- C. Base requests for payment on the approved schedule of values.

1.03 SUBMITTALS

- A. Informal Submittal: Unless otherwise directed by the Construction Manager:
 - 1. Make an informal submittal of request for payment by filling in, with erasable pencil, pertinent portions of AIA Document G702, "Application and Certificate for Payment", plus continuation sheet or sheets.
 - 2. Make this preliminary submittal of request for payment as agreed with the Construction Manager, initialing all copies.
- B. Formal Submittal: Unless otherwise directed by the Construction Manager:

APPLICATIONS FOR PAYMENT

1. Make formal submittal of request for payment by filling in the agreed date, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment", plus continuation sheet or sheets.
2. Sign and notarize the Application and Certificate for Payment.
3. Submit the original of the Application and Certificate for Payment, plus five (5) identical copies of the entire Application including all continuation sheet or sheets, to the Construction Manager. All copies shall bear original signatures and original notarizations.
4. The USC/Columbia Project Manager will compare the formal submittal with the approved informal submittal and, when approved, will sign the Application and Certificate for Payment, and will distribute:
 - a. Six copies to Architect/Engineer for Approval;
 - b. After approval of Architect/Engineer, Four copies to Owner.
5. Request for Payment against any change order will not be honored until the change order is signed by all appropriate parties.

END OF SECTION

SECTION 01291

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Schedule of Values is required to be compatible with the continuation sheet and accompanying applications for payment, as described in Section 01290.

1.02 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Construction Manager and/or Architect/Engineer, provide copies of the subcontractor's Schedule of Values or other data acceptable to the Construction Manager and/or Architect/Engineer, substantiating the sums described.

1.03 SUBMITTALS

- A. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect/Engineer.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
 - 3. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
 - 4. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the

SCHEDULE OF VALUES

materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values.
 7. Schedule Updating: Update the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.
- B. Prior to first application for payment, submit a proposed schedule of values to the Construction Manager.
1. Meet with the Construction Manager and determine additional data, if any required to be submitted.
 2. Secure the Construction Manager's approval of the schedule of values prior to submitting first application for payment. NO APPLICATIONS FOR PAYMENT WILL BE PROCESSED PRIOR TO APPROVAL OF THE SCHEDULE OF VALUES.
 3. AIA Form G703 and "Form A" provided by the Construction Manager shall be submitted with all columns and spaces completed.

END OF SECTION

SECTION 01311

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems and to coordinate all phases of the Project toward completion in accordance with the Contract Documents, the Construction Manager will conduct project meetings throughout the construction period.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contractor's relations with his subcontractors and materials suppliers are the Contractor's responsibility and normally are not part of project meeting content.
 - 3. This Section specifies administrative and procedural requirements for project meetings including, but not limited to:
 - a. Pre-construction conferences.
 - b. Progress meetings.
 - c. Coordination meetings.
 - d. Pre-installation conferences.

1.02 QUALITY ASSURANCE

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings. Any change in personnel by a Contractor will be forwarded in writing to the Construction Manager prior to the change.

1.03 SUBMITTALS

- A. Agenda Items: To the maximum extent practical, advise the Construction Manager at least 24 hours in advance of project meetings regarding items to be added to the agenda.
- B. Minutes:
 - 1. The Construction Manager will compile minutes of each monthly project meeting, and will furnish one copy to the General Contractor, Architect/Engineer and required copies to the Owner. The General Contractor shall compile minutes of each weekly project meeting and will furnish one copy to the Architect/Engineer, Owner, and Construction Manager..
 - 2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS

(No products are required in this Section)

PART 3 - EXECUTION

3.01 MEETING SCHEDULE

- A. Except as noted for Pre-construction Meeting, formal job site meetings with on site job superintendents will be held weekly.
- B. Except as noted for Pre-construction Meeting, formal project meetings with attendance of each Contractor's office Project Manager will be held monthly.
- C. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.02 MEETING LOCATION

- A. The Construction Manager will establish meeting location. To the maximum extent practicable, meetings will be held at the job site.

3.03 PRECONSTRUCTION MEETING

- A. Pre-construction Meeting will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed.
 - 1. Provide attendance by authorized representatives of the Contractor.
 - 2. The Construction Manager will advise other interested parties, including the Owner, and request their attendance, as necessary.
- B. Minimum Agenda: Data will be distributed and discussed on at least the following items:
 - 1. Organizational arrangement of Contractor's forces and personnel, subcontractors, material suppliers, the Construction Manager, and the Architect/Engineer.
 - 2. Channels and procedures for communication.
 - 3. Construction schedule, including sequence of critical work.
 - 4. Contract Documents, including distribution of required copies of original Documents and revisions.
 - 5. Processing of Shop Drawings and other data submitted to the Construction Manager for transmittal to Architect for review.
 - 6. Processing of Bulletins, field decisions, Change Orders, and Payment Applications.
 - 7. Rules and regulations governing performance of the Work.
 - 8. Procedures for safety and first aid, security, quality control, housekeeping and

PROJECT MEETINGS

related matters.

9. Preparation of record drawings.
10. Use of the premises.
11. Office, work and storage areas.
12. Equipment deliveries and priorities.
13. Working hours.
14. Request for Information format.
15. Notification of Defective and Non-Conforming Work format.
16. Rejection of Work format.
17. Building and Special Inspections

3.04 PROJECT MEETINGS

A. Attendance:

1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
2. Conduct progress meetings at the Project site at regularly scheduled intervals. Notify the Owner and Architect/Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
3. Attendees: In addition to representatives of the Owner and Architect/Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at the meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

B. Minimum Agenda:

1. Review, revise as necessary, and approve minutes of previous meetings.
2. Review progress of the Work since last meeting, including status of submittals for approval. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so.
3. Identify problems which impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

PROJECT MEETINGS

6. Update as-built documents as required.
 7. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.
 8. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - i. Hours of work.
 - j. Hazards and risks.
 - k. Cleaning and site conditions.
 - l. Quality and work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.
 9. Building and Special Inspections
- C. Revisions to minutes:
1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
 2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
 3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.
- D. Reporting: No later than 5 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

END OF SECTION

SECTION 01320

PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Architect/Engineer in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.
- B. It should be noted by all Contractors and material suppliers the extremely critical nature of this project and time being allowed for its completion.
- C. Work shall be performed in accordance with the Pre-Bid Construction Schedule. Liquidated Damages to be assessed on individual activities as they fall behind rather than on an entire job.

1.02 RELATED WORK

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
- B. Requirements for progress schedule: General Conditions.
- C. Construction period: Form of Agreement

1.03 DEFINITIONS

- A. "Day", as used throughout the Contract unless otherwise stated, means "calendar day".

1.04 QUALITY ASSURANCE

- A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule, and in preparing and issuing periodic updates and reports as required.
- B. Perform data preparation, analysis, charting and updating in accordance with standards approved by the Architect.

1.05 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300, Submittals.
- B. Construction schedule: After the Contractor has received the Owner's Notice to Proceed, the Contractor shall provide the Construction Manager with sufficient information on his plan for completing all work under this Contract. The Contractor shall provide a detailed bar chart (CPM Method) of this work clearly showing how his schedule integrates with the

total construction duration. This bar chart schedule must include subcontract awards, material purchase dates and delivery dates, manpower levels broken down by trades and plant and equipment to be used. All interface activities and tasks which must be completed by other trades prior to proceeding with the work must be shown on the bar chart schedule. Submit one (1) reproducible copy and four (4) prints of a construction schedule for review.

- C. Periodic revisions and reports: Submit four (4) prints of the construction schedule updated along with the monthly payment request.

PART 2 - PRODUCTS

2.01 CONSTRUCTION ANALYSIS

- A. Graphically show by bar-chart the order and interdependence of all activities necessary to complete the work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors.

PART 3 - EXECUTION

3.01 CONSTRUCTION SCHEDULE

- A. Immediately after receipt of Notice to Proceed meet with the Construction Manager, review contents of the proposed construction schedule, and make all revisions agreed upon.
- B. The information on the Contractor's plan of action for performing the work under this Contract shall be based on the allotted construction duration for this work. The Construction Schedule shall indicate the key points of interface between the work under this contract and the other work of the project and the major project milestones. Sequencing and coordinating of miscellaneous activities will be discussed and agreed upon in the weekly meetings. It is agreed and understood that the schedule dates shown in the Construction Schedule for the indicated interface points and project milestones may change during the course of the Contract and such changes, in and of themselves, will not entitle the Contractor to any additional compensation or be deemed to constitute an extension of time or to constitute a change under Article 7 of the General Conditions for the Contract for Construction.
- C. Every effort will be made to make progress on the work as expeditiously as possible and if critical path activities can be improved during the course of the work, the Construction Schedule shall be revised to reflect improved dates on all work activities.
- D. The Contractor shall award all subcontracts, purchase materials, arrange for deliveries, furnish sufficient forces, plant and equipment and work such hours as necessary to insure execution of the work in conformity with the project duration.
- E. In the event of material procurement delays, the Contractor shall immediately notify the Construction Manager. However, it will be assumed that the Contractor has checked material deliveries as specified prior the Bid, as submission of a Bid for work will be assumed to be an agreement to the time frame allocated for that work as noted per the total project duration.

- F. If the Contractor falls behind the Construction Schedule, or current approved revision of the Construction Schedule, and is not entitled to any time extension as determined by the Construction Manager, he shall, upon request of the Construction Manager, submit within forty-eight (48) hours his plan for bringing his work back up to schedule. This plan shall include a commitment for immediate implementation, unless otherwise approved by the Construction Manager, and must include a time commitment, acceptable to the Construction Manager, for bringing the work up to schedule. If the Contractor fails to provide an acceptable plan within the requested time, he will be given a mandatory plan by the Construction Manager.
- G. The Contractor's plan shall illustrate his proposed methods for bringing his work back up to schedule, whether by a normal 40 hour work week, or by working 24 hours a day if necessary. If other measures will not be sufficient to make up the lag, the Contractor's plans and implementation thereof shall include increasing the number of shifts, days of work and/or instituting or increasing overtime, all at his own expense.
- H. If a Contractor fails or refuses to implement such measures as will bring his work back up to conformity with the approved Schedule, his right to proceed with any or all portions of the Contract requirements may be terminated pursuant to Article 14 of the General Conditions for the Contract for Construction.

3.02 PERIODIC REVISIONS AND REPORTS

- A. The approved construction schedule shall be updated monthly and submitted along with each monthly payment application.
 - 1. Indicate "actual" progress in percent completion for each activity.
 - 2. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.03 REVISIONS

- A. The Contractor will be given ample notice on any schedule changes that may affect the starting dates of his work. Periodic schedule review and revision meetings will be held with the Contractors who will be expected to provide input to the scheduling activities. The latest approved revision of the Construction Schedule shall be part of the Contract Documents and shall be complied with by the Contractor at no extra cost to the Owner. Activity duration period shown on the Construction Schedule will not be reduced without the approval of the Contractor nor will they be increased without the approval of the Construction Manager.
- B. Make only those revisions to approved construction schedule as are approved in advance by the Construction Manager.

3.04 REQUEST FOR EXTENSION DUE TO DELAYS

- A. It is understood that the Owner, Construction Manager or Architect/Engineer shall not in any event be liable to the Contractor for delays of any kind whatsoever and the Contractor shall be fully responsible for making up lost time of all delays except to the extent that extensions of time are granted. If completion of the work is delayed by any act of neglect of the Owner, or by the Construction Manager or the acts of the Construction Manager or Architect/Engineer, by strikes or by other exceptional conditions

over which the Contractor has no reasonable control, the time of completion shall upon receipt of the Contractor's written request, be extended by such period as the Construction Manager may consider reasonable. No extension shall be allowed unless a claim is presented in writing to the Construction Manager within seven (7) days after the commencement of such delay. In case of continued cause of delay, only one claim is necessary. Nothing in this clause shall be construed to release the Contractor from the obligation to perform at his own expense all overtime necessary to maintain the Contract completion date where delays have occurred which are not excused. If the Contractor, delayed by any acts of the Owner, Construction Manager, Architect/Engineer, and is granted an extension of time by the Construction Manager, the Contractor shall comply with the extended schedule with no additional compensation from the Owner.

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 - GENERAL

- A. The Contractor shall submit for review by the Architect/Engineer, Shop Drawings and schedules required by the Specifications, or that may be requested by the Architect/Engineer, and no work shall be fabricated by the Contractor, except at his own risk, until such review has been completed.

1.01 FORM OF SUBMISSION MATERIALS

A. SHOP DRAWING SCHEDULE

1. Immediately after date of Notice to Proceed, each Contractor shall submit to the Construction Manager a Shop Drawing Submittal Schedule, which shall include the following minimum information:
 - a. List all items to be submitted for review referenced to the specific specifications section.
 - b. Name of subcontractor if applicable.
 - c. Supplier and date of purchase order.
 - d. Total fabrication and delivery time from time submittals are returned to the Contractor.
 - e. Scheduled delivery date.

(NOTE): No applications for payment will be processed unless the above listed information has been submitted.

B. SHOP DRAWINGS

1. Scale and Measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work.
2. Review comments of the Architect/Engineer will be shown on submittal when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for his purposes.

C. MANUFACTURER'S LITERATURE

1. Where contents of submitted literature from manufacturers include data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.

D. SAMPLES

1. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of Submittals" below.
2. Number of Samples required:
 - a. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus three which will be retained by the Architect and Construction Manager.
 - b. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect/Engineer.

E. COLORS AND PATTERNS

1. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Architect/Engineer for selection.
2. No colors will be selected by the Architect/Engineer until all colors are submitted. If a color selection is needed prior to final approval of the color schedule, Contractor shall notify Architect/Engineer of which items need early color selection, provide color charts and date that selection must be made to keep project on schedule.

1.02 SUBMISSION PROCEDURE

A. IDENTIFICATION OF SUBMITTALS

1. Multiple submittals on a single transmittal are not acceptable. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
2. Consecutively number all submittals.
 - a. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
 - b. On re-submittals, cite the original submittal number for reference.
3. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.

4. Maintain an accurate submittal log for duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Architect/Engineer and Construction Manager for their review, upon request.
5. Provide number of copies required by Contractor plus two copies for Architect/Engineer and two copies for the Construction Manager files. The Construction Manager will maintain one copy of each submittal to deliver to Owner at project close-out.

B. GROUPING OF SUBMITTALS

1. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - a. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - b. The Contractor may be held liable for delays so occasioned.
2. Provide a separate transmittal and drawing number for each item to be reviewed.

C. CHECKING SUBMITTALS PRIOR TO SUBMISSION

1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
3. The drawings submitted shall be marked with the name of the project, numbered consecutively and bear the signed and dated stamp of the approval of that Contractor as evidence that the drawings have been checked by the Contractor. Any drawings submitted without this stamp of approval will not be considered and will be returned to the Contractor for re-submission. If the shop drawings show variation from the requirements of the Contract because of standard shop practice or with reasons, the Contractor shall make specific mention of such variations in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment; otherwise, that Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though such shop drawings have been approved.

D. DELIVERY AND TIMING OF SUBMITTALS

1. All submittals shall be transmitted to the Construction Manager for forwarding to the Architect/Engineer for review based upon their relative position in the Construction Schedule, or as follows:
 - a. Prior to Mobilizing On-Site
 1. Performance Bond
 2. Labor and Material Bonds

3. Insurance Certificate
- b. Following Notice to Proceed
 1. Shop Drawing Submittal Schedule (immediately)
 2. Schedule of Values (within 10 days)
 3. Superintendent's Resume (within 10 days)
 4. Detailed Construction Schedule (within 21 days)
 5. Subcontractor Listing (within 30 days)
 6. All Equipment & Furnishings submittals (within 90 days) UNO.
2. Shop drawing submittals shall be made far enough in advance, based on the approved Construction Schedule, to meet all installation dates as scheduled. This will require that sufficient lead time be allowed to address an adequate review period, securing necessary approvals, possible revisions and re-submittals, placing orders and securing delivery dates. A detailed Shop Drawing Submittal Schedule is included as part of the Pre-Bid Construction Schedule.
3. In scheduling, allow at least ten (10) working days for review by the Architect following his receipt of the submittal (plus transit time).

E. ARCHITECT/ENGINEER'S REVIEW

1. Review by the Architect/Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
2. The review of Shop Drawings will be general and shall not be construed as:
 - a. Permitting any departure from the Contract Requirements.
 - b. Relieving the Contractor of the responsibility for any error in details, dimensions or otherwise that may exist.
 - c. Approving departures from additional details or instruction previously furnished by the Architect/Engineer.
3. Revisions:
 - a. Make revisions required by the Architect/Engineer.
 - b. If the Contractor considers any required revisions to be a change, he shall notify the Construction Manager and/or Architect as provided for in Paragraph 4.7.7 of the General Conditions.
 - c. Make only those revisions directed or approved by the Architect/Engineer.
4. If a drawing, as submitted, indicates a departure from the Contract requirements which the Architect/Engineer finds to be in the interest of the Owner and to be minor as not to involve a change in the Contract Price or time for performance, the Architect/Engineer may approve the drawing.

F. FINAL DISTRIBUTION OF SUBMITTALS

1. The Construction Manager will retain one set at the project site. Each Contractor

shall be responsible for the distribution of the Shop Drawings and schedules within his own organization and to his subcontractors.

2. The Contractor will advise the Construction Manager of the date that reviewed shop drawings are forwarded to the manufacturers or fabricators. Un-priced copies of purchase orders placed with suppliers or fabricators are to be forwarded to the Construction Manager when orders are placed.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 SCOPE

- A. **DESCRIPTION OF REQUIREMENTS:** Required inspection and testing services are intended to assist in the determination of probable compliance of the work with requirements specified or indicated. These required services do not relieve the Contractor of responsibility for compliance with these requirements or for compliance with requirements of the contract documents. See Section 01415 - Special Inspections for additional requirements regarding inspections and testings.

1. Definitions: The requirements of this section relate primarily to customized fabrication and installation procedures, not to the production of standard products. Quality control services include inspections and tests and related actions including reports, performed by independent agencies and governing authorities, as well as directly by the Contractor. These services do not include observation activities performed directly by the Architect or Engineer.

Specific quality control requirements for individual units of work are specified in the sections of these specifications that specify the individual element of the work. These requirements, including inspections and tests, cover both production of standard products, and fabrication of customized work. These requirements also cover quality control of the installation procedures.

Inspections, tests and related actions specified in this section and elsewhere in the contract documents are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the contract documents.

Requirements for the Contractor to provide quality control services as required by the Architect/Engineer, the Owner, governing authorities or other authorized entities are not limited by the provisions of this section.

1.02 RESPONSIBILITIES

- A. Contractor Responsibilities: Except where specifically indicated as being the Contractor's responsibility to pay for testing and/or inspections, it shall be the Owner's responsibility to engage and pay for testing and inspections and similar quality control services.

1. Contractor shall be responsible for proper notification when an inspection or test is required, to provide access to facilitate the inspection / test and shall be responsible to make corrections necessary when work is not in compliance with the Contract Documents. These responsibilities shall apply regardless of which party pays for the inspection / test.

- B. Owner's Responsibilities:

1. The Owner will engage and pay for the services of an independent agency to perform all inspections and tests unless specifically specified as the Contractor's responsibility or to be provided by another identified entity (i.e., the manufacturer).
 2. Inspections: All inspections as listed in Section 01415 – Special Inspections shall be the Owner's responsibility to procure and pay for required inspections and testing.
- C. Retest Responsibility: Where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance of related work with the requirements of the contract documents, then retests are the responsibility of the Contractor, regardless of whether the original test was the Contractor's responsibility. Retesting of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original work. Same agency that performed original tests shall perform re-tests.
- D. Responsibility for Associated Services: The Contractor is required to cooperate with the independent agencies performing required inspections, tests and similar services. Provide such auxiliary services as are reasonably requested. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel. These auxiliary services include, but are not necessarily limited to, the following:
- Providing access to the work.
Taking samples or assistance with taking samples.
Delivery of samples to test laboratories.
Security and protection of samples and test equipment at the project site.
- E. Coordination: The Contractor and each independent agency engaged to perform inspections, tests and similar services for the project shall coordinate the sequence of their activities so as to accommodate required services with a minimum of delay in the progress of the work. In addition the Contractor and each independent testing agency shall coordinate their work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking of samples and similar activities.
- F. Qualification for Service Agencies: Except as otherwise indicated, engage inspection and test service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which are recognized in the industry as specialized in the types of inspections and tests to be performed. Testing agency shall be approved by the Architect/Engineer and the State Engineer (OSE).

1.03 SUBMITTALS

- A. General: Refer to Division - 1 section on "Submittals" for the general requirements on submittals. See Sections 01415 and 01416 for specific reporting requirements for Special Inspections. Submit a certified written report of each inspection, test or similar service, to

the Architect/Engineer, Construction Manager, Owner, State Engineer (OSE), and Contractor.

1. Inspection / testing firm shall be responsible to notify the Contractor, Construction Manager and Owner immediately of all failed tests in writing. If deficiency is not corrected, the inspection / testing firm shall notify the Owner and the State Engineer (OSE).
2. Report Data: Written reports of such inspection, test or similar service shall include, but not be limited to the following:

Name of Project.

Name of testing agency or test laboratory.

Dates and locations of samples and tests or inspections.

Names of individuals making the inspection or test.

Designation of the work and test method.

Complete inspection or test data.

Test results.

Interpretations of test results.

Notation of significant ambient conditions at the time of sample-taking and testing.

Comments or professional opinion as to whether inspected or tested work complies with requirements of the contract documents.

Recommendations on corrections necessary, if applicable.

Recommendation on retesting, if applicable.

3. A copy of each report shall be kept in the job trailer.

- B. Test report submittals are for Architect/Engineer's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 TESTING AND INSPECTION

- A. See individual specification sections and sections 01410, 01415 and 01416 for testing and inspection required.
- B. Testing Agency Duties:
 1. Test samples of mixes submitted by Contractor.
 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

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5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests and inspections required by Architect.
7. Attend preconstruction meetings and progress meetings.
8. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

3.02 MANUFACTURERS' FIELD SERVICES:

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, and test, adjust and balance equipment, as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.03 REPAIR AND PROTECTION:

- A. General: Upon completion of inspection, testing, sample-taking and similar services performed on the work, Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed finishes. Comply with the contract document requirements for "Cutting and Patching". Protect work exposed by or for quality control service activities, and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

SECTION 01415

SPECIAL INSPECTIONS & STRUCTURAL TESTING

PART 1 - GENERAL

1.01 SCOPE

- A. This section includes a listing of special inspections as required by Chapter 17 of the 2006 International Building Code (IBC) to be performed during the progress of this project. A Certificate of Occupancy cannot be issued without documentation that these inspections have been performed and the work is in conformance with the Contract Documents and the 2006 International Building Code.
- B. Related Work:
 - Section 01400 Quality Control
 - Section 01410 Building Inspections
 - Section 01416 Quality Assurance Plan for Seismic Requirements

1.02 RESPONSIBILITY

- A. It shall be the Owner's responsibility to contract and pay for special inspections; however, the Contractor shall be responsible for proper notification when inspection is required in the progress of the work, providing access to facilitate the inspection and making corrections necessary when work is not in compliance with the Contract Documents. The Contractor shall give the Inspector 24 hours notice minimum when an inspection for a portion of the work is required.

1.03 REPORTS

- A. Copies of inspection reports signed by person performing the inspection or test shall be submitted to Construction Manager, Architect/Engineer, and Contractor. A copy shall also be kept in the job trailer.

1.04 GENERAL REQUIREMENTS

- A. Special Inspections and Materials Testing shall be in accordance with Chapter 17 of the 2006 International Building Code.
- B. Special Inspections and Materials Testing shall be in accordance with the 2001 edition of the "National Practice Guidelines for Special Inspections," by the Council of American Structural Engineers (CASE) and in accordance with Office of State Engineer inspection requirements.
- C. The program of Special Inspections and Structural Testing is a Quality Assurance Program intended to ensure that the work is performed in accordance with the Contract Documents.
- D. This specification section is intended to inform the Contractor of the Owner's quality assurance program and the extent of the Contractor's responsibilities. This specification section is also intended to notify the Special Inspector, Testing Laboratory, and other Agents of the Special Inspector of their requirements and responsibilities.

1.05 SPECIAL INSPECTIONS

- A. Shall be performed by a qualified inspector and/or approved testing agency, acceptable to Office of State Engineer (OSE).
- B. Contractor shall be responsible to notify inspector in a timely manner (24 hours prior notice minimum) when required inspections need to be performed.
- C. The inspection / testing firm shall be responsible to notify the Contractor, the Construction Manager, and Architect/Engineer immediately of all failed inspections and/or tests in writing. If discrepancies are not corrected, the Special Inspector shall notify OSE and the Owner.

1.06 SCHEDULE OF INSPECTIONS AND TESTS

- A. Required inspections and tests are described in the "Statement of Special Inspections" attached at the end of this section, and in the individual specification Sections for the items to be inspected or tested.

1.07 QUALIFICATIONS

- A. The Testing Laboratory and individual technicians shall be approved by the Structural Engineer of Record (SER) and OSE.
- B. The Testing Laboratory shall maintain a full time licensed Professional Engineer (P.E.) on staff who shall certify the test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.
- C. Special Inspections shall be performed by inspectors as approved by OSE.
 - 1. Special Inspectors shall possess current certifications in the trade areas which are to be inspected.

1.08 SUBMITTALS

- A. The Special Inspector and Testing Laboratory shall submit to the SER and OSE for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.
- B. The Special Inspector and Testing Laboratory shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.09 PAYMENT

- A. The Owner shall engage and pay for the services of the Special Inspector, Agents of the Special Inspector, and the Testing Laboratory.
- B. If any materials which require Special Inspections are fabricated in a plant which is not located within 100 miles of the project, the Contractor shall be responsible for the travel expenses of the Special Inspector or Testing Laboratory.
 - 1. Expenses shall be adequate to provide same-day round-trip transportation to remote plant.
 - 2. Expenses shall include travel, lodging and meals.

- C. The Contractor shall be responsible for the cost of any retesting or re-inspection of work which fails to comply with the requirements of the Contract Documents.

1.10 CONTRACTOR RESPONSIBILITIES

- A. Contractor's Statement of Responsibility: Each Contractor responsible for the construction of a seismic-force-resisting system, designated seismic system, or component listed in the Seismic Quality Assurance Plan shall submit a "Contractor's Statement of Responsibility" to OSE and the Architect/Engineer prior to the commencement of work. The Contractor's statement of responsibility contains the following:
 - 1. Acknowledgement of awareness of the project's special inspection requirements.
 - 2. Acknowledgement that control will be exercised to obtain conformance with the construction documents approved by the Building Official.
 - 3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting, and the distribution of the reports
 - 4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.
- B. The Contractor shall cooperate with the Special Inspector and his agents so that the Special Inspections and testing may be performed without hindrance.
- C. The Contractor shall review the "Statement of Special Inspections" and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector or Testing Laboratory at least 24 hours in advance of a required inspection or test. Un-inspected work that required inspection may be rejected solely on that basis.
- D. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at the source of products to be tested, and to facilitate tests and inspection, storage and curing of test samples.
- E. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved and field use shop and erection drawings, and specifications for use by the inspectors and testing technicians.
- F. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is to be subjected to Special Inspections shall first be reviewed by the Contractor's quality control personnel.
- G. The Contractor shall be solely responsible for construction site safety.

1.11 LIMITS ON AUTHORITY

- A. The Special Inspector or Testing Laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
- B. The Special Inspector or Testing Laboratory will not have control over the Contractor's means and methods of construction.
- C. The Special Inspector or Testing Laboratory shall not be responsible for construction site safety.

- D. The Special Inspector or Testing Laboratory has no authority to stop the work except with prior written consent of the Owner.

1.12 RECORDS AND REPORTS

- A. Detailed daily reports shall be prepared of each inspection and test and submitted to the Special Inspector. Reports shall include:
 - 1. Name of Project
 - 2. Date of test or inspection
 - 3. Name of inspector or technician
 - 4. Location of specific areas tested or inspected
 - 5. Description of test or inspection and results and interpretation of results
 - 6. Applicable ASTM standard or test method
 - 7. Weather conditions
 - 8. Engineer's seal and signature
 - 9. Corrective actions, if any
 - 10. Recommendation for re-inspection (if applicable)
- B. The Special Inspector shall submit interim reports at the end of each week which includes all inspections and test reports received that week. Copies shall be sent to the Construction Manager, Architect/Engineer, Contractor, and SER and a copy shall be kept on site.
- C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor, Construction Manager, and Architect/Engineer. If the discrepancies are not corrected, the Special Inspector shall notify the Owner and OSE. Reports shall document all discrepancies identified and the corrective action taken.
- D. The Testing Laboratory shall immediately notify the Special Inspector, Contractor, Construction Manager, and Architect/Engineer by telephone, fax or email of any test results which fail to comply with the requirements of the Contract Documents. If conditions are not corrected, the testing laboratory shall notify the Owner and OSE.
- E. Reports shall be submitted to the Special Inspector within 7 days of the inspection or test. Hand written reports may be submitted if final typed copies are not available. See Inspection Report Form in Section 01400 – Quality Control.
- F. At the completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Owner, Construction Manager, Architect/Engineer and Building Official that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.13 FINAL REPORT OF SPECIAL INSPECTIONS

- A. The "Final Report of Special Inspections" shall be completed by the Special Inspector and submitted to the Owner, Construction Manager, Architect and OSE prior to the issuance of a Certificate of Use and Occupancy.
- B. The "Final Report of Special Inspections" will certify that all required inspections have been performed and will itemize any discrepancies that were not corrected or resolved.

1.14 SCHEDULE OF SPECIAL INSPECTION AGENTS

Project Name: USC Greenhouse Construction State Project # H27-Z090

Architect's Commission Number: _____

The construction divisions which require special inspections for this project are listed below. The following firms / individuals are designated to perform Special Inspections of the material or work for each construction division and shall be employed by the Owner.

| CONSTRUCTION DIVISION | INSPECTION AGENT / FIRM | ADDRESS / TELEPHONE |
|---|-------------------------|---------------------|
| <input checked="" type="checkbox"/> Soils and Foundations <input type="checkbox"/> Piles and/or Piers <input type="checkbox"/> Cast-in-Place Concrete <input type="checkbox"/> Precast Concrete <input checked="" type="checkbox"/> Masonry <input type="checkbox"/> Structural Steel <input type="checkbox"/> Cold-Formed Steel Framing <input type="checkbox"/> Spray Fire Resistant Material <input type="checkbox"/> Wood Construction <input type="checkbox"/> Exterior Insulation and Finish System <input checked="" type="checkbox"/> Mechanical & Electrical Systems <input type="checkbox"/> Architectural Systems <input type="checkbox"/> Special Cases <input type="checkbox"/> Smoke Control System <input checked="" type="checkbox"/> Metal Building Fabrication <input type="checkbox"/> Pre-Fabricated Trusses <input type="checkbox"/> Wall Panels & Veneers | To be determined | |

1.15

SCHEDULE OF SPECIAL INSPECTIONS

Project Name: USC Greenhouse Construction State Project # H27-Z090

Architect's Commission Number: _____

Page 1 of 3

Instructions

The Structural Engineer of Record shall determine the material and/or work on the project requiring Special Inspections. The Special Inspection requirements shall be based on Chapter 17 of the 2006 International Building Code. Any deviations from the requirements of Chapter 17 must be approved by OSE. If Inspection is by "Other", the inspecting entity shall be identified by the Owner to the Contractor prior to the execution of the Contract.

* Following form to be completed at completion of Construction Documents.

| MATERIALS | TYPE OF INSPECTION | SPECIFICATION REFERENCE | INSPECTION BY: | | |
|------------------|--|-------------------------|----------------|----------|-------|
| | | | Architect | Engineer | Other |
| Soils | Subgrade Preparation per Soils Report | | | | X |
| | Fill Placement Materials | | | | X |
| | Fill Lift Thickness | | | | X |
| | In-Place Fill Density | | | | X |
| | Footing Bottoms | | | | X |
| Concrete | Material Certification | | | | X |
| | Rebar Placement (Periodic) | | | | X |
| | Reinforcing Steel Welding (Cont) | | | | X |
| | Verify use of Design Mix (Periodic) | | | | X |
| | Formwork | | | | X |
| | Sample Slump, air, temperature (Cont) | | | | X |
| | Concrete Placement (Cont) | | | | X |
| | Curing (Periodic) | | | | X |
| | Verification of In-Situ Strength (Periodic) | | | | X |
| Structural Steel | Fabricator Certification / QC Procedures | | | | X |
| | Verification of high-strength bolts / washers (Periodic) | | | | X |
| | Inspection of high-strength bolting (Periodic) | | | | X |

| MATERIALS | TYPE OF INSPECTION | SPECIFICATION REFERENCE | INSPECTION BY: | | |
|--------------------------|---|-------------------------|----------------|----------|-------|
| | | | Architect | Engineer | Other |
| Structural Steel (con't) | Verification of structural steel materials | | | | X |
| | Verification of weld filler materials | | | | X |
| | Inspection of steel frame joints (periodic) | | | | X |
| | Bracing, stiffening, member locations & connections – inspection @ completion | | | | X |
| | Inspection of Structural Steel Welding: | | | | |
| | a) Welder's certifications & procedures | | | | X |
| | b) Penetration groove (Continuous) | | | | X |
| | c) Single-pass < 5/16" (Periodic) | | | | X |
| | d) Visually inspect all completed welds | | | | X |
| Steel Frame Joints | Periodic Inspection of Steel Frame | | | | X |
| Steel Joists | Inspection of field welds and bolts (Periodic) | | | | X |
| Steel Deck | Inspection of roof deck fastening (Periodic) | | | | X |
| Light Gage Steel Trusses | Fabrication and QC Procedures | | | | |
| | Verification of members and fastening (Periodic) | | | | |
| | Bracing and anchorage to walls | | | | |
| Mechanical Components | Manufacturer certification required on mechanical equipment | | | | |
| | Inspection of label & anchorage of mechanical equipment (upon completion) | | | | |
| | Seismic isolators, review of submittal | | | | |
| | Seismic isolators field inspection of installation (upon completion) | | | | |
| | Fire Sprinkler systems installation (Periodic) | | | | |
| | Manufacturer certification required on fire sprinkler system | | | | |
| | Inspection of label and anchorage of fire sprinkler equipment | | | | |

| MATERIALS | TYPE OF INSPECTION | SPECIFICATION REFERENCE | INSPECTION BY: | | |
|--|---|----------------------------|----------------|----------|----------|
| | | | Architect | Engineer | Other |
| Exterior Windows and Glass Doors | Manufacturer conforming to NAMA / NWWDA 101 / I.S. 2 or 101 / I.S. 2 / NFAS | | | | |
| Electrical Components | Grounding system - field inspection (Periodic) | | | | X |
| | Seismic anchorage of emergency lighting | | | | X |

SECTION 01417

REGULATORY REQUIREMENTS

PART 1 - GENERAL

- A. The following requirements of Regulatory Agencies having an interest in this project are hereby made a part of this Contract.
- B. The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of State, territorial, and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.
- C. South Carolina Sales Tax: All applicable South Carolina sales tax shall be to the account of the Contractor.
- D. Use of chemicals: All chemicals used during the project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.
- E. Safety and Health Regulations: The Contractor shall comply with the Department of Labor and Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54).
- F. Inspection by Agencies: The representatives of the South Carolina Department of Health and Environmental Control, Lexington County and Richland County, Department of Highways and Public Transportation shall have access to the work wherever it is, in preparation or in progress, and the Contractor shall provide proper facilities for such access and inspection.
- G. Withholding for Non-Residents shall comply with the following:
 - 1. Attention of non-resident contractors is invited to Part Two, Act No. 855, Acts of the General Assembly of South Carolina 1958.
 - 2. If a non-resident contractor is the successful bidder on this project, he shall be required to post surety bond, or deposit cash or securities with the South Carolina Tax Commission in compliance with the Act. Proof of such coverage shall be filed with the Engineer before work is started.
 - 3. If the Contractor fails to comply with the regulations of the South Carolina Tax Commission, two percent (2%) of each and every payment made to the Contractor shall be retained by the Owner to satisfy such requirements.
- H. The Owner shall provide and maintain competent and adequate observation of construction as required by 40 CFR 35.2214.

END OF SECTION.

REGULATORY REQUIREMENTS

01417 - 1

SECTION 01418

PERMITS AND RIGHTS-OF-WAY

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: This section establishes requirements pertaining to the securement and payment for licenses, building permits, rights-of-way, etc. necessary for the construction of the project.
- B. Work not included: The Owner will obtain and provide to the Contractor, as required, copies of:
 - 1. Encroachment permits, State Highway Department.
 - 2. Encroachment permits, Public Utility.
 - 3. Easements obtained to cross private property.
 - 4. S.C. Department of Health and Environmental Control Permit to Construct.
- C. Related Work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

1.02 SUBMITTALS

- A. Submit to the Engineer satisfactory evidence that all necessary licenses, building permits, etc. have been secured prior to commencing the work.

PART 2 - PRODUCTS

No products are required for this work.

PART 3 - EXECUTION

3.01 BUSINESS LICENSE

- A. Determine licenses necessary to perform the work at project location.
- B. Obtain all necessary licenses at no additional cost to the Owner.

3.02 BUILDING PERMITS

- A. Contractor shall secure all building permits required whether of temporary or permanent nature.

3.03 RIGHTS-OF-WAYS, UTILITY LINES

- A. Owner will provide necessary right-of-way or easements for construction of utility lines, whether on privately or publicly owned property.

3.04 NPDES PERMIT FOR CONSTRUCTION ACTIVITY

- A. The Architect/Engineer will provide the Contractor with the approved land disturbance permit and SWPPP (if required). The Contractor is responsible for notifying the local SCDHEC office having jurisdiction at least 48 hours prior to start of construction. Contractor must read all documents pertaining to land disturbance and the control of sediment and erosion control furnished to him/her by the Architect/Engineer and abide by all requirements as stated therein.
- B. Permit application must be filed forty eight (48) hours prior to commencing construction activity.
- C. The Contractor shall use Best Management Practices (BMP) to control sediment runoff from construction areas.

3.05 LAND

- A. The necessary land for construction of the project will be provided by the Owner.

END OF SECTION

SECTION 01420

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Throughout the Project Documents, reference is made to specifications and standards issued by nationally recognized professional and/or trade organizations.
1. Unless otherwise specifically stated, all manufacturer's catalogs, specifications, instructions or other information or literature that are referred to in the specifications shall be considered as the latest edition and/or revision of such publication that is in effect on the date of the Invitation or Advertisement for Bids.
 2. When standard specifications such as the American Society for Testing and Materials, Federal specifications, Department of Commerce (Commercial Standards), American Institute of Steel Construction, or other well-known public or trade associations, are cited as a standard to govern materials and/or workmanship, such specifications or portions thereof as referred to shall be equally as binding and have the full force and effect as though it were copied into these specifications. Such standards as are mentioned are generally recognized by and available to the trades concerned. The Construction Manager will, however, upon request of a bidder or Contractor, furnish for inspection a copy of any standard specifications mentioned or direct the bidder or Contractor to an easily available copy. Unless otherwise specifically stated, the standard specifications referred to shall be considered as the latest edition and/or revision of such specifications that is in effect on the date of the Invitation for Bids. In case of any conflicts between standard specifications and the written portion of the Specifications, the specifications as actually written herein will govern.
 3. The referenced standards are generally identified by abbreviating the name of the organization following with the specification/standard number.
 4. Unless specifically indicated otherwise, all references to standards refer to the latest edition available at the time of bidding.

1.02 ABBREVIATIONS

- A. Wherever the following abbreviations are used in these Project Documents, they are to be construed the same as the respective expressions represented:

| | |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ACI | American Concrete Institute |
| ACPA | American Concrete Pipe Association |
| AGA | American Gas Association |
| AI | Asphalt Institute |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| ALS | American Lumber Standards |
| ANSI | American National Standards Institute, Inc. |

REFERENCE STANDARDS

| | |
|----------------|--|
| APA | American Plywood Association |
| ARI | Air Conditioning and Refrigeration Institute |
| ARMA | Asphalt Roofing Manufacturers Association |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASPE | American Society of Plumbing Engineers |
| ASTM | American Society for Testing Materials |
| AWI | Architectural Woodwork Institute |
| AWWA | American Water Works Association |
| AWPA | American Wood Preservers Association |
| AWS | American Welding Society |
| BIA | Brick Institute of America |
| CE | Corps of Engineers |
| CISPI | Cast Iron Soil Pipe Institute |
| CRSI | Concrete Reinforcing Steel Institute |
| CTI | Ceramic Tile Institute of America |
| DOT | Department of Transportation |
| EPA | Environmental Protection Agency |
| FSS | Federal Specifications and Standards, General Services Administration |
| GA | Gypsum Association |
| IEEE | Institute of Electrical and Electronics Engineers |
| MBMA | Metal Building Manufacturer's Association |
| MCAA | Mechanical Contractors Association of America |
| MFMA | Marble Flooring Manufacturers Association |
| MIA | Marble Institute of America |
| ML/SFA | Metal Lath/Steel Framing Association |
| NAAMM | National Association of Architectural Metal Manufacturers |
| NAPA | National Asphalt Pavement Association |
| NBHA | National Builders Hardware Association |
| NCMA | National Concrete Masonry Association |
| NEC | National Electric Code (Now NFPA) |
| NECA | National Electrical Contractors Association |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| NIST | National Institute of Standards and Technology |
| NPCA | National Paint and Coating Association |
| NRCA | National Roofing Contractors Association |
| NTMA | National Terrazzo and Mosaic Association |
| OSHA | Occupational Safety and Health Administration |
| OSF | Office of School Facilities |
| PCA | Portland Cement Association |
| PCI | Pre-stressed Concrete Institute |
| SDI | Steel Deck Institute |
| S.D.I. | Steel Door Institute |
| SJI | Steel Joist Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| SPIB | Southern Pine Inspection Bureau |
| SSPC | Steel Structures Painting Council |
| TCA | Tile Council of America, Inc. |
| UL | Underwriters Laboratories, Inc. |
| END OF SECTION | |

SECTION 01430

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Quality control of products and workmanship.
- B. Manufacturer's instructions.
- C. Manufacturer's certificates and field services.
- D. Mockups.

1.02 RELATED REQUIREMENTS

- A. Section 01330 Submittal Procedures: Submittal of manufacturer's instructions.
- B. Section 01450 – Quality Control and Testing Services
- C. Individual Specification Section: Mockups required.

1.03 DESCRIPTION

- A. Maintain quality control over supervision, subcontractors, suppliers, manufacturers, products, services, workmanship, and site conditions to produce Work in accordance with Contract Documents.

1.04 WORKMANSHIP

- A. Comply with industry standards of the region except when more restrictive tolerances or specified requirements indicate more rigid standards or precise workmanship.
- B. Provide suitably qualified personnel to produce Work of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration and racking.
- D. Provide finishes to match approved samples.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. Require compliance with instructions in full detail, including each step in sequence.
- B. Should instructions conflict with Contract Documents, request clarification from Construction Manager before proceeding.

1.06 MANUFACTURER'S CERTIFICATES

- A. When required in individual specification sections, submit manufacturer's certificate, in duplicate, certifying that products meet or exceed specified requirements, executed by responsible officer.

1.07 MANUFACTURER'S FIELD SERVICES

- A. See Section 01400 - Quality Control

1.08 MOCKUPS

- A. Assemble and erect complete, with specified attachment and anchorage devices, flashings, seals and finishes.
- B. Remove mockup and clear area approved by Construction Manager.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division - 1 Specifications, apply to this Section.

1.02 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities required include but are not limited to:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Telephone service and fax machine.
 - 4. Storm and sanitary sewer.
- C. Temporary construction and support facilities required include but are not limited to:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Temporary roads and paving.
 - 4. Sanitary facilities, including drinking water.
 - 5. Dewatering facilities and drains.
 - 6. Temporary enclosures.
 - 7. Temporary Project identification signs and bulletin boards as described at the end of this section.
 - 8. Waste disposal services.
 - 9. Rodent and pest control.
 - 10. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities required include but are not limited to:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Sidewalk bridges or enclosure fence for the site.
 - 4. Environmental protection.

1.03 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.04 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department, and Rescue Squad rules.
 - 5. Environmental protection regulations.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services," prepared jointly by AGC and ASC, for industry recommendations.
 - 2. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. If acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. Electrical Outlets: Provide properly configured NEMA polarized to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

TEMPORARY FACILITIES

- E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- F. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for loading required.
- G. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated re-circulation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- H. First Aid Suppliers: Comply with governing regulations.
- I. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination or extinguishers of NFPA recommended classes for the exposures.
 - 1. Comply with NFPA 10 and 214 for classification, extinguishing agent and size required by location and class of fire exposure.
- J. Security Fencing: Provide temporary 6' high chain link security fencing as indicated along construction limit lines.
- K. Temporary Project Sign: Provide construction sign as described by the Contract Documents. Locate as directed by Architect/Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.
- C. Temporary Facilities to be by General Construction Contractor unless noted otherwise or needed by the respective prime contractors to commence, install or complete their required work.
- D. Once installed the cost of maintenance and monthly service charge for all utilities shall be borne by the general contractor.

3.02 TEMPORARY UTILITY INSTALLATION

- A. Unless otherwise noted the general contractor shall be responsible for providing and maintaining all temporary utilities and support facilities.
- B. Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the

remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 3. Temporary (construction) power supplied by contractor and water may be obtained from the existing school facilities; however, the Owner must be consulted and approve exact location(s) and details prior to the taps. The Owner reserves the right to revoke this "privilege" if it is being abused and require the contractor(s) to obtain these services from other (off-site) means.
 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.
- C. Water Service (Plumbing Contractor): Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.
1. Sterilization: Sterilize temporary water piping prior to use.
 2. Permanent Tap: Tap fees and all materials and labor associated with permanent water service shall be provided by the plumbing contractor and coordinated and approved by governing authorities.
- D. Temporary Electric Power Service (Electrical Contractor): Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
1. Except where underground service must be used, install electric power service overhead.
 2. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- E. Temporary Lighting (Electrical Contractor): Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.
1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.
 2. The electrical contractor shall be responsible for all maintenance of temporary lighting.
- F. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a

separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants. Long distance charges will be paid for by the responsible prime contractor.

1. At each telephone, post a list of important telephone numbers.
- G. Sewers and Drainage: If sewers are available, providing temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
 2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- H. Provide earthen embankments and similar barriers in and around excavations and sub-grade construction, sufficient to prevent flooding by runoff of storm-water from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low/high temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient conditions required and minimize consumption of energy. The general contractor shall not rely upon the permanent HVAC system being available during the construction period and shall be responsible for the heat required to install and maintain finishes and finish material until such time as permanent heat is available. The general contractor will be responsible for any cost associated with warrantee extension due to this action.
- D. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
- E. Contractor and Construction Manager Field Offices: Provide insulated, weather tight temporary offices of sufficient size to accommodate required office personnel at the Project site. Include in the base bid office space for the Architects, Construction Manager, and Owners use. Space must have indoor plumbing, HVAC, and be equipped with desks, table, and chairs as required. Keep the office clean and orderly for use for progress meetings. Furnish and equip offices as required but most importantly, plan table shall have most up-to-date set of plans and specs which shall serve as the "control set." Field Office shall have a conference room area for holding weekly and monthly project meetings with the Owner, Architect, Contractor and Construction Manager.
- F. Storage and Fabrication Sheds: Install storage and fabricated sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site. Each contractor shall provide for their own storage requirements.
- G. Temporary Paving: Construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Architect.
1. Paving: Comply with South Carolina Department of Transportation Standard Specifications for Highway Construction (2007) for construction and maintenance of temporary paving.
 2. Coordinate temporary paving development with sub-grade grading, compaction, installation and stabilization of sub-base, and installation of base and finish courses of permanent paving.
 3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas that are without damage to deterioration when occupied by the Owner.
 4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.
 5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervision.
- H. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
- I. Dewatering facilities and drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division - 2 sections. Where feasible, utilize the same facilities. Maintain the site, excavations an construction free of water.

- J. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
 - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Install tarpaulins securely, with incombustible wood framing and other materials.
 - 3. Close openings through floor or roof deck and horizontal surfaces with load-bearing wood-framed construction.
- K. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- L. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood to steel. Do not permit installation of unauthorized signs.
 - 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
 - 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- M. Temporary Exterior Lighting: Install exterior yard and sign lights so that signs are visible when work is being performed.
- N. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner. The general contractor shall provide a dumpster for the use of all contractors on the job. Each prime shall reimburse the general for the disposal cost associated with their debris.
- O. Rodent and Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion. Perform control operations in a lawful manner using environmentally safe materials.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

- B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - 2. Store combustible materials in containers in fire-safe locations.
 - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access route for fighting fires. Prohibit smoking in hazardous fire exposure areas.
 - 4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements of erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- E. Enclosure Fence: Prior to beginning construction, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
 - 1. Provide 6' high open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.
- F. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways, and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 OPERATION, TERMINATION AND REMOVAL

TEMPORARY FACILITIES

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve results and to avoid possibility of damage.
 - 2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect/Engineer requests that it be maintained longer, remove each temporary facility when the need has ended, or when 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 the Contractor. The Owner reserves the right to take possession of Project identification signs.
 - 2. Remove temporary paving that is not intended or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt, other petrochemical compounds, and other substances, which might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
 - 3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION

SECTION 01640

OWNER FURNISHED PRODUCTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Coordinate and, if required, install Owner Furnished Equipment as shown on the drawings, as specified herein, and as needed for a complete and proper installation.
 - 1. Owner Furnished/Contractor Installed (OF/CI) Equipment items and Owner Furnished/Owner Installed (OF/OI) Equipment items will be identified on the drawings or in the specifications.
 - 2. Connections and interface: All necessary connections and interface with new construction shall be the responsibility of the General Contractor. This includes but is not limited to mechanical, plumbing, and electrical connections, sealing and trim closures.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Product Data: In accordance with the Contractor's project schedule, the Owner shall submit to the Contractor the following:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications, catalog cut sheets, installation and instructions.
 - 3. Shop drawings indicating assembly and construction interface details.

1.04 COORDINATION - FOR OF/CI EQUIPMENT

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Arrange and pay for Product delivery to site.
 - 3. On delivery, inspect Products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections, and service.

OF/CI AND OF/OI EQUIPMENT

B. Contractor's Responsibilities:

1. Review Owner reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload Products at site; inspect for completeness or damage, jointly with Owner.
3. Handle, store, install and finish Products.
4. Repair or replace items damaged after receipt.

1.05 COORDINATION FOR OF/OI EQUIPMENT

A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data and Samples to Contractor.
2. Arrange and pay for Product delivery to site.
3. On delivery, inspect Products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange and pay for Product installation at site.
6. Arrange for manufacturer's warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner reviewed Shop Drawings, Product Data and Samples to become thoroughly familiar with the work. Establish work schedules and material deliveries.
2. Receive and unload Products at site, inspect for completeness or damage, jointly with Owner.
3. Coordinate work with Owner's installation Contractor. Provide temporary power, water, etc. to facilitate work.
4. Provide storage, if necessary, of products prior to installation.
5. Make final connections to permanent utility services, such as power, water, gas, sewer to allow for full functional use.
6. Protect all completed work.
7. Repair or replace items damaged after completion.
8. Coordination training sessions with Owner's personnel in the proper operation of the equipment.

PART 2- PRODUCTS

2.01 GENERAL: The following equipment will be furnished by the Owner. This general listing is for rough-in information and coordination. See the drawings for the location of the installation.

2.02 EQUIPMENT

A. Owner Furnished/Contractor Installed (OF/CI)

1. Door Hardware (Paid via Hardware Allowance)

B. Owner Furnished. Owner Installed (OF/OI)

3.03 SURFACE CONDITIONS

A. Examine the area and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.04 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. For OF/CI equipment, install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved, anchoring all components firmly into position for long life under hard use.

C. For OF/CI and OF/OI equipment, upon completion of installation and hookup to utilities, put each operating component through at least five complete operating cycles, adjusting as needed to secure optimum operation level.

D. Promptly remove from the job site all cartons and packing material associated with the work of this Section.

3.05 RESPONSIBILITY CHARTS

A. Refer to the attached charts for representation of areas of responsibility between OF/CI and OF/OI System of Products.

OWNER FURNISHED/CONTRACTOR INSTALLED (OF/CI) TYPICAL

RESPONSIBILITY CHART

| Item | Description | Owner | Contractor | Manufacturer | A/E | Construction Manager |
|------|-----------------------------------|-------|--------------|-----------------|-----|----------------------|
| 1 | List of Equipment | | | | X | |
| 2 | Bidding Negotiations | | | | | X |
| 3 | Purchase Equipment | X | | | | |
| 4 | Produce Equipment Shop Drawings | | | X | | |
| 5 | Shop Drawing Approval | | | | X | |
| 6 | Schedule Equipment Delivery Dates | | X | | | |
| 7 | Deliver to Jobsite | | | X | | |
| 8 | Unload at Jobsite | | X | | | |
| 9 | Inspect at Jobsite | X | X | | | X |
| 10 | Property Insurance | X | X | | | |
| 11 | Installation | | X | | | |
| 12 | Equipment Startup | | X | | | |
| 13 | Clean-up | | X | | | |
| 14 | Warranty | | (Labor) X | (Material) X | | |

OWNER FURNISHED/OWNER INSTALLED (OF/OI) TYPICAL

RESPONSIBILITY CHART

| Item | Description | Owner | Contractor | Manufacturer | A/E | Construction Manager |
|------|-----------------------------------|--------------|------------|-----------------|-----|----------------------|
| 1 | List of Equipment | | | | X | |
| 2 | Bidding Negotiations | | | | | X |
| 3 | Purchase Equipment | X | | | | |
| 4 | Produce Equipment Shop Drawings | | | X | | |
| 5 | Shop Drawing Approval | | | | X | |
| 6 | Schedule Equipment Delivery Dates | | X | | | |
| 7 | Deliver to Jobsite | | | X | | |
| 8 | Unload at Jobsite | | X | | | |
| 9 | Inspect at Jobsite | X | X | | | X |
| 10 | Property Insurance | X | | | | |
| 11 | Installation | X | | | | |
| 12 | Equipment Startup | X | X | | | |
| 13 | Clean-up | X | | | | |
| 14 | Warranty | (Labor) X | | (Material) X | | |

END OF SECTION

SECTION 01650

PRODUCT DELIVERY AND HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Sections in Division 1 of these specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these specifications.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURERS' RECOMMENDATIONS

- A. Except as otherwise approved by the Engineer, determine and comply with manufacturer's recommendations on product handling, storage and protection.

1.04 PRODUCT DELIVERY

- A. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
- B. 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.

1.05 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.06 PROTECTION OF MATERIAL AND WORK

A. General

1. Carefully and properly protect all materials of every description, both before and after installation.
2. Provide any enclosing or special protection from weather as deemed necessary by the Engineer at no additional cost to the Owner.

B. Partial payments under the Contract will not relieve the Contractor from responsibility.

1. When materials and work at the site which have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the Owner at the expense of the Contractor and no further partial payment thereon will be made.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.07 STORAGE

- A. Store all items of equipment, component parts, etc. in accordance with the manufacturers' recommendations or as may otherwise be necessary to prevent damage or deterioration of any sort.

1.08 REPAIRS AND REPLACEMENTS

- A. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

END OF SECTION

SECTION 01720

PROJECT LAYOUT AND FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Provide such field engineering services, including survey and civil engineering, as are required for proper completion of the Work including, but not necessarily limited to:
1. Establish and maintain all horizontal and vertical reference points, grades, lines and planes as required to construct project as indicated, specified, or both.
 2. Structural design of shores, forms and similar items provided by the Contractor as part of his means and methods of Construction.
- B. Related Work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 2. Additional requirements for field engineering also may be described in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary craft and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of the Section.
1. Surveyor: Engage a Registered Land Surveyor registered in the State where the project is located, to perform land surveying services required.
 2. Engineer: Engage a Professional Engineer of the discipline required, registered in the State in which the project is located, to perform required engineering services.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01330 - Submittal Procedures.
- B. Upon request of the Construction Manager and/or Architect/Engineer, submit:
1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
 2. Documentation verifying accuracy of field engineering work.
 3. Certification, signed by a registered land surveyor, certifying that elevations and

locations of improvements are in conformance with requirements of the Contract Documents. The cost for registered land surveyors shall be included in the Contractors bid.

- C. Final Property Survey: Prior to Substantial Completion, prepare a final property survey showing significant features that have resulted from construction of the project. Include a certification signed by the surveyor that lines and levels of the project are accurately positioned as shown on the survey and in accordance with the contract documents.

PART 2- PRODUCTS

2.01 ENGINEERING EQUIPMENT

- A. Transit and measuring devices shall be calibrated to layout site and building work indicated.

2.02 OTHER LAYOUT EQUIPMENT

- A. Provide stakes and batter boards of size and quality to execute the work indicated, Use wire and non-stretching cord to establish lines for site, paving and building work.

PART 3 - EXECUTION

3.01 BENCHMARKS

- A. The contractor shall maintain carefully all benchmarks, monuments and other reference points throughout execution of this work. If these are disturbed or destroyed, same shall be replaced and rest as directed by the Architect/Engineer at Contractor's expense.

3.02 LAYOUT

- A. Stake site improvements relative to reference lines indicated on plan.
- B. Locate storage sheds, temporary office and topsoil stockpile so as to best advance progress of work and as approved by architect.

3.03 SITE CONDITIONS

- A. Before commencing work, verify benchmarks, reference points, and conditions where new work ties into existing work.

3.04 ADDITIONAL PROCEDURES

- A. In addition to procedures necessary for proper performance of the Contractor's responsibilities:
 - 1. Locate and protect control points before starting work on the site.
 - 2. Preserve a minimum of two permanent reference points during progress of the

Work and through completion of the Work. Locate permanent reference points on as-built documents.

3. Do not change or relocate reference points or items of the Work without specific approval from the Architect/Engineer.
4. Promptly advise the Construction Manager when a reference point is lost or destroyed, or required relocation because of other changes in the Work.
 - a. Upon direction of the Construction Manager, require the field engineer to replace reference stakes or markers.
 - b. Locate such replacements according to the original survey control.
5. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning any work, investigate and verify the existence and location of underground utilities and other construction.
 - a. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

END OF SECTION

SECTION 01730
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 Description

- A. Work included: This Section establishes general requirements pertaining to cutting (including excavating), fitting and patching of the work required to:
 - 1. Make the several parts fit properly;
 - 2. Uncover work to provide for installing, inspection, both, of ill-timed work;
 - 3. Remove and replace work not conforming to requirements of the Contract Documents; and
 - 4. Remove and replace defective work.
- B. Related Work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, NCLC, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to other requirements specified, upon the Construction Managers and/or Architect/Engineer's request to uncover work to provide for inspection by the Construction Manager and/or Architect of covered work, and remove samples of installed materials for testing.
 - 3. Do not cut or alter work performed under separate contracts without the Construction Manager's and Architect/Engineer's written permission.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.03 SUBMITTALS

- A. Request for Construction Manager's and/or Architect/Engineer's consent:
 - 1. Prior to cutting which effects structural safety, submit written request to the Construction Manager and/or Architect/Engineer for permission to proceed with cutting.
 - 2. Should conditions of the Work, or schedule indicate a required change of materials or methods for cutting and patching, so notify the Construction Manager and/or Architect/Engineer and secure his written permission and the required Change Order prior to proceeding.
- B. Notices to the Construction Manager and/or Architect/Engineer:

1. Prior to cutting and patching performed pursuant to the Construction Manager's and/or Architect/Engineer's instructions, submit cost estimate to the Construction Manager and Architect. Secure the Construction Manager's and the Architect/Engineer's approval of cost estimates and type of reimbursement before proceeding with cutting and patching.
2. Submit written notice to the Construction Manager and/or Architect/Engineer designating the time the Work will be uncovered, to provide for the Construction Manager's and/or Architect/Engineer's observation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. For replacement of items removed, use materials complying with pertinent Sections of these Specifications.

2.02 PAYMENT FOR COSTS

- A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to the written Change Order, after claim for such reimbursement is submitted by the Contractor and approved by the Construction Manager and Architect/Engineer. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching and backfilling.
 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 1. If uncovered conditions are not as anticipated, immediately notify the Construction Manager and/or Architect/Engineer and secure needed directions.
 2. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the Work.
- B. Provide required fire protection including, but not necessarily limited to, fire blankets, fire extinguishing equipment, prior to consent from Construction Manager.

3.03 PERFORMANCE

- A. Perform required excavating and backfilling as required under pertinent other Sections of these Specifications.
1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.
 2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.
 3. All penetrations made by the Contractor through walls, ceilings, and/or floors shall be sealed by the Contractor to meet the requirements of all building codes, fire codes, applicable to this project.
 4. Extent of Cutting and Patching: Cut areas in new or existing work only to the extent required to perform the work. Cutting shall be in a manner that will not disturb adjoining work as much as possible and will facilitate patching in a sound and durable manner with invisible seams between the patched areas and the existing adjoining work. Patching shall restore area to match original finish to the satisfaction of the Architect. All rejected patched areas shall be removed and replaced to provide visually acceptable and durable work as directed by the Architect.
 5. General: Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect/Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.
 6. Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installer's recommendations.

In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

Comply with requirements of applicable sections of South Carolina Department of Transportation Standard Specifications for Highway Construction (2007) where cutting and patching requires excavating and backfilling.

- a. Generally, unless other specified, work that requires cutting shall be performed by the tradesman performing the work.
7. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

Where feasible, inspect and test patched areas to demonstrate integrity of work.

Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

- a. Responsibility For Patching: The subcontractor will pay the masons on site to patch masonry walls that have to be cut for ductwork and any other larger opening. Holes in walls for pipe and conduit shall be drilled and grouted as required. Any damage to the fire rated construction will be the responsibility of the subcontractor to have properly repaired to meet the UL rating and meet approval of the Architect/Engineer. The ultimate responsibility for all patching shall be on the General Contractor to provide an acceptable patch as determined by the Architect/Engineer. All patching determined by the Architect/Engineer to be unacceptable shall be corrected by personnel skilled and qualified in installing the material to be patched.
 - b. All patching shall be performed by personnel skilled in patching the substrate that has been disturbed. The subcontractor who performed the cutting shall be responsible to pay the appropriate personnel to install the patching material.
8. Cleaning: Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01740

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

- 1.1.1 Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this section.
- 1.1.2 Related work:
 - A. Documents affecting work of this section include but are not necessarily limited to General Conditions, Supplemental Conditions, and Sections in Division 1 of these Specifications.
 - B. In addition to standards described in this section, comply with requirements for cleaning as described in pertinent other sections of these Specifications.

1.02 QUALITY ASSURANCE

- 1.2.1 Conduct daily inspection and more often if necessary, to verify that requirements for cleanliness are being met.
- 1.2.2 In addition to the standards described in this section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

- 2.1.1 Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

- 2.2.1 Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

3.1.1 General

- A. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage and providing required protection of materials.
- B. Do not allow accumulation of scrap, debris, waste material and other items not required for construction of this work.

- C. At least twice each month and more often if necessary, completely remove all scrap, debris and waste material from the job site. Provide adequate storage for all items waiting removal from the job site, observing requirements for fire protection and protection of the ecology.

3.1.2 Site

- A. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
- B. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1.1A above.
- C. Maintain the site in a neat and orderly condition at all times.

3.02 FINAL CLEANING

- 3.2.1 "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- 3.2.2 Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in paragraph 3.1 above.
- 3.2.3 Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean work.

END OF SECTION

SECTION 01770

CONTRACT CLOSE-OUT PROCEDURES

PART 1 - GENERAL

1.01 DEFICIENCY LISTS

- A. During the construction of the work, the Construction Manager and/or Architect/Engineer shall inspect the work for conformance to the Contract Documents.
- B. Should an inspection reveal work that is not in conformance with the Contract Documents, and if the nature of the non-conformance warrants, at the sole discretion of the Construction Manager and/or Architect/Engineer, a written list of deficiencies will be issued.
- C. The "deficiency list" as hereinafter called, shall stipulate the item or items of work that are in non-conformance and shall specify a reasonable time for the deficient work to be brought into conformance with the Contract Documents.
- D. Upon receipt of the deficiency list the Contractor shall by any and all means at his disposal, endeavor to correct the work within the time stipulated. The Contractor shall notify the Construction Manager in writing when the work has been corrected and request an inspection.
- E. If the inspection reveals the deficiency has been corrected, then the deficiency list shall be rescinded.
- F. During the period that the deficiency list is in effect, the Construction Manager may, at his option, not authorize the payment of progress billings until the deficiency list is rescinded or, in the opinion of the Construction Manager, the Contractor is making a good faith effort to correct the deficiency.

1.02 PUNCH LISTS/FINAL INSPECTION

- A. When the Contractor determines that his work or portions of his work are sufficiently near completion to warrant a preliminary inspection, he shall request in writing to the Construction Manager a preliminary inspection.
- B. At a mutually agreeable time, the Construction Manager and Contractor shall conduct a preliminary inspection of the work for completeness and conformance of work. Any items noted as incomplete shall be listed on a preliminary punch list, a copy of which shall be forwarded to the Contractor for completion and correction.
- C. The Construction Manager shall establish a reasonable time period for the completion or correction of all items on the preliminary inspection punch list. At the end of this time period a pre-final inspection shall be conducted.
- D. The substantial completion inspection shall include the Architect/Engineer, Owner, Construction Manager and Contractor. The Contractor shall present to the Architect/Engineer a written list of all work incomplete, a reason why the item of work is incomplete and give a date when the work will be complete. The substantial completion

CONTRACT CLOSE-OUT PROCEDURES

inspection shall not be conducted unless the Contractor presents the list of incomplete items.

- E. Should the Architect/Engineer find any item of work to be unacceptable he shall prepare a punch list of those items. The Contractor shall complete all items on the list within fourteen (14) days of the inspection.
- F. At the conclusion of the substantial completion inspection and if the completeness of the work allows, the Architect/Engineer shall issue a Certificate of Substantial Completion after OSE issues the certificate of occupancy. Should the amount of incomplete work be such that a Certificate of Substantial Completion cannot be issued, another substantial completion inspection shall be scheduled.
- G. Upon completion of the substantial completion punch list and provided a Certificate of Substantial Completion has been issued, a final inspection shall be held with the Owner, Architect/Engineer, Construction Manager and Contractor. Provided the inspection reveals work to be complete and all punchlist items are corrected, the Architect/Engineer shall establish the date of substantial completion.

1.03 PROJECT CLOSE-OUT

A. Final Close-Out and Payment

- 1. The Contractor may make Application for Final Payment after the Certificate of Substantial Completion has been issued. The following items must be submitted to the Construction Manager prior to processing of the Final Application for Payment:
 - a. Affidavit of Payment of Debts and Claims, (AIA-G706);
 - b. Consent of Surety, (AIA-G707);
 - c. Release of Liens, (AIA-G706A) from: Contractors, Sub-Contractors, and Material Suppliers;
 - d. Letter on company letterhead stating all temporary facilities, services, debris and surplus materials have been removed;
 - e. Final "Project Record Documents" as specified in Section 01780, Project Record Documents;
 - f. Operations & Maintenance Manuals as specified in Section 01780, Project Record Documents;
 - g. Final "As Built" surveyor's drawings verifying dimensions noted on stake-out plan sheet;
 - h. Guarantees, Warranties, and Bonds as specified in Section 01780, Project Record Documents;
 - i. Spare parts and replacement items as required by the Specifications;
 - j. Letter on company letterhead stating no asbestos containing material has been installed in the project;
 - k. Certificate of Final Occupancy;
 - l. Demonstration and testing of equipment has been scheduled or is completed.
 - m. Property survey as required in Section 01720.
- 2. **No final payment application will be processed for payment until final inspection and final acceptance.**

CONTRACT CLOSE-OUT PROCEDURES

3. Close-out time encompasses a large amount of work during a short period of time. Therefore, the Contractor is encouraged to begin to submit close-out items as soon as possible so that the Contract may be completed, thus allowing the Architect/Engineer to recommend approval of the final payment to the Owner.
4. As per Article 9 of the Supplementary Conditions, the Construction Manager may continue to withhold no less than 5% retainage from the Contractor until all outstanding close-out materials are submitted to the Construction Manager. It shall be at the discretion of the Construction Manager, upon consultation with the Architect, to reduce the amount of retainage on a project by project basis, upon a favorable review of the status of completion of the final punch list, the status of close-out submittals, and above all, the total amount listed on the Release of Liens submitted by the Contractor for all Sub-Contractors and Material Suppliers contracted with by the General Contractor. At no time shall the retainage be reduced to an amount less than the total of the Release of Liens submitted by the Contractor. Final payment may then be made once all remaining outstanding close-out requirements are met.

1.04 RESPONSIBILITY

- A. It shall be the Contractor's responsibility to see that all requirements of this Section of the Specifications are executed and complete in a timely manner.
- B. No provisions of this section of the Specifications shall in any way relieve the Contractor of completing his work on time and in accordance with the Project Schedule.

END OF SECTION

CONTRACT CLOSE-OUT PROCEDURES

TECHNICAL SPECIFICATIONS

Civil

- 02068 Erosion and Sediment Control
- 02100 Clearing and Grubbing
- 02220 Excavation and Backfill
- 02250 Soil Treatment for Subterranean Termite Control
- 02465 Polyvinyl Chloride Pipe
- 02485 Valves, Hydrants, Backflow Preventers and Appurtenances

Electrical

- 16050 Basic Electrical Materials and Methods
- 16060 Grounding and Bonding
- 16140 Wiring Devices
- 16142 Electrical Connections for Equipment
- 16410 Enclosed Switches
- 16442 Panelboards
- 16510 Interior Lighting

Greenhouse

TECHNICAL SPECIFICATIONS

Civil

- 02068 Erosion and Sediment Control
- 02100 Clearing and Grubbing
- 02220 Excavation and Backfill
- 02250 Soil Treatment for Subterranean Termite Control
- 02465 Polyvinyl Chloride Pipe
- 02485 Valves, Hydrants, Backflow Preventers and Appurtenances

Electrical

- 16510 Interior Lighting
- 16442 Panelboards
- 16410 Enclosed Switches
- 16142 Electrical Connections for Equipment
- 16140 Wiring Devices
- 16060 Grounding and Bonding
- 16050 Basic Electrical Materials and Methods

Greenhouse

SECTION 02068

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY: Work outlined in this section includes:

- A. Installation of silt barriers such as silt fence, inlet protection, etc.
- B. Installation of temporary sediment traps and rock check dams.
- C. Seeding for the purpose of stabilization or erosion control.
- D. Installation of rip-rap, erosion control matting, and sod for slope stabilization.
- E. Removal of erosion control devices.

1.02 REFERENCED STANDARDS:

- A. South Carolina State Department of Transportation (SCDOT): Standard Specification for Highway Construction, 2007 Edition.
- B. South Carolina Code of Regulations, Chapter 72, Article 2 (Erosion & Sediment Reduction & Stormwater Management Regulations).
- C. Guide to Site Development and Best Management Practices for Storm Water Management and Sediment Control (SCLRCC).

1.03 SUBMITTALS: Proposed materials to be employed, for siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include a list of proposed materials including manufacturer's product data.

1.04 EROSION CONTROL PRINCIPLES: The following erosion control principles shall apply to the land grading and construction phases:

- A. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
- B. Whenever feasible, natural vegetation shall be retained and protected.
- C. Extent of area which is exposed and free of vegetation shall be kept within practical limits.
- D. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance.
- E. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
- F. Sediment shall be retained on-site.
- G. Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work.
- H. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two (2) weeks, and temporary erosion protection when erosion exposure period is expected to be less than two (2) weeks.
- I. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

EROSION AND SEDIMENT CONTROL

- J. Temporary erosion protection shall be accomplished by covering with erosion protection materials, as appropriate for prevailing conditions.
 - K. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical) cut slopes shall be limited to a grade of 1.5:1.
- 1.05 SECTION DESCRIPTION: Provide all equipment and materials, and do all work necessary to construct a complete erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

PART 2 – PRODUCTS

2.01 SILT FENCE

- A. Silt Fence: Silt fence shall consist of woven filter fabric attached to steel posts with wire or nylon ties. Fence shall be a minimum of two (2) ft. high measured from the ground surface, and shall have eight (8) inches of the woven fabric embedded in the ground per the details on the plans. The posts shall be five (5) feet long 1.25 lb per foot steel "T" section fence posts with stabilization plate spaced welded to the post near the bottom. Posts shall be installed at a maximum of six (6) feet apart. Filter fabric shall be selected from one of the products listed on SCDOT's Qualified Products List 34, or an approved equal.
- B. Silt fence shall be supported by steel posts, driven a minimum of 18 inches into the ground. Posts shall be spaced 6 feet o.c. maximum.
- C. Fencing other than that specified above shall be subject to review and acceptance by the Engineer.

- 2.02 SEEDING: Grass seed for temporary cover and permanent cover shall be previous year's crop. Not more than 0.5% by weight shall be weed seed and not more than 1.75% by weight crop seed. Seed shall be delivered to site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. Seed shall meet the requirements of SCDOT Standard Specifications for Seeding.

Seed shall conform to the following requirements:

- A. All seed must meet the requirements of the state seed laws including the labeling requirements for showing pure live seed, (PLS - purity x germination), name and type of seed.
- B. Seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project. Each variety of seed shall be furnished and delivered in separate bags or containers.
- C. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Architect/Engineer. The amount and type of seed planted per acre shall be as specified on the plans.
- D. All seed shall be treated with fungicide approved by the Engineer.
- E. Seed application rate shall conform to SCDOT Standard Specifications or at the rate specified on the plans, whichever is greater.
- F. Apply mulch to retain adequate moisture near the soil surface and assist with germination in accordance with SCDOT Standard Specifications.

- 2.03 RIP-RAP: Rip-rap shall consist of hard quarry of field stone and shall be of such quality that it will be resistant to exposure to the action of water and air. Stone shall consist of well graded mixture of 6 inches to 8 inches stone.
- 2.04 CHECK DAM: Check dams may be placed in swale and ditch sections to reduce velocities and erosion. Check dams shall consist of 12 inch or hand placed sized rip-rap. The Contractor shall place the stone at locations shown on the plans and in other areas as approved by the Engineer where erosion occurs. The check dams shall be cleaned and otherwise maintained by the Contractor on a regular basis.
- 2.05 SEDIMENT TUBES: Sediment tubes shall be a minimum of 10 feet long, 18 inches in diameter and shall conform to the material and installation requirements in SCDOT Standard Specifications including 80% Total Suspended Solids filtering efficiency performance measured per ASTM D5141 or ASTM D7351.

PART 3 – EXECUTION

- 3.01 SEEDING: Grass seed shall be spread by mechanical spreader at the specified rate. Following seeding, area shall be lightly raked to mingle seed with the top 1/8 to 1/4 inch of soil. Areas shall then be smoothed and rolled.
 - A. Following rolling, entire area shall be watered until equivalent of a 2 inch depth of water has been applied to entire seeded surface, at a rate which will not dislodge seed. Watering shall be repeated thereafter as frequently as required to prevent drying of surface, until grass attains an average height of 1-1/2 inch.
 - B. At the Contractor's option, seed may be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed and mulch shall be mixed and applied to achieve application quantities specified herein for the conventional seeding method, with mulch applied at the rate of 2700 lb. dry weight of mulch per acre. A mulching machine, acceptable to the Engineer, shall be equipped to eject the thoroughly wet mulch material at a uniform rate to provide the mulch coverage specified. Other provisions specified above for conventional seeding shall apply to hydroseeding.
 - C. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.
 - D. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be re-seeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.
- 3.02 SILT FENCE: Silt fence shall be constructed and installed as shown on the plans, prior to start of clearing and grubbing operations.
- 3.03 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES: Wetland areas, water courses, and drainage swales adjacent to construction activities shall be monitored weekly and after each rainfall event for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.
 - A. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.
- 3.04 EROSION CONTROL DEVICES
 - A. Sediment behind the erosion control device shall be checked twice each month and after each heavy rain. Silt shall be removed if greater than six (6) inches deep.
 - B. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

EROSION AND SEDIMENT CONTROL

- C. Sediment Tubes shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of tubes shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath tubes.
- D. Sediment deposits shall be disposed of off-site, in a location and manner which will not cause sediment nuisance elsewhere.

3.05 REMOVAL OF EROSION CONTROL DEVICES

- A. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be re-graded and seeded.
- B. Erosion protection material shall be kept securely anchored until acceptance of completed slope or entire project, whichever is later.

END OF SECTION

SECTION 02100

CLEARING AND GRUBBING

PART 1 – GENERAL

- 1.01 DESCRIPTION OF WORK: This work includes clearing, grubbing, removing, and disposing of all vegetation, debris, and obstructions within the construction limits or right-of-way except such objects as are designated to remain, or are to be otherwise removed in accordance with the Drawings or other sections of these Specifications. This work also includes the preservation from injury or defacement of all vegetation and objects designated to remain.

PART 2 – PRODUCTS Not applicable to this Section.

PART 3 – EXECUTION

- 3.01 CLEARING: Perform all clearing before other construction work in the same general area is started. This consists of clearing and removal from the site all trees, downed timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for fill material.
- A. Trees unavoidably falling outside the specified limits must be cut up, removed and disposed of in a satisfactory manner. In order to minimize damage to trees that are to be left standing, fell trees toward the center of area being cleared. Preserve and protect from injury all trees not required to be removed; prune and paint all trees damaged by clearing operation in a satisfactory manner as approved by the Landscape Architect.
 - B. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- 3.02 GRUBBING: Grub and remove from the site all stumps, roots, matted roots, buried logs, brush, grass, foundations, and other unsatisfactory materials. Grub out tap roots over 1-1/2 inches in diameter to a depth of at least 18 inches below the surface of the ground. Remove all spoil material from the site or burn as herein described.
- 3.03 REMOVAL OF SPOIL MATERIALS: Remove all spoil materials from the site or burn on the site (if permitted by local law and the Owner) in strict accordance with local laws and regulations. Place piles for burning either in the cleared area near the center or in adjacent open areas where no damage to trees, other vegetation, or other property will occur. The Contractor will be responsible for controlling fires in compliance with all federal, state, and local laws and regulations relative to building fires at the site. Remove, or dispose of in an acceptable manner, all ashes resulting from burning.
- 3.04 PROTECTION OF EXISTING IMPROVEMENTS: Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties as well as those on Owner's property or easement. Restore any improvements to their original condition, as acceptable to the Owner or other parties or authorities having jurisdiction.
- 3.05 RIGHT TO WOOD AND LOGS: All logs and other wood removed in the course of clearing shall become the property of the Contractor and be removed from the job site.
- 3.06 FENCES: Remove fences as required for completion of the work within the designated limits. Provide temporary fencing where necessary. Restore existing fences as soon as practicable and do not leave until the end of the construction period.

END OF SECTION
CLEARING AND GRUBBING
02100 - 1

SECTION 02220

EXCAVATION AND BACKFILL

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: The extent of excavation and backfill is limited to the areas of construction, and includes (but is not necessarily limited to) stockpiling of topsoil, site grading, excavation of trenches, filling, backfilling, compaction, finish grading, and spreading of topsoil. Perform all excavation, dewatering, sheeting, bracing, and backfilling in such a manner as to eliminate all possibility of undermining or disturbing the foundations of existing structures.
- 1.02 QUALITY ASSURANCE
- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown in report of In-Situ Bearing Capacity Verification for Shallow Foundations – Proposed Greenhouse, University of South Carolina – Horseshoe, Columbia, Richland County, SC, Project No. 13-1000-G, June 21, 2013.
1. ASTM D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. Rammer and 12 inch Drop.
 2. ASTM D 3282 Recommended Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
- 1.03 SOIL TESTING AND INSPECTION SERVICE: All compaction tests of all fill areas will be made by an independent testing laboratory as indicated in Section 01100. The independent testing laboratory shall be contracted directly with owner for their services, but coordination of all of their work shall be the responsibility of the contractor.
- 1.04 Rework any fill areas which fail to meet the compaction requirements as herein specified and perform this work at no additional cost to the Owner. Testing of fill areas will be provided by the Owner, except that tests which reveal nonconformance with the Specifications and all succeeding tests for the same area, until conformance with the Specifications is established, shall be at the expense of the Contractor.
- 1.05 JOB CONDITIONS
- A. Existing Utilities: Locate existing underground utilities in the areas of work. Verify all utility locations with authorities providing utilities and a utility location service. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions as to procedure. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility companies.
- C. Do not interrupt existing utilities serving facilities occupied and used by others, except when permitted in writing by the Owner, and then only after acceptable temporary utility services have been provided.
- D. Demolish, and completely remove from site, existing underground utilities that conflict with construction and are no longer active. Coordinate with utility companies for shut-off of services if lines are active.

- 1.06 TEMPORARY PROTECTION: Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- 1.07 SHEETING AND BRACING: Make all excavations in accordance with the rules and regulations promulgated by the Department of Labor, Occupational Safety and Health Administration, "Safety and Health Regulations for Construction." Furnish, put in place, and maintain such sheeting, bracing, etc., as may be necessary to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the width of the excavation to less than that necessary for proper construction, or could otherwise injure or delay the work, or endanger adjacent structures, roads, utilities, or other improvements.

PART 2 – PRODUCTS

2.01 DEFINITIONS

- A. Satisfactory Subgrade Soil Materials: Soils complying with ASTM D 3282, soil classification Groups A-1, A-2-4, A-2-5, and A-3.
- B. Unsatisfactory Subgrade Soil Materials: Soils described in ASTM D 3282, soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7; also peat and other highly organic soils, unless otherwise acceptable to the Engineer.
- C. Cohesionless Soil Materials: Gravels, sand-gravel mixtures, sands, and gravelly-sands.
- D. Cohesive Soil Materials: Clayey and silty gravels, sand-clay mixtures, gravel-silt mixtures, clayey and silty sands, sand-silt mixtures, clays, silts, and very fine sands.

2.02 SOIL MATERIALS

- A. Backfill And Fill Materials: Provide satisfactory soil materials for backfill and fill, free of masonry, rock, or gravel larger than 2 inches in any dimension, and free of metal, gypsum, lime, debris, waste, frozen materials, vegetable, and other deleterious matter. Use only excavated material that has been sampled, tested, and certified as satisfactory soil material.
- B. Topsoil: Provide a 3" thick layer of screened topsoil from offsite or stockpiled topsoil stripped from the site over all disturbed areas to be landscaped or grassed.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which excavating and backfilling is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.02 EXCAVATION: Excavation consists of the removal and disposal of all materials encountered for footings, foundations, pipework, and other construction as shown on the Drawings. Perform all excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- 3.03 STRIPPING: Remove all topsoil, vegetable matter, and organic materials over proposed excavations. The contractor shall stockpile the stripped materials that are suitable for reuse in areas selected by the owner.
- 3.04 TOPSOIL: Respread stripped topsoil to a depth of 3" over all landscape and grass areas. If suitable amounts of stripped topsoil are not present at the site, provide screened topsoil from an approved offsite location.
- 3.05 EXCAVATION CLASSIFICATION: All excavation will be performed as unclassified excavation and includes excavation to required subgrade elevations regardless of the character of material encountered with the exception of "Rock" as defined herein.

EXCAVATION AND BACKFILL

- A. Mass Rock Definition: Any material which cannot be ripped using a tracked dozer or similar equipment with a minimum draw force of 60,000 pounds pulling a single tooth ripper or excavated using a front end loader with a minimum bucket breakout force of 30,000 pounds should be considered mass rock.
 - B. Trench Rock Definition: Any material that cannot be excavated with a backhoe having a minimum bucket curling force of not less than 30,000 pounds fitted with rock teeth shall be considered trench rock.
 - C. Intermittent drilling, blasting, or ripping to increase production and not necessary to permit excavation of material encountered will be considered unclassified excavation.
- 3.06 SITE GRADING: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finish the surface within specified tolerances; compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- 3.07 GROUND SURFACE PREPARATION: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface. Shape the subgrade as indicated on the Drawings by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.
- 3.08 PLACEMENT AND COMPACTION: Place backfill and fill materials in layers not more than 6 inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to the required percentage of maximum density for each area classification. Do not place backfill or material on surfaces that are muddy, frozen, or contain frost or ice. Take care not to overcompact subsoils where pervious concrete is proposed.
- A. In areas not accessible to rollers or compactors, compact the fill with mechanical hand tampers. If the mixture is excessively moistened by rain, aerate the material by means of blade graders, harrows, or other approved equipment, until the moisture content of the mixture is satisfactory. Finish the surface of the layer by blading or rolling with a smooth roller, or a combination thereof, and leave the surface smooth and free from waves and inequalities.
 - B. Place backfill and fill materials evenly adjacent to structures, to the required elevations. Take care to prevent wedging action of backfill against structures. Carry the material uniformly around all parts of the structure to approximately the same elevation in each lift.
 - C. When existing ground surface has a density less than that specified under the subsection entitled COMPACTION for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- 3.09 GRADING OUTSIDE BUILDING LINES: Grade to drain away from structures to prevent ponding of water. Finish surfaces free from irregular surface changes.
- A. Planting Areas: Finish areas to receive topsoil to within not more than one inch above or below the required subgrade elevations, compacted as specified, and free from irregular surface changes.
 - B. Walks: Shape the surface of areas under walks to line, grade, and cross-section, with the finish surface not more than zero inches above or one inch below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.
 - C. Pavements: Shape the surface of the areas under pavement to line, grade and cross section, with finish surface not more than 1/2-inch above or below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.

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Include such operations as plowing, discing, and any moisture or aerating required to provide the optimum moisture content for compaction.

- D. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross section as shown on the Drawings.
- 3.10 GRADING SURFACE OF FILL UNDER BUILDING SLABS: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/4-inch when tested with a 10-foot straightedge.
- 3.11 PROTECTION OF GRADED AREAS: Protect newly graded areas from traffic and erosion, and keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- 3.12 RECONDITIONING COMPACTED AREAS: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather prior to acceptance of work, scarify surface, reshape, and compact to required density prior to further construction.
- 3.13 UNAUTHORIZED EXCAVATION: Unauthorized excavation consists of the removal of materials beyond indicated elevations without the specific direction of the Engineer. Under footings, foundations, bases, etc., fill unauthorized excavation by extending the indicated bottom elevation of the concrete to the bottom of the excavation, without altering the required top elevation. Lean concrete fill may be used to bring elevations to proper position only when acceptable to the Engineer. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by the Engineer.
- 3.14 DEWATERING: Prevent surface water and subsurface or ground water from flowing into excavated areas by using berms or drainage ditches. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Dispose of all water pumped or drained from the work in a suitable manner without undue interference with other work, damage to pavements, other surfaces or property. Provide suitable temporary pipes, flumes or channels for water which may flow along or across the site of the work.
- 3.15 MATERIAL STORAGE: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - A. Locate and retain soil materials away from edge of excavations.
- 3.16 EXCAVATION FOR STRUCTURES: Conform to elevations and dimensions shown within a tolerance of plus or minus one inch, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction required, and for inspection.
 - A. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete. Final footing excavations should not be allowed to remain open overnight without covering unless permitted by Engineer.
- 3.17 BACKFILL AROUND STRUCTURES: Unless otherwise specified or indicated on the Drawings, use suitable material for backfill which was removed in the course of making the construction excavations. Do not use frozen material for the backfill and do not place backfill upon frozen material. Remove previously frozen material before new backfill is placed.
 - A. Material: Approved selected materials available from the excavations may be used for backfilling around structures. Obtain material needed in addition to that of construction

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excavations from approved banks or other approved deposits. Furnish all borrow material needed on the work. Place and compact all material, whether from the excavation or borrow, to make a dense, stable fill. Use fill material which contains no vegetation, masses of roots, individual roots over 18 inches long or more than 1/2-inch in diameter, stones over 2 inches in diameter, or porous matter. Organic matter must not exceed minor quantities.

- B. Placing Backfill: Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. Make special leakage tests, if required, as soon as practicable after the structures are structurally adequate and other necessary work has been done. Use the best of the excavated materials in backfilling within 2 feet of the structure. Avoid unequal soil pressures by depositing the material evenly around the structure.
- C. Place fill and backfill in layers not more than 6 inches thick, except as specified otherwise herein, and compact each layer evenly to the specified density. Do not backfill against concrete without Engineer's approval.

3.18 TRENCH EXCAVATION: Perform all excavation of every description and of whatever substance encountered so that pipe can be laid to the alignment and depth shown on the Drawings.

- A. Brace and shore all trenches, where required, in accordance with the rules and regulations, promulgated by the Department of Labor, Occupational Safety and Health Administration, "Safety and Health Regulations for Construction".
- B. Make all excavations by open cut unless otherwise specified or indicated on the Drawings.
- C. Width Of Trenches: Excavate trenches sufficiently wide to allow proper installation of pipe, fittings and other materials and not more than 12 inches clear of pipe on either side at any point. Do not widen trenches by scraping or loosening materials from the sides. Where supports, and sheeting and bracing are required, trench may be of extra width so as to permit the placing of the trench supporting material.
- D. Trench Excavation In Earth: Earth excavation includes all excavation of whatever substance encountered. In locations where pipe is to be bedded in earth excavated trenches, fine grade the bottoms of such trenches to allow firm bearing for the bottom of the pipe on undisturbed earth. Where any part of the trench has been excavated below the grade of the pipe, fill the part excavated below such grade with pipe bedding material and compact at the Contractor's expense.
- E. Trench Excavation In Fill: If pipe is to be laid in embankments or other recently filled material, first place the fill material to the finish grade or to a height of at least one foot above the top of the pipe, whichever is the lesser. Take particular care to ensure maximum consolidation of material under the pipe location. Excavate the pipe trench as though in undisturbed material.
- F. Trench Bottom In Poor Soil: Excavate and remove unstable or unsuitable soil to a width and depth, as directed by the Engineer, and refill with a thoroughly compacted gravel bedding.
- G. Bell Holes: Provide bell holes at each joint to permit the joint to be made properly and to provide a continuous bearing and support for the pipe.

3.19 TRENCH BACKFILL: Unless otherwise specified or indicated on the Drawings, use suitable material for backfill which was removed in the course of making the construction excavations. Do not use frozen material for the backfill and do not place backfill on frozen material. Remove previously frozen material before new backfill is placed. Start backfilling as soon as practicable after the pipes have been laid, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, and proceed until its completion.

- A. With the exception mentioned below in this paragraph, do not backfill trenches at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights, and barricades, and the obstruction of traffic, he may, at his own risk, backfill the entire trench as soon as practicable after installation of pipe, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
 - B. Materials: The nature of the materials will govern both their acceptability for backfill and the methods best suited for their placement and compaction in the backfill. Both are subject to the approval of the Engineer. Do not place stone or rock fragments larger than 2 inches in greatest dimension in the backfill. Do not drop large masses of backfill material into the trench in such a manner as to endanger the pipe line. Use a timber grillage to break the fall of material dropped from a height of more than 5 feet. Exclude pieces of bituminous pavement from the backfill unless their use is expressly permitted.
 - C. Zone Around Pipe: Place bedding material to the level shown on the Drawings and work material carefully around the pipe to ensure that all voids are filled, particularly in bell holes. For backfill up to a level of 2 feet over the top of the pipe, use only selected materials containing no rock, clods or organic materials. Place the backfill and compact thoroughly under the pipe haunches and up to the mid-line of the pipe in layers not exceeding 6 inches in depth. Place each layer and tamp carefully and uniformly so as to eliminate the possibility of lateral displacement. Place and compact the remainder of the zone around the pipe and to a height of one foot above the pipe in layers not exceeding 6 inches and compact to a maximum density of at least 100 percent as determined by ASTM D 698.
 - D. Tamping: Deposit and spread backfill materials in uniform, parallel layers not exceeding 12 inches thick before compaction. Tamp each layer before the next layer is placed to obtain a thoroughly compacted mass. Furnish and use, if necessary, an adequate number of power driven tampers, each weighing at least 20 pounds for this purpose. Take care that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling and compacting as furnished by the Contractor.
 - E. Wet the material by sprinkling, if necessary, to ensure proper compaction by tamping (or rolling). Perform no compaction by tamping (or rolling) when the material is too wet either from rain or applied water to be compacted properly.
- 3.20 TRENCH COMPACTION: Compact backfill in pipe trenches to the maximum density as shown on the Drawings, or as listed in the subsection entitled COMPACTION, with a moisture content within the range of values of maximum density as indicated by the moisture-density relationship curve.
- A. Compaction: Control soil compaction during construction providing at least the minimum percentage of density specified for each area classification.
 - B. Percentage Of Maximum Density Requirements: After compaction, all fill will be tested in accordance with Method "C" of ASTM D 698, unless specified otherwise. Except as noted otherwise for the zone around pipe, provide not less than the following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material-in-place:
 - 1. Structure Foundations: Top 12" - 100%; Remainder-95%.

2. Under Building Slabs: Top 12" - 100%; Remainder-95%.
 3. Unpaved Areas: Compact Full Depth To 95%.
 4. Trench Backfill (Unpaved Areas): Compact Full Depth To 95%.
 5. All Other Backfill: Top 24"- 100%; Remainder - 95%.
- C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests.
- D. Disposal Of Surplus Material: Upon approval of the Engineer, haul all surplus materials not needed or acceptable for backfill and legally dispose of offsite.

3.21 EXCAVATION NEAR EXISTING UTILITIES AND STRUCTURES

- A. Existing Utilities: Attention is directed to the fact that there are pipes, drains, and other utilities in locations adjacent to the proposed work. Where information is available as to the location of existing pipes, drains, and other utilities, the approximate locations have been indicated on the Drawings; however, the completeness or accuracy of the information given is not guaranteed.
- B. As the excavation approaches pipes, conduits, or other underground structures, discontinue digging by machinery and excavate by means of hand tools, as directed. Such manual excavation, when incidental to normal excavation, is included in the work to be done under items involving normal excavation.
- C. Where determination of the exact location of a pipe or other underground structure is necessary for doing the work properly, the Contractor may be required to excavate test pits to determine such locations. When such test pits may be properly considered as incidental to other excavation, the work is understood to be included as a part of the excavation.
- D. Existing Structures: Support and protect from damage all existing pipes, poles, wires, fences, guard rails, curbing, catch basins, manholes, property line markers, and other structures which do not require temporary or permanent relocation.
- E. Restore or replace damaged items, without compensation, to the condition in which they were found immediately before the work under this project was begun.
- F. Fences: Remove fences which interfere with the Contractor's operation and (unless otherwise specified) later restore them to a condition at least as good as that in which they were found immediately before the work was begun, all without additional compensation. Restore fences as promptly as possible and do not leave until the end of the construction period.
- G. Property Markers: Replace property line markers which are disturbed or removed. Have this work performed by a Registered Land Surveyor.
- H. Care And Restoration Of Property: Enclose the trunks of trees which are to remain adjacent to the work with substantial wooden boxes of such height as may be necessary to protect them from piled material, equipment or equipment operation. Use excavating machinery and cranes of suitable type and operate the equipment with care to prevent injury to remaining tree trunks, roots, branches and limbs.

- I. Do not cut branches, limbs, and roots except by permission of the Engineer. Cut smoothly and neatly without splitting or crushing. In case of cutting or unavoidable injury to branches, limbs, and trunks of trees, neatly trim the cut or injured portions and cover with an application of grafting wax or tree healing paint as directed.
- J. Protect by suitable means all cultivated hedges, shrubs and plants which might be injured by the Contractor's operations. Promptly heel in any such trees or shrubbery necessary to be removed and replanted. Perform heeling in and replanting under the direction of a licensed and experienced nurseryman. Replant in their original position all removed shrubbery and trees after construction operations have been substantially completed and care for until growth is reestablished.
- K. Replace cultivated hedges, shrubs, and plants injured to such a degree as to affect their growth or diminish their beauty or usefulness, by items of kind and quality at least equal to the kind and quality existing at the start of the work.
- L. Do not operate tractors, bulldozers or other power-operated equipment on paved surfaces if the treads or wheels of the equipment are so shaped as to cut or otherwise injure the surfaces.
- M. Restore all surfaces, including lawns, grassed, and planted areas which have been injured by the Contractor's operations, to a condition at least equal to that in which they were found immediately before the work was begun. Use suitable materials and methods for such restoration. Maintain all restored plantings by cutting, trimming, fertilizing, etc., until acceptance. Restore existing property or structures as promptly as practicable and do not leave until the end of construction period.
- N. Protection Of Streams: Exercise reasonable precaution to prevent the silting of streams. Provide at Contractor's expense temporary erosion and sediment control measures to prevent the silting of streams and existing drainage facilities.

3.22 EROSION CONTROL

- A. General: Exercise precaution to prevent the erosion of disturbed surfaces. Provide temporary erosion and sediment control measures to prevent the silting of existing drainage facilities.
- B. Air Pollution: Comply with all pollution control rules, regulations, ordinances, and statutes which apply to any work performed under the Contract, including any air pollution control rules, regulations, ordinances and statutes, or any municipal regulations pertaining to air pollution.
- C. During the progress of the work, maintain the area of activity, including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride or more effective dust control, furnish and spread the material, as directed, and without additional compensation.
- D. Bridging Trenches: Provide suitable and safe bridges and other crossings where required for the accommodation of travel; provide access to private property during construction, and remove said structures thereafter.
- E. Bridge or backfill trenches in any portion of the travel lanes of public or private roads, or drives, at the end of each day's operation to provide for safe travel. No additional compensation will be made for this work.
- F. Respreading Topsoil: This work consists of preparing the ground surface for topsoil application and removing topsoil from stockpile and placing and spreading the topsoil on smooth, graded areas in accordance with these Specifications.

- G. Supply topsoil reasonably free from subsoil, clay lumps, stones, or other similar objects larger than 2 inches in greatest diameter, brush, stumps, roots, objectionable weeds or litter, excess acid or alkali, or any other material or substance which may be harmful to plant growth or a hindrance to subsequent smooth grading, planting, and maintenance operations.
- H. Inventory topsoil requirements with the landscape subcontractor. Evaluate amount of topsoil needed and locations needed. Respread topsoil on all excavated areas and areas damaged by the work after coordinating with the landscape subcontractor. Clear the surface of the areas to be topsoiled of all stones larger than 4 inches in greatest dimension and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, and the proper growth of the desired planting. Maintain the grades on the areas to be top-soiled in a true and even condition. Where grades have not been established, smooth grade the area and leave the surface at the prescribed grades in an even and properly compacted condition, which insofar as practical will prevent the formation of low places or pockets where water will stand.
- I. Dump the topsoil in separate piles uniformly distributed in planting and seed areas so that when spread it will give a 4-inch depth of topsoil over the graded area. Leave in place the piles of topsoil on any given area until it has been determined that the requirements of the Specifications have been met and spreading has been authorized by the Engineer. Evenly spread the topsoil over the areas by a blade grader or other equipment. Spread in such a manner that grassing operations can proceed with a minimum of soil preparation or tilling. Correct any irregularities in the surface, resulting from topsoiling or other operations, insofar as practical to prevent the formation of low places and pockets where water will stand. Do not place topsoil when it or the ground surface is frozen, excessively wet, or in a condition otherwise unsatisfactory for preparation of planting surfaces or smooth grading operations.
- J. After the topsoil has been spread and the area smoothed to the specified grades, clear the surface of all stones, roots, other objects larger than 2 inches in greatest diameter, and of all wire, brush or other objects that may interfere with subsequent planting or maintenance operations. Remove promptly any topsoil or other dirt which may be brought upon concrete or pavement as a result of hauling of topsoil.

END OF SECTION

SECTION 02250

SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: Provide soil treatment for subterranean termite control including the earth fill of floor slabs on grade, crawl spaces, along exterior foundation walls, at entrances and soil base under paving, walkways, and sidewalks which abut exterior walls.
- 1.02 QUALITY ASSURANCE: In addition to the requirements of these specifications, comply with manufacturer's instructions and recommendations for the work, including preparation of substrate and application.
- 1.03 CONTRACTOR LICENSE AND CERTIFICATION REQUIREMENTS: Engage a professional pest control applicator who is licensed by the applicable state agency responsible for enforcing the Federal Insecticide, Fungicide, and Rodenticide Act as amended (FIFRA), in the category required for performance of this contract. All pesticide applications shall be made by a certified applicator.
- 1.04 WARRANTY: The Contractor shall warrant for 5 years, each building unit treated, guaranteeing pretreatment of any subsequent subterranean termite infestation, and that any structural damage due to subterranean termite infestation shall be repaired at no additional cost to the Owner. The warranty shall be covered by an insurance policy issued by a bona fide insurance company. The form of insurance coverage will be subject to the approval of the Owner.
- 1.05 ENVIRONMENTAL AND SAFETY CONDITIONS: Formulation, treatment, storage and disposal of pesticide shall be in accordance with label directions. Water for formulating shall be drawn only from a site(s) designated by the Owner, and the filling hose shall be fitted with a backflow preventer meeting local plumbing codes/standards. The filling operation shall be under the direction and continuous observation of a Contractor's representative to prevent overflow.
- 1.06 SUBMITTALS
 - A. Product Data; Soil Treatment For Termite Control: Submit 2 copies of manufacturer's technical data and application instructions to the Engineer.
 - B. Warranty: Furnish 2 copies of written guarantee certifying that the applied soil poisoning treatment will prevent the infestation of subterranean termites and, that if subterranean termite activity is discovered during the guarantee period, the Contractor will re-treat the soil and also repair or replace damage caused by termite infestation.
 - C. Provide guarantee for a period of 5 years from date of treatment, signed by the Applicator and the Contractor.
- 1.07 DELIVERY AND STORAGE
 - A. General: Deliver pesticide to the project site in original or transport/service containers bearing original labels or reasonable facsimiles thereof.

PART 2 – PRODUCTS

- 2.01 MATERIALS: Provide pesticides which are registered with the Environmental Protection Agency (EPA), or are State registered with EPA approval for use as specified herein. The pesticides shall be water-based emulsions.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which soil treatment for subterranean termite control will be applied and notify the Engineer in writing of conditions detrimental to the proper

SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 APPLICATION

- A. General: At the time of soil treatment application, the soil shall be preferably in a friable condition with low moisture content to allow uniform distribution of the treatment solution throughout the soil. Do not apply pesticide during or immediately following heavy rains, or when conditions will cause runoff and create an environmental hazard. Cover treated area with waterproof sheeting if concrete is not poured on the same day as the soil treatment. Take precautions to prevent disturbance of the pesticide barrier. Before the placement of structural components, retreat where soil or fill is disturbed after treatment. Apply pesticide prior to placement of the vapor barrier or waterproof membrane.
- B. Slab On Grade Construction: Establish a horizontal pesticide barrier over areas intended for covering by floors, porches, attached entryways, garages, carports, and terraces. Apply treatment solution with a low pressure coarse spray at the rate of one gallon per 10 square feet of earth fill. Apply at the rate of 1-1/2 gallons per 10 square feet if the fill is washed gravel or other coarse material. Establish a vertical pesticide barrier under slab in critical areas such as inside of foundation walls, both sides of interior partition walls, around plumbing and utility conduits. Apply treatment by rodding or rodding and trenching the fill at the rate of 4 gallons per 10 linear feet, and one foot deep. Make pesticide band at least 6 inches wide with the pesticide evenly distributed throughout. Treat buildings constructed with basement slabs in the same manner.
- C. Foundation Walls: Establish vertical pesticide barriers along the outside of foundation walls and in voids located within the foundation walls. Apply termite treatment solution with low pressure coarse spray to voids within foundation walls at the rate of 2 gallons per 10 linear feet of wall. When the foundation wall consists of more than one row of masonry units with voids, including the void created by a brick veneer, treat each row of masonry units with voids at the rate of 2 gallons per 10 linear feet. Treat outer foundation wall after grading has been completed. Apply treatment solution to fill along the outside perimeter of foundation walls, beneath entrance platforms, porches, and garages, and similar locations, by trenching or rodding and trenching at the rate of 4 gallons per 10 linear feet of wall per each foot of depth down to the top of the footing; for example, a footing 3 feet deep would require 12 gallons of solution per 10 linear feet. Make band of treated fill at least 6 inches wide with the solution evenly distributed from grade level to the footing.
- D. Signs: Post signs in the areas of application warning workers that soil poisoning has been applied. Remove signs when areas are covered by other construction.
- E. Reapplication: Reapply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

END OF SECTION

SECTION 02465

POLYVINYL CHLORIDE GRAVITY PIPE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. General: Requirements of the General and Supplemental Conditions apply to all Work in this Section. Provide all labor, materials, equipment, and services indicated on the Drawings, or specified herein, or reasonably necessary for or incidental to a complete job.

1.02 DESCRIPTION OF WORK

- A. General: The work includes the installation and testing of all polyvinyl chloride (PVC) gravity pipe and fittings shown on the Drawings.

1.03 QUALITY ASSURANCE

- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown or specified.

1. ASTM D 1598 Test Method for Time-To-Failure of Plastic Pipe Under Constant Internal Pressure
2. ASTM D 1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
3. ASTM D 2321 Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
4. ASTM D 3034 Specification for Type PSM SDR 35 Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
5. ASTM D 3212 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

- 1.04 GENERAL: 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.)

- 1.05 MANUFACTURER'S QUALIFICATIONS: Only the products of a manufacturer regularly engaged in the manufacture of pipe used for the conveyance of sewage will be acceptable.

- 1.06 INSPECTION AND ACCEPTANCE OF PIPE: Acceptance will be on the basis of design, material tests, and inspection of the complete product. The quality of all materials used in the pipe, the process of manufacture, and the finished pipe shall be subject to inspection by the Engineer. Inspection may be made at the place of manufacture, or on the job site after delivery, or at both places and the pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though sample pipe units may have been accepted as satisfactory at the place of manufacture. All pipe which is rejected must be immediately removed from the project site by the Contractor.

1.07 SUBMITTALS

- A. Manufacturer's Certificate; Pipe And Fittings: Submit manufacturer's certificate indicating that the pipe and fittings have been inspected and tested at the place of manufacture in accordance with ASTM D 3034, as amended to date. Each certification so furnished shall be signed by an authorized agent of the manufacturer.
- B. Shop Drawings; Joint Gaskets: Submit shop drawings for all joint gaskets.

PART 2 - PRODUCTS

- 2.01 PVC PIPE: Provide PVC pipe with a standard dimension ratio of 21 under the building and to a point 5 feet outside the building. Provide PVC pipe with a standard dimension ratio of 35 more than 5 feet outside the building; comply with the requirements of ASTM D 3034 under the classification for DR 35 pipe, as amended to date.
- 2.02 PIPE LENGTHS: Provide pipe not exceeding 12-1/2 feet laying length.
- 2.03 PVC PIPE JOINTS: Provide gasket integral bell end pipe joints utilizing elastomeric gasket coupler. Rubber gaskets shall comply with the physical requirements specified in the latest revision of ASTM F 477, as amended to date. Joints shall meet the requirements specified in ASTM D 3212, as amended to date. The joint must provide protection of the line from shock, vibration and earth movement, and must compensate for the expansion and contraction of pipe lengths. The use of solvent cement joints will not be acceptable.
- 2.04 FITTINGS: Provide bell type push-on PVC fittings meeting the physical and chemical requirements of ASTM D 1598 and ASTM D 1599.
- 2.05 BEDDING MATERIAL: Comply with the requirements of ASTM D 2321, Class III Embedment Material.

PART 3 – EXECUTION

3.01 INSPECTION

- A. General: Examine the areas and conditions under which the pipe is to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner. Prior to backfilling the trenches notify the engineer for an inspection of the pipes and installation. **DO NOT BACKFILL THE TRENCHES UNTIL THE ENGINEER HAS INSPECTED THE PIPES AND INSTALLATION.**

3.02 EXCAVATION

- A. General: Excavate trenches in accordance with Section 02220, EXCAVATION AND BACKFILL.

3.03 PIPE HANDLING

- A. General: Transport pipe to the job site and handle in such a manner as not to damage the pipe.
- B. Stockpiling: Stockpile pipe on the site so that no dangerous conditions will exist to life or property. Store pipe so that damage to surfaces and/or structures will be prevented. Provide suitable devices to support pipe when it is lifted.
- C. Cover pipe which is stored outside and exposed to prolonged periods of sunlight (more than one month) with an opaque material. Clear plastic will not be acceptable as a cover. Provide air circulation under covering. Provide supports under pipe which are spaced to prevent the pipe from bending during storage.

3.04 PIPE INSTALLATION

- A. General: Install pipe in accordance with ASTM D 2321. Adhere to the rules, regulations, and requirements of OSHA, Occupational Safety and Health Act.
- B. Precautions: Lay pipe in dry trenches only. Keep all trenches completely free of water during bedding, laying, and jointing of pipe. Dewater and use sheeting where required by field conditions. Pump or drain all water away from the work and dispose of in a suitable manner so that no damage occurs outside the construction easement. Do not permit water to rise in an unbackfilled trench after pipe has been placed. Promptly repair any damage within the construction easement.
- C. Pipe Lengths: Lay pipe in length not exceeding 12-1/2 feet.

- D. Placing Pipe In Trench: After delivery alongside the trench, visibly inspect each length of pipe for marking, damaged surfaces, breakage, and conformance to specifications. Acceptable pipe may be marked with paint or other permanent marking material so that the marks are plainly visible after installation in the trench and before pipe is covered. Reject, stockpile, and remove from the site all pipe not conforming to Specifications.
1. Before pipe is placed on the bedding material, excavate suitable bell holes so that after placement of the pipe, only the barrel receives bearing pressure from the supporting material. Support the entire length of the unit. Protect pipe during handling against impact shocks and free falls. Do not permit hooks to come in contact with premolded joint surfaces.
 2. Handle pipe having premolded joint rings or attached couplings so that no weight, including the weight of the pipe itself, will bear on or be supported by the jointing material. Take care to avoid dragging the spigot ring on the ground or allowing it to be damaged by contact with gravel, crushed stone, or other hard objects. Do not subject the bell and spigot sections to direct stress of any kind except that required to effect the jointing.
- E. Pipe Laying: Unless otherwise shown on the Drawings, lay all pipe in open trench construction. Lay pipe to conform to the lines and grades indicated on the Drawings unless otherwise directed by the Engineer in writing. Comply with the requirements of ASTM D 2321.
1. Immediately after the pipe units are put together, inspect the position of the gasket in the joint to make sure it is properly positioned. Pull apart and remake all joints, using new gaskets, if the gasket has become damaged or improperly positioned. Make all joints in accordance with manufacturer's recommendations. Prior to backfill, fill bell holes with bedding material and compact so that the spigot will not move the bell of the adjoining pipe under backfill load. Do not permanently support pipe on saddles, blocking, or boulders.
 2. Push-On Type Jointing: Perform the jointing of push-on type pipe in accordance with manufacturer's recommendations.
 3. Temporary Plugs: At all times when pipe laying is not actually in progress, close the open end of pipe by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, do not remove the plug until all danger of earth or other material entering the pipe has passed.
 4. Backfill (Sewer Pipe): When pipe has been properly bedded and jointed, notify the engineer for an inspection of the pipe and installation prior to backfilling the trenches. Backfill trenches in accordance with Section 02220, EXCAVATION AND BACKFILL. Provide embedment material complying with ASTM D 2321, Class II or III, for a minimum of 6 inches above the pipe.
 5. Ten States Standards: The horizontal and vertical separation of sewer lines and water mains must be in accordance with the "Ten States Standards".
 6. Horizontal Separation: Whenever possible, sewers should be laid at least 10 feet, horizontally, from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if:
 - a. It is laid in a separate trench.
 - b. It is laid in the same trench with the water mains located at one side on a bench of undisturbed earth.
 - c. In either case, the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.

7. Vertical Separation: Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation, or reconstructed with slipon or mechanical joint cast iron pipe, asbestos-cement pressure pipe or prestressed concrete cylinder pipe for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

3.05 TESTING

- A. Testing: Test PVC gravity sewer lines for leakage in accordance with Section 02493, AIR TESTING PIPELINES.
- B. Repairs: Repair and retest, at Contractor's expense, any section of pipe failing to meet the leakage test. Perform repairs with capable personnel and with sound materials equal to those materials used in the manufacture of the pipe.
- C. Deflection Test: The maximum allowable pipe deflection is 5 percent. The Owner may elect to have any or all of the completed sewers tested to determine adherence to the deflection requirement. Check deflection with a pin-type "GO/NO GO" gauge. The Contractor shall be responsible for performing all deflection tests as may be required by the Owner.
- D. Remove and replace all pipe failing to meet the deflection test.

END OF SECTION

SECTION 02485

VALVES, HYDRANTS, BACKFLOW PREVENTERS AND APPURTENANCES

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: This section covers valve boxes, valve pits, hydrants and all necessary appurtenances generally associated with buried piping located outside of major structures and vaults as shown on the Drawings and as specified herein.
- 1.02 QUALITY ASSURANCE
- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provision of the following codes and standards, except as otherwise indicated.
 - 1. ASTM B 584 Specification for Copper Alloy Sand Castings for General Applications
 - 2. AWWA C500 Standard for Gate Valves, 3 Inches Through 48 Inches NPS for Water & Sewage Systems.
- 1.03 SUBMITTALS
- A. Manufacturer's Certification; Valves, Backflow Preventers: For information only, submit manufacturer's notarized certification that valves and backflow preventers furnished for this project are in full compliance with the Referenced Standards and these specifications. All valves and backflow preventers must be AWWA approved.

PART 2 - PRODUCTS

- 2.01 BACKFLOW PREVENTERS: Unless otherwise noted on the Drawings, provide backflow preventers which meet ASSE standard, of size indicated for maximum flow rate and minimum pressure loss and rated for 150 psig minimum working pressure except where indicated or required by regulatory authorities.
- A. Standard Of Quality: Manufacturers offering products that may be incorporated into the work, subject to requirements of South Carolina Department of Health and Environmental Control (SCDHEC) and utility company, agencies and municipalities having jurisdiction for potable water system, include, but are not limited to the following:
 - 1. Hersey Products, Inc., Grinell Corp.
 - 2. Watts Regulator Co.
 - 3. Wilkins Regulator Div., Zurn Industries, Inc.
 - B. Listing And Labeling: Provide equipment that are listing/approval stamp, label or other marking on equipment made to specified standards.
 - C. Testing: Backflow Preventers shall be tested and perform satisfactorily after installation by certified tester according to SCDHEC requirements.
- 2.02 GATE VALVES: Unless otherwise noted on the Drawings, provide gate valves which are mechanical joint, manually operated, inside screw, iron body, bronze mounted, double disc parallel seat type, and rated for 200 psi working pressure and 400 psi hydrostatic test pressure. Provide cut-in valves which are as described above, with mechanical joint ends that allow the valves to be installed on different classes of ductile iron pipe. Provide PVC ends for valves in PVC lines.
- A. Standard Of Quality: Manufacturers offering products complying with the requirements for gate valves include (but are not necessarily limited to) the following:
 - 1. American Darling Valves Birmingham, AL

2. Dresser Manufacturing Division Anniston, AL
 3. Mueller Company Decatur, IL
 4. Stockham Valves and Fittings Birmingham, AL
 - B. Casting Markings: Cast integral with either the bonnet or the body, the size of the valve, the manufacturer's identification, the year of manufacture, and the maximum water working pressure.
 - C. Painting: Coat all ferrous parts of the gate valves, except finished or bearing surfaces, with 2 coats of coal-tar varnish pipe dip or other approved material. After the valves are assembled and tested, apply a third coat to the exterior.
 - D. Testing: Test each gate valve at the manufacturer's plant for performance in watertightness and resistance to distortion under internal pressure. Subject each valve to hydrostatic tests under pressure at the water working pressure cast on the valve and at 400 psi.
 1. First, test the valve at the highest pressure by applying the hydrostatic pressure between the discs. Valves showing leakage through the metal or flanged joints will not be acceptable.
 2. Second, test the valve at the working pressure applied between the discs. Valves showing leakage through the metal or flanged joints, or showing leakage past either seat exceeding one fluid ounce per hour per inch of nominal valve size, will not be acceptable.
 - E. Opening Directions: Furnish valves which are opened by turning the wrench nut to the left (counterclockwise).
- 2.03 STEM: Furnish stems of manganese bronze with threads accurately cut to gauge. Conform to ASTM B 584, Alloy A.
- 2.04 OPERATING NUT: Conform to AWWA C500.
- 2.05 STUFFING BOX: Use an "O" ring and conform to AWWA C500.
- 2.06 VALVE BOXES: Unless otherwise noted, provide a cast iron valve box with drop type cover for all buried gate valves, including bypass valves. The valve box must be suitable for traffic loading. Do not rest the valve box base on the flanged joints of the valve bonnet.
- A. For valves 10 inches in diameter and smaller and for gear operated valves with enclosed gear case, provide two-piece, screw type, 5-1/4 inch shaft valve box with bell bottom.
 - B. For valves 12 inches in diameter and larger, provide three-piece, screw type, 5-1/4 inch shaft valve box with oval base.
 - C. Cast the word "WATER" or "SEWER", whichever is applicable in raised letters on the valve box cover. Coat boxes with approved asphalt.
- 2.07 VALVE WRENCHES: Provide two T-handle wrenches to permit operation of all buried gate valves with square operating nuts regardless of depth. The T-handle must project not less than 2'-0", nor more than 4'-6" above surrounding grade when operating valve operator.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which valves, backflow preventers, hydrants and appurtenances are to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.02 INSTALLATION: Install valves and appurtenances to the same specification which covers the piping to which these items are connected. Install backflow preventers of type, size and capacity indicated. Include valves and test cocks. Install according to SCDHEC and City of Columbia regulations. Construct pits of poured-in-place concrete or provide precast concrete pits of sufficient size for

installation, dismantling and servicing without disturbing the box or as required by regulatory authorities. Include sleeves with waterproof mechanical sleeve seals for pipe entry and exit. Support backflow preventers on 3000-psi minimum, portland-cement-mix concrete piers.

3.03 RECORD DRAWINGS

- A. Contractor to provide "Record drawing" of all water mains and appurtenances that meet the following requirements:
 - 1. All structures including bends to be referenced by field survey. Digital survey file to be provided to Engineer for preparation of Water Record Drawings to City of Columbia.
 - 2. Survey Drawing to be certified by a Registered Land Surveyor.
 - 3. Drawing to be provided for ample time for Engineer, City of Columbia and SCDHEC to conduct final inspections for Permits to Operate. Survey file needed approximately 2 months prior to needing permanent water service.

END OF SECTION

SECTION 02068

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY: Work outlined in this section includes:

- A. Installation of silt barriers such as silt fence, inlet protection, etc.
- B. Installation of temporary sediment traps and rock check dams.
- C. Seeding for the purpose of stabilization or erosion control.
- D. Installation of rip-rap, erosion control matting, and sod for slope stabilization.
- E. Removal of erosion control devices.

1.02 REFERENCED STANDARDS:

- A. South Carolina State Department of Transportation (SCDOT): Standard Specification for Highway Construction, 2007 Edition.
- B. South Carolina Code of Regulations, Chapter 72, Article 2 (Erosion & Sediment Reduction & Stormwater Management Regulations).
- C. Guide to Site Development and Best Management Practices for Storm Water Management and Sediment Control (SCLRCC).

1.03 SUBMITTALS: Proposed materials to be employed, for siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include a list of proposed materials including manufacturer's product data.

1.04 EROSION CONTROL PRINCIPLES: The following erosion control principles shall apply to the land grading and construction phases:

- A. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
- B. Whenever feasible, natural vegetation shall be retained and protected.
- C. Extent of area which is exposed and free of vegetation shall be kept within practical limits.
- D. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance.
- E. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
- F. Sediment shall be retained on-site.
- G. Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work.
- H. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two (2) weeks, and temporary erosion protection when erosion exposure period is expected to be less than two (2) weeks.
- I. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

EROSION AND SEDIMENT CONTROL

- J. Temporary erosion protection shall be accomplished by covering with erosion protection materials, as appropriate for prevailing conditions.
 - K. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical) cut slopes shall be limited to a grade of 1.5:1.
- 1.05 SECTION DESCRIPTION: Provide all equipment and materials, and do all work necessary to construct a complete erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

PART 2 – PRODUCTS

2.01 SILT FENCE

- A. Silt Fence: Silt fence shall consist of woven filter fabric attached to steel posts with wire or nylon ties. Fence shall be a minimum of two (2) ft. high measured from the ground surface, and shall have eight (8) inches of the woven fabric embedded in the ground per the details on the plans. The posts shall be five (5) feet long 1.25 lb per foot steel "T" section fence posts with stabilization plate spaced welded to the post near the bottom. Posts shall be installed at a maximum of six (6) feet apart. Filter fabric shall be selected from one of the products listed on SCDOT's Qualified Products List 34, or an approved equal:
- B. Silt fence shall be supported by steel posts, driven a minimum of 18 inches into the ground. Posts shall be spaced 6 feet. o.c. maximum.
- C. Fencing other than that specified above shall be subject to review and acceptance by the Engineer.

- 2.02 SEEDING: Grass seed for temporary cover and permanent cover shall be previous year's crop. Not more than 0.5% by weight shall be weed seed and not more than 1.75% by weight crop seed. Seed shall be delivered to site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. Seed shall meet the requirements of SCDOT Standard Specifications for Seeding.

Seed shall conform to the following requirements:

- A. All seed must meet the requirements of the state seed laws including the labeling requirements for showing pure live seed, (PLS - purity x germination), name and type of seed.
- B. Seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project. Each variety of seed shall be furnished and delivered in separate bags or containers.
- C. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Architect/Engineer. The amount and type of seed planted per acre shall be as specified on the plans.
- D. All seed shall be treated with fungicide approved by the Engineer.
- E. Seed application rate shall conform to SCDOT Standard Specifications or at the rate specified on the plans, whichever is greater.
- F. Apply mulch to retain adequate moisture near the soil surface and assist with germination in accordance with SCDOT Standard Specifications.

- 2.03 RIP-RAP: Rip-rap shall consist of hard quarry of field stone and shall be of such quality that it will be resistant to exposure to the action of water and air. Stone shall consist of well graded mixture of 6 inches to 8 inches stone.
- 2.04 CHECK DAM: Check dams may be placed in swale and ditch sections to reduce velocities and erosion. Check dams shall consist of 12 inch or hand placed sized rip-rap. The Contractor shall place the stone at locations shown on the plans and in other areas as approved by the Engineer where erosion occurs. The check dams shall be cleaned and otherwise maintained by the Contractor on a regular basis.
- 2.05 SEDIMENT TUBES: Sediment tubes shall be a minimum of 10 feet long, 18 inches in diameter and shall conform to the material and installation requirements in SCDOT Standard Specifications including 80% Total Suspended Solids filtering efficiency performance measured per ASTM D5141 or ASTM D7351.

PART 3 – EXECUTION

- 3.01 SEEDING: Grass seed shall be spread by mechanical spreader at the specified rate. Following seeding, area shall be lightly raked to mingle seed with the top 1/8 to 1/4 inch of soil. Areas shall then be smoothed and rolled.
 - A. Following rolling, entire area shall be watered until equivalent of a 2 inch depth of water has been applied to entire seeded surface, at a rate which will not dislodge seed. Watering shall be repeated thereafter as frequently as required to prevent drying of surface, until grass attains an average height of 1-1/2 inch.
 - B. At the Contractor's option, seed may be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed and mulch shall be mixed and applied to achieve application quantities specified herein for the conventional seeding method, with mulch applied at the rate of 2700 lb. dry weight of mulch per acre. A mulching machine, acceptable to the Engineer, shall be equipped to eject the thoroughly wet mulch material at a uniform rate to provide the mulch coverage specified. Other provisions specified above for conventional seeding shall apply to hydroseeding.
 - C. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.
 - D. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be re-seeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.
- 3.02 SILT FENCE: Silt fence shall be constructed and installed as shown on the plans, prior to start of clearing and grubbing operations.
- 3.03 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES: Wetland areas, water courses, and drainage swales adjacent to construction activities shall be monitored weekly and after each rainfall event for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.
 - A. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.
- 3.04 EROSION CONTROL DEVICES
 - A. Sediment behind the erosion control device shall be checked twice each month and after each heavy rain. Silt shall be removed if greater than six (6) inches deep.
 - B. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

EROSION AND SEDIMENT CONTROL

- C. Sediment Tubes shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of tubes shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath tubes.
- D. Sediment deposits shall be disposed of off-site, in a location and manner which will not cause sediment nuisance elsewhere.

3.05 REMOVAL OF EROSION CONTROL DEVICES

- A. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be re-graded and seeded.
- B. Erosion protection material shall be kept securely anchored until acceptance of completed slope or entire project, whichever is later.

END OF SECTION

SECTION 02100

CLEARING AND GRUBBING

PART 1 – GENERAL

- 1.01 **DESCRIPTION OF WORK:** This work includes clearing, grubbing, removing, and disposing of all vegetation, debris, and obstructions within the construction limits or right-of-way except such objects as are designated to remain, or are to be otherwise removed in accordance with the Drawings or other sections of these Specifications. This work also includes the preservation from injury or defacement of all vegetation and objects designated to remain.

PART 2 – PRODUCTS Not applicable to this Section.

PART 3 – EXECUTION

- 3.01 **CLEARING:** Perform all clearing before other construction work in the same general area is started. This consists of clearing and removal from the site all trees, downed timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for fill material.
- A. Trees unavoidably falling outside the specified limits must be cut up, removed and disposed of in a satisfactory manner. In order to minimize damage to trees that are to be left standing, fell trees toward the center of area being cleared. Preserve and protect from injury all trees not required to be removed; prune and paint all trees damaged by clearing operation in a satisfactory manner as approved by the Landscape Architect.
 - B. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- 3.02 **GRUBBING:** Grub and remove from the site all stumps, roots, matted roots, buried logs, brush, grass, foundations, and other unsatisfactory materials. Grub out tap roots over 1-1/2 inches in diameter to a depth of at least 18 inches below the surface of the ground. Remove all spoil material from the site or burn as herein described.
- 3.03 **REMOVAL OF SPOIL MATERIALS:** Remove all spoil materials from the site or burn on the site (if permitted by local law and the Owner) in strict accordance with local laws and regulations. Place piles for burning either in the cleared area near the center or in adjacent open areas where no damage to trees, other vegetation, or other property will occur. The Contractor will be responsible for controlling fires in compliance with all federal, state, and local laws and regulations relative to building fires at the site. Remove, or dispose of in an acceptable manner, all ashes resulting from burning.
- 3.04 **PROTECTION OF EXISTING IMPROVEMENTS:** Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties as well as those on Owner's property or easement. Restore any improvements to their original condition, as acceptable to the Owner or other parties or authorities having jurisdiction.
- 3.05 **RIGHT TO WOOD AND LOGS:** All logs and other wood removed in the course of clearing shall become the property of the Contractor and be removed from the job site.
- 3.06 **FENCES:** Remove fences as required for completion of the work within the designated limits. Provide temporary fencing where necessary. Restore existing fences as soon as practicable and do not leave until the end of the construction period.

END OF SECTION
CLEARING AND GRUBBING
02100 - 1

SECTION 02220

EXCAVATION AND BACKFILL

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: The extent of excavation and backfill is limited to the areas of construction, and includes (but is not necessarily limited to) stockpiling of topsoil, site grading, excavation of trenches, filling, backfilling, compaction, finish grading, and spreading of topsoil. Perform all excavation, dewatering, sheeting, bracing, and backfilling in such a manner as to eliminate all possibility of undermining or disturbing the foundations of existing structures.
- 1.02 QUALITY ASSURANCE
- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown in report of In-Situ Bearing Capacity Verification for Shallow Foundations – Proposed Greenhouse, University of South Carolina – Horseshoe, Columbia, Richland County, SC, Project No. 13-1000-G, June 21, 2013.
1. ASTM D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. Rammer and 12 inch Drop.
 2. ASTM D 3282 Recommended Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
- 1.03 SOIL TESTING AND INSPECTION SERVICE: All compaction tests of all fill areas will be made by an independent testing laboratory as indicated in Section 01100. The independent testing laboratory shall be contracted directly with owner for their services, but coordination of all of their work shall be the responsibility of the contractor.
- 1.04 Rework any fill areas which fail to meet the compaction requirements as herein specified and perform this work at no additional cost to the Owner. Testing of fill areas will be provided by the Owner, except that tests which reveal nonconformance with the Specifications and all succeeding tests for the same area, until conformance with the Specifications is established, shall be at the expense of the Contractor.
- 1.05 JOB CONDITIONS
- A. Existing Utilities: Locate existing underground utilities in the areas of work. Verify all utility locations with authorities providing utilities and a utility location service. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions as to procedure. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility companies.
- C. Do not interrupt existing utilities serving facilities occupied and used by others, except when permitted in writing by the Owner, and then only after acceptable temporary utility services have been provided.
- D. Demolish, and completely remove from site, existing underground utilities that conflict with construction and are no longer active. Coordinate with utility companies for shut-off of services if lines are active.

EXCAVATION AND BACKFILL

- 1.06 TEMPORARY PROTECTION: Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- 1.07 SHEETING AND BRACING: Make all excavations in accordance with the rules and regulations promulgated by the Department of Labor, Occupational Safety and Health Administration, "Safety and Health Regulations for Construction." Furnish, put in place, and maintain such sheeting, bracing, etc., as may be necessary to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the width of the excavation to less than that necessary for proper construction, or could otherwise injure or delay the work, or endanger adjacent structures, roads, utilities, or other improvements.

PART 2 – PRODUCTS

2.01 DEFINITIONS

- A. Satisfactory Subgrade Soil Materials: Soils complying with ASTM D 3282, soil classification Groups A-1, A-2-4, A-2-5, and A-3.
- B. Unsatisfactory Subgrade Soil Materials: Soils described in ASTM D 3282, soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7; also peat and other highly organic soils, unless otherwise acceptable to the Engineer.
- C. Cohesionless Soil Materials: Gravels, sand-gravel mixtures, sands, and gravelly-sands.
- D. Cohesive Soil Materials: Clayey and silty gravels, sand-clay mixtures, gravel-silt mixtures, clayey and silty sands, sand-silt mixtures, clays, silts, and very fine sands.

2.02 SOIL MATERIALS

- A. Backfill And Fill Materials: Provide satisfactory soil materials for backfill and fill, free of masonry, rock, or gravel larger than 2 inches in any dimension, and free of metal, gypsum, lime, debris, waste, frozen materials, vegetable, and other deleterious matter. Use only excavated material that has been sampled, tested, and certified as satisfactory soil material.
- B. Topsoil: Provide a 3" thick layer of screened topsoil from offsite or stockpiled topsoil stripped from the site over all disturbed areas to be landscaped or grassed.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which excavating and backfilling is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.02 EXCAVATION: Excavation consists of the removal and disposal of all materials encountered for footings, foundations, pipework, and other construction as shown on the Drawings. Perform all excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- 3.03 STRIPPING: Remove all topsoil, vegetable matter, and organic materials over proposed excavations. The contractor shall stockpile the stripped materials that are suitable for reuse in areas selected by the owner.
- 3.04 TOPSOIL: Respread stripped topsoil to a depth of 3" over all landscape and grass areas. If suitable amounts of stripped topsoil are not present at the site, provide screened topsoil from an approved offsite location.
- 3.05 EXCAVATION CLASSIFICATION: All excavation will be performed as unclassified excavation and includes excavation to required subgrade elevations regardless of the character of material encountered with the exception of "Rock" as defined herein.

EXCAVATION AND BACKFILL

- A. Mass Rock Definition: Any material which cannot be ripped using a tracked dozer or similar equipment with a minimum draw force of 60,000 pounds pulling a single tooth ripper or excavated using a front end loader with a minimum bucket breakout force of 30,000 pounds should be considered mass rock.
 - B. Trench Rock Definition: Any material that cannot be excavated with a backhoe having a minimum bucket curling force of not less than 30,000 pounds fitted with rock teeth shall be considered trench rock.
 - C. Intermittent drilling, blasting, or ripping to increase production and not necessary to permit excavation of material encountered will be considered unclassified excavation.
- 3.06 SITE GRADING: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finish the surface within specified tolerances; compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- 3.07 GROUND SURFACE PREPARATION: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface. Shape the subgrade as indicated on the Drawings by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.
- 3.08 PLACEMENT AND COMPACTION: Place backfill and fill materials in layers not more than 6 inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to the required percentage of maximum density for each area classification. Do not place backfill or material on surfaces that are muddy, frozen, or contain frost or ice. Take care not to overcompact subsoils where pervious concrete is proposed.
- A. In areas not accessible to rollers or compactors, compact the fill with mechanical hand tampers. If the mixture is excessively moistened by rain, aerate the material by means of blade graders, harrows, or other approved equipment, until the moisture content of the mixture is satisfactory. Finish the surface of the layer by blading or rolling with a smooth roller, or a combination thereof, and leave the surface smooth and free from waves and inequalities.
 - B. Place backfill and fill materials evenly adjacent to structures, to the required elevations. Take care to prevent wedging action of backfill against structures. Carry the material uniformly around all parts of the structure to approximately the same elevation in each lift.
 - C. When existing ground surface has a density less than that specified under the subsection entitled COMPACTION for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- 3.09 GRADING OUTSIDE BUILDING LINES: Grade to drain away from structures to prevent ponding of water. Finish surfaces free from irregular surface changes.
- A. Planting Areas: Finish areas to receive topsoil to within not more than one inch above or below the required subgrade elevations, compacted as specified, and free from irregular surface changes.
 - B. Walks: Shape the surface of areas under walks to line, grade, and cross-section, with the finish surface not more than zero inches above or one inch below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.
 - C. Pavements: Shape the surface of the areas under pavement to line, grade and cross section, with finish surface not more than 1/2-inch above or below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.

EXCAVATION AND BACKFILL

Include such operations as plowing, discing, and any moisture or aerating required to provide the optimum moisture content for compaction.

- D. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross section as shown on the Drawings.
- 3.10 GRADING SURFACE OF FILL UNDER BUILDING SLABS: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/4-inch when tested with a 10-foot straightedge.
- 3.11 PROTECTION OF GRADED AREAS: Protect newly graded areas from traffic and erosion, and keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- 3.12 RECONDITIONING COMPACTED AREAS: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather prior to acceptance of work, scarify surface, reshape, and compact to required density prior to further construction.
- 3.13 UNAUTHORIZED EXCAVATION: Unauthorized excavation consists of the removal of materials beyond indicated elevations without the specific direction of the Engineer. Under footings, foundations, bases, etc., fill unauthorized excavation by extending the indicated bottom elevation of the concrete to the bottom of the excavation, without altering the required top elevation. Lean concrete fill may be used to bring elevations to proper position only when acceptable to the Engineer. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by the Engineer.
- 3.14 DEWATERING: Prevent surface water and subsurface or ground water from flowing into excavated areas by using berms or drainage ditches. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Dispose of all water pumped or drained from the work in a suitable manner without undue interference with other work, damage to pavements, other surfaces or property. Provide suitable temporary pipes, flumes or channels for water which may flow along or across the site of the work.
- 3.15 MATERIAL STORAGE: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - A. Locate and retain soil materials away from edge of excavations.
- 3.16 EXCAVATION FOR STRUCTURES: Conform to elevations and dimensions shown within a tolerance of plus or minus one inch, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction required, and for inspection.
 - A. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete. Final footing excavations should not be allowed to remain open overnight without covering unless permitted by Engineer.
- 3.17 BACKFILL AROUND STRUCTURES: Unless otherwise specified or indicated on the Drawings, use suitable material for backfill which was removed in the course of making the construction excavations. Do not use frozen material for the backfill and do not place backfill upon frozen material. Remove previously frozen material before new backfill is placed.
 - A. Material: Approved selected materials available from the excavations may be used for backfilling around structures. Obtain material needed in addition to that of construction

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excavations from approved banks or other approved deposits. Furnish all borrow material needed on the work. Place and compact all material, whether from the excavation or borrow, to make a dense, stable fill. Use fill material which contains no vegetation, masses of roots, individual roots over 18 inches long or more than 1/2-inch in diameter, stones over 2 inches in diameter, or porous matter. Organic matter must not exceed minor quantities.

- B. Placing Backfill: Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. Make special leakage tests, if required, as soon as practicable after the structures are structurally adequate and other necessary work has been done. Use the best of the excavated materials in backfilling within 2 feet of the structure. Avoid unequal soil pressures by depositing the material evenly around the structure.
 - C. Place fill and backfill in layers not more than 6 inches thick, except as specified otherwise herein, and compact each layer evenly to the specified density. Do not backfill against concrete without Engineer's approval.
- 3.18 TRENCH EXCAVATION: Perform all excavation of every description and of whatever substance encountered so that pipe can be laid to the alignment and depth shown on the Drawings.
- A. Brace and shore all trenches, where required, in accordance with the rules and regulations, promulgated by the Department of Labor, Occupational Safety and Health Administration, "Safety and Health Regulations for Construction".
 - B. Make all excavations by open cut unless otherwise specified or indicated on the Drawings.
 - C. Width Of Trenches: Excavate trenches sufficiently wide to allow proper installation of pipe, fittings and other materials and not more than 12 inches clear of pipe on either side at any point. Do not widen trenches by scraping or loosening materials from the sides. Where supports, and sheeting and bracing are required, trench may be of extra width so as to permit the placing of the trench supporting material.
 - D. Trench Excavation In Earth: Earth excavation includes all excavation of whatever substance encountered. In locations where pipe is to be bedded in earth excavated trenches, fine grade the bottoms of such trenches to allow firm bearing for the bottom of the pipe on undisturbed earth. Where any part of the trench has been excavated below the grade of the pipe, fill the part excavated below such grade with pipe bedding material and compact at the Contractor's expense.
 - E. Trench Excavation In Fill: If pipe is to be laid in embankments or other recently filled material, first place the fill material to the finish grade or to a height of at least one foot above the top of the pipe, whichever is the lesser. Take particular care to ensure maximum consolidation of material under the pipe location. Excavate the pipe trench as though in undisturbed material.
 - F. Trench Bottom In Poor Soil: Excavate and remove unstable or unsuitable soil to a width and depth, as directed by the Engineer, and refill with a thoroughly compacted gravel bedding.
 - G. Bell Holes: Provide bell holes at each joint to permit the joint to be made properly and to provide a continuous bearing and support for the pipe.
- 3.19 TRENCH BACKFILL: Unless otherwise specified or indicated on the Drawings, use suitable material for backfill which was removed in the course of making the construction excavations. Do not use frozen material for the backfill and do not place backfill on frozen material. Remove previously frozen material before new backfill is placed. Start backfilling as soon as practicable after the pipes have been laid, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, and proceed until its completion.

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- A. With the exception mentioned below in this paragraph, do not backfill trenches at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights, and barricades, and the obstruction of traffic, he may, at his own risk, backfill the entire trench as soon as practicable after installation of pipe, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
 - B. Materials: The nature of the materials will govern both their acceptability for backfill and the methods best suited for their placement and compaction in the backfill. Both are subject to the approval of the Engineer. Do not place stone or rock fragments larger than 2 inches in greatest dimension in the backfill. Do not drop large masses of backfill material into the trench in such a manner as to endanger the pipe line. Use a timber grillage to break the fall of material dropped from a height of more than 5 feet. Exclude pieces of bituminous pavement from the backfill unless their use is expressly permitted.
 - C. Zone Around Pipe: Place bedding material to the level shown on the Drawings and work material carefully around the pipe to ensure that all voids are filled, particularly in bell holes. For backfill up to a level of 2 feet over the top of the pipe, use only selected materials containing no rock, clods or organic materials. Place the backfill and compact thoroughly under the pipe haunches and up to the mid-line of the pipe in layers not exceeding 6 inches in depth. Place each layer and tamp carefully and uniformly so as to eliminate the possibility of lateral displacement. Place and compact the remainder of the zone around the pipe and to a height of one foot above the pipe in layers not exceeding 6 inches and compact to a maximum density of at least 100 percent as determined by ASTM D 698.
 - D. Tamping: Deposit and spread backfill materials in uniform, parallel layers not exceeding 12 inches thick before compaction. Tamp each layer before the next layer is placed to obtain a thoroughly compacted mass. Furnish and use, if necessary, an adequate number of power driven tampers, each weighing at least 20 pounds for this purpose. Take care that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling and compacting as furnished by the Contractor.
 - E. Wet the material by sprinkling, if necessary, to ensure proper compaction by tamping (or rolling). Perform no compaction by tamping (or rolling) when the material is too wet either from rain or applied water to be compacted properly.
- 3.20 TRENCH COMPACTION: Compact backfill in pipe trenches to the maximum density as shown on the Drawings, or as listed in the subsection entitled COMPACTION, with a moisture content within the range of values of maximum density as indicated by the moisture-density relationship curve.
- A. Compaction: Control soil compaction during construction providing at least the minimum percentage of density specified for each area classification.
 - B. Percentage Of Maximum Density Requirements: After compaction, all fill will be tested in accordance with Method "C" of ASTM D 698, unless specified otherwise. Except as noted otherwise for the zone around pipe, provide not less than the following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material-in-place:
 - 1. Structure Foundations: Top 12" - 100%; Remainder-95%.

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2. Under Building Slabs: Top 12" - 100%; Remainder-95%.
 3. Unpaved Areas: Compact Full Depth To 95%.
 4. Trench Backfill (Unpaved Areas): Compact Full Depth To 95%.
 5. All Other Backfill: Top 24"- 100%; Remainder - 95%.
- C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests.
- D. Disposal Of Surplus Material: Upon approval of the Engineer, haul all surplus materials not needed or acceptable for backfill and legally dispose of offsite.

3.21 EXCAVATION NEAR EXISTING UTILITIES AND STRUCTURES

- A. Existing Utilities: Attention is directed to the fact that there are pipes, drains, and other utilities in locations adjacent to the proposed work. Where information is available as to the location of existing pipes, drains, and other utilities, the approximate locations have been indicated on the Drawings; however, the completeness or accuracy of the information given is not guaranteed.
- B. As the excavation approaches pipes, conduits, or other underground structures, discontinue digging by machinery and excavate by means of hand tools, as directed. Such manual excavation, when incidental to normal excavation, is included in the work to be done under items involving normal excavation.
- C. Where determination of the exact location of a pipe or other underground structure is necessary for doing the work properly, the Contractor may be required to excavate test pits to determine such locations. When such test pits may be properly considered as incidental to other excavation, the work is understood to be included as a part of the excavation.
- D. Existing Structures: Support and protect from damage all existing pipes, poles, wires, fences, guard rails, curbing, catch basins, manholes, property line markers, and other structures which do not require temporary or permanent relocation.
- E. Restore or replace damaged items, without compensation, to the condition in which they were found immediately before the work under this project was begun.
- F. Fences: Remove fences which interfere with the Contractor's operation and (unless otherwise specified) later restore them to a condition at least as good as that in which they were found immediately before the work was begun, all without additional compensation. Restore fences as promptly as possible and do not leave until the end of the construction period.
- G. Property Markers: Replace property line markers which are disturbed or removed. Have this work performed by a Registered Land Surveyor.
- H. Care And Restoration Of Property: Enclose the trunks of trees which are to remain adjacent to the work with substantial wooden boxes of such height as may be necessary to protect them from piled material, equipment or equipment operation. Use excavating machinery and cranes of suitable type and operate the equipment with care to prevent injury to remaining tree trunks, roots, branches and limbs.

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- I. Do not cut branches, limbs, and roots except by permission of the Engineer. Cut smoothly and neatly without splitting or crushing. In case of cutting or unavoidable injury to branches, limbs, and trunks of trees, neatly trim the cut or injured portions and cover with an application of grafting wax or tree healing paint as directed.
- J. Protect by suitable means all cultivated hedges, shrubs and plants which might be injured by the Contractor's operations. Promptly heel in any such trees or shrubbery necessary to be removed and replanted. Perform heeling in and replanting under the direction of a licensed and experienced nurseryman. Replant in their original position all removed shrubbery and trees after construction operations have been substantially completed and care for until growth is reestablished.
- K. Replace cultivated hedges, shrubs, and plants injured to such a degree as to affect their growth or diminish their beauty or usefulness, by items of kind and quality at least equal to the kind and quality existing at the start of the work.
- L. Do not operate tractors, bulldozers or other power-operated equipment on paved surfaces if the treads or wheels of the equipment are so shaped as to cut or otherwise injure the surfaces.
- M. Restore all surfaces, including lawns, grassed, and planted areas which have been injured by the Contractor's operations, to a condition at least equal to that in which they were found immediately before the work was begun. Use suitable materials and methods for such restoration. Maintain all restored plantings by cutting, trimming, fertilizing, etc., until acceptance. Restore existing property or structures as promptly as practicable and do not leave until the end of construction period.
- N. Protection Of Streams: Exercise reasonable precaution to prevent the silting of streams. Provide at Contractor's expense temporary erosion and sediment control measures to prevent the silting of streams and existing drainage facilities.

3.22 EROSION CONTROL

- A. General: Exercise precaution to prevent the erosion of disturbed surfaces. Provide temporary erosion and sediment control measures to prevent the silting of existing drainage facilities.
- B. Air Pollution: Comply with all pollution control rules, regulations, ordinances, and statutes which apply to any work performed under the Contract, including any air pollution control rules, regulations, ordinances and statutes, or any municipal regulations pertaining to air pollution.
- C. During the progress of the work, maintain the area of activity, including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride or more effective dust control, furnish and spread the material, as directed, and without additional compensation.
- D. Bridging Trenches: Provide suitable and safe bridges and other crossings where required for the accommodation of travel; provide access to private property during construction, and remove said structures thereafter.
- E. Bridge or backfill trenches in any portion of the travel lanes of public or private roads, or drives, at the end of each day's operation to provide for safe travel. No additional compensation will be made for this work.
- F. Respreading Topsoil: This work consists of preparing the ground surface for topsoil application and removing topsoil from stockpile and placing and spreading the topsoil on smooth, graded areas in accordance with these Specifications.

EXCAVATION AND BACKFILL

- G. Supply topsoil reasonably free from subsoil, clay lumps, stones, or other similar objects larger than 2 inches in greatest diameter, brush, stumps, roots, objectionable weeds or litter, excess acid or alkali, or any other material or substance which may be harmful to plant growth or a hindrance to subsequent smooth grading, planting, and maintenance operations.
- H. Inventory topsoil requirements with the landscape subcontractor. Evaluate amount of topsoil needed and locations needed. Respread topsoil on all excavated areas and areas damaged by the work after coordinating with the landscape subcontractor. Clear the surface of the areas to be topsoiled of all stones larger than 4 inches in greatest dimension and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, and the proper growth of the desired planting. Maintain the grades on the areas to be top-soiled in a true and even condition. Where grades have not been established, smooth grade the area and leave the surface at the prescribed grades in an even and properly compacted condition, which insofar as practical will prevent the formation of low places or pockets where water will stand.
- I. Dump the topsoil in separate piles uniformly distributed in planting and seed areas so that when spread it will give a 4-inch depth of topsoil over the graded area. Leave in place the piles of topsoil on any given area until it has been determined that the requirements of the Specifications have been met and spreading has been authorized by the Engineer. Evenly spread the topsoil over the areas by a blade grader or other equipment. Spread in such a manner that grassing operations can proceed with a minimum of soil preparation or tilling. Correct any irregularities in the surface, resulting from topsoiling or other operations, insofar as practical to prevent the formation of low places and pockets where water will stand. Do not place topsoil when it or the ground surface is frozen, excessively wet, or in a condition otherwise unsatisfactory for preparation of planting surfaces or smooth grading operations.
- J. After the topsoil has been spread and the area smoothed to the specified grades, clear the surface of all stones, roots, other objects larger than 2 inches in greatest diameter, and of all wire, brush or other objects that may interfere with subsequent planting or maintenance operations. Remove promptly any topsoil or other dirt which may be brought upon concrete or pavement as a result of hauling of topsoil.

END OF SECTION

SECTION 02250

SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: Provide soil treatment for subterranean termite control including the earth fill of floor slabs on grade, crawl spaces, along exterior foundation walls, at entrances and soil base under paving, walkways, and sidewalks which abut exterior walls.
- 1.02 QUALITY ASSURANCE: In addition to the requirements of these specifications, comply with manufacturer's instructions and recommendations for the work, including preparation of substrate and application.
- 1.03 CONTRACTOR LICENSE AND CERTIFICATION REQUIREMENTS: Engage a professional pest control applicator who is licensed by the applicable state agency responsible for enforcing the Federal Insecticide, Fungicide, and Rodenticide Act as amended (FIFRA), in the category required for performance of this contract. All pesticide applications shall be made by a certified applicator.
- 1.04 WARRANTY: The Contractor shall warrant for 5 years, each building unit treated, guaranteeing pretreatment of any subsequent subterranean termite infestation, and that any structural damage due to subterranean termite infestation shall be repaired at no additional cost to the Owner. The warranty shall be covered by an insurance policy issued by a bona fide insurance company. The form of insurance coverage will be subject to the approval of the Owner.
- 1.05 ENVIRONMENTAL AND SAFETY CONDITIONS: Formulation, treatment, storage and disposal of pesticide shall be in accordance with label directions. Water for formulating shall be drawn only from a site(s) designated by the Owner, and the filling hose shall be fitted with a backflow preventer meeting local plumbing codes/standards. The filling operation shall be under the direction and continuous observation of a Contractor's representative to prevent overflow.
- 1.06 SUBMITTALS
 - A. Product Data; Soil Treatment For Termite Control: Submit 2 copies of manufacturer's technical data and application instructions to the Engineer.
 - B. Warranty: Furnish 2 copies of written guarantee certifying that the applied soil poisoning treatment will prevent the infestation of subterranean termites and, that if subterranean termite activity is discovered during the guarantee period, the Contractor will re-treat the soil and also repair or replace damage caused by termite infestation.
 - C. Provide guarantee for a period of 5 years from date of treatment, signed by the Applicator and the Contractor.
- 1.07 DELIVERY AND STORAGE
 - A. General: Deliver pesticide to the project site in original or transport/service containers bearing original labels or reasonable facsimiles thereof.

PART 2 – PRODUCTS

- 2.01 MATERIALS: Provide pesticides which are registered with the Environmental Protection Agency (EPA), or are State registered with EPA approval for use as specified herein. The pesticides shall be water-based emulsions.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which soil treatment for subterranean termite control will be applied and notify the Engineer in writing of conditions detrimental to the proper

SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 APPLICATION

- A. General: At the time of soil treatment application, the soil shall be preferably in a friable condition with low moisture content to allow uniform distribution of the treatment solution throughout the soil. Do not apply pesticide during or immediately following heavy rains, or when conditions will cause runoff and create an environmental hazard. Cover treated area with waterproof sheeting if concrete is not poured on the same day as the soil treatment. Take precautions to prevent disturbance of the pesticide barrier. Before the placement of structural components, retreat where soil or fill is disturbed after treatment. Apply pesticide prior to placement of the vapor barrier or waterproof membrane.
- B. Slab On Grade Construction: Establish a horizontal pesticide barrier over areas intended for covering by floors, porches, attached entryways, garages, carports, and terraces. Apply treatment solution with a low pressure coarse spray at the rate of one gallon per 10 square feet of earth fill. Apply at the rate of 1-1/2 gallons per 10 square feet if the fill is washed gravel or other coarse material. Establish a vertical pesticide barrier under slab in critical areas such as inside of foundation walls, both sides of interior partition walls, around plumbing and utility conduits. Apply treatment by rodding or rodding and trenching the fill at the rate of 4 gallons per 10 linear feet, and one foot deep. Make pesticide band at least 6 inches wide with the pesticide evenly distributed throughout. Treat buildings constructed with basement slabs in the same manner.
- C. Foundation Walls: Establish vertical pesticide barriers along the outside of foundation walls and in voids located within the foundation walls. Apply termite treatment solution with low pressure coarse spray to voids within foundation walls at the rate of 2 gallons per 10 linear feet of wall. When the foundation wall consists of more than one row of masonry units with voids, including the void created by a brick veneer, treat each row of masonry units with voids at the rate of 2 gallons per 10 linear feet. Treat outer foundation wall after grading has been completed. Apply treatment solution to fill along the outside perimeter of foundation walls, beneath entrance platforms, porches, and garages, and similar locations, by trenching or rodding and trenching at the rate of 4 gallons per 10 linear feet of wall per each foot of depth down to the top of the footing; for example, a footing 3 feet deep would require 12 gallons of solution per 10 linear feet. Make band of treated fill at least 6 inches wide with the solution evenly distributed from grade level to the footing.
- D. Signs: Post signs in the areas of application warning workers that soil poisoning has been applied. Remove signs when areas are covered by other construction.
- E. Reapplication: Reapply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

END OF SECTION

SECTION 02465

POLYVINYL CHLORIDE GRAVITY PIPE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. General: Requirements of the General and Supplemental Conditions apply to all Work in this Section. Provide all labor, materials, equipment, and services indicated on the Drawings, or specified herein, or reasonably necessary for or incidental to a complete job.

1.02 DESCRIPTION OF WORK

- A. General: The work includes the installation and testing of all polyvinyl chloride (PVC) gravity pipe and fittings shown on the Drawings.

1.03 QUALITY ASSURANCE

- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown or specified.

1. ASTM D 1598 Test Method for Time-To-Failure of Plastic Pipe Under Constant Internal Pressure
2. ASTM D 1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
3. ASTM D 2321 Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
4. ASTM D 3034 Specification for Type PSM SDR 35 Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
5. ASTM D 3212 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

- 1.04 GENERAL: 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.)

- 1.05 MANUFACTURER'S QUALIFICATIONS: Only the products of a manufacturer regularly engaged in the manufacture of pipe used for the conveyance of sewage will be acceptable.

- 1.06 INSPECTION AND ACCEPTANCE OF PIPE: Acceptance will be on the basis of design, material tests, and inspection of the complete product. The quality of all materials used in the pipe, the process of manufacture, and the finished pipe shall be subject to inspection by the Engineer. Inspection may be made at the place of manufacture, or on the job site after delivery, or at both places and the pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though sample pipe units may have been accepted as satisfactory at the place of manufacture. All pipe which is rejected must be immediately removed from the project site by the Contractor.

1.07 SUBMITTALS

- A. Manufacturer's Certificate; Pipe And Fittings: Submit manufacturer's certificate indicating that the pipe and fittings have been inspected and tested at the place of manufacture in accordance with ASTM D 3034, as amended to date. Each certification so furnished shall be signed by an authorized agent of the manufacturer.
- B. Shop Drawings; Joint Gaskets: Submit shop drawings for all joint gaskets.

PART 2 - PRODUCTS

POLYVINYL CHLORIDE GRAVITY PIPE

- 2.01 PVC PIPE: Provide PVC pipe with a standard dimension ratio of 21 under the building and to a point 5 feet outside the building. Provide PVC pipe with a standard dimension ratio of 35 more than 5 feet outside the building; comply with the requirements of ASTM D 3034 under the classification for DR 35 pipe, as amended to date.
- 2.02 PIPE LENGTHS: Provide pipe not exceeding 12-1/2 feet laying length.
- 2.03 PVC PIPE JOINTS: Provide gasket integral bell end pipe joints utilizing elastomeric gasket coupler. Rubber gaskets shall comply with the physical requirements specified in the latest revision of ASTM F 477, as amended to date. Joints shall meet the requirements specified in ASTM D 3212, as amended to date. The joint must provide protection of the line from shock, vibration and earth movement, and must compensate for the expansion and contraction of pipe lengths. The use of solvent cement joints will not be acceptable.
- 2.04 FITTINGS: Provide bell type push-on PVC fittings meeting the physical and chemical requirements of ASTM D 1598 and ASTM D 1599.
- 2.05 BEDDING MATERIAL: Comply with the requirements of ASTM D 2321, Class III Embedment Material.

PART 3 – EXECUTION

3.01 INSPECTION

- A. General: Examine the areas and conditions under which the pipe is to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner. Prior to backfilling the trenches notify the engineer for an inspection of the pipes and installation. **DO NOT BACKFILL THE TRENCHES UNTIL THE ENGINEER HAS INSPECTED THE PIPES AND INSTALLATION.**

3.02 EXCAVATION

- A. General: Excavate trenches in accordance with Section 02220, EXCAVATION AND BACKFILL.

3.03 PIPE HANDLING

- A. General: Transport pipe to the job site and handle in such a manner as not to damage the pipe.
- B. Stockpiling: Stockpile pipe on the site so that no dangerous conditions will exist to life or property. Store pipe so that damage to surfaces and/or structures will be prevented. Provide suitable devices to support pipe when it is lifted.
- C. Cover pipe which is stored outside and exposed to prolonged periods of sunlight (more than one month) with an opaque material. Clear plastic will not be acceptable as a cover. Provide air circulation under covering. Provide supports under pipe which are spaced to prevent the pipe from bending during storage.

3.04 PIPE INSTALLATION

- A. General: Install pipe in accordance with ASTM D 2321. Adhere to the rules, regulations, and requirements of OSHA, Occupational Safety and Health Act.
- B. Precautions: Lay pipe in dry trenches only. Keep all trenches completely free of water during bedding, laying, and jointing of pipe. Dewater and use sheeting where required by field conditions. Pump or drain all water away from the work and dispose of in a suitable manner so that no damage occurs outside the construction easement. Do not permit water to rise in an unbackfilled trench after pipe has been placed. Promptly repair any damage within the construction easement.
- C. Pipe Lengths: Lay pipe in length not exceeding 12-1/2 feet.

- D. Placing Pipe In Trench: After delivery alongside the trench, visibly inspect each length of pipe for marking, damaged surfaces, breakage, and conformance to specifications. Acceptable pipe may be marked with paint or other permanent marking material so that the marks are plainly visible after installation in the trench and before pipe is covered. Reject, stockpile, and remove from the site all pipe not conforming to Specifications.
1. Before pipe is placed on the bedding material, excavate suitable bell holes so that after placement of the pipe, only the barrel receives bearing pressure from the supporting material. Support the entire length of the unit. Protect pipe during handling against impact shocks and free falls. Do not permit hooks to come in contact with premolded joint surfaces.
 2. Handle pipe having premolded joint rings or attached couplings so that no weight, including the weight of the pipe itself, will bear on or be supported by the jointing material. Take care to avoid dragging the spigot ring on the ground or allowing it to be damaged by contact with gravel, crushed stone, or other hard objects. Do not subject the bell and spigot sections to direct stress of any kind except that required to effect the jointing.
- E. Pipe Laying: Unless otherwise shown on the Drawings, lay all pipe in open trench construction. Lay pipe to conform to the lines and grades indicated on the Drawings unless otherwise directed by the Engineer in writing. Comply with the requirements of ASTM D 2321.
1. Immediately after the pipe units are put together, inspect the position of the gasket in the joint to make sure it is properly positioned. Pull apart and remake all joints, using new gaskets, if the gasket has become damaged or improperly positioned. Make all joints in accordance with manufacturer's recommendations. Prior to backfill, fill bell holes with bedding material and compact so that the spigot will not move the bell of the adjoining pipe under backfill load. Do not permanently support pipe on saddles, blocking, or boulders.
 2. Push-On Type Jointing: Perform the jointing of push-on type pipe in accordance with manufacturer's recommendations.
 3. Temporary Plugs: At all times when pipe laying is not actually in progress, close the open end of pipe by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, do not remove the plug until all danger of earth or other material entering the pipe has passed.
 4. Backfill (Sewer Pipe): When pipe has been properly bedded and jointed, notify the engineer for an inspection of the pipe and installation prior to backfilling the trenches. Backfill trenches in accordance with Section 02220, EXCAVATION AND BACKFILL. Provide embedment material complying with ASTM D 2321, Class II or III, for a minimum of 6 inches above the pipe.
 5. Ten States Standards: The horizontal and vertical separation of sewer lines and water mains must be in accordance with the "Ten States Standards".
 6. Horizontal Separation: Whenever possible, sewers should be laid at least 10 feet, horizontally, from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if:
 - a. It is laid in a separate trench.
 - b. It is laid in the same trench with the water mains located at one side on a bench of undisturbed earth.
 - c. In either case, the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.

7. Vertical Separation: Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation, or reconstructed with slipon or mechanical joint cast iron pipe, asbestos-cement pressure pipe or prestressed concrete cylinder pipe for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

3.05 TESTING

- A. Testing: Test PVC gravity sewer lines for leakage in accordance with Section 02493, AIR TESTING PIPELINES.
- B. Repairs: Repair and retest, at Contractor's expense, any section of pipe failing to meet the leakage test. Perform repairs with capable personnel and with sound materials equal to those materials used in the manufacture of the pipe.
- C. Deflection Test: The maximum allowable pipe deflection is 5 percent. The Owner may elect to have any or all of the completed sewers tested to determine adherence to the deflection requirement. Check deflection with a pin-type "GO/NO GO" gauge. The Contractor shall be responsible for performing all deflection tests as may be required by the Owner.
- D. Remove and replace all pipe failing to meet the deflection test.

END OF SECTION

SECTION 02485

VALVES, HYDRANTS, BACKFLOW PREVENTERS AND APPURTENANCES

PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: This section covers valve boxes, valve pits, hydrants and all necessary appurtenances generally associated with buried piping located outside of major structures and vaults as shown on the Drawings and as specified herein.
- 1.02 QUALITY ASSURANCE
- A. Referenced Standards: Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these Specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provision of the following codes and standards, except as otherwise indicated.
1. ASTM B 584 Specification for Copper Alloy Sand Castings for General Applications
 2. AWWA C500 Standard for Gate Valves, 3 Inches Through 48 Inches NPS for Water & Sewage Systems.
- 1.03 SUBMITTALS
- A. Manufacturer's Certification; Valves, Backflow Preventers: For information only, submit manufacturer's notarized certification that valves and backflow preventers furnished for this project are in full compliance with the Referenced Standards and these specifications. All valves and backflow preventers must be AWWA approved.

PART 2 - PRODUCTS

- 2.01 BACKFLOW PREVENTERS: Unless otherwise noted on the Drawings, provide backflow preventers which meet ASSE standard, of size indicated for maximum flow rate and minimum pressure loss and rated for 150 psig minimum working pressure except where indicated or required by regulatory authorities.
- A. Standard Of Quality: Manufacturers offering products that may be incorporated into the work, subject to requirements of South Carolina Department of Health and Environmental Control (SCDHEC) and utility company, agencies and municipalities having jurisdiction for potable water system, include, but are not limited to the following:
1. Hersey Products, Inc., Grinell Corp.
 2. Watts Regulator Co.
 3. Wilkins Regulator Div., Zurn Industries, Inc.
- B. Listing And Labeling: Provide equipment that are listing/approval stamp, label or other marking on equipment made to specified standards.
- C. Testing: Backflow Preventers shall be tested and perform satisfactorily after installation by certified tester according to SCDHEC requirements.
- 2.02 GATE VALVES: Unless otherwise noted on the Drawings, provide gate valves which are mechanical joint, manually operated, inside screw, iron body, bronze mounted, double disc parallel seat type, and rated for 200 psi working pressure and 400 psi hydrostatic test pressure. Provide cut-in valves which are as described above, with mechanical joint ends that allow the valves to be installed on different classes of ductile iron pipe. Provide PVC ends for valves in PVC lines.
- A. Standard Of Quality: Manufacturers offering products complying with the requirements for gate valves include (but are not necessarily limited to) the following:
1. American Darling Valves Birmingham, AL

2. Dresser Manufacturing Division Anniston, AL
 3. Mueller Company Decatur, IL
 4. Stockham Valves and Fittings Birmingham, AL
 - B. Casting Markings: Cast integral with either the bonnet or the body, the size of the valve, the manufacturer's identification, the year of manufacture, and the maximum water working pressure.
 - C. Painting: Coat all ferrous parts of the gate valves, except finished or bearing surfaces, with 2 coats of coal-tar varnish pipe dip or other approved material. After the valves are assembled and tested, apply a third coat to the exterior.
 - D. Testing: Test each gate valve at the manufacturer's plant for performance in watertightness and resistance to distortion under internal pressure. Subject each valve to hydrostatic tests under pressure at the water working pressure cast on the valve and at 400 psi.
 1. First, test the valve at the highest pressure by applying the hydrostatic pressure between the discs. Valves showing leakage through the metal or flanged joints will not be acceptable.
 2. Second, test the valve at the working pressure applied between the discs. Valves showing leakage through the metal or flanged joints, or showing leakage past either seat exceeding one fluid ounce per hour per inch of nominal valve size, will not be acceptable.
 - E. Opening Directions: Furnish valves which are opened by turning the wrench nut to the left (counterclockwise).
- 2.03 STEM: Furnish stems of manganese bronze with threads accurately cut to gauge. Conform to ASTM B 584, Alloy A.
- 2.04 OPERATING NUT: Conform to AWWA C500.
- 2.05 STUFFING BOX: Use an "O" ring and conform to AWWA C500.
- 2.06 VALVE BOXES: Unless otherwise noted, provide a cast iron valve box with drop type cover for all buried gate valves, including bypass valves. The valve box must be suitable for traffic loading. Do not rest the valve box base on the flanged joints of the valve bonnet.
- A. For valves 10 inches in diameter and smaller and for gear operated valves with enclosed gear case, provide two-piece, screw type, 5-1/4 inch shaft valve box with bell bottom.
 - B. For valves 12 inches in diameter and larger, provide three-piece, screw type, 5-1/4 inch shaft valve box with oval base.
 - C. Cast the word "WATER" or "SEWER", whichever is applicable in raised letters on the valve box cover. Coat boxes with approved asphalt.
- 2.07 VALVE WRENCHES: Provide two T-handle wrenches to permit operation of all buried gate valves with square operating nuts regardless of depth. The T-handle must project not less than 2'-0", nor more than 4'-6" above surrounding grade when operating valve operator.

PART 3 – EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which valves, backflow preventers, hydrants and appurtenances are to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.02 INSTALLATION: Install valves and appurtenances to the same specification which covers the piping to which these items are connected. Install backflow preventers of type, size and capacity indicated. Include valves and test cocks. Install according to SCDHEC and City of Columbia regulations. Construct pits of poured-in-place concrete or provide precast concrete pits of sufficient size for

installation, dismantling and servicing without disturbing the box or as required by regulatory authorities. Include sleeves with waterproof mechanical sleeve seals for pipe entry and exit. Support backflow preventers on 3000-psi minimum, portland-cement-mix concrete piers.

3.03 RECORD DRAWINGS

- A. Contractor to provide "Record drawing" of all water mains and appurtenances that meet the following requirements:
 - 1. All structures including bends to be referenced by field survey. Digital survey file to be provided to Engineer for preparation of Water Record Drawings to City of Columbia.
 - 2. Survey Drawing to be certified by a Registered Land Surveyor.
 - 3. Drawing to be provided for ample time for Engineer, City of Columbia and SCDHEC to conduct final inspections for Permits to Operate. Survey file needed approximately 2 months prior to needing permanent water service.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

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 SUMMARY

- A. This Section includes the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Touchup painting.

1.3 DEFINITIONS

- A. RNC: Rigid non-metallic conduit.
- B. RMC: Rigid metal conduit.
- C. LFMC: Liquidtight flexible metal conduit.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 - 2011.

1.5 COORDINATION

- A. Coordinate equipment locations with general construction work and arrange during progress of construction to facilitate the electrical installations that follow.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing generator with lift station components.

- C. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.1 METALLIC RACEWAYS

- A. RMC: ANSI C80.6, zinc-coated steel, with threaded fittings.
- B. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
- C. Raceway Fittings: Specifically designed for the raceway type with which used.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- B. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material. Provide rigid steel conduit elbows.

2.3 CONDUCTORS

- A. Conductors, No. 10 AWG and Smaller: Solid copper.
- B. Conductors, Larger Than No. 10 AWG: Stranded copper.
- C. Insulation: Thermoplastic, rated at 75 deg C minimum.
- D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.4 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- (14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.

2.5 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
 - 1. Type: Pretensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 - 2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
 - 3. Color: Black letters on orange background.
 - 4. Legend: Indicates voltage.
 - C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).
 - D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed legend that indicates type of underground line.
 - E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
 - F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
 - G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.
 - H. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6-mm) grommets in corners for mounting.
 - I. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- 2.6 TOUCHUP PAINT
- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
 - B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY APPLICATION

- A. Use the following raceways:
 - 1. Exposed: Schedule 40 PVC (RNC) unless in areas of possible damage then RMC.
 - 2. Underground, Single Run: RNC, unless noted otherwise on plan.
 - 3. Connection to Vibrating Equipment: LFMC.
 - 4. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

3.3 RACEWAY AND CABLE INSTALLATION

- A. Use temporary raceway caps to prevent foreign matter from entering.
- B. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- C. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.
- D. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.
- E. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch (1830-mm) flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

3.4 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

- A. Service Entrance Conductors and Feeders: Type THHN/THWN insulated conductors in raceway.
- B. Branch Circuits: Type THHN/THWN insulated conductors in raceway.
- C. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.

3.5 WIRING INSTALLATION

- A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- B. Install wiring at outlets with at least 12 inches (300 mm) of slack conductor at each outlet.
- C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Selection of Supports: Comply with manufacturer's written instructions.
- C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

3.7 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

3.8 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label each cabinet, panel, switch, pull box, junction box, device, and outlet box. Identify source and circuit numbers in each cabinet, pull box, junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multi-

ple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.

- F. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 - 1. Phase A: Black.
 - 2. Phase B: Red.
 - 3. Phase C: Blue.
 - 4. Neutral: White.
 - 5. Ground: Green.
- G. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- H. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.9 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Concrete bases.
 - 6. Cutting and patching for electrical construction.
 - 7. Touchup painting.

3.10 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in other sections of the specifications.
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.11 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16060
GROUNDING AND BONDING

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 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 – 2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 1. Comply with UL 467.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by, but not limited to, one of the following:
 - 1. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Chance/Hubbell.
 - b. Copperweld Corp.
 - c. Erico Inc.; Electrical Products Group.
 - d. Framatome Connectors/Burndy Electrical.
 - e. Ideal Industries, Inc.
 - f. ILSCO.
 - g. Kearney/Cooper Power Systems.

- h. Lyncole XIT Grounding.
- i. O-Z/Gedney Co.; a business of the EGS Electrical Group.
- j. Raco, Inc.; Division of Hubbell.
- k. Superior Grounding Systems, Inc.
- l. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 16 Section "Basic Electrical Materials and Methods."
- B. Material: copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Grounding Electrode Conductors: Stranded cable.
- E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- F. Bare Copper Conductors: Comply with the following:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Assembly of Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
- G. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
 - 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

2.3 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel.
 - 1. Size: 3/4 inch diameter by 10 feet long.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Provide only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, provide insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Provide for connections to structural steel and for underground connections, except those at test wells.
- D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- E. Grounding Bus: Provide in all panelboards and provide one BISC type at each communications backboard.
- F. Neutral Bus: Provide in all panelboards.
- G. Underground Grounding Conductors: Use tinned-copper conductor, No. 3/0 AWG minimum. Bury at least 30 inches (600 mm) below grade.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70 - 2011, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install equipment grounding conductors in all feeders and circuits.

3.3 INSTALLATION

- A. Ground Rods – Provide three, minimum, located 20 feet apart from each other.
 - 1. Drive ground rods until tops are 6 inches below finished floor or final grade, unless otherwise indicated.
 - 2. Interconnect ground rods with grounding electrode conductors. Make connections without exposing steel or damaging copper coating.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Bonding Straps and Jumpers: Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.4 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Connections at Test Wells: Use compression-type connectors on conductors and make bolted-and clamped-type connections between conductors and ground rods.
- E. Bond the main building water service piping to the building grounding system.
- F. Bond interior hot water and cold water piping systems to the grounding system.
- G. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

3.5 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
 - 3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 - a. Maximum Ground System Resistance: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds above specified value, notify Architect/Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 16140
WIRING DEVICES

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 SUMMARY

- A. This Section includes the following:
 - 1. Straight-Blade and twist-lock receptacles and associated wallplates.
 - 2. Snap switches.

1.3 DEFINITIONS

- A. GFI/GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 - 2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- C. Comply with NFPA 70 - 2011.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers' Names (Subject to compliance with requirements, provide products by, but not limited to, one of the following):
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. General: Single-Type and combination-type receptacles shall be rated for each applicable compliance as indicated below.
- B. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498. Include hinged "side insulation guards" on all receptacles to protect wiring terminals of receptacles from contacting metal boxes – electrical tape is not acceptable.
 - 1. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.
- C. GFCI/GFI Receptacles, 125 V, 20 A: Straight blade, feed or non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped. Include hinged "side insulation guards" on all receptacles to protect wiring terminals of receptacles from contacting metal boxes – electrical tape is not acceptable.
 - 1. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.

2.3 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:

2.4 WALLPLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
- B. Wet-Location, Weatherproof Covers for ALL receptacles on project: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum. Provide "In-Use" covers where required by code.

- C. Wet-Location, Weatherproof Covers for ALL Switches on project: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum.

2.5 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 8. Tighten unused terminal screws on the device.
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles bottom, and on horizontally mounted receptacles to the left.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Wiring analyzer with illuminated LED indicators.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Ground Impedance: Values of up to 2 ohms are acceptable.
 3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 4. Using the test plug, verify that the device and its outlet box are securely mounted.
 5. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION

SECTION 16142

ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

NEC Compliance: Comply with applicable requirements of the 2011 edition of the NEC.

UL Compliance: Comply with UL Std 486A. Provide electrical connection products and materials which are UL-listed and -labeled.

IEEE Compliance: Comply with requirements of Std 241 pertaining to connectors and terminations.

PART 2 - PRODUCTS

General: For each required electrical connection, provide complete assembly of materials, including pressure connectors, terminals (lugs), clamps, electrical insulating tape, heat-shrinkable insulating tubing and boots, cable ties, solderless wirenuts, and other items and accessories as needed to complete splices and terminations.

Raceways: Provide metal conduit and tubing complying with Division 16 specification section, "Basic Electrical Materials and Methods".

Wires/Cables: Provide wires, cables and conductors complying with Division 16 specification section, "Basic Electrical Materials and Methods". Unless otherwise indicated, provide wires, cables and conductors for electrical connections which match, including sizes and ratings, wires, cables and conductors of those supplying power to equipment. Provide copper conductors with conductivity of not less than 98% at 20°C (68°F).

PART 3 - EXECUTION

General: Install electrical connections in accordance with connector manufacturer's written instructions and wiring diagrams, and complying with UL, NEC and NECA's "Standard of Installation".

Where electrical disconnect switches and combination starters are shown on drawings, the Division 16 contractor shall:

- Provide equipment, coordinating specific requirements with lift station motor requirements.

- Provide mounting of electrical disconnect switches and combination starters, and

- Provide power wiring for/through electrical disconnect switches and combination starters.

- Provide all control wiring as required for lift station installation.

Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment, wherever possible.

Cover splices with electrical insulation equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.

Trim cables and wires to be short as practicable and arrange routing to facilitate inspection, testing and maintenance.

Provide flexible conduit for motor connections, and for other electrical equipment connections where subject to movement and vibration. Provide cords with compatible insulation ratings as required.

Tighten connectors and terminals, including screws and bolts in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torqueing tools. Where manufacturer's torqueing requirements are not available, tighten connectors and terminals to comply with torqueing values contained in UL's 486A.

Fasten identification markers to each electrical power supply wire/cable conductor which indicates their voltage, phase and feeder number in accordance with Division 26 section "Basic Electrical Materials and Methods". Affix markers on each terminal conductor, as close as possible to the point of connection.

Test electrical connections to demonstrate capability and compliance with requirements upon completion of installation of connections. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 16410
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
 - 1. Fusible switches.
 - 2. Enclosures.
 - 3. Fuses.

1.2 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled by UL, and marked for intended use.
- B. Comply with NFPA 70, 2011 Edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by, but not limited to, one of these manufacturers:
 - 1. Eaton Corporation; Cutler-Hammer Products.
 - 2. General Electric Co.; Electrical Distribution & Control Division.
 - 3. Square D/Group Schneider.
- B. Fusible Switch: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2.2 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

All Locations: NEMA 250, Type 3R.

2.3 FUSES

- A. Provide RK5 rated fuses for each disconnect switch. Coordinate fuse sizes with the Mechanical Contractor for mechanical equipment where applicable.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate size and location of concrete bases with mechanical contractor.
- B. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches.
- C. Mount individual wall-mounting switches with tops at uniform height, unless otherwise indicated.
- D. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods."

3.2 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
 1. Inspect mechanical and electrical connections.
 2. Verify rating of fuses with mechanical contractor prior to installation.

END OF SECTION

SECTION 16442

PANELBOARDS

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 SUMMARY

- A. This Section includes panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for distribution panelboards.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- D. Maintenance Data: For panelboards and components to include in maintenance manuals.
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 - 2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70 - 2011.

1.5 COORDINATION

- A. Coordinate layout and installation of panelboards and components with existing building construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.6 EXTRA MATERIALS

- A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by, but not limited to, one of the following:
 - 1. Panelboards, Overcurrent Protective Devices, and Accessories:
 - a. Eaton Corp.; Cutler-Hammer Products
 - b. General Electric Co.; Electrical Distribution & Control Division
 - c. Square D Company

2.2 FABRICATION AND FEATURES

- A. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.
 - 1. All Locations: NEMA 250, Type 3R
- B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions without overlap.
- C. Hinged Front Cover: Hinged door within front trim cover.
- D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
- E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

- F. Bus: Hard-drawn copper, 98 percent conductivity.
- G. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.
- H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
- I. Neutral Bus: Neutral bus rated 100 percent of phase bus.
- J. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.3 PANELBOARD SHORT-CIRCUIT RATING

- A. UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

2.4 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 200 A and larger.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mounting: Plumb and rigid without distortion of box.
- C. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- D. Install filler plates in unused spaces.

- E. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."
- B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

3.5 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 16510
INTERIOR LIGHTING

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 SUMMARY

- A. This Section includes the following:
 - 1. Lighting fixtures, lamps, and ballasts (interior and exterior building mounted).
 - 2. Emergency lighting units.
 - 3. Lighting fixture supports.

1.3 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Ballast.
 - 4. Energy-efficiency data.
 - 5. Lighting Fixtures.
 - 6. Suspended ceiling components.
 - 7. Structural members to which suspension systems for lighting fixtures will be attached.
- B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- C. Shop Drawings: Custom fixtures shall require submittal of detailed, scaled shop drawings showing lamping, material, and UL certification.
- D. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 - 2011.

1.5 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide products listed in Lighting Fixture Schedule on the drawings or prior approved equals.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Comply with UL 1598.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- E. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- F. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
 - b. UV stabilized.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Electronic Ballasts: Comply with ANSI C82.11; instant-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
 - 1. Sound Rating: A.
 - 2. Total Harmonic Distortion Rating: Less than 20 percent.

3. BF: 0.85 or higher.
4. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C 82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

2.4 DRIVERS FOR LED LAMPS

- A. Description: Electronic and shall be designed for full light output:

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: A.

2.5 EMERGENCY POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate lamps continuously at an output of 500 lumens. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture driver.
2. Battery: Sealed, maintenance-free, nickel-cadmium type.
3. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.6 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- B. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches (1220 mm), 2800 initial lumens (minimum), CRI 75 (minimum), color temperature as indicated on drawings, and average rated life 20,000 hours, unless otherwise indicated.

2.7 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

END OF SECTION

Equipment List

1.1 Exhaust Fans:

- A. Each fan shall bear the AMCA seal for rated sound and air.
- B. Noise level indicated is maximum level in sones for fans and curb combination at 5'-0" distance in accordance with AMCA Standards 210 and 300.
- C. Sidewall propeller fans shall be belt drive and shall be complete with wall housing with motor guard, gravity operated back draft damper with guard, and weatherhood with insect screen. Propellers shall be constructed with cast aluminum blades and hubs. Propellers shall be securely attached to fan shafts. All propellers shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy duty type, carefully matched to the fan load and furnished at the specified voltage, phase, and enclosure. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Drives shall be sized for a minimum of 150 percent of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to wheel and motor shafts. Motors sheaves shall be adjustable for system balancing. Drive frame and panel assemblies shall be galvanized steel or painted steel. Drive frames shall be formed channels and fan panels shall have prepunched mounting holes, formed flanges, and a deep formed inlet venturi. Drive frames and panels shall be bolted construction or welded construction.
- D. Fans shall have 2-speed fan motors.

2.0 COOLING PADS

- A. Cooling pads shall fit between the double doors and the north and south exterior walls. The height of the pads shall be determined by dividing the total exhaust fan air flow by 400 ft/min. maximum, and dividing by the total available width in feet. Room for pipe connections shall be considered.
- B. Cooling pads shall be corrugated cellulose impregnated with wetting agents and insoluble salts to help resist rot. Pads susceptible to algae infestation will not be accepted.
- C. Provide a control damper at the inlet to each cooling pad.

3.0 INTAKE LOUVERS

- A. Fixed louvers shall be Ruskin model ELF-375D drainable blade louver or equal by Empco, United Entertech, Dowco, Arrow, American Warming or approved equal.
- B. Louvers shall be box type and shall be 4" deep. Furnish louvers with expanded flattened aluminum birdscreen, 3/4" X 0.51". Water penetration shall not exceed 0.02 ounces of water per square foot of free area at 1000 feet per minute free area velocity.
- C. Louver shall be extruded aluminum with finish and color as selected by Architect. Price shall be based on Kynar finish. Submit color and finish sample chart to Architect for selection.
- D. Provide a control damper at the inlet to each intake louver.

4.0 CONTROL DAMPERS

- A. The control damper shall be equal to Ruskin CD60, airfoil blade, low leakage or Air Balance, Inc. model AC-516 or equal by Leader Industries, Dowco AWM or approved equal. Damper frame and blades shall be 16 gauge galvanized steel. Bearings shall be molded synthetic. Finish shall be mill galvanized. Leakage on a 24" wide damper shall not exceed 5.8 CFM per square foot.

5.0 GAS FIRED UNIT HEATER

- A. Gas fired heaters shall conform to all safety requirements of the American Gas Association and bear the AGA Designed Certified seal.
- B. Blower shall be centrifugal type, statically and dynamically balanced. Motor shall have factory lubricated bearings and shall be multi-speed direct drive. Casing shall be 22 gage steel with baked enamel finish.
- C. Heat exchanger shall be aluminized steel sectional in design and have a 5 year warranty. Burners shall be elongated and tapered for even gas distribution.
- D. Controls shall include: gas valve to regulate gas flow, filtered pilot gas, intermittent safety pilot, main burner cutoff, high limit cutoff, adjustable outlet temperature controller and a prewired indoor fan relay with transformer.
- E. Vent system shall include power blower for exhausting product of combustion through
- E. Unit heaters shall be manufactured by Modine, Reznor, Sterling, Trane or approved equal.
- F. Suspend heaters from building structure above. Provide auxiliary steel to span at least 2 steel supports to support unit.
- G. Suspend heaters with threaded rods. Provide seismic sway cables at each support point and connect to building structure in accordance with 2012 International Building Code.
- H. Combustion air ducts shall be low pressure galvanized sheet metal. Sheet metal ductwork shall be in accordance with SMACNA Manual "Low Velocity Construction Standards," latest edition.

6.0 GAS VENT

- A. Gas vent shall be UL labeled and designed for positive draft applications.
- B. Type "PS" gas vent shall be designed in accordance with National Fuel Gas Code, NFPA Standards 37 and 211, and UL 103. Maximum operating temperatures shall be 1000EF. continuous and 1400EF. intermittent.
- C. Vent pipe shall be provided with manufacturer's 10-year warranty on all components against functional failure due to defects in material and workmanship.
- D. Type "PS" gas vent shall be double wall constructed of 0.035" 316 or 304 stainless steel.
- E. Gas vent pipe and accessories shall be as manufactured by Metalbestos, Dura-vent, Hart and Cooley or approved equal.
- F. Provide type "PS" gas vent, originating at flue connection to unit heater to horizontal

discharge termination.

- G. Install vent system using all factory manufactured clamps, flanges, increasers, tees, elbows, wall support assemblies, wall guide assemblies, thimbles, sealants, etc. as required by manufacturer's written installation instructions.

7.0 PUMPS

- A. Furnish and install cooling water pump with capacities as required by the cooling pad manufacturer.
- B. Pumps shall be submersible, 1/3 hp, automatic sump pumps. Pumps shall be capable of 45 gpm at 17 ft. lift high head.
- B. Submit pump curves to show specification compliance for each pump.
- C. Pump s shall include 1-1/2" discharge and intake screen..
- D. Provide pumps with pressure switch, diaphragm, O ring, bracket and screw, and pump base with seal ring.
- E. All pumps shall be mounted, supported, and piped in strict accordance with the printed recommendations of the manufacturer. Mounting shall comply with the seismic requirements of the 2012 International Building Code.

8.0 PIPING

- A. Cooling pad water piping may be sch 40 PVC plastic pipe and fittings. PVC pipe and fittings shall be in accordance with ASTM D-2661 and ASTM D-2665. Cellular core PVC plastic pipe is not permitted.
- B. PVC plastic pipe joints shall be solvent cement.
- C. Final connections to equipment shall be by unions. Provide unions at intervals for convenient dissassembly of pipe systems. Unions to match material of adjacent pipe.

9.0 FOGGERS

- A. Fogger system shall be equal to a CoolNet Pro Fogger Assembly complete with 4-way fogger, check valve, hanging assembly with stabilizer weight.
- B. The fogger shall produce a flow rate of 8.1 gph at 60 psi water pressure, and has (4) removable nozzles for disassembly and cleaning.
- C. The check valve includes a pin, shall open at 28 psi and close at 13 psi.
- D. Pipe drops shall be 12" long Super Flex UV White (solid white, not coated) 4/7mm polyethylene tubing to prevent algae growth.
- E. Main pipes shall be 3/4" low density polyethylene pipe.
- F. Provide a ball valve filter, and pressure regulator in the main line pipe at the connection to the domestic water.

10. RECIRCULATING FANS

- A. Fans shall be 20", 1/3 hp.
- B. Fan shall include a powder coated fan guard, maintenance free enclosed motor with moisture resistant bearings.
- C. Fans shall be provided with a mounting bracket for ceiling or wall mounting.
- D. Fans shall be provided with a variable speed controller.

11. TEMPERATURE CONTROLLER

- A. Temperature and humidity controller shall be equal to a iGrow 1200. Mount in NEMA 4 enclosure.
- B. Display shall be 4 line backlit graphical display.
- C. Controller shall include the following features:
 - 1. Digital Temperature: -30 to 150EF, +/- 0.5EF
 - 2. Digital Humidity: 0 to 95% RH, +/- 3%
 - 3. Outdoor air Temperature: -30 to 150EF, +/- 0.5EF
 - 4. Light Sensor (Solar): 0 to 2,000 W/m2
 - 5. Spoil Temperature Probe: -30 to 150EF, +/- 0.5EF
 - 6. Wind Speed Range: 3 to 175 mph, +/- 5%
 - 7. (12) equipment control outputs with manual switches
 - 8. (4) daily setpoints (day, mid-day, night, DIF)
 - 9. (6) heating and (6) cooling stages
 - 10. (2) dehumidification and (1) humidify stages
 - 11. (2) alarm outputs.
 - 12. SmartCool predictive cooling
 - 13. Alarm auto-dialer
- D. Controller shall control:
 - 1. Exhaust fans,
 - 2. Control dampers for intake louvers,
 - 3. Control dampers for cooling pads,
 - 4. Pumps for cooling pads,
 - 5. Recirculating fans,
 - 6. Fog systems for cooling and humidifying.
 - 7. Gas unit heater,
 - 8. Irrigation systems
 - Time schedule
 - Misting
 - 9. Roof vent(s)
- E. Furnish controller with:
 - 1. Remote control software,
 - 2. Vent and curtain motor controllers
- F. Cooling sequence shall be as follows:

Stage 1: Exhaust Fan #1 (low speed), Intake Louver Dampers open, Recirc. Fans On

- A. Fans shall be 20", 1/3 hp.
- B. Fan shall include a powder coated fan guard, maintenance free enclosed motor with moisture resistant bearings.
- C. Fans shall be provided with a mounting bracket for ceiling or wall mounting.
- D. Fans shall be provided with a variable speed controller.

11. TEMPERATURE CONTROLLER

- A. Temperature and humidity controller shall be equal to a iGrow 1200. Mount in NEMA 4 enclosure.
- B. Display shall be 4 line backlit graphical display.
- C. Controller shall include the following features:
 - 1. Digital Temperature: -30 to 150EF, +/- 0.5EF
 - 2. Digital Humidity: 0 to 95% RH, +/- 3%
 - 3. Outdoor air Temperature: -30 to 150EF, +/- 0.5EF
 - 4. Light Sensor (Solar): 0 to 2,000 W/m2
 - 5. Spoil Temperature Probe: -30 to 150EF, +/- 0.5EF
 - 6. Wind Speed Range: 3 to 175 mph, +/- 5%
 - 7. (12) equipment control outputs with manual switches
 - 8. (4) daily setpoints (day, mid-day, night, DIF)
 - 9. (6) heating and (6) cooling stages
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 - 9. Roof vent(s)
- E. Furnish controller with:
 - 1. Remote control software,
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- F. Cooling sequence shall be as follows:

Stage 1: Exhaust Fan #1 (low speed), Intake Louver Dampers open, Recirc. Fans On

June 21, 2013

Chao & Associates, Inc.
7 Clusters Court
Columbia, South Carolina 29210

Attention: Mr. Gerald Lee, PE

**Reference: Report of In-Situ Bearing Capacity Verification for
Shallow Foundations
Proposed Greenhouse
President's House
University of South Carolina – Horseshoe
Columbia, South Carolina
GS2 Project Number: 13-1000-G**



Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
350 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

Dear Mr. Lee:

Project Information

Our understanding of the project is based on conversations with you and the information provided by you via email on June 7, 2013. From these conversations and information, we understand that the site of the proposed structure is located at south of the existing President's House, located on The Horseshoe, on the University of South Carolina campus in Columbia, South Carolina. We understand that the structure will be a one-story, 1,400 square foot structure that will be constructed utilizing a pre-engineered steel framed wall and roof system. Furthermore, we understand that the structure will be supported with a conventional shallow foundation system with a cast-in-place concrete slab-on-grade. Maximum wall and column loads for a structure of this type are assumed to be on the order of 2 to 3 kips per linear foot (klf) and 10 to 15 kips, respectively.

It is important to note that at the time of our visit, the site was an existing landscaped area. Furthermore, it is our assumed at this time that the site is at currently at or near at finished grade elevation.

Summary of Field Activities and Findings

As you requested, our personnel were present on June 14, 2013, in order to perform an initial in-situ foundation subgrade investigation at the above referenced site. Our initial investigation consisted of performing five (5) hand augered soil borings, with Dynamic Cone Penetrometer (DCP) testing at regular intervals, to refusal/termination depths of up to approximately 5 feet below the existing ground surface at the locations shown on the attached *Boring Location Plan*. In general, the borings conducted within the proposed building area encountered clean and clayey sands (SP and SC) with DCP blow counts observed to range from 3 to 25+ blows per increment (bpi), indicating very loose to very firm relative densities. It is important to note that no groundwater was encountered below the existing ground surface during our investigation. Furthermore, it is important to note that the hand auger refusal encountered in Borings B-2 through B-5 appeared to be due to subsurface/buried washed No. 57 stone. The boring log summaries are attached.

Corporate
(803) 776-2105
(803) 776-5572

Columbia
(803) 699-7900
(803) 699-7911

Charleston
(843) 225-3031
(843) 225-3249

Bluffton
(843) 297-2035
(843) 763-4094

Greenville
(864) 234-0151
(864) 234-0152

Florence
(843) 407-6755
(843) 407-6756

Myrtle Beach
(843) 444-2766
(843) 444-2799

Conclusions

Based upon the findings of our initial investigation, it appears that, in general, the proposed foundation bearing soils appear suitable for support of the proposed structure, however, some minor ground modifications will be necessary to provide a design bearing capacity of 2,500 psf. This recommendation is presented in the assumption that the following site preparation and foundation construction recommendations are, or have been, adhered to, and that the subsurface conditions intermediate of the boring locations do not vary greatly from those encountered at the boring locations.

Provided the site is prepared in accordance with the recommendations presented in this letter, adequate support of the future structure should be attainable. However, we strongly recommend that a qualified geotechnical engineer or engineering technician verify the grading activities at the site, and that the building contractor verify the adequacy of the bearing soils at the time of construction.

These conclusions are provided in the assumption that the soil conditions at the site do not vary greatly from those encountered in our borings and that our recommendations presented in the following sections of this report are followed.

Site Preparation and Construction Recommendations

1.) Any remaining vegetation and organic laden soils should be removed from structurally loaded or fill areas and wasted off site or in areas to be landscaped, prior to placement of structure or controlled fills. This should include the roughly 2 inches of topsoil encountered across the building pad.

2.) As previously stated, the near-surface soils at the site have been identified to have an SP and SC USCS soil classification. Most text includes soils with Unified Soil Classifications of SW, SP, SM, SC, SM-SC, ML and CL as suitable for support of structure or for use as structural fill, while soils with classifications of MH, CH, OL and OH are considered unsuitable. Therefore, it is important to note that the near-surface soils at the site are considered in the industry to be *suitable* (SP and SC) for use as structural fill and to support structures.

Soils that have SC (with high Plasticity Indexes) designations are less preferable fill soils that exhibit fair to good structural support characteristics under buildings, less ease in workability, with little flexibility in achieving compaction at various moisture contents.

Fine-grained soils (SC (with high Pls)) are typically sensitive to variations in moisture content with a relatively narrow range of workable moisture contents. Therefore, close control of moisture content will probably be necessary during grading and fill placement operations, where these soils are involved. In addition, these soils may become difficult to work during periods of wet weather. Grading operations under wet conditions may result in the deterioration of otherwise suitable soil conditions, or of previously placed and properly compacted fill.

3.) Additionally, as this site is to be developed on a previously developed property, it is *probable* that buried debris and *possible* that surface debris and utilities, may be encountered during excavation activities. Therefore, any surface/buried debris, or underground utilities, encountered will need to be removed from beneath and within a 5 foot perimeter of structure, and wasted off site or in areas to be landscaped prior to placement of structural fills.



4.) We recommend that the non-performing, unstable bearing soils within the building pad, and 5 feet beyond the perimeters, should be densified in-place to a depth of 3 feet **below the planned bearing elevations** within the northwestern portion of the building pad. These dimensions assume that the planned bottom of footing elevation is 1 foot below existing grade. Depending on the existing and proposed grades at the site, the building pad area may be required to be partially over-excavated to effectively densify the upper 3 feet of surface sands at the site, as our experience of in-place densification dictates that typically only the upper 2 to 3 feet of "dead sands" are able to be affected through conventional methods.

In-place soil densification can be accomplished using a large smooth-drum vibratory roller by making several passes over the area to be densified in a crossing pattern, after the site has been stripped. Densification in-place of loose "dead sands" yields varying results in the field, and is highly dependent upon obtaining a sufficiently large roller, the in-situ moisture content, and the ability to achieve confinement on at least one side, (i.e. along one strip), prior to proceeding to the next. Obtaining confinement is typically an iterative process and requires that multiple passes along well established rolling lanes be performed, the initial passes made with the vibratory setting used and the finishing passes made with a static roller. Upon achieving an optimal densification in one direction it is recommended that the rolling efforts be repeated in the perpendicular direction, until no noticeable improvements in densification are observed. In-place soil densification is recommended for soils in which below optimum moisture contents are present, and where groundwater is greater than 3 feet below the depth of densification required. Densification of the on-site soils should continue until an SPT N-value of 6, or an equivalent Dynamic Cone Penetrometer (DCP) value of 8, is achieved, with a target density of 95 percent of the laboratory Standard Proctor maximum dry density (ASTM D698). The densification techniques and activities should be verified as the work progresses.

Alternately, we recommend that the unstable soils located within the northwestern portion of the building pad be undercut to a depth of roughly 3 feet **below existing ground surface elevations** and that the resulting excavation base be inspected to determine if further undercut is required to provide a stable base for fill placement. If the base is stable, the excavation should be backfilled with properly compacted structural fill. We further recommend that the replacement fill utilized at the site have a Unified Soil Classifications of SW, SP, SM, SC (with low plasticity concentrations), due to its ability to retain structural stability when exposed to possible wet conditions. During placement, fill should be kept at +/- 2 percent of the soil's optimum moisture content, and it should be placed in no more than 10-inch thick lifts, loose measurement. It is recommended that the fill placed at this site be placed in accordance with the recommendations provided in the following sections of this report.

5.) Upon completion of the removal of any vegetation, and after the completion of ground modification activities the cut and proposed fill areas of the building pad should be carefully inspected and proofrolled in order to detect locally yielding soils. Proofrolling should be performed with a loaded 20-ton tandem axle dump truck or similarly loaded vehicle and should be observed by a qualified geotechnical engineer. The designated vehicle should make at least four passes over each section of the exposed soils with the last two passes perpendicular to the first two.

Any localized areas of yielding, soft and/or saturated soils identified during proofrolling operations will need to be densified in-place, or undercut and the removed soil replaced with properly compacted fill. All fill should be monitored and placed in general accordance with the recommendations made in the following sections of this report.



6.) Any fill material should be monitored and placed in accordance with the local governing authorities' specifications. In the absence of these specifications, fill beneath the structure for this project should be placed in general accordance with the recommendations made in the following paragraphs of this section.

Prior to the placement of fill soils, representative soil samples should be obtained and tested to determine their classification and compaction characteristics. Optimum fill material should be free of debris and any fibrous organic material or organic soils and should have a Plasticity Index (PI) less than 15, and a maximum dry density, determined by laboratory Proctor testing, of at least 85 pounds per cubic foot (pcf). We recommend that fibrous organic material found in the fill materials be no more than 5 percent by weight. Compaction characteristics of the fill soils should be determined using the laboratory Standard Proctor density test, ASTM D698, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. Rammer and 12-in. Drop*.

Fill material should be placed in no more than 8-inch thick lifts, loose measurement, and within 2 percent of the optimum moisture content determined by ASTM D698. Fills placed beneath the area of the structure, 10 feet beyond building perimeters, and in areas to support slabs should be compacted to a minimum of 95 percent of the laboratory Standard Proctor maximum dry density (ASTM D698).

Placement of the fill material should be observed and tested by a geotechnical engineer or qualified engineering technician as placement of the fill progresses. Compaction testing should be performed at a minimum frequency of one test per lift per 2,000 square feet of fill placed.

7.) Any exposed subgrade soils and recently placed fill soils should be well drained to minimize the accumulation of stormwater runoff. If the exposed subgrade soils are not as anticipated, or become excessively wet, the geotechnical engineer should be consulted.

8.) The foundations for the proposed structure should have a minimum width of 24 inches in order to avoid localized punching failure. Some densification of the loose upper soils and possible disturbed soils may be required after foundation excavation activities throughout the pad. Additionally, we recommend that the foundations for the structure bear a minimum of 12 inches below existing ground surface, in order for the foundations to bear below the maximum frost depth.

We recommend that when conducting excavation activities at the site, special care should be taken to not undermine, or disturb, in-place bearing subgrades associated with portions of adjacent structure that are supported by the near-surface soils.

9.) The footings should be properly benched and the bearing soils free of loose or organic laden debris or ponded water. If excavated bearing soils are exposed to the environment for extended periods or varying weather conditions they may weaken. Foundation concrete should not be placed on bearing soils that have been weakened from the environment. Therefore, we recommend that the footings be concreted shortly after excavation. If the footing excavation should remain open overnight, or if rain becomes imminent, we recommend that the bearing soils be covered with a 2 to 4 inch mud-mat of 2000 psi concrete. If the exposed bearing soils become excessively wet, the geotechnical engineer should be consulted, and the footing excavations re-inspected.

10.) The footing excavations should be observed and DCP values obtained by a qualified geotechnical engineer or engineering technician in order to confirm that the bearing soils are acceptable for the recommended bearing pressure, prior to the placement of structural concrete. Soil samples and DCP values



or probing should be performed at a minimum testing frequency of one test per 50 feet of exposed continuous footings or one test per pier. It is important to note that some reworking, or in-place densification, of the exposed near-surface bearing soils will likely be necessary at the time of excavation.

Closing

Recommendations detailed in this report are specific to the soil conditions in the immediate vicinity of the boring locations for this particular project. This report does not include any environmental assessment of soils, surface water or groundwater, the determination of wetlands, the determination of noise impact, the assessment of air quality, the identification of cultural resources, and the identification of endangered species. Furthermore this report does not include any seismic or liquefaction analysis associated with the provision set forth in the International Building Code, 2006/2009 Edition. These services are beyond the scope of services of this verification.

GS2 personnel should verify that the recommendations presented in this letter are, or were, adhered to during, or after, any remediation process chosen. The geotechnical engineer should be consulted with any anomalies or discrepancies encountered during construction, so that we may review and adjust our recommendations if necessary.

Sincerely,

GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.



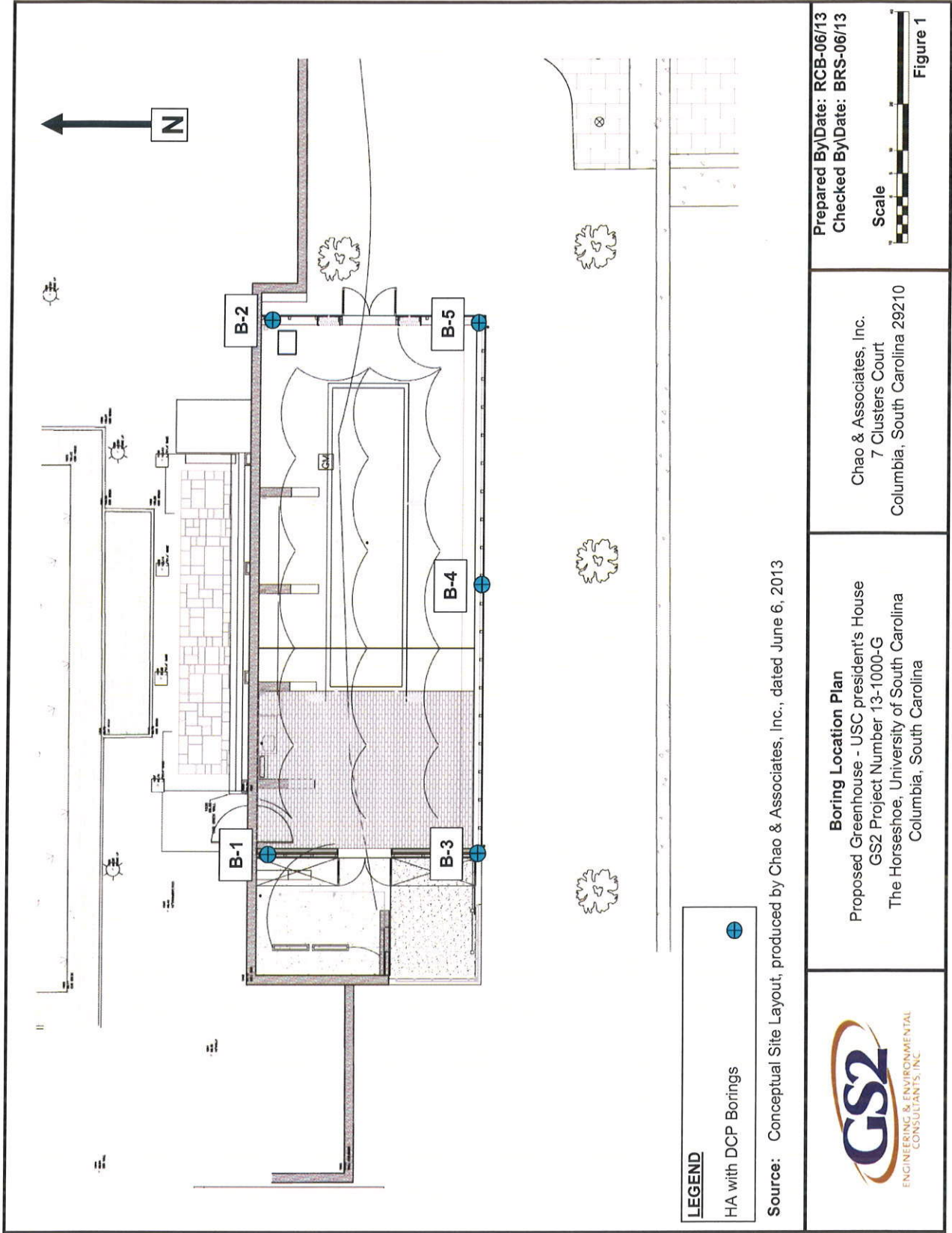
Brian R. Surowiec
Operations Manager, AVP



Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP

Attachments: Boring Location Plan
Record of Hand Auger Boring logs





Boring Location Plan
Proposed Greenhouse - USC president's House
GS2 Project Number 13-1000-G
The Horseshoe, University of South Carolina
Columbia, South Carolina

Chao & Associates, Inc.
7 Clusters Court
Columbia, South Carolina 29210



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-1

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|---|---------------|------------------|-----|-----|------------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL | 0' | 1 | 2 | 3 | 3 |
| 2" | | Tan Fine to Medium SAND. (SP) | | | | | |
| | | | 1' | 8 | 6 | 6 | 6 |
| | | | 2' | 2 | 4 | 6 | 5 |
| | | | 3' | 5 | 7 | 7 | 7 |
| 3' | 3' | Orange Clayey Fine to Medium SAND. (SC) | | | | | |
| | | | 4' | 5 | 7 | 8 | 8 |
| | | | 5' | 5 | 7 | 7 | 7 |
| | 5' | Boring Terminated at 5 Feet. | | | | | |
| | | | 6' | | | | |
| | | | 7' | | | | |
| | | | 8' | | | | |
| | | | 9' | | | | |
| | | | 10' | | | | |
| | | | | | | | |

Method of drilling: Hand Auger Performed By: Gainey/Spires
 Depth of Groundwater T.O.B.: Not Encountered Boring Location: see Boring Location Plan
 Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.
 ** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: _____

Robert C. Bruorton
 Robert C. Bruorton, P.E.
 Chief Geotechnical Engineer, AVP

GREENHOUSE

PART 1 - GENERAL

The basis of design for this project is the American Classic Series (ACSE 2557) greenhouse manufactured by the Texas Greenhouse Company. Alternates will be considered provided they meet the owners approval for aesthetics and functionality. The submitted greenhouse kit must be able to be adapted to the existing site conditions and meet the architectural review standards pertaining to structures in the historic horseshoe area on the campus of the University of South Carolina.

1.1 SCOPE OF WORK

All greenhouse parts, materials and equipment shall be furnished by the greenhouse manufacturer. Greenhouse installer shall erect the greenhouse and place all equipment. Masonry, flashing, plumbing, heating, electrical power (and control wiring), and utility connections shall be provided and installed by others.

PART 2 - STRUCTURE

Exterior framing shall consist of 6063-T6 aluminum extrusion alloy, supported by a hot-dipped galvanized steel sub-structure. The steel structure shall consist of truss-style ribs on 8' 5 1/4" centers or 6'9". Framing sections between steel ribs shall consist of 5 vertical rows of glass on 8' 5 1/4" centers or 4 rows at 6'9" centers for 25' & 30' wide. Sidewalls posts shall attach to perimeter foundation 8" above floor grade, 8" thick or 9" thick depending on width of greenhouse to the depth required by local conditions and practice. (24" high walls or higher for snow zones and special applications may be used). All bolt screws, nuts and other fasteners used in the greenhouse shall be galvanized, stainless, plated or aluminum as required by manufacturer.

2.1 DESIGN LOAD

Greenhouse must meet all applicable codes. Manufacturer must provide stamped engineering drawings and calculations. Foundation kneewall width may change with engineering.

2.2 GLAZING

All glass shall be 1/8" double strength or 1/8" tempered glass. Roof glass is shingled 1/2" to 3/4", vertical glass shall be supported and separated by special vinyl extrusions. All glass shall be held in place with specially designed stainless steel clips. Glazing compounds used in the bedding of glass shall be butyl glazing tape with silicone caulking in certain areas. Clear insulated polycarbonate materials are available at additional charge. Insulated Glass is available at an additional charge but does not carry a warranty against seal break down.

2.3 VENTILATION

The greenhouse shall have a continuous ball and socket hinge along either side of the ridge to facilitate a single vent along each side or end to end. Ridge vents are glazed with polycarbonate and are controlled by a thermostat and integrated into the overall climate control system.

2.4 DOORS

Doors and frame shall be extruded aluminum shapes for hanging 1 3/4" thick tubular aluminum doors (1 1/4" thick on smaller models). Doors shall be installed and pre-hung within 1 3/4" X 3" extruded aluminum framing at all openings to the size required. Double doors are required at each end of the greenhouse.

PART 3 - MATERIALS

3.1 SILL PLATE

The sill plate shall be extruded aluminum shape approximately 2 ½" x 2", permitting lateral security and sufficient adjustment to accommodate minor foundation irregularities.

3.2 STEEL FRAME

The hot-dipped galvanized steel frame is to be 3 X 4.1 channel. Welded 3/8" base plates to be secured to foundation with two anchor bolts each of the size specified on drawings.

3.3 PURLINS

The purlins shall be an extruded aluminum shape specifically designed for greenhouse use, weighing 0.912 lbs per foot.

3.4 RIDGE

The ridge shall be of extruded aluminum shapes designed to incorporate the ball and socket hinge for the roof vents, weighing 1.636 lbs per foot.

3.5 GLAZING BARS

The glazing bars are an extruded shape weighing approx. 0.3 lbs per foot measuring- 1 1/8" x 1 ¼", designed to receive stainless steel glazing clips.

PART 4 – EQUIPMENT LIST

4.1 EXHAUST FANS

- A. Each fan shall bear the AMCA seal for rated sound and air.
- B. Noise level indicated is maximum level in sones for fans and curb combination at 5'-0" distance in accordance with AMCA Standards 210 and 300.
- C. Sidewall propeller fans shall be belt drive and shall be complete with wall housing with motor guard, gravity operated back draft damper with guard, and weatherhood with insect screen. Propellers shall be constructed with cast aluminum blades and hubs. Propellers shall be securely attached to fan shafts. All propellers shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy duty type, carefully matched to the fan load and furnished at the specified voltage, phase, and enclosure. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Drives shall be sized for a minimum of 150 percent of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to wheel and motor shafts. Motors sheaves shall be adjustable for system balancing. Drive frame and panel assemblies shall be galvanized steel or painted steel. Drive frames shall be formed channels and fan panels shall have prepunched mounting holes, formed flanges, and a deep formed inlet venturi. Drive frames and panels shall be bolted construction or welded construction.
- D. Fans shall have 2-speed fan motors.

4.2 COOLING PADS

- A. Cooling pads shall fit between the double doors and the north and south exterior walls. The height of the pads shall be determined by dividing the total exhaust fan air flow by 400 ft/min. maximum, and dividing by the total available width in feet. Room for pipe connections shall be considered.
- B. Cooling pads shall be corrugated cellulose impregnated with wetting agents and insoluble salts to help resist rot. Pads susceptible to algae infestation will not be accepted.
- C. Provide a control damper at the inlet to each cooling pad.

4.3 INTAKE LOUVERS

- A. Fixed louvers shall be Ruskin model ELF-375D drainable blade louver or equal by Empco, United Entertech, Dowco, Arrow, American Warming or approved equal.
- B. Louvers shall be box type and shall be 4" deep. Furnish louvers with expanded flattened aluminum birdscreen, 3/4" X 0.51". Water penetration shall not exceed 0.02 ounces of water per square foot of free area at 1000 feet per minute free area velocity.
- C. Louver shall be extruded aluminum with finish and color as selected by Architect. Price shall be based on Kynar finish. Submit color and finish sample chart to Architect for selection.
- D. Provide a control damper at the inlet to each intake louver.

4.4 CONTROL DAMPERS

- A. The control damper shall be equal to Ruskin CD60, airfoil blade, low leakage or Air Balance, Inc. model AC-516 or equal by Leader Industries, Dowco AWM or approved equal. Damper frame and blades shall be 16 gauge galvanized steel. Bearings shall be molded synthetic. Finish shall be mill galvanized. Leakage on a 24" wide damper shall not exceed 5.8 CFM per square foot.

4.5 GAS FIRED UNIT HEATER

- A. Gas fired heaters shall conform to all safety requirements of the American Gas Association and bear the AGA Designed Certified seal.
- B. Blower shall be centrifugal type, statically and dynamically balanced. Motor shall have factory lubricated bearings and shall be multi-speed direct drive. Casing shall be 22 gage steel with baked enamel finish.
- C. Heat exchanger shall be aluminized steel sectional in design and have a 5 year warranty. Burners shall be elongated and tapered for even gas distribution.
- D. Controls shall include: gas valve to regulate gas flow, filtered pilot gas, intermittent safety pilot, main burner cutoff, high limit cutoff, adjustable outlet temperature controller and a prewired indoor fan relay with transformer.
- E. Vent system shall include power blower for exhausting product of combustion through
- E. Unit heaters shall be manufactured by Modine, Reznor, Sterling, Trane or approved equal.
- F. Suspend heaters from building structure above. Provide auxiliary steel to span at least 2

steel supports to support unit.

- G. Suspend heaters with threaded rods. Provide seismic sway cables at each support point and connect to building structure in accordance with 2012 International Building Code.
- H. Combustion air ducts shall be low pressure galvanized sheet metal. Sheet metal ductwork shall be in accordance with SMACNA Manual "Low Velocity Construction Standards," latest edition.

4.6 GAS VENT

- A. Gas vent shall be UL labeled and designed for positive draft applications.
- B. Type "PS" gas vent shall be designed in accordance with National Fuel Gas Code, NFPA Standards 37 and 211, and UL 103. Maximum operating temperatures shall be 1000EF. continuous and 1400EF. intermittent.
- C. Vent pipe shall be provided with manufacturer's 10-year warranty on all components against functional failure due to defects in material and workmanship.
- D. Type "PS" gas vent shall be double wall constructed of 0.035" 316 or 304 stainless steel.
- E. Gas vent pipe and accessories shall be as manufactured by Metalbestos, Dura-vent, Hart and Cooley or approved equal.
- F. Provide type "PS" gas vent, originating at flue connection to unit heater to horizontal discharge termination.
- G. Install vent system using all factory manufactured clamps, flanges, increasers, tees, elbows, wall support assemblies, wall guide assemblies, thimbles, sealants, etc. as required by manufacturer's written installation instructions.

4.7 PUMPS

- A. Furnish and install cooling water pump with capacities as required by the cooling pad manufacturer.
- B. Pumps shall be submersible, 1/3 hp, automatic sump pumps. Pumps shall be capable of 45 gpm at 17 ft. lift high head.
- B. Submit pump curves to show specification compliance for each pump.
- C. Pump s shall include 1-1/2" discharge and intake screen..
- D. Provide pumps with pressure switch, diaphragm, O ring, bracket and screw, and pump base with seal ring.
- E. All pumps shall be mounted, supported, and piped in strict accordance with the printed recommendations of the manufacturer. Mounting shall comply with the seismic requirements of the 2012 International Building Code.

4.8 PIPING

- A. Cooling pad water piping may be sch 40 PVC plastic pipe and fittings. PVC pipe and fittings shall be in accordance with ASTM D-2661 and ASTM D-2665. Cellular core PVC plastic pipe is not permitted.
- B. PVC plastic pipe joints shall be solvent cement.
- C. Final connections to equipment shall be by unions. Provide unions at intervals for convenient disassembly of pipe systems. Unions to match material of adjacent pipe.

4.9 FOGGERS

- A. Fogger system shall be equal to a CoolNet Pro Fogger Assembly complete with 4-way fogger, check valve, hanging assembly with stabilizer weight.
- B. The fogger shall produce a flow rate of 8.1 gph at 60 psi water pressure, and has (4) removable nozzles for disassembly and cleaning.
- C. The check valve includes a pin, shall open at 28 psi and close at 13 psi.
- D. Pipe drops shall be 12" long Super Flex UV White (solid white, not coated) 4/7mm polyethylene tubing to prevent algae growth.
- E. Main pipes shall be 3/4" low density polyethylene pipe.
- F. Provide a ball valve filter, and pressure regulator in the main line pipe at the connection to the domestic water.

4.10 RECIRCULATING FANS

- A. Fans shall be 20", 1/3 hp.
- B. Fan shall include a powder coated fan guard, maintenance free enclosed motor with moisture resistant bearings.
- C. Fans shall be provided with a mounting bracket for ceiling or wall mounting.
- D. Fans shall be provided with a variable speed controller.

4.11 TEMPERATURE CONTROLLER

- A. Temperature and humidity controller shall be equal to a iGrow 1200. Mount in NEMA 4 enclosure.
- B. Display shall be 4 line backlit graphical display.
- C. Controller shall include the following features:
 - 1. Digital Temperature: -30 to 150EF, +/- 0.5EF
 - 2. Digital Humidity: 0 to 95% RH, +/- 3%
 - 3. Outdoor air Temperature: -30 to 150EF, +/- 0.5EF
 - 4. Light Sensor (Solar): 0 to 2,000 W/m²
 - 5. Spoil Temperature Probe: -30 to 150EF, +/- 0.5EF
 - 6. Wind Speed Range: 3 to 175 mph, +/- 5%
 - 7. (12) equipment control outputs with manual switches
 - 8. (4) daily setpoints (day, mid-day, night, DIF)

9. (6) heating and (6) cooling stages
10. (2) dehumidification and (1) humidify stages
11. (2) alarm outputs.
12. SmartCool predictive cooling
13. Alarm auto-dialer

D. Controller shall control:

1. Exhaust fans,
2. Control dampers for intake louvers,
3. Control dampers for cooling pads,
4. Pumps for cooling pads,
5. Recirculating fans,
6. Fog systems for cooling and humidifying.
7. Gas unit heater,
8. Irrigation systems
 - Time schedule
 - Misting
9. Roof vent(s)

E. Furnish controller with:

1. Remote control software,
2. Vent and curtain motor controllers

F. Cooling sequence shall be as follows:

- Stage 1: Exhaust Fan #1 (low speed), Intake Louver Dampers open, Recirc. Fans On
- Stage 2: Exhaust Fan #1 (high speed), Intake Louver Dampers open, Cooling Pad Dampers closed, Recirc. Fans On
- Stage 3: Exhaust Fan #1 and #2 (high speed), Intake Louver Dampers closed, Cooling Pad Dampers open, Recirc. Fans On
- Stage 4: Exhaust Fan #1 and #2 (high speed), Intake Louver Dampers closed, Cooling Pad Dampers open, Cooling Pad Pumps On, Recirc. Fans On
- Stage 5: Exhaust Fan #1 and #2 (high speed), Intake Louver Dampers closed, Cooling Pad Dampers open, Cooling Pad Pumps On, Recirc. Fans On, Foggers On.

G. Controller shall include a Help button to assist user when no manual is present

4.12 SHADE CLOTH

- A. A shade cloth and operating system shall be included. The shade cloth shall be of a fire retardant material intended for this type of installation and be capable of providing 60% shade. The operating system shall be manual and include all necessary hardware.

June 21, 2013

Chao & Associates, Inc.
7 Clusters Court
Columbia, South Carolina 29210

Attention: Mr. Gerald Lee, PE

**Reference: Report of In-Situ Bearing Capacity Verification for
Shallow Foundations
Proposed Greenhouse
President's House
University of South Carolina – Horseshoe
Columbia, South Carolina
GS2 Project Number: 13-1000-G**



Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
350 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

Dear Mr. Lee:

Project Information

Our understanding of the project is based on conversations with you and the information provided by you via email on June 7, 2013. From these conversations and information, we understand that the site of the proposed structure is located at south of the existing President's House, located on The Horseshoe, on the University of South Carolina campus in Columbia, South Carolina. We understand that the structure will be a one-story, 1,400 square foot structure that will be constructed utilizing a pre-engineered steel framed wall and roof system. Furthermore, we understand that the structure will be supported with a conventional shallow foundation system with a cast-in-place concrete slab-on-grade. Maximum wall and column loads for a structure of this type are assumed to be on the order of 2 to 3 kips per linear foot (klf) and 10 to 15 kips, respectively.

It is important to note that at the time of our visit, the site was an existing landscaped area. Furthermore, it is our assumed at this time that the site is at currently at or near at finished grade elevation.

Summary of Field Activities and Findings

As you requested, our personnel were present on June 14, 2013, in order to perform an initial in-situ foundation subgrade investigation at the above referenced site. Our initial investigation consisted of performing five (5) hand augered soil borings, with Dynamic Cone Penetrometer (DCP) testing at regular intervals, to refusal/termination depths of up to approximately 5 feet below the existing ground surface at the locations shown on the attached *Boring Location Plan*. In general, the borings conducted within the proposed building area encountered clean and clayey sands (SP and SC) with DCP blow counts observed to range from 3 to 25+ blows per increment (bpi), indicating very loose to very firm relative densities. It is important to note that no groundwater was encountered below the existing ground surface during our investigation. Furthermore, it is important to note that the hand auger refusal encountered in Borings B-2 through B-5 appeared to be due to subsurface/buried washed No. 57 stone. The boring log summaries are attached.

Corporate
(803) 776-2105
(803) 776-5572

Columbia
(803) 699-7900
(803) 699-7911

Charleston
(843) 225-3031
(843) 225-3249

Bluffton
(843) 297-2035
(843) 763-4094

Greenville
(864) 234-0151
(864) 234-0152

Florence
(843) 407-6755
(843) 407-6756

Myrtle Beach
(843) 444-2766
(843) 444-2799

Conclusions

Based upon the findings of our initial investigation, it appears that, in general, the proposed foundation bearing soils appear suitable for support of the proposed structure, however, some minor ground modifications will be necessary to provide a design bearing capacity of 2,500 psf. This recommendation is presented in the assumption that the following site preparation and foundation construction recommendations are, or have been, adhered to, and that the subsurface conditions intermediate of the boring locations do not vary greatly from those encountered at the boring locations.

Provided the site is prepared in accordance with the recommendations presented in this letter, adequate support of the future structure should be attainable. However, we strongly recommend that a qualified geotechnical engineer or engineering technician verify the grading activities at the site, and that the building contractor verify the adequacy of the bearing soils at the time of construction.

These conclusions are provided in the assumption that the soil conditions at the site do not vary greatly from those encountered in our borings and that our recommendations presented in the following sections of this report are followed.

Site Preparation and Construction Recommendations

1.) Any remaining vegetation and organic laden soils should be removed from structurally loaded or fill areas and wasted off site or in areas to be landscaped, prior to placement of structure or controlled fills. This should include the roughly 2 inches of topsoil encountered across the building pad.

2.) As previously stated, the near-surface soils at the site have been identified to have an SP and SC USCS soil classification. Most text includes soils with Unified Soil Classifications of SW, SP, SM, SC, SM-SC, ML and CL as suitable for support of structure or for use as structural fill, while soils with classifications of MH, CH, OL and OH are considered unsuitable. Therefore, it is important to note that the near-surface soils at the site are considered in the industry to be *suitable* (SP and SC) for use as structural fill and to support structures.

Soils that have SC (with high Plasticity Indexes) designations are less preferable fill soils that exhibit fair to good structural support characteristics under buildings, less ease in workability, with little flexibility in achieving compaction at various moisture contents.

Fine-grained soils (SC (with high Pls)) are typically sensitive to variations in moisture content with a relatively narrow range of workable moisture contents. Therefore, close control of moisture content will probably be necessary during grading and fill placement operations, where these soils are involved. In addition, these soils may become difficult to work during periods of wet weather. Grading operations under wet conditions may result in the deterioration of otherwise suitable soil conditions, or of previously placed and properly compacted fill.

3.) Additionally, as this site is to be developed on a previously developed property, it is *probable* that buried debris and *possible* that surface debris and utilities, may be encountered during excavation activities. Therefore, any surface/buried debris, or underground utilities, encountered will need to be removed from beneath and within a 5 foot perimeter of structure, and wasted off site or in areas to be landscaped prior to placement of structural fills.



4.) We recommend that the non-performing, unstable bearing soils within the building pad, and 5 feet beyond the perimeters, should be densified in-place to a depth of 3 feet **below the planned bearing elevations** within the northwestern portion of the building pad. These dimensions assume that the planned bottom of footing elevation is 1 foot below existing grade. Depending on the existing and proposed grades at the site, the building pad area may be required to be partially over-excavated to effectively densify the upper 3 feet of surface sands at the site, as our experience of in-place densification dictates that typically only the upper 2 to 3 feet of "dead sands" are able to be affected through conventional methods.

In-place soil densification can be accomplished using a large smooth-drum vibratory roller by making several passes over the area to be densified in a crossing pattern, after the site has been stripped. Densification in-place of loose "dead sands" yields varying results in the field, and is highly dependent upon obtaining a sufficiently large roller, the in-situ moisture content, and the ability to achieve confinement on at least one side, (i.e. along one strip), prior to proceeding to the next. Obtaining confinement is typically an iterative process and requires that multiple passes along well established rolling lanes be performed, the initial passes made with the vibratory setting used and the finishing passes made with a static roller. Upon achieving an optimal densification in one direction it is recommended that the rolling efforts be repeated in the perpendicular direction, until no noticeable improvements in densification are observed. In-place soil densification is recommended for soils in which below optimum moisture contents are present, and where groundwater is greater than 3 feet below the depth of densification required. Densification of the on-site soils should continue until an SPT N-value of 6, or an equivalent Dynamic Cone Penetrometer (DCP) value of 8, is achieved, with a target density of 95 percent of the laboratory Standard Proctor maximum dry density (ASTM D698). The densification techniques and activities should be verified as the work progresses.

Alternately, we recommend that the unstable soils located within the northwestern portion of the building pad be undercut to a depth of roughly 3 feet **below existing ground surface elevations** and that the resulting excavation base be inspected to determine if further undercut is required to provide a stable base for fill placement. If the base is stable, the excavation should be backfilled with properly compacted structural fill. We further recommend that the replacement fill utilized at the site have a Unified Soil Classifications of SW, SP, SM, SC (with low plasticity concentrations), due to its ability to retain structural stability when exposed to possible wet conditions. During placement, fill should be kept at +/- 2 percent of the soil's optimum moisture content, and it should be placed in no more than 10-inch thick lifts, loose measurement. It is recommended that the fill placed at this site be placed in accordance with the recommendations provided in the following sections of this report.

5.) Upon completion of the removal of any vegetation, and after the completion of ground modification activities the cut and proposed fill areas of the building pad should be carefully inspected and proofrolled in order to detect locally yielding soils. Proofrolling should be performed with a loaded 20-ton tandem axle dump truck or similarly loaded vehicle and should be observed by a qualified geotechnical engineer. The designated vehicle should make at least four passes over each section of the exposed soils with the last two passes perpendicular to the first two.

Any localized areas of yielding, soft and/or saturated soils identified during proofrolling operations will need to be densified in-place, or undercut and the removed soil replaced with properly compacted fill. All fill should be monitored and placed in general accordance with the recommendations made in the following sections of this report.



6.) Any fill material should be monitored and placed in accordance with the local governing authorities' specifications. In the absence of these specifications, fill beneath the structure for this project should be placed in general accordance with the recommendations made in the following paragraphs of this section.

Prior to the placement of fill soils, representative soil samples should be obtained and tested to determine their classification and compaction characteristics. Optimum fill material should be free of debris and any fibrous organic material or organic soils and should have a Plasticity Index (PI) less than 15, and a maximum dry density, determined by laboratory Proctor testing, of at least 85 pounds per cubic foot (pcf). We recommend that fibrous organic material found in the fill materials be no more than 5 percent by weight. Compaction characteristics of the fill soils should be determined using the laboratory Standard Proctor density test, ASTM D698, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. Rammer and 12-in. Drop*.

Fill material should be placed in no more than 8-inch thick lifts, loose measurement, and within 2 percent of the optimum moisture content determined by ASTM D698. Fills placed beneath the area of the structure, 10 feet beyond building perimeters, and in areas to support slabs should be compacted to a minimum of 95 percent of the laboratory Standard Proctor maximum dry density (ASTM D698).

Placement of the fill material should be observed and tested by a geotechnical engineer or qualified engineering technician as placement of the fill progresses. Compaction testing should be performed at a minimum frequency of one test per lift per 2,000 square feet of fill placed.

7.) Any exposed subgrade soils and recently placed fill soils should be well drained to minimize the accumulation of stormwater runoff. If the exposed subgrade soils are not as anticipated, or become excessively wet, the geotechnical engineer should be consulted.

8.) The foundations for the proposed structure should have a minimum width of 24 inches in order to avoid localized punching failure. Some densification of the loose upper soils and possible disturbed soils may be required after foundation excavation activities throughout the pad. Additionally, we recommend that the foundations for the structure bear a minimum of 12 inches below existing ground surface, in order for the foundations to bear below the maximum frost depth.

We recommend that when conducting excavation activities at the site, special care should be taken to not undermine, or disturb, in-place bearing subgrades associated with portions of adjacent structure that are supported by the near-surface soils.

9.) The footings should be properly benched and the bearing soils free of loose or organic laden debris or ponded water. If excavated bearing soils are exposed to the environment for extended periods or varying weather conditions they may weaken. Foundation concrete should not be placed on bearing soils that have been weakened from the environment. Therefore, we recommend that the footings be concreted shortly after excavation. If the footing excavation should remain open overnight, or if rain becomes imminent, we recommend that the bearing soils be covered with a 2 to 4 inch mud-mat of 2000 psi concrete. If the exposed bearing soils become excessively wet, the geotechnical engineer should be consulted, and the footing excavations re-inspected.

10.) The footing excavations should be observed and DCP values obtained by a qualified geotechnical engineer or engineering technician in order to confirm that the bearing soils are acceptable for the recommended bearing pressure, prior to the placement of structural concrete. Soil samples and DCP values



or probing should be performed at a minimum testing frequency of one test per 50 feet of exposed continuous footings or one test per pier. It is important to note that some reworking, or in-place densification, of the exposed near-surface bearing soils will likely be necessary at the time of excavation.

Closing

Recommendations detailed in this report are specific to the soil conditions in the immediate vicinity of the boring locations for this particular project. This report does not include any environmental assessment of soils, surface water or groundwater, the determination of wetlands, the determination of noise impact, the assessment of air quality, the identification of cultural resources, and the identification of endangered species. Furthermore this report does not include any seismic or liquefaction analysis associated with the provision set forth in the International Building Code, 2006/2009 Edition. These services are beyond the scope of services of this verification.

GS2 personnel should verify that the recommendations presented in this letter are, or were, adhered to during, or after, any remediation process chosen. The geotechnical engineer should be consulted with any anomalies or discrepancies encountered during construction, so that we may review and adjust our recommendations if necessary.

Sincerely,

GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.



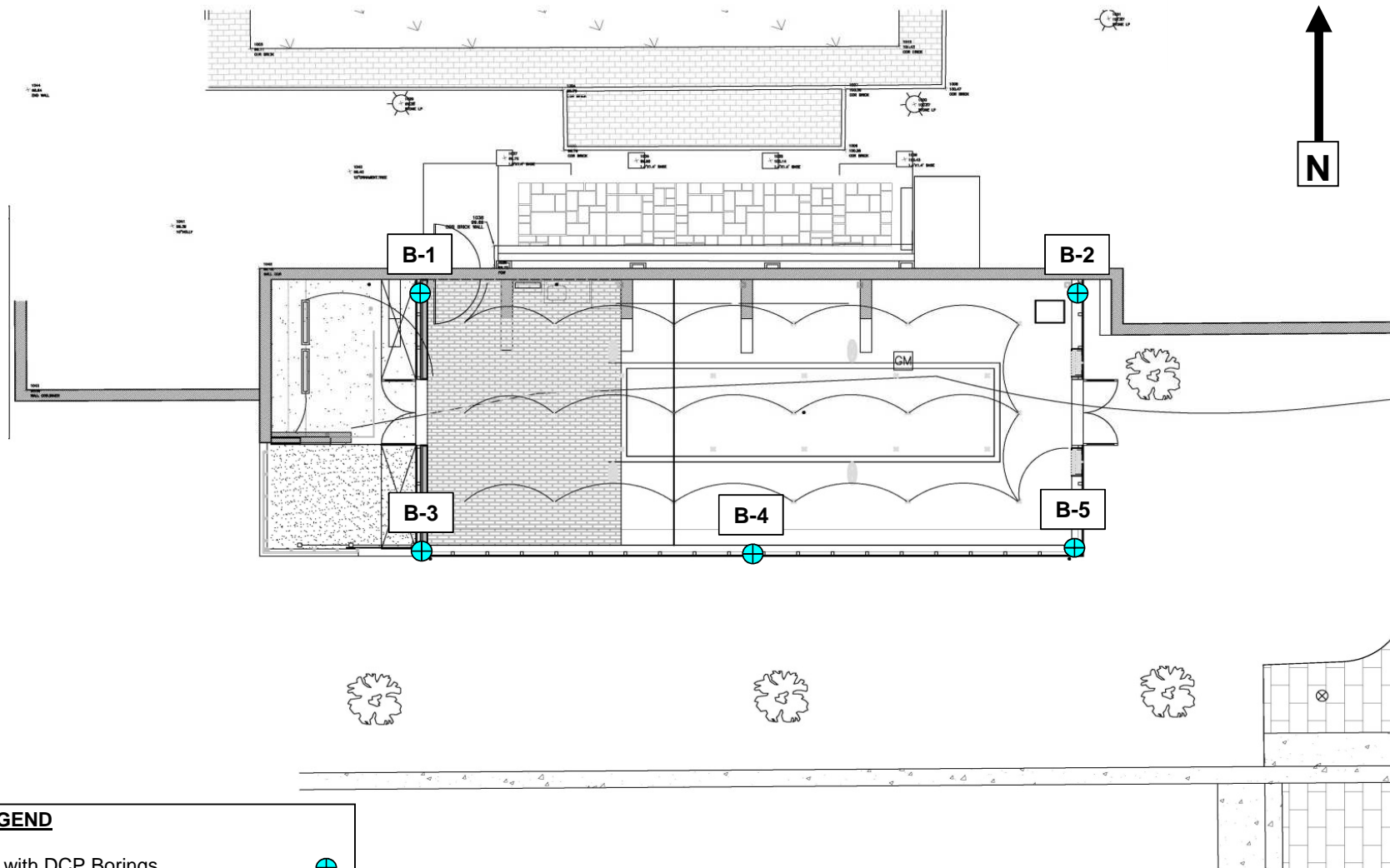
Brian R. Surowiec
Operations Manager, AVP



Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP

Attachments: Boring Location Plan
Record of Hand Auger Boring logs





LEGEND

HA with DCP Borings



Source: Conceptual Site Layout, produced by Chao & Associates, Inc., dated June 6, 2013



Boring Location Plan
 Proposed Greenhouse - USC president's House
 GS2 Project Number 13-1000-G
 The Horseshoe, University of South Carolina
 Columbia, South Carolina

Chao & Associates, Inc.
 7 Clusters Court
 Columbia, South Carolina 29210

Prepared By: RCB-06/13
Checked By: BRS-06/13



Figure 1



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-1

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|---|---------------|------------------|-----|-----|---------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL | 0' | 1 | 2 | 3 | 3 |
| 2" | | Tan Fine to Medium SAND. (SP) | | | | | |
| | | | 1' | 8 | 6 | 6 | 6 |
| | | | 2' | 2 | 4 | 6 | 5 |
| | | | 3' | 5 | 7 | 7 | 7 |
| 3' | 3' | Orange Clayey Fine to Medium SAND. (SC) | | | | | |
| | | | 4' | 5 | 7 | 8 | 8 |
| | | | 5' | 5 | 7 | 7 | 7 |
| | 5' | Boring Terminated at 5 Feet. | | | | | |
| | | | 6' | | | | |
| | | | 7' | | | | |
| | | | 8' | | | | |
| | | | 9' | | | | |
| | | | 10' | | | | |
| | | | | | | | |
| | | | | | | | |

Method of drilling: Hand Auger

Performed By: Gainey/Spires

Depth of Groundwater T.O.B.: Not Encountered

Boring Location: see Boring Location Plan


Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.

** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: _____


Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-2

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|---|---------------|------------------|-----|-----|---------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL. | 0' | 16 | 17 | 17 | 17 |
| 2" | | Tan Fine to Medium SAND. (SP) | | | | | |
| | 1' | | 1' | 23 | 25+ | --- | 25+ |
| | | Auger Refusal at 1 Foot. (washed 57 stone) | | | | | |
| | | | 2' | | | | |
| | | | 3' | | | | |
| | | | 4' | | | | |
| | | | 5' | | | | |
| | | | 6' | | | | |
| | | | 7' | | | | |
| | | | 8' | | | | |
| | | | 9' | | | | |
| | | | 10' | | | | |

Method of drilling: Hand Auger

Performed By: Gainey/Spires

Depth of Groundwater T.O.B.: Not Encountered

Boring Location: see Boring Location Plan

Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.

** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: _____

Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-3

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|---|---------------|------------------|-----|-----|---------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL. | 0' | 10 | 12 | 12 | 12 |
| 2" | | Tan Fine to Medium SAND. (SP) | | | | | |
| | 1' | | 1' | 24 | 25+ | --- | 25+ |
| | | Auger Refusal at 1 Foot. (washed 57 stone) | | | | | |
| | | | 2' | | | | |
| | | | | | | | |
| | | | 3' | | | | |
| | | | | | | | |
| | | | 4' | | | | |
| | | | | | | | |
| | | | 5' | | | | |
| | | | | | | | |
| | | | 6' | | | | |
| | | | | | | | |
| | | | 7' | | | | |
| | | | | | | | |
| | | | 8' | | | | |
| | | | | | | | |
| | | | 9' | | | | |
| | | | | | | | |
| | | | 10' | | | | |
| | | | | | | | |

Method of drilling: Hand Auger

Performed By: Gainey/Spires

Depth of Groundwater T.O.B.: Not Encountered


Boring Location: see Boring Location Plan

Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.

** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: 
Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-4

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|--|---------------|------------------|-----|-----|---------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL. | 0' | 21 | 23 | 25 | 24 |
| 2" | | Orange Clayey Fine to Medium SAND. (SC) | | | | | |
| | 1' | | 1' | 25+ | --- | --- | 25+ |
| | | Auger Refusal at 1 Foot. (washed 57 stone) | | | | | |
| | | | 2' | | | | |
| | | | 3' | | | | |
| | | | 4' | | | | |
| | | | 5' | | | | |
| | | | 6' | | | | |
| | | | 7' | | | | |
| | | | 8' | | | | |
| | | | 9' | | | | |
| | | | 10' | | | | |

Method of drilling: Hand Auger

Performed By: Gainey/Spires

Depth of Groundwater T.O.B.: Not Encountered

Boring Location: see Boring Location Plan

Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.

** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: _____

Robert C. Bruorton, P.E.
Chief Geotechnical Engineer, AVP



Record Of Hand Auger Boring

Project Name: Proposed reenhouse - USC President's House

Boring No.: B-5

Project Number: 13-1000-G

Date: 6/14/2013

| Depth | | Soil Description | Depth of Test | DCP* Blow Counts | | | Average** DCP (bpi) |
|-------|----|--|---------------|------------------|-----|-----|---------------------|
| From | To | | | 1st | 2nd | 3rd | |
| 0' | 2" | TOPSOIL. | 0' | 16 | 19 | 19 | 19 |
| 2" | | Orange Clayey Fine to Medium SAND. (SC) | | | | | |
| | 1' | | 1' | 24 | 25+ | --- | 25+ |
| | | Auger Refusal at 1 Foot. (washed 57 stone) | | | | | |
| | | | 2' | | | | |
| | | | 3' | | | | |
| | | | 4' | | | | |
| | | | 5' | | | | |
| | | | 6' | | | | |
| | | | 7' | | | | |
| | | | 8' | | | | |
| | | | 9' | | | | |
| | | | 10' | | | | |

Method of drilling: Hand Auger

Performed By: Gainey/Spires

Depth of Groundwater T.O.B.: Not Encountered


Boring Location: see Boring Location Plan

Depth of Groundwater 24 hrs.: Not Available

Notes: 1. Please see attached report.

* DCP (or Dynamic Cone Penetrometer) tests were taken in general accordance with ASTM #T-399.

** The average DCP blow per increment (bpi) is arrived at by averaging the 2nd and 3rd blows.

Signature: 
 Robert C. Bruorton, P.E.
 Chief Geotechnical Engineer, AVP