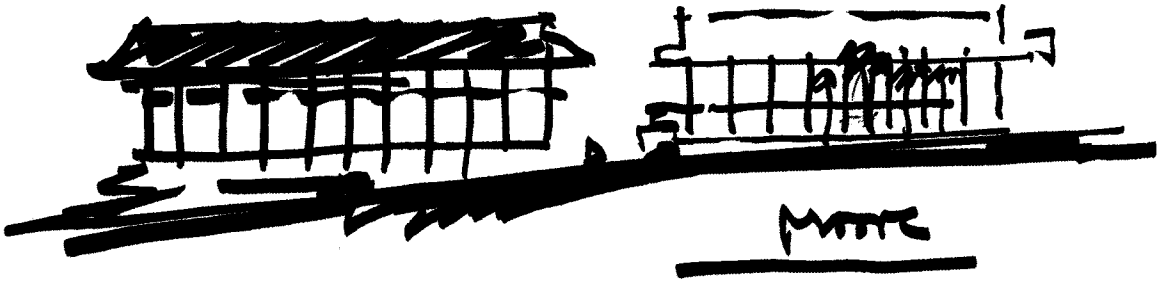
BID PACKAGE 2: STRUCTURE – DECEMBER 9, 2011

SPECIFICATIONS MASTER DOCUMENT INDEX

SOUTH CAROLINA
RAFAEL VINOLY ARCHITECTS PC
No. 100627
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ARCHITECT
No. 8279
ANDREA DEAN LAMBERTI



SOUTH CAROLINA
STEVENS & WILKINSON OF SOUTH CAROLINA, INC.
No. C00226
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 27495
TODD W. WHISENHUNT

UNIVERSITY OF SOUTH CAROLINA
RAFAEL VINOLY ARCHITECTS

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END OF SECTION

PROJECT DIRECTORY

OWNER	University of South Carolina Campus Planning and Construction 743 Greene Street Columbia, South Carolina 29208 Telephone Number: (803) 777-5818 Fax Number: (803) 777-7334 Attention: Ms. Michelle Adams
CONSTRUCTION MANAGER	Gilbane Cumming|SMG 1213 Lady Street, 4th Floor Columbia, South Carolina 29201 Telephone Number: (803) 256-1989 Fax Number: (803) 254-5620 Attention: Mr. David Lindsay
ARCHITECT	Rafael Vinoly Architects, PC 50 Vandam Street New York, New York 10013 Telephone Number: (212) 924-5060 Fax Number: (212) 924-5858 Attention: Ms. Joyce Ignacio
CIVIL ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Mr. Kevin Eubanks
LANDSCAPE ARCHITECT	Grimball-Cotterill & Associates 600 Beltline Boulevard Columbia, South Carolina 29205 Telephone Number: (803) 738-9525 Fax Number: (803) 782-3916 Attention: Ms. Emily Jones

FOODSERVICE DESIGN	William Caruso and Associates 8055 East Tufts Ave, Suite 1320 Denver, CO 80237 Telephone Number: (303) 649-1600 Fax Number: (303) 649-1660 Attention: Mr. Phillip Landgraf
STRUCTURAL ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Ms. Michelle Motchos
PLUMBING ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Mr. Eric Smith
MECHANICAL ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Mr. Eric Smith
FIRE PROTECTION ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Mr. Eric Smith
ELECTRICAL ENGINEER	Stevens & Wilkinson 1501 Main Street Columbia, South Carolina 29201 Telephone Number: (803) 765-0320 Fax Number: (803) 254-6209 Attention: Mr. Mark Nicolai

SE-310 **2011 Edition**

REQUEST FOR ADVERTISEMENT

PROJECT NAME: Darla Moore School of Business Construction – Bid Package 2 - Structure

PROJECT NUMBER: H27-6069-AC-2

PROJECT LOCATION: University of South Carolina

Contractor may be subject to performance appraisal at close of project

BID SECURITY REQUIRED? Yes X No ☐

PERFORMANCE & PAYMENT BONDS REQUIRED? Yes X No ☐

CONSTRUCTION COST RANGE: $17,500,000 to $20,000,000

DESCRIPTION OF PROJECT: The Project consists of both sub-structure and super-structure elements for the construction of a new 5-story facility of approximately 256,068 square feet for the Business School at the University of South Carolina. The project includes, but is not limited to: excavation, foundations, cast concrete walls, waterproofing and backfill, steel erection, and placement of concrete slabs on grade and elevated concrete slabs. This is Phase 3 of a multi-phased project. Prime bidders must be licensed as General Contractors – Building.

This is a designated contract directed towards certified South Carolina based minority firms to satisfy the MINORITY BUSINESS goal of the Agency. However, this does not prevent other firms from bidding on this project.

A/E NAME: Rafael Vinoly Architects PC

A/E CONTACT: Joyce Ignacio

A/E ADDRESS: Street/PO Box: 50 Vandam Street
City: New York
State: NY ZIP: 10013-1102

EMAIL: JIgnacio@rvapc.com

TELEPHONE: 212-924-5060

FAX: 212-924-5858

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

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: See online website below.

PLAN DEPOSIT AMOUNT: $0.00 IS DEPOSIT REFUNDABLE: N/A

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:

http://purchasing.sc.edu/ SEE: Facilities/Construction Solicitations & Awards

Two copies of plans and specs will be on file at USC 743 Greene Street for review by appointment only

AGC - Columbia, SC and Charlotte, NC

Offices of the Architect (RVA and S&W), Construction Manager (Gilbane Cumming|SMG) and Brownstone Construction Group

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

DATE: January 5, 2012 **TIME:** 10:00 AM EST **PLACE:** Conference Room 53, 743 Greene Street, Columbia, SC 29208

AGENCY: University of South Carolina

NAME OF AGENCY PROCUREMENT OFFICER: Michelle Adams

ADDRESS: Street/PO Box:743 Greene Street
City: Columbia
State: SC ZIP: 29208-____

EMAIL: mdadams@fmc.sc.edu

TELEPHONE: 803-777-0981

FAX: 803-777-8739

BID CLOSING DATE: January 25, 2012 **TIME:** 2:00 PM EST **LOCATION:** 743 Greene Street, Columbia, SC 29208,

BID DELIVERY ADDRESSES:

HAND-DELIVERY: Attn: Michelle Adams
Campus Planning and Construction
743 Greene Street
Columbia, SC 29208

MAIL SERVICE: Attn: Michelle Adams
Campus Planning and Construction
743 Greene Street
Columbia, SC 29208

SE-310

2011 Edition

REQUEST FOR ADVERTISEMENT

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

APPROVED BY *(Office of State Engineer)*: AIA **DATE:** 12-12-11

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.1 INSTRUCTIONS TO BIDDERS

A. The form is AIA A701 – 1997 Edition

B. A sample copy of the agreement is available for viewing. Contact the office of the Construction Management Advisor.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

OWNER: University of South Carolina
PROJECT NUMBER: H27-6069-AC-2
PROJECT NAME: Darla Moore School of Business Construction - Bid Package 2 - Structure
PROJECT LOCATION: University of South Carolina

PROCUREMENT OFFICER: Michelle Adams

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.

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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

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

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.

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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.

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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.

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-responsible

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."*

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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

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: Campus Planning and Construction
Address of Building: 743 Greene Street, Columbia, SC 29208
WEB site address (if applicable): NA
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.

OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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 capped at $50,000 per year or the total tax liability; whichever is lesser. The taxpayer is eligible to claim the credit for 6 consecutive taxable years beginning with the taxable year in which the credit is first claimed. There is no carry forward of unused credits. 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

CONSTRUCTION MANAGEMENT SERVICES

It is noted that the University has employed the services of a Construction Manager for this project to act as their representative and to assist in the planning, coordination and management of project activities on behalf of the University. The Contractor shall fully cooperate with the Construction Manager in all regards. Additional information and requirements are indicated within division 1 specification sections.

END OF DOCUMENT

BID BOND

PART 1 GENERAL

1.1 BID BOND

A. The form is AIA A310 – 2010 Edition

B. A sample copy of the agreement is available for viewing. Contact the office of the Construction Manager.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SE-330 – LUMP SUM BID
BID FORM

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

BID SUBMITTED BY:_____
(Bidder's Name)

BID SUBMITTED TO: University of South Carolina
(Owner's Name)

FOR PROJECT: NAME Darla Moore School of Business Construction - Bid Package 2: Structure

PROJECT NUMBER H27-6069-AC-2

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):*** All Civil work as shown on bid documents.

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

SE-330 – LUMP SUM BID
BID FORM

§ 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-3A)***

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
Concrete		
Structural Framing		
ALTERNATE 1		
NA		
ALTERNATE 2		
NA		
ALTERNATE 3		
NA		

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.

SE-330 – LUMP SUM BID
BID FORM

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 associated with this project within 280 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 $2,500.00for 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

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: _____

ADRESS: _____

_____

BY:_____ **DATE:**_____
(Signature)

TITLE:_____

TELEPHONE:_____

EMAIL: _____

00 50 00 - OWNER AND CONTRACTOR AGREEMENT

PART 1 GENERAL

1.1 AGREEMENT

A. The agreement form is AIA A101

1.2 REFERENCE STANDARD

A. AIA A201 – General Conditions of the Contract for Construction, 2007 Edition

B. A sample copy of the agreement is available for viewing. Contact the office of the Construction Management Advisor.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 00 50 00

OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

OWNER: University of South Carolina
PROJECT NUMBER: H27-6060-AC-2
PROJECT NAME: Darla Moore School of Business Construction - Bid Package 2: Structure

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: Jeff Lamberson
Title: Director, Campus Planning and Construction
Address: 743 Greene Street, Columbia, SC 29208
Telephone: 803-777-5818 **FAX:** 803-777-8739
Email: jlambers@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 Stree, Columbia, SC 29208
Telephone: 803-777-5818 **FAX:** 803-777-8739
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: _____

OSE FORM 00501
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: Joyce Ignacio
Title: Project Manager
Address: 50 Vandam Street, New York, NY 10013-1102
Telephone: 212-924-5060 **FAX:** 212-924-5858
Email: JIgnacio@rvapc.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

00 80 00 – GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

PART 1 GENERAL

1.1 GENERAL CONDITIONS

A. The General Conditions of the Contract for Construction form is AIA A201

1.2 REFERENCE STANDARD

A. AIA A201 – General Conditions of the Contract for Construction, 2007 Edition

B. A sample copy of the form is available for viewing. Contact the office of the Construction Management Advisor.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 00 80 00

OSE FORM 00811
STANDARD SUPPLEMENTARY CONDITIONS

OWNER: University of South Carolina
PROJECT NUMBER: H27-6060-AC-2
PROJECT NAME: Darla Moore School of Business Construction - Bid Package 2: Structure

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.

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.

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 and fourth sentences 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 under Section 3.8.2.1, as documented by invoices, and the allowance amounts.

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

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 Contactor 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 before the opening words "The Contractors shall."*

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 word "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.

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 is 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

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;

.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:

.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.

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.

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

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.

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."*

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) $1,000,000
- (b) Products/Completed Operations $1,000,000
- (c) Personal and Advertising Injury $1,000,000
- (d) Each Occurrence $1,000,000
- (e) Fire Damage (Any one fire) $50,000
- (f) Medical Expense (Any one person) $5,000

(2) BUSINESS AUTO LIABILITY (including All Owned, Non-owned, and Hired Vehicles):
- (a) Combined Single Limit $1,000,000

(3) WORKER'S COMPENSATION:
- (a) State Statutory
- (b) Employers Liability ..... $100,000 Per Acc.
  ..... $500,000 Disease, Policy Limit
  ..... $100,000 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

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.

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 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.

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 to 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.

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 Caroline 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.

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

.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;

.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.

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 waive 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)

attorney's fees, (vi) any interest; (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waive 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.

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: By Agency
- ☒ Structural: By Agency
- ☐ Mechanical: _____
- ☒ Plumbing: By Agency
- ☐ Electrical: _____
- ☐ Gas: _____
- ☐ Other *(list)*: _____

Remarks: Independent Testing & Inspection as selected and paid by Agency.

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)*
None

16.3. Requirements for Record Drawings, if any. *(Refer to attachments as needed.* If *none, enter NONE)*
Per Section 01 77 00

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)*
Per Sections 01 33 00 . 01 60 00 and technical specifications.

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)*
Per section 01 50 00

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

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

USC SUPPLEMENTAL GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.

2. Fraternization between Contractor's employees and USC students, faculty or staff is strictly prohibited-zero tolerance!

3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to $500 per violation.

4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.

5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.

6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.

7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.

8. The Contractor's lay-down area is identified on the plans. This area will also be used for the Contractor's work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Vehicles parked in the lay down area (or designated parking areas) will be clearly marked or display a CPC furnished placard for identification.

Updated: July 15, 2011

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.

10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.

11. For all projects over $100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.

12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least one time per week. Construction waste must not be placed in University dumpsters. THE CONSTRUCTION SITE MUST BE THOROUGHLY CLEANED WITH ALL TRASH PICKED UP AND PROPERLY DISPOSED OF ON A DAILY BASIS AND THE SITE MUST BE LEFT IN A SAFE AND SANITARY CONDITION EACH DAY. THE UNIVERSITY WILL INSPECT JOB SITES REGULARLY AND WILL FINE ANY CONTRACTOR FOUND TO BE IN VIOLATION OF THIS REQUIREMENT AN AMOUNT OF UP TO $1,000 PER VIOLATION.

13. **Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.**

14. The contractor will comply with all regulations set forth by OSHA and SCDHEC. Contractor must also adhere to USC's internal policies and procedures (available by request). As requested, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.

15. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 5' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 4" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone. NOTE: Tree protection measures have been installed during a prior phase of this project. The Contractor is responsible for maintaining and/or repairing the installed measures due to any damages caused by the Contractor's work or operations.

16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.

17. For projects requiring heavy loads to cross walks tree root zones or lawns. A construction entry road consisting of 10' X 16' oak logging mates on 12" coarse, chipped, hardwood

base. Mulch and logging mats shall be supplemented throughout the project to keep matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated before final payment is made.

19. Orange safety fence to be provided by the contractor. (USC Arborist, Kevin Curtis may be contacted at 777-0033 or 315-0319)

Campus Vehicle Expectations

1. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.

2. All motorized vehicle traffic on USC walkways must first receive the Landscape Manager's authorization. Violators may be subject to fines and penalties.

3. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.

4. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.

5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.

6. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.

7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.

8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.

9. All incidents of property damage will be reported to Parking Services or the Work Management Center.

10. Parking on campus is restricted to spaces designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be "fixed". Parking spaces are restricted to work vehicles only; no personal vehicles.

Project Name: Darla Moore School of Business Construction – Bid Package 2: Structure

Project Number: H27-6069-AC-2

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 _____

SE-355 2011 Edition

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: _____
Address:_____
_____

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: DMSoB Const. - Bid Package 2: Structure
State Project Number: H27-6069-AC-2
Brief Description of Awarded Work, as found on the SE-330, Bid Form: All sub-structure, super-structure and associated work as shown on Bid Documents

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

Name: Rafael Vinoly Architects PC
Address:50 Vandam Street
New York, NY 11013-1102

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

2011 Edition

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: _____
Address:_____
_____

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: DMSoB Const. - Bid Package 2: Structure
Project Number: H27-6069-AC-2
Brief Description of Awarded Work, as found on the SE-330, Bid Form: All sub-structure.super-structure and associated work as shown on Bid Documents.

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

Name: Rafael Vinoly Architects PC
Address:50 Vandam Street
New York, NY 10013-1102

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)

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 §11-35-3020(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 o ne 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.

TECHNICAL SPECIFICATIONS

DIVISION 1- GENERAL REQUIREMENTS

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Project Identification: Darla Moore School of Business Construction, State Project No. H27-6069-AC, University of South Carolina, Columbia, South Carolina.

B. The Project consists of both sub-structure and super-structure elements for the construction of a new 6-story facility of approximately 256,068 square feet for the Business School at the University of South Carolina. The project includes, but is not limited to: excavation, foundations, cast concrete walls, waterproofing and backfill, steel erection, and placement of concrete slabs on grade and elevated concrete slabs. This is Phase 3 of a multi-phased project.

C. This is a designated contract directed towards certified South Carolina based minority firms to satisfy the MINORITY BUSINESS goal of the Agency. However, this does not prevent other firms from bidding on this project.

1. Project Location: Columbia, South Carolina.
2. Owner: University of South Carolina.

D. Architect: The Architect of Record for the Project is Rafael Vinoly Architects PC, 50 Vandam Street, New York, NY 10013.

E. Construction Manager: The Construction Manager for the Project is the Joint Venture of Gilbane Cumming|SMG, 1213 Lady Street, Columbia, SC 29201.

1.3 COORDINATION OF WORK SEQUENCE

A. Coordinate performance of all work with the Construction Manager, Owner, and all other Prime Contractors and sub-contractors.

B. 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.

C. Project Phasing Requirements: This project includes two phases of work and is part of a project with additional phases. Phases of the project are as indicated below and it is noted that the work of this contract will overlap with work that has been previously bid and awarded as well as with work of a subsequent phase. The contractor shall fully cooperate with the Owner and Construction Manager and shall coordinate their own activities so as not to interfere with the work of other contractors. Phasing and additional information is noted as follows:

1. Phase 1 Utility Relocation: This package has been previously awarded and work is currently underway. The package consists of work required to relocate a high voltage electrical service running across the west side of the project site. The physical work of the

package is entirely within the right-of-way of Greene and Park Streets adjacent to the site and the contractor does not have any work on the actual project site itself. This work must be completed prior to demolition of the current electrical feed and associated ductbank. It is also noted that the University is in the process of relocating telecom lines which also run across the project site and that these lines may not be disturbed until this process is complete.

2. Phase 2 (Bid Package 1C) Civil:

   a. Site Preparation: The initial work of the Phase 2 Civil package is the preparation of the site for following bid packages. This work includes site clearing and demolition, earthwork, permanent shoring and site utilities.
   b. The primary intent of the Phase 2 Civil package is to establish grades and site conditions as indicated in the contract documents, access through the site to the building pad area, installation of sediment and erosion control measures, utility rough-ins throughout the site, and to expedite the preparation of the site to aid in the timely commencement of other construction activities. Work on the building pad, and proper access to such, (collier is not building this guy a road – also need to say that they need to provide roads and ramps as needed for the pads) will be in process at the time of award for the BP-2 Structure bid package, and will be completed to the extent to allow foundation work on a minimum of one of the four building quadrants to begin no later than 30 days from the Date of Commencement for the Phase 3 BP-2 Structure bid package.
   c. Completion of Site Civil: The BP-1C Contractor will re-mobilize and complete remaining civil work near the end of the project.

3. Phase 3 (BP-2 Structure - <u>THIS CONTRACT</u>):

   a. This package will consist of installation of foundations, cast concrete walls, concrete slabs on grade and elevated concrete slabs and steel structure for the new building. The contractor will be responsible for backfill of retaining walls and building exterior to establish finish sub-grade elevation.

   b. The work associated with this package will commence prior to completion of the first phase of work of the Phase 2 (BP-1C) Civil Contractor as noted above. The contractor will coordinate mobilization and start-up activities with the Construction Manager and the BP-1C Civil Contractor. Areas of the building pad and access to such will be made available for the start of foundations included in BP-2 Work. Initial foundation work should focus on core and shear wall areas on the east side of the structure. The BP-1C Civil Contractor will be completing work of their contract as BP-2 foundations progress from east to west.

   c. The award for the BP-3 Enclosure Finishes MEPF contract (see Phase 4 below) will occur after award of the BP-2 Structure contract, but prior to the placement of slabs-on-grade and elevated slabs. The BP-2 Structure Contractor will provide all sleeves, block-outs and other elements as indicated on the contract drawings. The BP-3 Contractor will coordinate with the Construction Manager and the BP-2 Structure Contractor for the timely and proper placement of any other required embeds, sleeves, inserts and other rough-ins below the slabs-on-grade and within elevated concrete slabs. The BP-2 Structure Contractor should anticipate that the placement of slabs-on-grade will occur after steel and metal deck erection has commenced due to the required coordination and installation of below slab rough-ins. The BP-2 Structure Contractor will in general work east to west and allow for mobilization of the BP-3 Contractor after BP-3 contract award to allow underground and exterior enclosure work to begin.

4. Phase 4 (BP-3) Enclosure / Finishes and MEPF: This package will consist of the exterior walls, roofing, finishes, mechanical, plumbing, electrical and all other components necessary to complete construction of the new facility. The BP-3 Contractor will mobilize and begin work after bidding and contracting of the BP-3 Package. This is anticipated to occur approximately 140 days after the Date of Commencement for the BP-2 Structure Contractor. The BP-2 and BP-3 Contractors will both be required to coordinate all work with the Construction Manager to allow for concurrent work and comply with all relevant safety plans and procedures. Safety plans must be site-specific to address coordination with other trades and relevant conditions.

1.4 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. For the work included in this contract (Bid Package BP-2 Structure), the Date of Substantial Completion shall be two hundred eighty (280) calendar days from date of written Notice of Commencement. Substantial Completion for the Contract shall be defined as "All work for the building structure complete with decking installed, inspected, and approved for rough-ins and preparation for placement of concrete at all levels." As the actual placement of concrete for slabs-on-grade and elevated slabs is dependent upon rough-ins provided under another contract, the concrete placement is excluded from consideration of Substantial Completion.

B. Should the contractor fail to have all work completed within the time specified, the contractor shall be accessed Liquidated Damages in the amount of two thousand five hundred dollars ($2,500.00) per calendar day that the actual Date of Substantial Completion exceeds the approved Date of Substantial Completion.

C. Final Completion is to be achieved within 30 days of the Date of Substantial Completion. If Final Completion is not achieved within this timeframe, and failing approval of the Construction Manager and Architect, the contractor will be assessed Liquidated Damages in the amount indicated above for each calendar day that Final Completion exceeds this timeframe. Final Completion is defined as "All concrete for slabs-on-grade and elevated slabs placed and accepted and all punch list work approved and accepted". Should slab placement be delayed due to incomplete work provided under another contract through no fault of the BP-2 Structure Contractor, the timeframe noted above shall be extended accordingly.

1.5 INCENTIVE CLAUSE

A. The Owner has provided for a Tiered Incentive Clause to be included with this contract. To be eligible for award of incentives, the Contractor must meet the requirements of Substantial Completion for the building structure as indicated above in 1.4.A. Tiered Incentives (non-cumulative) will be awarded as follows:

	GOAL	*REWARD*
Tier 1:	Meet Substantial Completion Two Weeks Early	$100,000.00
Tier 2:	Meet Substantial Completion Four Weeks Early	$250,000.00
Tier 3:	Meet Substantial Completion Six Weeks Early	$500,000.00

1.6 USE OF PREMISES

A. General: Contractor shall have concurrent use of the premises for access and construction operations as noted in the Project Phasing Requirements of this section. Use of the premises is limited by Owner's right to perform work and to retain other contractors on portions of Project.

B. Limit use of premises to allow:

1. Owner occupancy.
2. Work by Owner and other Bid Package Contractors.

C. Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb existing conditions beyond the areas in which the Work is indicated.

1. Existing trees and other vegetation indicated to remain must be carefully protected from soil compaction or physical damage from construction traffic.

D. Maintain Owner's continuous building services and operations. Construct Work in phases to accommodate Owner's occupancy requirements during the construction period. Coordinate construction schedule and operations with Owner.

E. The following are prohibited on the site:
1. Alcoholic beverages and drugs.
2. Smoking anywhere on premises.
3. Radios, televisions and other noise-making devices.
4. Dogs and other pets.
5. Workers' personal vehicles.
6. Advertising and protest signs.
7. Sale or trade of any items.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-Division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity

to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 25 00 – CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. NO EXTRA WORK SHALL BE PERFORMED WITHOUT FIRST RECEIVING WRITTEN APPROVAL FROM THE CONSTRUCTION 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 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.

1.3 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.

1.4 SUBMITTALS

A. Make submittals directly to the Construction Manager.

B. Submit the number of copies called for under the various items listed in this Section along with appropriate back-up materials.

1.5 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 Construction Manager and/or Architect 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 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 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 as provided for under subparagraphs 4.3.5 and 4.3.7 of the General Conditions.

C. If the Contractor has been directed by the Construction Manager and/or Architect 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 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 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 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 in writing when avoidance no longer is practicable.

1.6 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

A. Make written reply to the Construction Manager and/or Architect 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 a 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 Construction Manager will issue a "Change Order" to the Contractor.

1.7 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, Construction Manager and the Architect.

C. The Construction Manager will issue five copies of each Change Order to the Contractor.

1. The Contractor shall promptly sign all five copies and return all five copies to the Construction Manager.
2. Should the change order exceed Agency certification limits, the Construction Manager will then forward five copies to the University and the University will forward to the OSE for review.
3. The Construction Manager will then forward five copies to the Architect for his signature.
4. The Architect will sign all five copies and then forward five copies to the Owner for his signature.
5. 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, and Architect.

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 Construction Manager with copy to the Architect 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 29 00 – APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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'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 as described in Section 01 77 00 of these Specifications.

1.3 QUALITY ASSURANCE

A. Prior to approval of payment application number one, secure the Construction Manager's approval of the project schedule and the schedule of values required to be submitted as further described in Section 01 29 01 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.

1.4 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:

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. On all payment applications, include the Project number, P.O. number and the Capital Projects number.
3. Sign and notarize the Application and Certificate for Payment.
4. 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.
5. The Construction 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 for Approval;
   b. After approval of Architect, Four copies to Owner.

6. Request for Payment against any change order will not be honored until the change order is signed by all appropriate parties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 29 01 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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. Schedule of Values is required to be compatible with the continuation sheet and accompanying applications for payment, as described in Section 01 29 00.

1.3 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, provide copies of the subcontractor's Schedule of Values or other data acceptable to the Construction Manager and/or Architect, substantiating the sums described.

1.4 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.
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 materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
5. 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.

6. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. General project coordination procedures.
2. Conservation.
3. Administrative and supervisory personnel.
4. Project meetings.
5. Requests for Interpretation (RFI's)

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

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

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

1.4 CONTRACTOR'S PERSONNEL

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

B. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 PROJECT MEETINGS

A. General: The Construction Manager shall schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: The Construction Manager shall inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: The Construction Manager shall prepare the meeting agenda and distribute the agenda to all invited attendees.
3. Minutes: The Construction Manager shall record significant discussions and agreements achieved. Construction Manager to distribute the meeting minutes to everyone concerned, including Owner, Architect and Contractor, within five days of the meeting.

B. Pre-construction Conference: The Construction Manager shall schedule a pre-construction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. The Construction Manager shall conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing.
d. Designation of responsible personnel.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for processing Applications for Payment.
g. Distribution of the Contract Documents.
h. Submittal procedures.
i. Preparation of Record Documents.
j. Use of the premises.
k. Responsibility for temporary facilities and controls.
l. Parking availability.
m. Office, work, and storage areas.
n. Equipment deliveries and priorities.

o. Safety/first aid.
p. Security.
q. Progress cleaning.
r. Working hours.
s. Quality.
t. Waste Management Plan

C. Pre-installation Conferences: The Construction Manager shall conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. The Construction Manager shall advise Owner, Architect and Contractor of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Submittals.
g. Review of mockups.
h. Possible conflicts.
i. Compatibility problems.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written recommendations.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Required performance results.
u. Protection of construction and personnel.

3. Minutes: The Construction Manager shall record significant discussions and agreements achieved. Construction Manager to distribute the meeting minutes to everyone concerned, including Owner, Architect and Contractor, within five days of the meeting
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress (Owner/Architect/Contractor - OAC) Meetings: The Construction Manager shall conduct progress meetings on the second and fourth Thursday of each month or at the convenience of all parties.

1. Attendees: In addition to representatives of Owner, Architect, Contractor, each major subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these

meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
   b. Review present and future needs of each entity present, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
      9) Work hours.
      10) Hazards and risks.
      11) Progress cleaning.
      12) Quality and work standards.
      13) Change Orders.
      14) Requests for Information (RFIs).

3. Reporting: The Construction Manager Shall record significant discussion and agreements achieved. The Construction Manager shall distribute to everyone in attendance within five working days of the meeting.

   a. Schedule Updating: Revise Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.6 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project Meeting, prepare and submit an RFI in the form specified.

   1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

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

   1. Project name.
   2. Date.
   3. Name of Contractor.

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

    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs:

1. Identify each page of attachments with the RFI number and sequential page number.

D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

1. RFI shall be electronic file in Microsoft Word format.
2. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager, Architect and Owner in writing within 10 days of receipt of the RFI response.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five days if Contractor disagrees with response.

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at O.A.C. meetings.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect
4. RFI number including RFIs that were dropped and not submitted.

5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.4 GENERAL REQUIREMENTS

A. This Section specifies general requirements and procedures for preparing and submitting shop drawings, product data, and samples.

B. Submittal requirements specified in this Section apply to shop drawings, schedules, working drawings, certifications, calculations, test data, samples, product data and any other supplementary data required to amplify the Contract Drawings, show arrangements and details, and/or provide comprehensive descriptions of the Work to be performed.

1. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
2. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.
3. Samples and mock-ups are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

C. Submittal of shop drawings, product data, samples, etc., specially prepared for the Work by any Subcontractor, manufacturer, supplier, or distributor shall be made through the Contractor.

D. Calculations as submitted shall be certified by a Professional Engineer registered in the State of South Carolina and shall convey, or be accompanied by sufficient information to completely explain the structure, machine or system described and its intended manner of use.

E. Pertinent submittal requirements are specified in the several Sections of the Specifications. Specific requirements set forth in the Specifications for furnishing submittals for any particular

portion of the Work shall not limit the obligation of the Contractor to furnish submittals for any other portion when so required.

F. The Contractor shall allow enough time for a maximum 3 full review and revision cycles for submittal of shop drawings, product data and samples to ensure an adequate allowance of time for the submittal process. A cycle is made up of the separate review/ revision periods of the Contractor and the Architect.

G. Refer to individual Specification Sections, to the General Conditions, and to other Sections in Division 1 for specific requirements on submittal of closeout information.

H. No portion of the Work requiring submission of shop drawings, product data, samples, etc., shall be commenced until the submittal has been reviewed, acted on, and satisfactorily completed. All such portions of the Work shall be completed in accordance with the accepted submittal, or submittals.

I. The Contractor shall be responsible for, and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of the Work prior to approval, or acceptance, of the necessary submittals.

J. The Contractor shall review all submittals, forwarding to the Architect those submittals which meet the requirements of their section and returning to the Contractor for resubmission those submittals which require modification or adjustment.

K. Failure of the Architect to note unacceptable submissions shall not be deemed to relieve the Contractor of his responsibility for completing the Work in accordance with the requirements expressed in the Contract Documents.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor within the first sixty (60) days of the Notice to Proceed, for Contractor's use in connection with Project, subject to the following conditions:

1. Terms and Conditions of Use of Documents: Refer to Exhibit "A".

1.6 LEED BUILIDING Submittal Requirements.

A. The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed LEED BUILDING MATERIALS CERTIFICATION FORM. Information to be supplied for this form shall include:
   a. Material cost(s) for building materials included in contractor's or subcontractor's work. The Materials cost shall not include costs associated with contractor's or subcontractor's labor or equipment.
   b. The amount of post consumer and/or post industrial recycled content in the supplied product(s).
   c. The location of origin and manufacture for the supplied product(s).
   d. The amount of "FSC Certified" wood product(s) used*.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the LEED BUILDING MATERIALS CERTIFICATION FORM.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria identified in each specification.
4. Documentation for "FSC Certified" wood products. Provide Chain-of-Custody documentation, per Forest Stewardship Council criteria for all wood materials that require FSC Certification in these specifications.
5. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
6. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Architect for review. Incomplete or inaccurate LEED BUILDING submittals may be used as the basis for the Architect's rejection of products or assemblies.

1.7 SUBMITTAL PROCEDURES

A. Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

B. The Contractor shall review all shop drawings, product data, and samples for compliance with the Contract Documents and shall certify that the Contractor has done so by stamp, or otherwise, affixed to each copy thereof. At the time of submission, the Contractor shall inform the Architect and Agency in writing of any deviation in the shop drawings, product data, or samples from the requirements of the Contract Documents.

1. By approving and submitting shop drawings, product data and samples, the Contractor thereby represents that the Contractor has determined and verified all field dimensions, field construction criteria, materials, catalog numbers and similar data, or will do so, and that the Contractor has checked and coordinated each shop drawing, product data and sample with the requirements of the Work and the Contract Documents and shall so certify as required above.

C. Contractor shall prepare and process a submittal, with reasonable promptness and in orderly sequence so as to cause no delay in the Work or in the work of the Agency or any separate contractor, submittals required by the Contract Documents or subsequently by the Construction Manager, Architect, or the Agency, to more fully explain or illustrate some portion of the Work. Sequence submission of shop drawings, product data, samples, etc., such that all information is available for reviewing each submittal when it is received. Partial or piecemeal submittals are not acceptable and will be returned without action.

D. Contractor shall not make submittals which are incomplete or which do not comply with the Contract Documents.

E. Contractor shall coordinate and effectively sequence different categories of submittals for the same work and for interfacing units of the Work, so that one will not be delayed for lack of coordination with another.

F. Submittals shall indicate compliance with called for standards and codes, and identify materials. Coordination details shall be clearly noted. Include complete information for making necessary connections with related and adjoining Work.

G. By approving and submitting shop drawings, product data, samples, etc., the Contractor

represents: (i) that he has determined and verified materials, quantities, dimensions, specified performance criteria, catalog numbers, field measurements, field construction criteria, installation requirements, and similar data related thereto, or will do so with reasonable promptness ; and, (ii) that he has checked, reviewed, and coordinated the information contained within each such submittal with other submittals and with the requirements of the Work and with the requirements appearing in the Contract Documents.

1. Data shown on submittals shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to permit the Architect to review the information.
2. At the time of each submission, the Contractor shall give the Architect specific written notice of each variation that the submittal may have from the Contract Documents.
3. The Contractor shall note on resubmissions revisions other than the revisions or corrections on previous submittals.
4. Submittals which do not conform to the requirements stated in the Contract Documents will be considered unacceptable, unless otherwise determined acceptable under the provisions of Paragraph "REVIEW".
5. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the requirements contained in the Contract Documents, even though submittals have been reviewed and approved, or accepted.

H. Deliver submittals to the Construction Manager, via courier service, hand conveyance, post paid express mail, United Parcel Service or other equally good and sufficient pre-paid delivery (refer to paragraph BB. Below for electronic submittal through the iBuild Management System).

1. Delivery time is part of the review and revision period of the Contractor, Construction Manager or Architect initiating the delivery.
2. Charges in connection with the delivery of submittals to Architect's office or where directed by Construction Manager shall be paid by Contractor.
3. Submittals received after 5:00 P.M. will be logged in and considered received the next business day.

I. The Construction Manager shall review all submittals prior to distribution to the Architect for review. After review and if acceptable to the Construction Manager, the submittal shall be forwarded to the Architect for review with the Construction Manager's stamp indication the submittal has been reviewed. Construction Manager will return submittal that are incomplete or not in accordance with the requirements of the Contract Document. Returned submittals by the Construction Manager will not be considered in the review time process.

J. The Contractor shall initiate the submittal process for each submittal a minimum of 30 calendar days in advance of the date the approved submittal is required to ensure a timely and orderly sequence of construction without delay of the work.

K. A Submittal cycle begins the day the Construction Manager receives the submittal from the Contractor.

L. Once the submittal process is initiated, the Contractor must allow for all three complete review/ revision/ delivery periods by the Construction Manager and Architect to run consecutively without interruption. For each party a period begins the day a submittal is received and ends one day prior to the day it is received by the next reviewing party.

M. Review Cycle:

1. Initial Review: Allow fifteen (15) calendar days for initial review of each submittal, or thirty

(30) calendar days for complex submittals. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in the same manner as initial submittal.
3. Resubmittal Review: Allow fifteen (15) working days for review of each resubmittal, or thirty (30) calendar days for complex resubmittals.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to the Architect and the Architect's consultants, allow fifteen (15) days for review of each submittal. Submittal will be returned to the Architect before being returned to the Contractor.
5. If, after the second review of the submittal, approval or approval with corrections is not achieved, the Contractor shall meet with the Construction Manager and Architect to determine the necessary conditions required to achieve approval or approval with notations. Cost of the Architect's (and applicable Consultant's) time for additional reviews shall be borne by the Contractor.

N. If two review/ revision/ delivery periods have been completed without an approval of the submittal, the Contractor, Construction Manger and the Architect will hold a coordination meeting after the Contractor has reviewed the Architect's latest comments. This meeting shall take place during the Contractor's allotted review period and in no way suspends the time allotted for the submittal process.

O. Submittals shall be accompanied by a Submittal Form/Cover Sheet of transmittal from the Contractor. Number transmittals consecutively. Indicate if submittal is original or resubmittal. On resubmittals, note the Architect's file number and project identification.

P. Provide each submittal and letter Submittal Form/Cover Sheet with the all the data required to be filled in.

Q. The Construction Manager and Contractor shall maintain one (1) complete set of final submittals at project site for reference. Each Contractor shall maintain one (1) complete set of final submittals at plant or shop office and at the project site for reference.

R. Provide additional submittals for distribution to subcontractors, materialmen, suppliers, fabricators, governing authorities and others as necessary for proper performance of the Work. Include such additional copies in transmittal to Architect and Agency where required before final distribution. Record distribution on transmittal forms.

S. Each transmittal shall have a dated transmittal number (whether first, second, third, etc.) and each transmittal after the first shall be clear of previous stamps.

T. The Contractor shall review each submittal and if it is acceptable, meeting the requirements of this section and showing the correct scope of work, and shall certify in writing on the submittal and forward the submittal to the Architect and all other appropriate consultants for their review and action. Distribution to consultants shall be determined by the Architect.

U. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

V. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

W. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 8 x 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Unique identifier, including revision number.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Other necessary identification.

X. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

Y. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Architect will return without review, submittals received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
3. Transmittal Form: Use AIA Document G810 or other form approved by Architect.

Z. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

AA. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

BB. The Construction Manager, along with the Owner and Architect, has elected to utilize iBuild. iBuild is an internet based program designed to enhance collaboration amongst the project team members. There are no fees to utilize iBuild.

iBuild requires Internet Explorer version 7.0 or higher, a current version of PDF writer, Windows XP, Vista, Windows 7 supported, and a high speed internet connection. The use of PDF, jpg (photos only) or dwg files will be required as upload formats for this system.

iBuild will be used to submit and answer all RFIs generated following contract award, to process electronic review and distribution of submittals, contract documents, rolling completion lists, punch lists, and daily reports. Each Contractor will be given a user account for iBuild, and will be required to submit electronically as per the iBuild format, all items as listed above. "Submit electronically" means to fill in the iBuild form and upload any corresponding documents.

Contractors that do not utilize iBuild, and instead provide hard copies of required documentation, will be responsible for related document transmission fees and document reproduction fees. Please notify the Construction Manager of any issues relating to the use of iBuild prior to bid date.

iBuild will be used as the mechanism for the Construction Manager to electronically provide all project related documents to Contractors. This specifically includes Contract Documents and Shop Drawings. NO HARD COPIES WILL BE PROVIDED BY THE CONSTRUCTION MANAGER, UNLESS PREVIOUSLY ARRANGED. If a Contractor requires printed copies of documents, all costs for printing and distribution of those documents shall be borne by the Contractor. This includes costs for all Contract Documents (bid sets and changes), shop drawings, coordination drawings, etc.

The iBuild electronic submittal process requires the Contractor to provide 1 hard copy (if requested) with electronic submission (shop drawings and as-builts, O&Ms), and 3 hard copies after review. These hard copies are for the Construction Manager's use and records. It remains the Contractor's responsibility to obtain/maintain copies of all documents required for the Contractor to complete their work.

The requirement for samples remains unchanged. The Contractor is responsible to arrange delivery to the jobsite of the required number of physical samples of each required item. All submittals intended for color selection and verification shall be provided as physical samples. *The Contractor shall be solely responsible for any cost resulting from color variation introduced by the use of electronic media in the submittal process.*

iBuild generates e-mail notifications to alert participants of actions required. The Contractor shall be responsible for accurate and current e-mail contact information for all project team personnel. The Contractor shall be responsible for timely interaction and response to assigned tasks through iBuild. The Construction Manager is not responsible to provide the Contractor duplicate notification via any other system. The Contractor's project team shall have continuous access to a computer, internet and e-mail to facilitate the effective use of these tools.

The Construction Manager will provide iBuild orientation and training for the Contractor's project personnel at no cost to the Contractor. The Contractor is responsible to complete the training within two weeks of contract award. On-line training is also available. The Contractor shall have their project team participate in this training at no additional cost to the Construction Manager or Owner.

1.8 SHOP DRAWING REQUIREMENTS

A. Provide shop drawings with graphic data accurately scaled and dimensioned. List reference Contract Drawing numbers and shop drawing numbers for related work by subcontractors, materialmen, sub-subcontractors, and fabricators. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.

B. Symbols and numbers used on the Contract Drawings and in the Schedules shall be used on

shop drawings or shall be shown in parenthesis. Items shown on shop drawings shall be clearly identified with their location in the Work, or by sheet or detail number in which they appear.

C. Contract Drawings shall not be reproduced or used for shop drawings or erection purposes without prior written approval of the Architect.

D. Number shop drawings consecutively. Shop drawings shall be of uniform size, form, and title as the Architect may require.

E. Drawings, the original design for which is the responsibility of the Contractor, shall bear the seal of a Professional Engineer registered in the State of South Carolina.

F. Shop drawings shall show design, dimensions, kinds of materials, connections, and other details necessary to insure that requirements appearing in the Contract Documents are accurately interpreted. Shop drawings shall show proper connections with adjoining work in detail. Where adjoining work requires shop drawings, such drawings shall be submitted for review at the same time so that connections can be accurately checked.

G. Shop drawings shall: (i) establish the actual detail of manufactured or fabricated items and indicate proper relation to adjoining work; (ii) incorporate minor changes of design or construction details to suit actual conditions; and, (iii) supplement the Contract Drawings by correctly reflecting field conditions and incorporating required field measurements. Identify and verify where field dimensions are required and obtain required field dimensions.

H. Where separate Sections are involved, shop drawings shall be coordinated and where required by the Architect shall be submitted in composite form clearly designating Section, subcontractor, or trade, and compliance responsibility. The words "work by others" will not be accepted.

I. The approval of shop drawings, product data or samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Agency and the Professional in writing of such deviation at the time of submission and the Agency or the Architect has not objected to the specific deviation. The approval shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings, product data, or samples. The approval of a separate item shall not indicate approval of an assembly in which the item functions.

J. If the Contractor considers any correction indicated on the revised shop drawings to constitute a change to the Contract Documents or Specification, written notice shall be given promptly to the Agency and the Architect.

K. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

1.9 COMPOSITE DRAWINGS

A. In the interest of coordination and expediting the Work in all areas, the Contractor shall prepare and submit to the Architect composite drawings embodying the Work of the various trades and/ or subcontractors involved.

B. After review, the Contractor shall distribute prints of reviewed composite drawings to affected trades and/ or subcontractors. Require that involved trades and/ or subcontractors cooperate in preparation of the composite drawings to assure proper coordination between trades and/ or subcontractors. Participating trades shall indicate their approval on these composite drawings.

C. Prepare composite drawings and installation layouts when required to solve field conditions.

Such drawings shall include dimensioned plans, sections and elevations, shall indicate layout and dimensions of ductwork with relationship to plumbing, heating, and chilled water piping, and shall give complete information, particularly size and location of sleeves, inserts, attachments, openings, and structural interferences.

D. Prepare composite drawings at a scale of not less then 1/4 in. = 1 ft. 0 in. Show components at verified field locations. Insure allocation of adequate space for clearance, connection, maintenance, and accessibility.

E. On composite drawings, include the following:

1. Composite drawings and field installation layouts shall be coordinated in the field by designated Contractor and subcontractors for consistency and proper installation relationships based on field conditions. They shall be checked for accuracy and approved by affected subcontractors, trades, etc., before submission.

1.10 DRAWING SUBMITTAL PROCEDURES

A. Submit digital prints of shop drawings to the Architect. Distribution to consultants will be determined by the Architect.

B. The Contractor shall review the drawings to insure and certify that they comply with requirements of Contract Documents before delivering them to the Construction Manager.

1.11 REVIEW

A. Architect will review submittals in 14 calendar days. Review will be only for conformance with the design concept of the Project and with the information given in the Contract Documents and will not extend to means, methods, techniques, sequences or procedures of construction (except where specific means, methods, techniques, sequences or procedures of construction are required by the Contract Documents). The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required and shall return the required number of corrected copies of shop drawings and submit as required new product data and samples for review and approval.

B. Review and approval of submittal samples shall not relieve Contractor from responsibility for any variation from the requirements appearing in the Contract Documents unless Contractor has in writing called the attention to each such variation at the time of submission and the Architect has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the shop drawing, product data, or sample approval; nor will any approval relieve Contractor from responsibility for errors or omissions in the submittal from responsibility for proper fitting of the Work, nor from the necessity of furnishing all work required by the Contract Documents.

C. Submittals need to be complete and Architect may return submittal without review in the event that adjacent assemblies, work of other trades, existing conditions, etc. are not adequately described to permit determination of the suitability of the submittal.

D. Following review, Architect will note one (1) of the following actions. The actions are:

1. "Provide as Submitted": "Provide as Submitted" means the submission is in general conformance with design concept. Construction, fabrication and/ or manufacture can proceed subject to the provision that the work shall be in accordance with the requirements

of the Contract Documents. Final acceptance of the work shall be contingent upon such compliance.

2. "Provide as Noted": "Provide as Noted" means the submission is in general conformance with the design concept subject to notations on the returned Shop Drawings. Construction, fabrication and/ or manufacturer can proceed subject to the provision that the work shall be carried out in compliance with all annotations and/ or corrections indicated on the returned Shop Drawings and Product Data and in accordance with the requirements of the Contract Documents. Final acceptance of the work shall be contingent upon such compliance.
3. "Revise and Resubmit": "Revise and Resubmit" means that the Contractor shall revise and resubmit the Shop Drawings and Product Data in accordance with all annotations and/ or corrections indicated therein. If construction, fabrication and/ or manufacture proceeds it is at the Contractor's risk. Shop Drawings and Product Data bearing "Revise and Resubmit" stamp shall not be permitted on the Project Site.
4. "Rejected": "Rejected" means that the submission is rejected for nonconformance with the construction documents and the Contractor shall make a new submittal which shall comply with the requirements of the Contract Documents. If construction, fabrication and/ or manufacture proceeds it is at the Contractor's risk. Shop Drawings and Product Data bearing "Rejected" stamp shall not be permitted on the Project Site. Any submittal rejected shall not be considered a first cycle submittal for the purpose of scheduling subsequent reviews, i.e., restart submittal process.
   a. Do not use, or allow others to use, submittals marked "Amend and Resubmit" or "Rejected " at the Project Site or elsewhere where Work is in progress.
5. "No Action Required": "No Action Required" means submittal is for information or record purposes or special processing or other activity. The submittal will not be returned and the Contractor will be so notified.
6. "Submittal Not Required, Returned Without Review": "Submittal Not Required, Returned Without Review" means the submittal is a not required contract document submittal, and will be returned to the Contractor without review by the Architect.

E. Other Action: Where a submittal is primarily for information or record purposes, special processing, Quality Assurance or other activity, the submittal will not be returned, and Contractor will be so notified.

F. Contractor shall make corrections required and shall promptly resubmit the required number of corrected copies of shop drawings and product data until "Provide as Submitted", or "Provide as Corrected" is noted by the Architect.

G. Resubmittals shall be handled in the same manner as first submittals.

H. One (1) digital file, which will give the Contractor necessary instructions for correction of same, will be returned to the Contractor.

I. Contractor shall be responsible for correctness of dimensions other than principal controlling dimensions and properties described on the Contract Drawings, and shall call the attention of Architect to errors or discrepancies that he may discover therein.

J. Contractor shall have no claim for damages that may result from following an error except for an error in principal controlling dimensions and properties shown on the Contract Drawings.

K. Contractor is similarly responsible for: (i) confirming and correlating quantities and dimensions; (ii) selecting fabrication processes, manufacturing details and workmanship, and techniques of construction; and, (iii) properly coordinating and synchronizing the Work in accordance with requirements expressed in the Contract Documents.

L. Actions which change Contract Price, or Prices, under any Pay Item, or Items, or time for completing performance, shall be brought to Agency's and Architect's attention before proceeding.

1. Carrying out of the Work or ordering of materials before receipt of written approval may constitute a cause for rejection of the Work or materials.

M. Contractor shall be responsible, and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of the Work prior to review and approval of required submittals.

N. Shop drawings and other submittals, shall not be issued to the field or used in the Work without Architect's or required consultants' stamp of approval.

O. The Contractor shall forward one (1) copy of final submittals to the Agency's Representative.

1.12 PRODUCT DATA

A. Product data called for by the Contract Documents or subsequently by the Architect shall be properly provided as specified.

B. The Contractor shall make any corrections required and shall resubmit the required number of corrected copies of product data until approval, as required for shop drawings.

C. Submit digital copies, together with a letter of transmittal, to the Architect.

D. Highlight product data or note to indicate the specific characteristics of the product.

E. All product data shall be labeled identifying the Contractor or subcontractor and the work for which the product is submitted.

1.13 SAMPLES

A. Samples called for by the Contract Documents shall be properly provided by the Contractor as specified, or as the Architect may subsequently require.

B. Submit five (5) samples for each required sample submittal, unless otherwise indicated, together with a letter of transmittal, directly to the Architect and other consultants.

C. Samples shall be of sufficient size to show the quality, type, range of color, finish and texture of the material. Samples are for review and confirmation of color, pattern, texture, "kind" and other specified characteristics. Compliance with other requirements is the exclusive responsibility of the Contractor.

D. Each sample shall be labeled, both on the outside packing and on the samples themselves, giving the descriptive name and quality of the item, the Contractor's name, Subcontractor name, date, Contract and Project, and the Specification or Drawing reference related to the samples submitted and the name and address of the manufacturer of the sample, or samples, submitted.

E. Each label or tag shall have sufficient clear space to permit application of the Contractor's approval stamp and the Architect's Action Stamp.

F. Samples required for a particular Specification Section shall be submitted together. Samples

shall be submitted from the same source which will supply the actual job.

G. Samples of materials or products which are normally furnished in containers or packages, which bear descriptive labels and/ or application or installation instructions, shall be submitted with such labels and/ or instructions.

H. Number sample transmittals consecutively in sequence with shop drawing and product data transmittals. Where appropriate, test data and/ or manufacturers' certificates shall be referenced in and forwarded with letters of transmittal.

I. Samples without accompanying certificates or test data will be returned without action.

J. In the event that a range of variations in texture, graining, color or other characteristics may be anticipated in furnished materials, assemblies, or elements of the Work, a sufficient number of samples of such materials or products shall be submitted to indicate the full range of characteristics which will be present in the materials or products proposed for the Work.

K. If examination discloses that the sample is not submitted to their satisfaction, the Architect shall give the Contractor the necessary instructions for correction. Upon correction, the Contractor shall resubmit the sample, or samples, and another review will be made. This procedure shall be repeated until the Contractor submits samples that are accepted.

L. Consideration and review of samples will only be made for the characteristic, color, texture, strength, or other feature of the material named in the Architect's finding of acceptability, and no other.

M. Valuable samples such as hardware, plumbing, and electrical equipment, parts, fixtures, controls, operating devices, not destroyed by inspection or test, will be returned to the Contractor and may be incorporated into the Work, providing suitable permanent records are made as to location of the samples.

N. When samples are accepted, supply one (1) piece to materialman's, fabricator's, manufacturer's, etc., shop, and retain one (1) sample in a suitable place at the Project site for use by all concerned as the standard for color, pattern, texture, kind, characteristic, etc., represented.

O. The Architect and Contractor shall each retain samples marked "Provide as Submitted" or "Provide as Corrected" intact to insure that the Work is completed in accordance with these samples.

1.14 INFORMATIONAL SUBMITTALS

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

B. Number of Copies: Submit the same number of copies as required for Product Data,, unless otherwise indicated. Architect will not return copies.

C. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

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

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply

with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

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

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

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

M. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

N. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.
8. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Operation and Maintenance Data."
9. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

10. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
    a. Preparation of substrates.
    b. Required substrate tolerances.
    c. Sequence of installation or erection.
    d. Required installation tolerances.
    e. Required adjustments.
    f. Recommendations for cleaning and protection.

O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. State whether or not conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

Q. Material Safety Data Sheets: Submit information directly to Agency. If submitted to Architect, Architect will not review this information but will return it with no action taken.

1.15 CERTIFICATES OF COMPLIANCE

A. When required Contractor shall furnish authoritative evidence in the form of manufacturer's certificates of compliance that materials to be used in the Work have been manufactured and tested in conformity with the requirements appearing in the Contract Documents and are certified acceptable.

B. Certificates shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product, or on similar products, being fabricated by the manufacturer.

1. Certificates shall be delivered to the Architect prior to installation of material or equipment to which they refer.
2. Certificates of compliance shall contain the following information:
    a. Name of Project to which material is consigned and Contractor to whom material is supplied.
    b. Kind and quantity of material represented by the certificates.
    c. Shipment identification, label or seal marking.
    d. Date and method of shipment and means of identifying the consignment.
    e. Statement that the material has been tested and found in conformity with the pertinent contractual requirements stated in the certificate.
    f. Signature of a person having legal authority to bind the supplier.

g. Signature attested to by a Notary Public or other properly authorized person.

C. Notarized certificates of specific manufactured products shall be accompanied with appropriate manufacturer's literature and shall state required information relating to the material being supplied.

D. Certifications shall simply state that the items offered meet contractual requirements.

E. Submit certificates in triplicate. Individually sign and notarize each copy.

F. Certificates shall not be binding or conclusive on Agency and may be rejected at any time by Architect if incorrect, improper or otherwise unsatisfactory in his opinion.

1.16 REQUEST FOR INFORMATION

A. Notification by the Trade Contractor:

1. Submit requests for clarification or additional information in writing using the Request for Information (RFI) form.
2. Limit each RFI to one subject.
3. Submit RFI's if one of the following conditions occur:
   a. Trade Contractor discovers an unforeseen condition or circumstance that is not described in the Contract Documents.
   b. Trade Contractor discovers an apparent conflict or discrepancy between portions of the Contract Documents that appears to be inconsistent or is not reasonably inferred from the intent of the Contract Documents.
   c. Trade Contractor discovers what appears to be an omission from the Contract Documents that cannot be reasonably inferred from the intent of the Contract Documents.
4. RFI's will not be recognized or accepted if, in the option of the Architect, one of the following conditions exist:
   a. Contractor submits the RFI as a request for substitution.
   b. Contractor submits the RFI as a submittal.
   c. Contractor submits the RFI under the pretense of a Contract Document discrepancy or omission without thorough review of the Documents.
   d. Contractor submits the RFI in a manner that suggests that specific portions of the Contract Documents be assumed or excluded, or by taking an isolated portion of the Contract Documents in part rather than whole.
   e. Contractor submits an RFI in an untimely manner without proper coordination and scheduling of work or related trades.
5. Request for clarification or request for information immediately upon discovery. Submit RFI's in a reasonable time to not affect the project schedule while allowing the full response time described below.
6. Refer to paragraph 1.7.BB. for information on submitting RFI's electronically through the iBuild Management System.

B. Response Time:

1. The conclusive, will resolve questions and issue instruction to the Contractor within a reasonable time. Generally, most RFI's will receive a response within 5 business days. In some cases, this time may be lengthened for complex issues, or shortened for emergency situations, as mutually agreed by all parties.
2. Should the Contractor proceed with the work affected before receipt of a response from the Architect, within the response time described above, any portion of the Work which is

not in accordance with the Architect's interpretations, clarifications, instructions, or decisions, is subject to removal or replacement and the Contractor shall be responsible for all resultant losses.

C. Additional Detailed Instructions:

1. The Architect may furnish additional detailed, written instructions to further explain the Work and these instructions shall be a part of the Contract Documents. Should additional detailed instructions in the opinion of the Architect constitute Work in excess of the scope of the Contract, the Contractor shall submit written notification to the Architect within 7 calendar days following receipt of instructions, and in any event prior to the commencement of Work. The Architect will then consider such notice and if the Architect considered it justified, the Architect's instructions will be revised or an extra work authorization will be issued.
2. Contractor has no claim for additional compensation or extension of the schedule because of additional instructions unless the Contractor gives the Architect written notice within the time specified above.

D. Failure to Agree:

1. In the event of failure to agree to the scope of the instructions, the Contractor shall follow the procedures contained in the Contract Documents.

END OF SECTION 01 33 00

EXHIBIT "A"

Rafael Vinoly Architects, P.C. hereby agrees to provide the files to the User subject to the terms and conditions herein.

Rafael Vinoly Architects, P.C. makes no representation as to the accuracy of the CADD files. Rafael Vinoly Architects, P.C. is not responsible for any discrepancies between the CADD files and the printed construction documents. Any use of the files for drawings shall be at the User's own risk. Such use is acknowledgement of the User's acceptance of full responsibility and liability for the files' content. Documents are only available in the format provided. Compatibility of this electronic document with the User's software or hardware and any required formatting and cost thereof is solely the responsibility of the User. Any use of this electronic document is at sole risk and liability of the User, and does not relieve them of responsibility for verification of actual or intended dimensions, configurations, material or all other information contained within the document.

The User acknowledges that the computer files may vary from the hard copy drawings. The User acknowledges and agrees that the computer files are being delivered and accepted as is, with all faults and flaws, and may not be relied upon by the User as determinative of any professional obligation by Rafael Vinoly Architects, P.C. User specifically acknowledges that hard copy drawings signed by or on the behalf of Rafael Vinoly Architects, P.C. are the only documents for which Rafael Vinoly Architects, P.C. is professionally responsible. Rafael Vinoly Architects, P.C. gives no representations or warranties whatsoever in connection with its delivery of the electronic files. Any document information from CADD files shall be carefully coordinated with the contract documents.

The User acknowledges and agrees that the CADD files shall not be copied and returned to the Architect/Engineer as a submittal drawing without specific modifications necessary to communicate their work and execute their contract. Submittal documents not specifically modified by the User specific for their work shall be rejected. The User acknowledges and agrees that the electronic documents are not intended to be used for construction and any such use shall be at the sole risk of the User.

The User acknowledges and agrees that the CADD files are the sole property of Rafael Vinoly Architects, P.C.. Except for use as CADD files for the drawings on this project, CADD files may not be duplicated. The User may not use them as CADD files on any other project or allow them to be used by other persons. Use of CADD files is granted only for the preparation of drawing submittals by the USER on the subject project.

Rafael Vinoly Architects, P.C. is acknowledged as the Author, retaining all common law, statutory and other reserved rights, including copyright.

The User shall to the fullest extent permitted by law, indemnify and hold harmless Rafael Vinoly Architects, P.C. from and against all claims, damages, losses and expenses including attorney's fees, directly or indirectly, arising out of or alleged to arise out of or resulting from the use of computer files, including but not limited to all claims, damages, losses or expenses which may be attributable to bodily injury, sickness, or death, or to injury to or destruction of tangible property

Please acknowledge your acceptance of the terms of this agreement by signing and returning one copy for our records. Upon receipt of your written acceptance, we will release the CADD files to you.

_____	_____
Accepted	Date
_____	_____
Printed Name	Title/Firm

END OF SECTION 01 33 00

SECTION 01 40 00 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Quality control and quality assurance activities are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Bidders are instructed that the Owner has previously engaged the services of a Testing Agency under separate contract. It shall be the responsibility of the contractor requiring the inspections or testing to adequately schedule and coordinate the timing of the inspections or tests. Specific testing, inspection and related requirements are specified in Divisions 2 through 17 sections. Refer to Division 1 sections 01 45 00 and 01 45 10 for specific responsibilities.

1.3 DEFINITIONS

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

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Quality-control services do not include Contract enforcement activities performed by Architect.

C. Mockups: Physical assemblies illustrating materials and workmanship. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

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

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

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

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

K. Testing Agency: An entity engaged by the Owner to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency. The Testing Agency shall be supplied and paid for by the Owner.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

C. The "Summary" usually placed in the front part of each Section of the Specifications, is intended to designate the scope and locations of all items of the Work included therein, either generally or specifically. It is not intended to limit the Scope of Work should plans, schedules, or notes indicate an increased scope. Inadvertent omission of an item from its proper section of the Specifications and its inclusion in another section shall not relieve the Contractor of responsibilities for the item specified.

1.5 EXAMINATION OF CONTRACT DOCUMENTS

A. The Contractor will be held to have examined the Contract Documents, and Modifications thereto, as they may affect subdivisions of the Work and to have informed itself, its Subcontractors, Sub-subcontractors, and materialmen of all conditions thereof affecting the prosecution of the Work.

B. The Scope of Work for the Contract is not necessarily limited to the description of each section of the Specifications and the illustrations shown on the drawings. Include all minor items not expressly indicated in the Contract Documents, or as might be found necessary as a result of the field conditions, in order to complete the Work as it is intended, without any gaps between the various subdivisions of Work of the Contractor, or between the Work of Subcontractors.

C. Any failure by the Contractor to become acquainted with available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of successfully performing the Work or mutually agreed changes thereto.

1.6 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are required of Contractor by the Contract Documents, provide products and systems complying with performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.7 SUBMITTALS

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

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product or system and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.

13. Recommendations on retesting and re-inspecting.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspection indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed. Agency shall be approved by the authorities having jurisdiction, Owner, and Architect prior to performing testing and inspection.

G. Pre-construction Testing: Testing agency shall perform pre-construction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include the following:

   a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
   d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to the authorities having jurisdiction, Owner and Architect, with a copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.9 QUALITY CONTROL

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

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

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

C. Special Tests and Inspections:

1. Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

   a. Testing agency will notify the Owner, the Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   b. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to the Owner, and to the Architect with copy to Contractor.
   c. Testing agency will submit a final report of special tests and inspections as soon as possible but prior to Substantial Completion, which includes a list of unresolved deficiencies.
   d. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   e. Testing agency will retest and re-inspect and document corrected work.
   f. Interim reports will be submitted periodically at a frequency agreed upon by the Owner and the code official prior to the start of Work.

2. Special inspection reports shall be delivered to the code official before covering or concealing structural elements.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   5. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field-curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

PART 2 - PRODUCTS

A. (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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. All Termite pesticides shall be in strict accordance to South Carolina Pesticide Control Act [SC Law 46-13 and amendments] and Federal Regulations. The contractor shall notify Clemson University Pesticide Regulation and Controls program prior to beginning of treatment and application. All pesticides are under the jurisdiction of the Pesticide Control Act.

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 Office of State Engineer, State Fire Marshall, South Carolina Department of Health and Environmental Control, South Carolina Department of Highways and Public Transportation and City of Columbia 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.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 41 00

SECTION 01 42 00 – REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. "Approved": The term "approved," is used to convey Architect's action on Contractor's submittals, applications, and requests.

B. Approved Equal, Accepted Equal, Equal": A product or system determined by the Architect to be equivalent to or better than that indicated, and acceptable for use in the project.

C. By Others": Work performed by the Owner or other contractors, and that is outside the scope of the Work of this Contract.

D. Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

E. Furnish": To supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations; installation is not included.

F. "Indicated": Graphic representations, notes, or schedules on Drawings; written representations such as Specifications or schedules; and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are intended to have similar meanings.

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

H. "Installer": The Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, who performs operations such as installation, erection, application, and similar operations.

1. The term "experienced," when used with an entity, means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
2. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades-people of the corresponding generic name.

I. "Project Site": The space available for performing construction activities. The extent of Project site is shown on Drawings.

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

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

1.3 INDUSTRY STANDARDS

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

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

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

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

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 42 00

SECTION 01 45 00 – QUALITY CONTROL AND TESTING SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Work included:

1. The Owner has previously engaged the services of a Testing Agency under separate contract. It shall be the responsibility of the contractor requiring the inspections or testing to adequately schedule and coordinate the timing of the inspections or tests.
2. Provide testing, inspecting, complete, as described in this section and elsewhere in pertinent section of the project manual.
3. Provide construction of small-scale sample of work as may be described in pertinent section of the project manual.
4. Remove and replace defective work.

B. Related work:

1. Requirements for testing may be described in various Sections of these Specifications.
2. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

1.3 QUALITY ASSURANCE

A. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

1.4 SUBMITTALS

A. Upon completion and/or inspections, the testing Agency will promptly distribute copies of test or inspection reports to the Construction Manager, Contractor, Architect, to governmental agencies requiring submission of such reports, and to such other persons as directed by the Construction Manager.

PART 2 - PRODUCTS

2.1 PAYMENT FOR TESTING

A. Quality control testing will be paid for by the Owner to cover all testing and inspecting under this Section of these Specifications. The contractor is responsible for scheduling and arranging for all testing and inspecting required by governmental agencies having jurisdiction, with the exception of Chapter 1 and 17 testing & inspections as detailed in Section 01 45 10.

B. When initial tests requested by the Architect\Engineer indicate non-compliance with the contract documents, subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and the costs thereof shall be paid by the Contractor.

C. It shall be understood and agreed by all involved that the Testing Laboratory is the Owner's agent and representative. By accepting the work of this job, the Laboratory agrees to represent the Owner alone. All reports shall be sent directly to the Owner, the Architect, the Engineer, and the Construction Manager. No reports will be sent to the Contractor alone or through the Contractor. The Construction Manager will provide copies of all reports to the contractor for his use.

D. Where test, certificates or approvals by authorities other than the Architect\Engineer are required for an item or material, the Contractor shall have such test performed and\or procure such certifications of approval. The Testing Agency will forward four copies of the results of the test certificates or approvals to the Construction Manager prior to the Contractor proceeding with the work involved. Such laboratories and\or authorities as are employed for this purpose shall be competent, with a generally recognized reputation in the field concerned and shall be subject to approval by the Architect.

2.2 SPECIFIC TESTS AND INSPECTIONS

A. Inspection and testing required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

B. Testing shall include, but not be necessarily limited to that described in detail in Part 3 of this Section.

2.3 CONTRACTOR'S CONVENIENCE TESTING

A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor and the contractor shall be responsible for payment for such services.

PART 3 - EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.2 TAKING SPECIMENS

A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.3 SPECIFIC TESTING REQUIREMENTS

A. Testing requirements are identified within the Technical Specifications sections of the project Manual. Required inspections and tests generally pertain to, but are not necessarily limited to:
   1. Division 3 – Concrete
   2. Division 5 – Steel
   3. Division 31 - Earthwork

3.4 WAIVER OF INSPECTION AND/OR TESTING

A. Specified inspections and/or tests may be waived only by the specific approval of the Architect or Engineer, after confirmation with the Office of the State Engineer.

END OF SECTION 01 45 00

SECTION 01 45 10 – COLLECTIVE INSPECTIONS AND STRUCTURAL TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Bidders are instructed that the Owner has previously engaged the services of an Inspector(s) to perform required inspections. A Testing Agency has also been procured under separate contract as identified in section 01 45 00 of these specifications. It shall be the responsibility of the contractor requiring the inspections or testing to adequately schedule and coordinate the timing of the inspections or tests. Tables for Chapter 1 and Chapter 17 inspections on Pages 6 - 8 of this section provides information with respect to the required inspections.

B. This section includes a listing of both special and required inspections to be performed during the progress of this project. A "Certificate of Substantial Completion" cannot be issued without documentation that these inspections have been performed and the work is in conformance with the Contract Documents.

C. Related Work: Requirements of Section 01 45 00 Quality Control and Testing Services shall apply to this section. This section includes additional requirements for Inspections.

1.3 RESPONSIBILTY

A. It shall be this Owner's responsibility to contract and remit payment for these 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.

B. When initial inspections or tests requested by the Code or the Architect\Engineer indicate non-compliance with the Code or the Contract Documents, subsequent re-inspections occasioned by the non-compliance shall be performed by the Owner's inspections agent and the costs thereof shall be paid by the Contractor.

1.4 REPORTS

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

1.5 GENERAL REQUIREMENTS

A. Inspections and Structural Testing shall be in accordance with Chapter 1 & 17 of the 2009 International Building Code.

B. The program of Inspections and Structural Testing is a Quality Assurance Program intended to ensure that the work is performed in accordance with the Contract Documents.

C. 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 Inspector and other Agents of the Inspector of their requirements and responsibilities.

1.6 INSPECTIONS

A. Inspections shall be performed by a qualified Inspector and/or approved Testing Agency, acceptable to the Building Official.
   1. Contractor shall be responsible to notify Inspector in a timely manner when required inspections need to be performed.

B. The Inspection/Testing firm shall be responsible for immediately notifying in writing the Owner, Construction Manager and Building Officials of all failed inspections and/or tests. The Architect and Contractor will be notified by the Construction Manager.

1.7 SCHEDULE OF INSPECTIONS AND TESTS

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

1.8 QUALIFICATIONS

A. The Testing Firm and individual technicians shall be approved by the Building Official.

B. Inspections shall be performed by inspectors as indicated below:
   1. Inspections of soils may be performed by inspectors with, as a minimum, the ICC Certification for Soils.
   2. Technicians performing sampling and testing of concrete shall be an ACI certified "Concrete Field Testing Technician - Grade 1".
   3. Inspectors performing inspections of concrete work, such as inspections of concrete placement, batching, reinforcing, curing and protection, shall be an ICC certified "Reinforced Concrete Inspector".
   4. Inspectors performing inspections of pre-stressed concrete work shall be an ICC certified "Pre-stressed Concrete Inspector".
   5. Inspectors performing inspections of masonry shall be an ICC certified "Structural Masonry Inspector".
   6. Inspectors performing visual inspections of welding shall be an ICC certified "Structural Steel and Welding Inspector". Technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III technician.
   7.

8. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate, either by oral or written examination, competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.9 SUBMITTALS

A. The Inspector shall submit to the Owner and Building Official 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 Inspector 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.

1.10 PAYMENT

A. The Owner shall engage and pay for the services of the Inspector and Agents of the Inspector.

B. 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, or for excessive stand-by time or cancellations due to failure to properly schedule tests and/or inspections.

1.11 CONTRACTOR RESPONSIBILITIES

A. Contractor's Statement of Responsibility: Each Contractor responsible for the construction of a seismic force resisting system, designated seismic system or components listed in the Seismic Quality Assurance Plan shall submit a "Contractor's Statement of Responsibility", attached at the end of this section, to the Building Official and the Owner prior to the commencement of work. The Contractor's statement of responsibility contains the following:
   1. Acknowledgement of awareness of the project's 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 positions(s) in the organization.

B. The Contractor shall cooperate with the Inspector and his agents so that the Inspections and Testing may be performed without hindrance.

C. The Contractor shall review the "Statement of Inspections" and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Inspector or Testing Laboratory at least 48 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 Inspections 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 Inspections shall first be reviewed by the Contractor's Quality Control personnel.

G. The Contractor shall be solely responsible for construction site safety.

1.12 LIMITS ON AUTHORITY

A. The Inspector may not release, revoke, alter or enlarge on the requirements of the Contract Documents.

B. The Inspector will not have control over the Contractor's means and methods of construction.

C. The Inspector shall not be responsible for construction site safety.

D. The Inspector has no authority to stop the work.

1.13 RECORDS AND REPORTS

A. Detailed daily reports shall be prepared of each inspection by the Inspector. Reports shall include:
1. Date of test or inspection
2. Name of Inspector or Technician
3. Location of specific areas tested or inspected
4. Description of test or inspection and results
5. Applicable ASTM standard
6. Weather conditions
7. Engineer's seal and signature

B. The Inspector shall submit interim reports to the Owner, Architect, Construction Manager and Building Official at the end of each week which includes all inspections and test reports received that week. Copies shall be sent to the Architect and Contractor.

C. Any discrepancies from the Contract Documents found during an Inspection shall be immediately reported to the Architect, Construction Manager, Contractor and Owner. If the discrepancies are not corrected, the Inspector shall notify the Owner, Architect, Construction Manager and Building Official. Reports shall document all discrepancies identified and the corrective action taken.

D. The Testing Firm shall immediately notify the Owner, Architect, Construction Manager and Building Official by telephone, fax or email of any test results which fail to comply with the requirements of the Contract Documents.

E. At the completion of the work requiring Inspections, each Inspection Agency and/or Testing Firm shall provide a statement to the Owner, Architect, Construction Manager and Building Official that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.14 FINAL REPORT OF REQUIRED INSPECTIONS

A. The "Final Report of Inspections" shall be completed by the Inspector and submitted to the Owner, Architect, Construction Manager and Building Official prior to the issuance of a "Certificate of Use and Occupancy".

B. The "Final Report of Inspections" will certify that all required inspections have been performed and will itemize any discrepancies that were not corrected or resolved.

PART 2 - PRODUCTS

2.1 Not Required

PART 3 - EXECUTION

3.1 Not Required

END OF SECTION 01 45 10

"STATEMENT OF INSPECTIONS"
SCHEDULE OF REQUIRED INSPECTIONS – CHAPTER 1

MATERIAL	TYPE OF INSPECTION	AREA/ BLDG	SPEC. SECTION
109.3.1 Footing or foundation inspection	Footing and foundation inspections shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.		
109.3.2 Concrete slab or under-floor inspection	Concrete slab and under-floor inspections shall be made after in-slab or under-floor reinforcing steel and building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the subfloor.		
109.3.4 Frame inspection	Framing inspections shall be made after the roof deck or sheathing, all framing, fireblocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes and ducts are approved.		
S406.6.6 Inspection of fill.	Placement of the fill material shall be inspected by the code official.		
M107.1 Mechanical Required Inspections			
M107.1.1 Underground Inspection	Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place. When excavated soil contains rocks, broken concrete, frozen chunks and other rubble that would damage or break the piping or cause corrosive action, clean backfill shall be on the job site.		
P107.1 Plumbing Required Inspections			
P107.1.1 Underground Inspection	Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before any backfill is put in place.		
Electrical Required Inspections			
Underground Inspection	Underground inspection shall be made after trenches or ditches are excavated and bedded, conduit installed, and before backfill is placed. Also, inspection of all building grounding connections shall be observed before backfill.		

SCHEDULE OF REQUIRED INSPECTIONS – CHAPTER 17

Instructions

The inspection requirements shall be based on Chapter 17 of the 2009 International Building Code. Any deviations from the requirements of Section 1704 must be approved by Office of State Engineer. If Inspection is by "Other", the inspecting entity shall be identified.

MATERIAL	TYPE OF INSPECTION	FREQUENCY	SPECIFICATION REFERENCE	INSPECTION BY:		
				Arch.	Eng.	Other
Concrete	Rebar Placement	(Periodic)	033000, par 3.17			X
	Verify Use of Design Mix	(Periodic)	033000, par 3.17			X
	Sample Slump, Air, Temperature	(Continuous)	033000, par 3.17			X
	Concrete Placement	(Continuous)	033000, par 3.17			X
	Curing	(Periodic)	033000, par 3.17			X
	Verification of In-Situ Strength via Compressive Testing of Cylinders	(Periodic)	033000, par 3.17			X
	Inspection of Embedded Anchors	(Periodic)	033000, par 3.2			X
	Inspection of Formwork for Shape Location & Dimensions	(Periodic)	033000 par 3.1			X
	Rebar Placement	(Periodic)	033000, par 3.17			X
Masonry	Periodic Verification:					
	a) Site mixed mortar	(Periodic)	042000, par. 2.10			X
	b) Mortar joint placement	(Periodic)	042000, par. 3.5			X
	c) Mortar joint construction	(Periodic)	042000, par. 3.5			X
	d) Rebar location	(Periodic)	042000, par. 2.5, 2.9C			X
	e) Rebar placement	(Periodic)	042000, par. 2.9.C, 3.6			X
	f) Clean grout space	(Periodic)	042000, par. 3.11.C			X
	g) Site mixed grout	(Periodic)	042000, par. 2.10			X
	h) Size & location of structural elements	(Periodic)	042000, par. 3.7, 3.9			X
	i) Type & location of anchors	(Periodic)	042000, par. 2.6, 2.7, 2.8			X
	j) Size & type of reinforcing	(Periodic)	042000, par. 2.5, 3.6			X
	k) Cold/hot weather protection	(Periodic)	042000, par. 1.9.B, 1.9.C, 3.1			X

MATERIAL	TYPE OF INSPECTION	FREQUENCY	SPECIFICATION REFERENCE	INSPECTION BY:		
				Arch.	Eng.	Other
	Verification of grout placement	(Continuous)	042000, par. 2.10.C			X
	Preparation of grout & mortar specimens	(Continuous)	042000, par. 2.10			X
	Compliance with inspections & submittals	(Periodic)	042000, par. 1.6, 1.7, 3.1			X
Structural Steel	Verifications of High-Strength Bolts/Washers	(Periodic)	051200, par 2.1.F 051213, par 2.1.C			X
	Inspection of High-Strength Bolting	(Periodic)	051200, par 3.5.F 051213, par 3.4			X
	Verifications of Structural Steel Materials	(Periodic)	051200, par 2.1 051213, par 2.1 and 2.3			X
	Verification of Weld Filler Materials	(Periodic)	051200, par 2.1.H 051213, par 2.1 E			X
	Inspection of Structural Steel Welding:					
	a)Complete & Partial penetration groove	(Continuous)	051200, par 3.5 G			X
	b)Multi-pass fillet welds	(Continuous)	051200, par 3.5 G			X
	c)Single-pass fillet welds >5/16"	(Periodic)	051200, par 3.5 G			X
	d)Single-pass fillet welds <5/16"	(Periodic)	051200, par 3.5 G			X
	Details such as Bracing and Stiffening	(Periodic)	(Periodic)			X
	Member Locations	(Periodic)	IBC Ref 1704.3.2 051213, par 3.6			X
	Application of Joint Details at Each Location	(Periodic)	IBC Ref 1704.3.2			X
Steel Deck	Inspection of Roof Deck materials	(Periodic)	053100, par. 3.5A			X
	Deck attachments	(Periodic)	053100, par. 3.5B			X
Soil	Verification of Materials Below Shallow Foundation are Adequate to Achieve the Design Bearing Capacity.	(Periodic)	IBC T1704.7			X
	Verify Excavations are Extended to Proper Depth and Have Reached Proper Material.	(Periodic)	IBC T1704.7			X

	Perform Classification and Testing of Compacted Fill Materials.	(Periodic)	IBC T1704.7			X
	Verify Use of Proper Materials, Densities and Lift Thickness during Placement and Comparing of Compacted Fill.	(Continuous)	IBC T1704.7			X
	Prior to Placement of Compacted Fill, Observe Subgrade and Verify that Site has been Prepared Properly.	(Periodic)	IBC T1704.7			X

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Temporary utilities include, but are not limited to, the following:
1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Electric power service (as necessary).
5. Lighting (as necessary).
6. Telephone service.

C. Support facilities include, but are not limited to, the following:
1. Dewatering facilities and drains.
2. Project identification and temporary signs.
3. Waste disposal facilities.
4. Field offices.
5. Storage and fabrication sheds.
6. Construction aids and miscellaneous services, facilities and vehicle parking.

D. Security and protection facilities include, but are not limited to, the following:
1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence (requested modifications).
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.
8. Covered walkways.
9. Temporary enclosures.
10. Fire protection.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
1. Owner's internal construction forces.
2. Architect.
3. Testing agencies.
4. Personnel of authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.

C. Water Service: The Owner's existing water service facilities shall not be used. Arrange for, provide connections and pay for water service used. Remove temporary connections when no longer needed.

D. Electric Power Service: The Owner's existing electric service facilities shall not be used. Arrange for, provide connections and pay for electric service used. Remove temporary connections when no longer needed.

1.4 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

1.5 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
   1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

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

1.6 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
   1. Keep temporary services and facilities clean and neat.
   2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Chain-Link Fencing: The Owner has provided limited construction site fencing as indicated on drawings. For additional fencing needed by the contractor, utilize minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts and concrete footers, or panel type fencing. Screening material to match existing screening material on Owner fencing.

C. Lumber and Plywood: Comply with requirements in Division 6 Section "Miscellaneous Carpentry."

D. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

E. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Mobile or prefabricated units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
   1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated re-circulation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Drinking-Water Fixtures: Containerized, bottled-water drinking-water units, including paper cup supply.

F. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

G. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work and as directed by Owner. 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.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sewers and Drainage: If sewers are available, provide 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-site in a lawful manner.
   1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
   2. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.

C. Water Service: The Owner's existing water service facilities shall not be used. Arrange for, provide connections, and pay for water service used. Remove temporary connections when no longer needed.
   1. Provide rubber hoses as necessary to serve Project site.

D. Sanitary Facilities: None of the sanitary facilities in the Owner's buildings will be available for use by construction personnel. Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
   3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
   4. Drinking-Water Facilities: Provide bottled-water, drinking-water units.

E. Electric Power Service: The Owner's existing electric service facilities shall not be used. Arrange for, provide connections and pay for electric service used. Remove temporary connections when no longer needed.

F. Electric Distribution: Electrical service shall be adequate for the work of all trades, except field welding, and shall be terminated in fused safety switch and circuit breaker distribution panels. Provide receptacle outlets adequate for connection of power tools and equipment.
   1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
   2. Provide warning signs at power outlets other than 110 to 120 V.
   3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades or other traffic areas.
   4. Provide metal conduit enclosures or boxes for wiring devices.

G. Lighting: Provide temporary lighting that provides adequate illumination for construction operations and traffic conditions.

H. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities for all personnel engaged in construction activities. Install separate telephone lines for each field office and first-aid station.
   1. Provide additional telephone lines for the following:
      a. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.

2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Architect's office.
   e. Consultants' offices.
   f. Owner's office.
   g. Principal subcontractors' field and home offices.
3. Provide answering machine or messaging service on superintendent's telephone 24 hours per day, seven days per week, holidays included.
4. Furnish superintendent with electronic voice communication device for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Space for storage, and other support facilities will be available for use in the general proximity to the project site.
   1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access and as directed by Owner.
   2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

B. Dewatering Facilities and Drains: Comply with requirements in applicable Division 31 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
   1. Remove snow and ice as required to minimize accumulations.

C. Project Identification and Temporary Signs: Provide project identification signs per Architect's design, and temporary information and direction signs as required and approved.
   1. No other signs will be permitted unless approved by Owner.
   2. Sign faces shall be 3/4" exterior grade, medium density overlay plywood unless otherwise indicated.
   3. Signs shall comply with all applicable code requirements and regulations.
   4. Project identification signs (two [2] required) shall be 4 feet by 8 feet with top of sign 9 feet above grade. Provide three (3) pressure treated 6"x6" wood posts imbedded 4 feet into 2 feet diameter by 5 feet deep concrete footings. Provide four (4) pressure treated 2"x4" studs mounted horizontally across posts to support face of sign.
   5. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer. Engage an experienced sign painter to apply graphics for Project identification and temporary signs.
   6. Prepare temporary signs to provide directional information to construction personnel and visitors.
   7. Erect signs at locations as directed

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
   1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
   2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and track quantities of each type. Provide information

on destination of each type of waste material and means to be used to dispose of all waste materials.

E. Contractor's Field Office: Provide an insulated, weather-tight, heated and air-conditioned field office for use by all personnel engaged in construction activities; of sufficient size to accommodate Contractor's required office personnel and meetings of 20 persons at Project site. Keep office clean and orderly.
   1. Furnish and equip office as follows:
      a. Office Furnishings: Contractor's option
   2. Provide a room of not less than 300 sq. ft. for Project meetings. Furnish room with conference table, 20 folding chairs, and 6 foot by 4 foot tack board and a 5 foot by 3 foot white marker board.
   3. Provide a telephone answering machine and plain paper facsimile machine, both to remain on-line 24 hours per day, 7 days per week including all holidays.
   4. Provide minimum of one (1) high speed copy machine with automatic feed, collating and enlargement/reduction capability.

F. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

G. Vehicular Parking Requirements: Refer to USC Supplemental General Conditions for Construction Projects and Campus Vehicle Expectations for requirements relative to parking at the project site and on University property. It is noted that there is very limited parking available at the project site and lay-down area. The Contractor is responsible for making adequate arrangements as necessary for off-site parking and transportation to the site for employees and subcontracting trades

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

D. Site Enclosure Fence: The Owner has provided for limited site enclosure fencing. The contractor is responsible for any additional required fencing, or relocation or repair of Owner provided fencing. When excavation begins, install additional chain-link enclosure fence with lockable entrance gates sufficient to completely secure work areas. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
   1. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with three sets of keys.

E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction as necessary. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
   1. The Owner assumes no responsibility for loss, theft, or damage to the work, tools, equipment, and construction. In the instance of any such loss, theft, or damage, the Contractor shall be responsible to renew, restore, or remedy the work, tools, equipment, and construction in accordance with requirements of the Contract Documents without additional cost to the Owner.
   2. Site parked equipment, operable machinery, and hazardous parts of the new construction subject to mischief and accidental operation shall be inaccessible, locked, or otherwise made inoperable when left unattended.

F. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

G. Covered Walkway: If any portion of the work will be immediately adjacent to pedestrian walkways, erect a structurally adequate, protective, covered walkway for passage of persons accessing and leaving adjacent existing facilities. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction. Maintain required egress from facilities affected by construction operations.
   1. Construct covered walkways using scaffold or shoring framing.
   2. Provide wood-plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
   3. Paint and maintain in a manner approved by Owner and Architect.
   4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- thick exterior plywood. Barricades must be 8 feet high as per 2009 IBC section 3306, table 3306.1.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
   1. Provide fire extinguishers visible and accessible from space being served, with sign mounted above.
      a. Field Offices: Class A stored-pressure water-type extinguishers.
      b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
      c. Locate fire extinguishers where convenient and effective for their intended purpose.
   2. Store combustible materials in containers in fire-safe locations.
   3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, and other access routes for firefighting.
   4. Supervise welding operations and similar sources of fire ignition.
   5. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
   6. Extend existing fire department connections at adjacent existing buildings to locations accessible to emergency vehicles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
   1. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 56 50 – ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for environmental controls in addition to those specified in other Sections.

1.3 DUST AND DIRT

A. Perform the Work in a manner to minimize the generation of dust and dirt, to prevent dust and dirt from interfering with the progress of the Work, and to keep dust and dirt from accumulating in Work areas and adjacent areas.

B. Sprinkle unpaved construction areas with water at least twice per day to reduce dust generation by approximately fifty percent (50%); cover stockpiles of soil, sand and other materials; cover trucks hauling debris, soils, sand or other such material; and sweep streets surrounding demolition and construction sites at least once per day to reduce particulate emissions.

C. Contractor to prepare and submit for approval, a dust and dirt containment plan prior to beginning any work.

D. Contractor is responsible for all required sediment and erosion control as indicated on the drawings.

1.4 POLLUTION

A. No burning of refuse, debris or other materials shall occur on or in the vicinity of the Project site. Comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of construction and disposal operations.

B. Prevent toxic concentrations of chemicals.

C. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere by the discharge of noxious substances from demolition and construction operations. Remove and legally dispose of soil contaminated by the performance of the Work, and replace with good soil at no expense to the Owner.

D. Provide systems for control of atmospheric pollutants.

E. Prevent harmful dispersal of pollutants into the atmosphere.

F. Maintain and operate construction equipment to maximize exhaust emissions of particulate and other pollutants, such as by prohibiting idling motors when equipment is not in use or when trucks are waiting in queues, or implementing specific maintenance programs to reduce emissions from equipment that would be in frequent use for much of the demolition and construction periods.

G. Contractor to prepare pollution containment plan and submit for review and approval prior to start of work.

1.5 NOISE CONTROL

A. The City will limit hours of certain types of demolition and construction operations; coordinate with the City.

B. Muffle and shield intakes and exhausts, shroud or shield impact tools, and use electric-powered rather than diesel-powered construction equipment, as feasible, or as directed by the City.

C. Predrill holes for piles to the maximum feasible depth, in order to minimize noise and vibration from pile driving. Consult with the Department of Public Works to determine the time when pile driving would cause the least disturbance of neighboring uses.

D. Contractor to prepare noise control plan and submit for review and approval prior to start or work.

E. All work shall conform to requirements of the City.

1.6 WATER CONTROL

A. Do not permit surface and subsurface water and other liquids to accumulate in or about the Project site and vicinity thereof. Should conditions develop, control the water or other liquids, and suitably dispose of by means of temporary pumps, piping, drainage lines, troughs, ditches, dams or other methods.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 56 50

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. Products: Items for incorporation in the Work, whether purchased for Project, taken from previously purchased stock, or reused from Owner's prior Project. The term "product" includes the terms "material", "equipment," "system," and similar terms.

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

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

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

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

a. Specification Section number and title.
b. Generic name used in the Contract Documents.
c. Proprietary name, model number, and similar designations.
d. Manufacturer's name and address.
e. Identification of items that require early submittal approval for scheduled delivery date.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.

a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

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

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified material or product cannot be provided.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
i. Cost information, including a proposal of change, if any, in the Contract Sum.
j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store materials in a manner that will not endanger Project structure.
6. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
7. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
8. Protect stored products from damage.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 17 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Acceptable Products: Where Specification paragraphs or subparagraphs titled "Acceptable Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Acceptable Manufacturers: Where Specification paragraphs or subparagraphs titled "Acceptable Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

    a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within at least ten days prior to the receipt of bids. Requests received after that time may be considered or rejected at discretion of Architect.

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

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution is compatible with other portions of the Work.
7. Requested substitution has been coordinated with other portions of the Work.
8. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

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

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 60 00

SECTION 01 70 00 – EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 SUBMITTALS

A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

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

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

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

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS

A. (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
   1. Before construction, verify the location and points of connection of permanent and temporary utility and building services.
   2. Coordinate utility and building services connection locations with Owner.

B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

   1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
      a. Description of the Work.
      b. List of detrimental conditions, including substrates.
      c. List of unacceptable installation tolerances.
      d. Recommended corrections.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility and Building services Interruptions: Do not interrupt utilities or building services for facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner not less than one week in advance of proposed utility interruptions.
   2. Do not proceed with utility and building services interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a

detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a registered land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including backfill to proper subgrade elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures. Transfer survey markings and elevations for use with control lines and levels.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.

I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

3.9 DEFICIENCY LISTS

A. During the construction of the Work, the Construction Manger and/or the Architect shall observe and evaluate the work for conformance to the Contract Documents.

B. Should such observation 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 Manger and/or the Architect, a written list of deficiencies shall 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 by the Construction Manager. In no case will this time be greater than thirty (30) days. 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 item shall be rescinded.

F. During the period that the deficiency list is in effect, the Construction Manager may, at his option, recommend that the Architect not authorize a representative portion of the Application for payment until the deficiency items are rescinded or, if, in the opinion of the Construction Manager, the Contractor is making a good faith effort to correct the deficiency.

END OF SECTION 01 70 00

SECTION 01 73 01 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.

B. Patching: The application, insertion, or projection of other products on, in or from a surface.

1. Patching shall achieve security, strength, weather protection, appearance for aesthetic match, all as applicable; efficiency, operational life, maintenance, and safety of operational elements; and shall preserve continuity of existing fire ratings.
2. Patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes and colors; materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the Architect's decision shall be final.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be as specified in the individual Specification Sections and as required to match existing construction.

PART 3 - EXECUTION

3.1 GENERAL

A. Perform cutting, associated structural reinforcing, and patching in a manner to prevent damage to other Work and to provide proper surfaces for the installation of materials, equipment and repairs. Adjust and fit products to provide a neat installation.

B. Do not cut or alter structural members without prior consultation with the Architect.

C. Employ original installer or fabricator providing Work under this Contract to perform cutting and patching.

D. Adjust and fit products to provide a neat installation.

E. Finish or refinish, as applicable, cut and patched surfaces to match adjacent finishes.

END OF SECTION 01 71 31

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

1.3 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors

C. Minimize trash / waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incinerations:

1. Aluminum and plastic beverage containers
2. Corrugated cardboard
3. Wood pallets and crates
4. Clean dimensional wood
5. Land clearing debris, including brush, branches, logs, and stumps: may be chipped and used as mulch as directed by the Landscape Architect or Civil Engineer or directed to other projects
6. Clay material on site to be used for making bricks for project: not included in early site development contract, but to be included in totals for overall project
7. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill on this or other projects as approved. May not be used in structural fill areas. Use as sub-base material must be approved and must meet SCDOT gradation requirements
8. Bricks: May be used on other projects if whole, or crushed and used as landscape cover, sub-base material or fill on other projects where applicable
9. Concrete masonry units: May be used on other projects if whole, or crushed and used as landscape cover, sub-base material or fill on other projects as applicable
10. Metals, including packaging banding, sheet metal, structural steel, piping, conduit, reinforcing bars, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass and bronze
11. Plastic buckets

12. Paper
13. Plastic sheeting and film

E. LEED Certification for this project is dependent on diversion of a minimum 75 percent, by weight, or potential landfill trash/waste by recycling and/or salvage

1. Salvage/Recycle Goals: Owner's goal is to reuse, salvage, and recycle as much nonhazardous demolition and construction waste as possible.

F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost of saving accrues; use the same units of measure on all reports.

G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

H. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site
2. Burying on the project site, except where crushed and approved by Architect to be reused as granular material
3. Dumping or burying on other property, public or private
4. Other illegal dumping or burying
5. Incineration, either on- or off-site

I. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.4 RELATED REQUIREMENTS

A. Section 01 31 00 Project Management and Coordination: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 50 00 – Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 60 00 – Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 70 00 – Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and clearing.

E. Section 01 81 13.13 – Sustainable Design Requirements

1.5 DEFINITIONS

A. Clean: untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction Demolition Waste: solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Disposal: removal of off-site demolition and construction waste and subsequent sale, recycling, reuse or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Hazardous: Exhibiting the characteristics of hazardous substances, i.e. ignitibility, corrosivity, toxicity or reactivity.

E. Nonhazardous: exhibiting none of the characteristics of hazardous substances, i.e. ignitibility, corrosivity, toxicity or reactivity.

F. Nontoxic: neither immediately poisonous to humans nor poisonous after a long period of exposure.

G. Recyclable: the ability of a product or materials to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

H. Recycle: to remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

I. Recycling: the process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating or thermally destroying waste.

J. Return: to give back reusable items or unused products to vendors for credit.

K. Reuse: to reuse a construction waste material in some manner on the project site.

L. Salvage: to remove a waste materials from the project site to another site for resale or reuse by others.

M. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

N. Source Separation: the act of keeping different types of waste materials separate beginning from the first time they become waste.

O. Toxic: poisonous to humans either immediately or after a long period of exposure.

P. Trash: any product or material unable to be reused, returned, recycled, or salvaged.

Q. Waste: extra material or material that has reached the end of its useful life in it intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.6 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. LEED Submittals: Submit Landfill Alternatives Proposal, Waste Management Plan, and Waste Disposal Reports in accordance with procedures specified in Section 01 33 00.

C. Submit Waste Management Plan within 30 days after receipt of Notice to Proceed, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to land filling.

D. Waste Management Plan: Include the following information:

1. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
2. Waste identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
   a. See Section 01 74 19 CWF for Construction Waste Identification Form
3. Analysis of the trash and waste projected to be generated during this phase of the project construction cycle, including types and quantities.
4. Landfill Options: the name address and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
5. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvaged, or recycling.

   a. List each material proposed to be salvaged, reused, or recycled.
   b. List the local market for each material.
   c. State the estimated net cost, versus landfill disposal.

6. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
7. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
8. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
9. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

E. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. See Section 01 74 19 CWF for Construction Waste Reduction Work Plan Form.
2. See Section 01 74 19 CWF for Cost/Revenue Analysis of Construction Waste Reduction Work Plan Form.
3. Salvaged Materials for Reuse. For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
4. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
5. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
6. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
7. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility
8. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

F. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

   a. LEED MR Credit 2 Template shall be updated, printed and attached to Application for Payment
   b. Update Materials Tracking Spreadsheet for materials that are included in Application for Payment and attach to Application for Payment

2. Submit Report on a form acceptable to Owner.
3. Landfill Disposal: Include the following information

   a. Identification of material
   b. Generation point of waste
   c. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
   d. Quantity of waste salvaged both estimated and actual in tons or cubic yards.
   e. Quantity of waste recycled both estimated and actual in tons or cubic yards.
   f. Total quantity of waste recovered (salvaged and recycled) in tons or cubic yards.
   g. Total quantity of waste recovered (salvaged and recycled) as a percentage of total waste.
   h. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
   i. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Recycled and Salvaged Materials: Include the following information for each:

   a. Identification of material, including those retrieved by installer or use on other projects.
   b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

5. Materials Reused on Project: Include the following information for each:

   a. Identification of material and how it was used in the project
   b. Amount, in tons or cubic yards
   c. Include weight tickets as evidence of quantity.

6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

G. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the work.

H. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

I. Record of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

J. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

K. Landfill Disposal Records: Indicate receipt and acceptance of waste by landfills licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

L. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

PART 2 - PRODUCTS

2.1 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 – Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00.

1. Relative amount of waste produced, compared to specific product.
2. Cost savings on waste disposal, compared to specified product, to be deducted from the contract sum
3. Proposed disposal method for waste product.
4. Markets for recycled waste production.

PART 3 - EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

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

B. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

C. Communication

1. Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, Construction Manager and Architect.
2. Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

E. Meetings: Discuss trash / waste management goals and issues at project meetings.

1. Pre-construction meeting
2. Regular job-site meetings

F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. At a minimum, provide:

   a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
   b. Separate dumpsters for each category of recyclable.
   c. Recycling bins at worker lunch area.

2. Provide containers as required
3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged
4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
5. Locate enclosures out of the way of construction traffic.
6. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
7. Provide adequate space for pick-up and delivery and convenience to subcontractors.
8. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
9. Keep recycling and trash / waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

G. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

H. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of material and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

I. Reuse of Materials On-Site: Set aside, sort and protect separated products in preparation for reuse.

1. Contractor for this contract is encouraged to present creative ways to reuse resources in the project

J. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each contain and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile Materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Pallets: as much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
3. Crates: Break down crate into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transportation of waste materials off Owner's property and legally dispose of them, except for items agreed upon by the Owner to be disposed of on site.

3.5 ATTACHMENTS

A. Section 01 74 19 CWF – Form CWM-1 For Construction Waste Identification

B. Section 01 74 19 CWF – Form CWM-2 for Construction Waste Reduction Work Plan.

C. Section 01 74 19 CWF – Form CWM-3 for Cost/Revenue Analysis of Construction Waste Reduction Work Plan.

END OF SECTION 01 74 19

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE % (B)	TOTAL EST. QUANTITY OF WASTE* (C=AxB)	EST. VOLUME CUBIC YARDS	EST. WEIGHT TONS	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Joint Sealant Tubes							
Piping							
Electrical Conduit							
Other:							
*Insert unit of measure							

FORM CWM-2: CONTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTATION PROCEDURES
			EST. AMOUNT SALVAGED TONS	EST. AMOUNT RECYCLED TONS	EST. AMOUNT DISPOSED TO LANDFILL TONS	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Plystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Joint Sealant Tubes						
Piping						
Electrical Conduit						
Other:						

FORM CWM-3: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIAL CATEGORY	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C=AxB)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTA-TION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H=D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Plystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Joint Sealant Tubes								
Piping								
Electrical Conduit								
Other:								

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Review procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

1.3 SUBSTANTIAL COMPLETION

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

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
4. Prepare and submit Project Record Documents, operation and maintenance manuals, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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

1. Results of completed review will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

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

1. Submit certified copy of Architect's Substantial Completion review list of items to be completed or corrected (punch list). The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Submit specific warranties and workmanship bonds.

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

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity that obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.

2. Mark record sets with indelible red pen. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.

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

1.7 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

   a. Emergency instructions and procedures.
   b. System, subsystem, and equipment descriptions, including operating standards.
   c. Piping diagrams.

2. Maintenance Data:

   a. Manufacturer's information, including list of spare parts.
   b. Name, address, and telephone number of Installer or supplier.
   c. Maintenance procedures.
   d. Maintenance and service schedules for preventive and routine maintenance.

e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents. Submit to Architect for review.

C. After review and comments by Architect, submit three complete sets (3 hard copies and 3 electronic copies on CD-Rom) of O&M manual to Owner at Substantial Completion.

1.8 WARRANTIES

A. Submittal Time: Submit three written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Final Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.

2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner with at least seven days' advance notice to Owner and Architect.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

3.2 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Remove labels that are not permanent.
   i. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   j. Replace parts subject to unusual operating conditions.
   k. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Platinum certification based on USGBC's "LEED 2009 for New Construction & Major Renovations."

1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
3. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on the Contractor's procedures and records. Compliance with these requirements is a part of this contract and are the Contractor's responsibility. Proper compliance throughout progress of the work is require to the satisfaction of the Architect and LEED Consultant as a prerequisite to recommending payment to the Owner of the Application for Payment.

B. Related Requirements:

1. Divisions 01 through 33 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. Forest Stewardship Council (FSC):

1. FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.4 DEFINITIONS

A. Definitions: The following list of definitions is for reference and is not intended to be comprehensive. Refer to LEED Reference Guide for definition of terms used in reference to the LEED certification process throughout the project manual.

B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates

shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

C. Commissioning: From the LEED Reference Guide, "Commissioning is the process of verifying and documenting that a building and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements."

D. Commissioning Plan: From the LEED Reference Guide, "Commissioning Plan is a document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process."

E. Construction IAG Management Plan: From the LEED Reference Guide, "Construction IAG Management Plan outlines measures to minimize contamination in a specific project building during construction and describes procedures to flush the building of contaminants prior to occupancy."

F. LEED: Leadership in Energy and Environmental Design. The LEED Green Building Rating System, or LEED, is a voluntary, consensus-based, market-driven building system based on proven technology. It evaluates environmental performance from a whole building perspective over a building's life-cycle, providing a definitive standard of what constitutes a green building. The LEED system is administered by the U.S. Green Building Council (USGBC).

G. Manufacturing: Refers to the final assembly of components into the building product.

H. Ozone Depleting Substances: Materials and chemical compounds that are destructive to the ozone layer. CFCs and HCFCs, aerosol sprays, and other similar substances are considered "ozone depleting."

I. Rapidly Renewable Materials: Agricultural products, both fiber and animal, that take 10 years or less to grow or raised and can be harvested in a sustainable fashion.

J. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

K. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

L. Salvaged Materials or Reused Materials: Construction materials recovered from existing buildings or construction sites and reused.

M. USGBC: U.S. Green Building Council, a not for profit coalition of leading and visionary organizations from all segments of the building industry that have joined forces to integrate, lead, and educate the building industry's efforts to develop and market products and services that are more environmentally and economically viable.

N. Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing, including, but not limited to, the following:

1. Solvents in paints and other coatings.
2. Wood preservatives, strippers, and household cleaners.
3. Adhesives in particleboard, fiberboard, and some plywoods.
4. Foam insulation.

O. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately reduce the amount of material being land filled.

1.5 LEED SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

1. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

B. LEED Action Plans: Provide preliminary submittals within 30 days of date established for commencement of the work indicating how the following requirements will be met.

1. Credit MR 2: Waste management plan complying with Division 01 Section – 01 74 19 Construction Waste Management and Disposal.
2. Credit MR 3: List of proposed salvaged and refurbished materials. Identify each material that will be salvaged or refurbished, including, but not limited to, its source, cost, and replacement cost if the item was to be purchased new.
3. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
4. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.

C. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:

1. Credit MR 2: Waste reduction progress reports complying with Division 01 Section – 01 74 19 Construction Waste Management and Disposal
2. Credit MR 3: Salvaged and refurbished materials.
3. Credit MR 4: Recycled content.
4. Credit MR 5: Regional materials.
5. Credit MR 7: Certified wood products.

D. LEED Documentation Submittals:

1. Credit MR 2: Comply with Division 01 Section 01 74 19 "Construction Waste Management and Disposal."
2. Credit MR 3: Receipts for salvaged and refurbished materials used for Project, indicating sources and costs for salvaged and refurbished materials.
3. Credit MR 4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
4. Credit MR 5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw

material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

5. Credit MR 7: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
6. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L.
7. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For LEED coordinator.

1.7 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4.1: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 10 percent of cost of materials used for Project.

1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2.3 REGIONAL MATERIALS

A. Credit MR 5 Not less than 10 percent of building materials (by cost) shall be regional materials.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

A. Credit MR 2: Comply with Division 01 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

END OF SECTION 01 81 13

DIVISION 1 – SPECIAL REQUIREMENTS

Insert A: Report of Geo-technical Investigation

REPORT OF
GEOTECHNICAL EXPLORATION

DARLA MOORE SCHOOL OF BUSINESS
COLUMBIA, SOUTH CAROLINA
S&ME PROJECT NO. 1611-10-426rev1

Prepared For:

University of South Carolina
Campus Planning & Construction
743 Greene Street
Columbia, South Carolina 29208

Prepared By:

S&ME

S&ME, Inc.
134 Suber Road
Columbia, South Carolina 29210

October 17, 2011

S&ME

October 17, 2011

University of South Carolina
Campus Planning and Construction
743 Greene Street
Columbia, South Carolina 29208

Attention: Ms. Lekita Hargrave

Reference: **Report of Geotechnical Exploration**
Darla Moore School of Business
Columbia, South Carolina
S&ME Project No. 1611-10-426rev1

Dear Ms. Hargrave:

As requested, S&ME, Inc. has conducted a geotechnical exploration at the above referenced site. The exploration was conducted in general accordance with S&ME Proposal No. 1611-7714-10 dated September 7, 2010, and Change of Scope letter dated April 12, 2011. The purpose of this exploration was to characterize the general subsurface conditions of the site, and evaluate these conditions relative to the proposed construction. This report includes our understanding of the proposed construction, field test and laboratory data, and recommendations regarding site preparation, fill placement, seismic design parameters, and foundation types and design values. This revision to the report incorporates several changes made to the design of the structure as well as addendums provided by S&ME to the design team after submission of our initial report.

S&ME appreciates this opportunity to work with USC as your geotechnical engineering consultant on this project. If you have any questions or need any further information in regard to this geotechnical report, or if we can be of additional service to you, please do not hesitate to contact us.

Sincerely,
S&ME,

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER 10/17/11 No. 26993 MATTHEW C. GLUNT

Matthew Glunt, P.E.
Geotechnical Engineer
mglunt@smeinc.com

John C. Lessley, P.E.
Technical Principal/Vice President
jlessley@smeinc.com

SOUTH CAROLINA CERTIFICATE OF AUTHORITY S&ME, INC. No. C00473

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APPENDIX A

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APPENDIX B

Exploration Procedures
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APPENDIX C

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EXECUTIVE SUMMARY

The information provided in this executive summary is intended to be a brief overview of project information and recommendations from the geotechnical report. Information in the executive summary should not be used without first reading the geotechnical report and the recommendations described therein.

Shallow foundations appear suitable for support of the proposed structure and may consist of spread footings supporting isolated columns, mat footings for supporting large area loads, combined footings for supporting loads from several columns, or strip footings for supporting walls.

Our foundation support recommendations given in this report will remain valid only if all excavated footings are examined by an S&ME representative prior to concreting to ensure that bearing soils are similar to what was encountered in our borings and that unsuitable soils have been removed from the footing subgrades.

A net bearing pressure of 5,000 psf or less is recommended for core footings. A net bearing pressure of 5,000 psf or less is recommended for column footings that bear at or below an elevation of +230 ft. A net bearing pressure of 3,000 psf or less is recommended for Level 1 footings that are not adjacent to basement walls. A net bearing pressure of 3,000 psf or less is recommended for footings adjacent to core and basement walls, if the bearing elevation is approximately +234 ft. A net bearing pressure of 5,000 psf or less is recommended if the footings are extended to bear at or below an elevation of +230 ft. Recommended allowable bearing pressures may be increased by 1/3 for transient conditions, such as wind or seismic loads.

As much as 10 feet of fill was required to grade the western portion of this site during previous development. The deepest area lies just north of the stairway leading down to Park Street, adjacent to the Coliseum structure. We expect that up to 25 feet of existing fill lies directly behind the Coliseum basement wall and in utility line cuts. At our boring locations, the data suggest these soils to be very stiff in consistency and that they were likely placed with engineering control and sufficient compactive effort. However, the suitability of existing fill soils for support of new foundations will need to be closely evaluated during construction.

Based on boring data from this site, shear wave velocity measurements conducted by S&ME at nearby sites, and our knowledge of the general geologic profile of this area, Site Class C, as defined by IBC 2009, represents conditions at the site.

Ground water was encountered at elevations ranging from about +222 ft. to +205 ft. at the time of drilling. The ground water elevation did not change significantly during continued monitoring of two piezometers installed on site. We expect that ground water will be encountered during basement excavation perched near the terrace sand/kaolin clay

interface. Given the downslope position of the site, inflow may be significant through gravel to cobble-sized rock seams encountered at this depth, especially if these lenses are recharged somewhere up the hill. If encountered during excavation, perched water can likely be controlled by ditching or placement of sumps and pumping. Perimeter wall drains and a permanent underslab drainage system, as described in Section 6.7, should be installed behind walls and below the basement floor slabs.

The clayey sands and sandy clays in cut areas of the site appear suitable for re-use as structural fill. Sandy clays encountered in the river terrace stratum and some of the more cohesive clayey sands will be difficult to work with if allowed to become wet and will likely require moisture conditioning procedures during placement.

1. INTRODUCTION

The purpose of the geotechnical exploration was to identify the general subsurface stratification underlying the site and assess the physical properties of the soils in terms of their potential utility for foundation support, their relative suitability for use as structural fill, and their lateral earth pressures. Our objectives may be summarized as follows:

- Provide a geotechnical profile and interpretation of conditions within the site.
- Provide recommendations for preparation or improvement of the bearing soils to support proposed foundations, grade slabs, and retaining walls
- Assess in general terms the characteristics of the site in terms of earthquake hazards, including estimating the Site Class of this location as described in IBC Section 1613.
- Provide recommendations for design and construction of foundations.
- Provide recommendations for design and construction of grade slabs.
- Provide recommendations for design and construction of retaining walls.

2. PROJECT INFORMATION

Project information was summarized in a letter provided to Andrea Lamberti of Rafael Vinoly Architects (RVA) by Michelle Motchos of Stevens and Wilkinson (S&W), the project structural engineer, dated August 3, 2010. The project is a new academic building on the University of South Carolina campus located within the half block outlined by Assembly Street, Greene Street, Park Street and the Carolina Coliseum. This area is currently an asphalt surfaced parking lot with some landscaped areas.

Additional information regarding structural elements of the design were provided to S&ME by S&W in telephone and e-mail correspondence between March and June 2011. Current programming is for a 4-story building with partial basements in the eastern and western portions of the structure and sunken auditorium and lecture hall spaces in the central portion. Typical bay spans will be 21-ft by 21-ft on center for Level 1 and above. The sunken auditorium and lecture hall will involve larger spans, in particular the north-south auditorium span which is in excess of 140 feet. An open-air courtyard will be constructed atop Level 1 in the central portion of the structure, covering a large portion of the sunken space. A large portion of the structural load will be transferred to four concrete core shafts placed in the interior of the structure. The cores will extend to the basement level (Level 0), span one bay spacing of 21-ft. by 21-ft., and include elevator shafts sunken below the basement floor level.

The following summarizes our knowledge of the estimated structural loads and planned bearing elevations for the project:

- Typical core load of 4,300 kips (3,100k dead load + 1,200k live load), with the core shell comprising 70% of the dead load.
- Loads for the auditorium/lecture hall varying from about 435 kips to 875 kips (dead + live).

- Loads for other Level 1 footings varying from about 80 kips to 795 kips (dead + live).
- Approx footing bearing elevations: core footings = +224 ft., other Level 0 footings = +228 ft., auditorium/lecture hall footings = +228 ft., Level 1 footings adjacent to basement walls = +234 ft., other Level 1 footings = +248 ft.

The projected footprint is approximately 356 ft by 258 ft. The structure will lie adjacent to the Coliseum. Dimensioned building lines depicted on the rough layout provided to us show the building to be set back approximately 27 feet from the setback line along the Assembly Street sidewalk, approximately 74 feet from the centerline of Park Street, and about 49 feet from the centerline of Greene Street.

New pavements on the project are to include drop-off points near the Greene Street (North) entrance and near the Park Street loading dock. A drawing labeled *Level 2 Site Plan* (No. A0303) was provided by S&W on March 11, 2011. Based on this plan, it appears the drop-off points will be constructed near the existing grades with cuts or fills on the order of two feet or less likely required.

3. EXPLORATION PROCEDURES

The American Society for Testing and Materials (ASTM) publishes standard methods to explore soil, rock and ground water conditions in Practice D-420-98, *"Standard Guide to Site Characterization for Engineering Design and Construction Purposes."* In exploring the site, we generally followed these standards and the approach described in our Proposal No. 1611-7714-10 dated September 7, 2010, and Change of Scope letter dated April 12, 2011. Right-of-entry to perform borings and other fieldwork on the property was conveyed with acceptance of our proposal.

3.1 Site Reconnaissance

Prior to performing our exploration for this site, we reviewed available field and laboratory data from nearby explorations for pertinent information including:

- USC undisclosed development within the block bounded by Greene, Park, Lincoln, and Blossom Streets (S&ME Project No. 1611-07-164, May 2007).

- USC Phase I Research Campus (Biomed) located one block north of this project, bounded by Park, Greene, Lincoln and College Streets (S&ME Project No. 1611-05-376, December 2005).

- USC Honors Dormitories located southeast of the site near the corner of Main and Blossom Streets (S&ME Project No. 1611-06-340, October 2006).

- USC Norman J. Arnold School of Public Health located northeast of the site and bounded by Assembly, College, Park and Pendleton Streets (S&ME Project No. 1611-01-276, October 2001).

- Chilled Water Plant located near the corner of Park and Devine Streets. This exploration was performed by MACTEC in March 2005. Results were provided to S&ME during performance of a previous nearby exploration.

The locations of these projects are shown on the attached site vicinity map (Figure 1) in Appendix A.

S&ME laid out boring locations on site in accessible locations within and near the planned structure footprint by measuring distances from existing site features. Sampling point locations were marked in the field with small colored flags or marking paint with the boring numbers indicated. Sampling point locations indicated on the attached "Boring Location Plan" must be considered as approximate. The elevations shown on our boring logs and subsurface profiles were interpolated from the topographic plan provided to S&ME and should also be considered as approximate.

3.2 Field Testing Procedures

Soil test borings were initially performed at the site between November 9th and November 12, 2010, using a truck-mounted drill rig. The borings were advanced using 2-1/4-inch inside diameter hollow-stem augers to refusal of the drilling equipment. Auger refusal occurred at depths ranging from 73.0 ft. to 123.0 ft. below the ground surface. Standard Penetration Testing (SPT) and split-spoon sampling in general accordance with ASTM D-1586 was performed at 2.5-foot intervals for the upper 10 feet of the borings and at maximum 5-foot intervals thereafter using a safety hammer. SPT "N" values were recorded for each sample taken. Representative samples of the soils obtained by the split-spoon sampler were collected and placed in suitably identified, sealed glass jars and transported to our laboratory. A summary of our exploration procedures is included in Appendix B.

On May 18 through May 25, 2011, we mobilized a drilling rig to the site and obtained nine relatively undisturbed soil samples at selected depths using pitcher and piston-type samplers. The samples were collected at four locations near the footprints of the planned structural cores, as shown on Figure 2. The samples were then delivered to labs in our Charlotte, NC, and Knoxville, TN, offices where they were logged, extruded and prepared for testing. Two of the samples contained too much gravel and/or saturated sand to extrude an acceptable sample for testing and were discarded. One-dimensional consolidation tests were performed on the seven remaining undisturbed samples of river terrace sediments and underlying Cretaceous-age materials.

Ground water measurements in the test borings were taken shortly after drilling was completed. Piezometers were installed in the boreholes of B-7 and B-10 to allow further monitoring of ground water levels. Because they were conducted in a heavily trafficked area, the remainder of the borings were backfilled with auger cuttings after the ground water measurements were completed.

3.3 Laboratory Testing

Recovered disturbed samples and field logs were transported to our laboratory. Soils were subsequently classified by the geotechnical engineer in general accordance with the visual-manual method described in ASTM D 2488, "*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*", and assigned for laboratory testing as deemed necessary. Laboratory testing was conducted on representative soil samples to confirm field identification of the soils and establish engineering characteristics for design. Laboratory testing included the following:

- Seven (7) percent fines (wash 200 sieve) analyses (ASTM D1140).
- One (1) grain-size analysis (ASTM D422).
- Twelve (12) natural moisture content tests (ASTM D2216).
- Four (4) Atterberg limits tests (ASTM D4318).
- Seven (7) one-dimensional consolidation tests (ASTM D2435).
- Two (2) standard Proctor moisture density relationship tests (ASTM D698).
- Two (2) soaked one-point California Bearing Ratio (CBR) Test (ASTM D1883).

A summary of our laboratory testing procedures and the laboratory test results are included in Appendix C.

4. SITE CONDITIONS

S&ME's assessment of the geotechnical conditions began with a reconnaissance of the topography and physical features of the site. We also consulted available geologic maps and reports of nearby explorations for relevant information.

4.1 Surface Features

During the course of our exploration, we obtained design drawings for the adjacent Coliseum (called Memorial Hall at that time) dated October 1966. The structure is founded on shallow foundations with a bearing pressure of 3,000 psf. The lowest basement level on the north side of the structure is indicated to have a finished floor elevation of +223.67 ft. Based on these drawings and the site plans submitted to us, the horizontal distance between the south wall of the new structure and the north wall of the Coliseum appears to be on the order of 30 to 35 feet.

We also reviewed the grading plan for the Coliseum, which included pre-construction contours. Prior to construction, the site sloped downward from east to west, as it does now. Cuts of up to 22 feet were required in the northeast quadrant of the current site, near the bottom of the stairway from Assembly Street. As much as 10 feet of fill was required to grade the western portion of this site, with the deepest portion just north of the stairway adjacent to the Coliseum leading down to Park Street.

We also reviewed a Sanborn fire map obtained from Environmental Data Resources, Inc. dated 1950. The map shows that the site at this time, prior to construction of the Coliseum, consisted mainly of single-story residential dwellings. A Baptist church stood

on the corner of Park and Greene Streets with a two-story apartment building directly to the south. Two small roadways were used to access the central portion of the property from Assembly Street. It does not appear that any structures on the site at this time had basements.

A preliminary topographic survey of the site dated November 3, 2010, was provided to us by B.P. Barber. The site slopes downward to the west with elevations ranging from approximately +280 ft. near the corner of Greene and Assembly Streets to approximately +226 ft. in the southwest corner of the site. Elevations in the parking area in the central portion of the site vary from about +250 ft. to +252 ft. Based on the planned site grades, as much as 30 feet of cut will be required near the northeast corner of the structure while excavation for the basement and auditorium spaces will vary from a few feet on the downslope (west) portion of the site to in excess of 30 feet near the slope coming down from Assembly Street.

4.2 Local Physiographic Conditions and Geology

The site lies on one of several archaic river terraces that flank the Congaree River Valley both within and immediately south of the downtown Columbia area. Up to six such terraces have been mapped in the Congaree Valley. The terraces were formed over several periods in which the Atlantic Ocean intruded up the valley during warm periods of the Pliocene and Pleistocene Epochs. The lower terraces are relatively young features, exhibit only minor erosion, and can be traced large distances on the basis of surface elevation. The upper terraces, including areas adjacent to Columbia and West Columbia, have been severely eroded and have little surface expression. Each terrace forms a thin veneer over older, underlying Coastal Plain or Piedmont residual soils. Materials comprising the terraces typically consist of medium dense, coarse-grained red-brown clayey sands or stiff reddish sandy silts or clays with numerous rounded quartz pebbles embedded in the soil binder. The fine grained soil binder is typically well desiccated and oxidized and generally moderately preconsolidated. Under these conditions the soils are not highly compressible under light to moderate structural loads.

Terrace sediments are underlain by mostly sandy Cretaceous age sediments of the Black Mingo and Middendorf formations below approximately elevation 210 to 225 feet. These soils were eroded from a range of mountains in the northwest portion of the state approximately 65,000,000 years ago and laid down in their present positions as fan deposits, where they have weathered in place. In the Columbia metropolitan area these sediments rest unconformably on top of the underlying Piedmont rocks at depths of between 20 and 120 feet. Massive light gray or tan kaolin beds are prevalent thoughout the sequence, alternating with coarse-grained water-bearing sands and gravels which become increasingly prevalent near the base of the formation. Soil layers exhibit considerable lateral and vertical discontinuity. Iron-oxide cemented sandstone beds are common.

Soils of the Carolina Piedmont have weathered in place from the parent crystalline bedrock material and lie below approximately elevation 190 feet at the site. Residual soils of the Carolina Piedmont consist of stiff or very stiff micaceous silts and clays, grading to firm sands with depth. These soils have been completely weathered in place from the parent bedrock material, but below depths of a few feet retain most of the relict rock structure. Soil strength derives largely from relict intermolecular bonding and remolded materials generally less exhibit lower shear strength than do undisturbed samples. Piedmont soils are normally consolidated to slightly overconsolidated.

The term partially weathered rock (PWR) is applied to very dense micaceous sands, or silty sands of the Carolina Piedmont, which register SPT N-values in excess of 100 blows per foot. PWR generally varies widely within even small areas owing to minute differences in the chemical properties of the parent bedrock, which results in widely varying rates of weathering. Isolated lenses or seams of PWR often are present within Piedmont Residuum well above the overall PWR level within a given area. PWR is considered excellent bearing material for foundations and is relatively incompressible except in highly stressed deep foundations.

4.3 Interpreted Stratification of Soils on Site

Interpreted subsurface cross-sectional profiles of the soils encountered onsite are attached in Appendix A as Figure 3 through Figure 5. The orientation of the cross-sections in plan view is indicated on Figure 2. Subsurface conditions between the borings will likely vary from those indicated on our cross-section. The nature and extent of variations between the sampling points will not become evident until construction, and stratification lines shown are not warranted. For detailed descriptions and stratification at a particular boring location, the respective boring log should be reviewed. Soil test boring logs are attached in Appendix B.

4.3.1 Surface Material

Our borings were conducted in an existing asphalt parking area, through concrete sidewalks, and in landscaped areas. The borings in the parking area encountered approximately 1 to 6 inches of asphalt over 2 to 6 inches of stone base course. In the landscaped areas, our borings encountered approximately 3 to 6 inches of topsoil. The concrete sidewalks were measured to be approximately 4 to 6 inches thick at our boring locations.

4.3.2 Existing Fill

According to the Coliseum construction grading plan, as much as 10 feet of fill was required to grade the western portion of this site, with the deepest portion just north of the stairway leading down to Park Street. Existing fill was encountered in borings B-8, B-2, and B-7 to depths of 3 ft., 10 ft., and 12 ft., respectively. Where sampled, the fill generally consisted of clayey sands and sandy clays similar in character to the upper soils found across the site. Dry, brown poorly-graded sands were encountered near the bottom of the fill. In boring B-7, asphalt and stone debris was encountered with the sand. SPT

N-values ranged from 16 to 48 blows per foot (bpf), indicating a medium dense to dense relative density or very stiff consistency.

In addition to the fill placed during grading operations for the Coliseum, we expect up to 25 feet of fill to be encountered directly behind the Coliseum basement wall and in utility line cuts. A noticeable offset can be seen in the sidewalk on the north side of the Coliseum near where fill was likely placed to backfill the basement wall. No documentation of compaction or engineering control of the onsite fill has been made available and we do not expect these documents to be readily available. Although the boring data and recovered samples appear to indicate that the fill was placed with some level of engineering control during construction of the Coliseum, we cannot at this time independently verify compacted density achieved. The site was also developed prior to construction of the Coliseum, so the possibility exists that additional grading of the site took place prior to this time.

Though not encountered in our borings, there is a possibility that large debris (such as trash or old foundations) may be encountered within other areas of the site not penetrated by our borings. The extent of unsuitable debris within the building area will only be revealed when the area is exposed by site demolition. If encountered, this material will need to be removed and replaced with well-compacted fill free of foreign material.

4.3.3 Terrace Soils

Soils underlying the surface material and/or fill generally consisted of archaic river terrace clayey sands encountered above an elevation of about +225 feet on the east (upper) end and about +210 feet on the west (lower) end of the site. In the upper 10 feet of the stratum, recovered samples were generally dessicated, dry to moist, and mottled red with brown in color. SPT N-values in this zone were generally in excess of 30 bpf, indicating a dense relative density.

Below the upper 10 feet, the terrace soils generally graded to coarser sands with a lower proportion of clayey fines. These samples were generally moist and brown to orange or light red in color. In the northwestern portion of the site, the recovered samples were wet starting at an elevation of about +220 feet. Rounded gravel and angular quartz fragments, up to 2 inches in size, were also occasionally embedded in the soil binder near the bottom of the layer. SPT N-values generally indicated a medium dense to loose relative density, with increasing values noted near the bottom of the layer in gravel lenses.

Borings near the two eastern core locations (B-11 and B-14) encountered a lens of gravel to cobble-size rock fragments at about elevation +228 ft., near the bottom of the terrace sediments, extending for a thickness of about 3 to 4 feet. In that our drilling bit encountered refusal in these lenses, the gravel or cobbles may be upwards of 6 to 12 inches in size. These lenses are common in this area, with similar material encountered during construction of the nearby USC biomedical research campus.

Compression of the terrace sand stratum will comprise the majority of the settlement experienced under final load for those column footings that bear above the bottom of the stratum. We expect this compression to occur almost immediately after placement of load.

4.3.4 Coastal Plain Residuum

Below the river terrace soils, our borings encountered Cretaceous sands and clays, residual soils of the middle or upper South Carolina Coastal Plain, to elevations of about +195 ft. to +185 ft. These soils typically consisted of sandy kaolinitic clay grading downward to water-bearing clayey sands.

Recovered samples were typically micaceous, light gray with yellow or orange in color, and exhibited moderate to high plasticity when remolded by hand. SPT N-values in the upper clays were typically in excess of 30 bpf, indicating a hard consistency. SPT N-values in the lower sands were generally consistent with a medium dense to dense relative density.

Laboratory consolidation test data imply that these soils are preconsolidated under stresses at least 2-½ times the stresses now applied by the overburden. In our experience, this is typical for this formation and is due to desiccation or erosion of overlying materials over time. These soils can be considered relatively incompressible under applied stresses below the preconsolidation stress. Since the Cretaceous material is overconsolidated, compression due to deformation of soil grains will occur almost immediately after load application. Time-dependent compression due to primary consolidation and secondary compression will likely be very small.

4.3.5 Piedmont Residuum

Below the coastal plain residuum, our borings encountered piedmont residual soils which typically consisted of sandy silts to silty sands. Recovered samples were micaceous, white with yellow in color, and with fine to coarse sand and low to moderate plasticity fines. SPT N-values typically ranged from 30 bpf to greater than 100 bpf, indicating a hard to very hard consistency. Partially-weathered rock (PWR) was typically encountered within 10 feet of the top of the layer. Partially-weathered rock consisted of very hard/dense sandy silts to silty sands of the Carolina Piedmont which registered SPT N-values in excess of 100 bpf. The vertical and horizontal extent of PWR generally varies widely within even small areas owing to minute differences in the chemical properties of the parent bedrock, which results in widely varying rates of weathering. Isolated lenses or seams of PWR often are present within Piedmont Residuum well above the overall PWR level within a given area.

Auger refusal was encountered at elevations of about +170 ft. to +160 ft. on site. Refusal to drilling likely resulted from encountering either thin rock seams or the upper surface of sound bedrock.

The hard Piedmont silts and Partially Weathered Rock (PWR) encountered on site were considered as essentially incompressible under the anticipated column loads.

4.4 Ground Water

Ground water was encountered at elevations ranging from about +222 ft. to +205 ft. at the time of drilling. Most boreholes were backfilled after completion of drilling and measurement of the ground water level. Piezometers were installed in the boreholes of B-7 and B-10 to allow further monitoring of ground water levels.

From monitoring the piezometers, we did not encounter a significant change in stabilized ground water levels from November 2010 through February 2011. Piezometers will remain in place until the start of construction so that ground water levels can be further monitored.

We expect that ground water will be encountered during basement excavation perched near the terrace sand/kaolin clay interface. Given the downslope position of the site, inflow may be significant through gravel to cobble-sized rock seams encountered at this depth, especially if these lenses are recharged somewhere up the hill. If encountered during excavation, perched water can likely be controlled by ditching or placement of sumps and pumping. Perimeter wall drains and a permanent underslab drainage system, as described in Section 6.7, should be installed behind walls and below the basement floor slabs.

We note that ground water levels are influenced by precipitation, long term climatic variations, and nearby construction. Ground water measurements made at different times than our exploration may indicate ground water levels substantially different than indicated on the boring logs in Appendix B.

5. BUILDING CODE SEISMIC PROVISIONS

Seismic induced ground shaking at the foundation is the effect taken into account by building code seismic-resistant design provisions. Other effects, such as soil liquefaction, are not addressed in building codes but must also be considered.

5.1 Site Class

We classified the site as one of the Site Classes defined in the 2009 IBC Section 1613 (Table 1613.5.2) using the procedures described in Section 1613.5.2. The Site Class is used in conjunction with mapped spectral accelerations S_S and S_1 to determine Site Coefficients F_A and F_V in IBC Section 1613.5.3, tables 1613.5.3(1) and 1613.5.3(2).

The initial step in site class definition is a check for the four conditions described for Site Class F, which would require a site-specific evaluation to determine site coefficients F_A and F_V. Soils vulnerable to potential failure under item 1) including quick and highly sensitive clays or collapsible weakly cemented soils, were not observed in the borings. Three other conditions, 2) peats and highly organic clays; 3) very high plasticity clays

(H>25 feet); and 4) very thick soft/medium stiff clays, were also not evident in the borings performed.

The remaining vulnerability, liquefaction, appears unlikely at this site due to the age of the soil deposits. This is discussed further in the proceeding section.

S&ME has performed shear wave velocity surveys of two nearby sites using surface wave analysis (MASW with MAM). During a previous exploration, we were also provided with shear wave velocity measurements using ReMi™ surface wave analysis of the adjacent chilled water plant site, performed by Mactec in 2005. The results of these surveys are provided below in Table 1:

Table 1: Summary of Shear Wave Velocity Testing in Project Vicinity

Project Location	Method	Average Shear Wave Velocity	IBC Site Classification
USC Biomed Research Campus	MASW/MAM	Array No. 1 = 1541 ft/s Array No. 2 = 1410 ft/s Array No. 3 = 1534 ft/s	Site Class C
USC Honors Dormitories	MASW/MAM	Array No. 1 = 1408 ft/s Array No. 2 = 1432 ft/s	Site Class C
USC Chilled Water Plant*	ReMi™	Array No. 1 = 1673 ft/s Array No. 2 = 1778 ft/s	Site Class C

* Measurements were not used for correlation and are provided for informational purposes only.

In assessing the Site Class for this site, we compared the subsurface profiles obtained at the Biomed and Honors Dormitories sites with conditions at this site. Soils encountered during this exploration were generally similar in character to those obtained at these other sites. A rough correlation was then made between boring data (SPT N-values) and shear wave velocity values for each geologic stratum encountered. The estimated weighted average shear wave velocity, v_{si}, from this correlation to a depth of 100 feet at this site exceeded 1200 feet per second. Based on this data and our knowledge of the general geologic profile of this area, IBC 2009 Site Class C represents conditions in and around the site.

5.2 Design Spectral Values

S&ME determined the spectral response parameters for the site using the general procedures outlined under the 2009 International Building Code Section 1613.5. This approach utilizes a mapped acceleration response spectrum corresponding to an earthquake having a 2 percent statistical probability of exceedance in 50 years to determine the spectral response acceleration at the top of seismic bedrock for any period. The 2009 International Building Code seismic provisions of Section 1613 use the 2002 Seismic Hazard Maps published by the National Earthquake Hazard Reduction Program (NEHRP) to define the base rock motion spectra.

The Site Class is used in conjunction with mapped spectral accelerations S_S and S_1 to determine Site Amplification Coefficients F_A and F_V in IBC Section 1613.5.3, tables 1613.5.3(1) and 1613.5.3(2). For purposes of computation, the Code includes probabilistic mapped acceleration parameters at periods of 0.2 seconds (S_S) and 1.0 seconds (S_1), which are then used to derive the remainder of the response spectra at all other periods. The mapped S_S and S_1 values represent motion at the top of seismic bedrock, defined as the Site Class B-C boundary. The surface ground motion response spectrum, accounting for inertial effects within the soil column overlying rock, is then determined for the design earthquake using spectral coefficients F_A and F_V for the appropriate Site Class.

The design ground motion at any period is taken as 2/3 of the smoothed spectral acceleration as allowed in section 1613.5.4. The design spectral response acceleration values at short periods, S_{DS}, and at one second periods, S_{D1}, are tabulated below for the unimproved soil profile using the IBC 2009 criteria. Peak ground acceleration (PGA) was obtained by dividing the S_{DS} value by 2.5.

Table 2: Spectral Design Values

	2009 IBC (2002 Seismic Hazard Maps)
S_{DS}	0.43 g
S_{D1}	0.16 g
PGA	0.17 g

Spectral response acceleration factors given above correspond to Design Category C for Use Group I, II, or III structures.

5.3 Liquefaction

Loose, sandy strata encountered in boring B-8 at depths of about 25 to 40 feet below ground surface appear to meet the general criteria for liquefaction, e.g. contain little fines, lie below the water table, and exhibit a loose relative density based on SPT N-values. However, empirical computations of liquefaction resistance based on SPT data do not account for the geologic age or origin of the deposit. In this case, use of the empirical charts would lead to very conservative results in terms of liquefaction susceptibility.

The effect of geologic age on the liquefaction susceptibility of a geologic formation was addressed in 1978 by Youd and Perkins[1]. Liquefaction potential decreases with increasing age of a soil deposit. Many processes occur with aging, such as cementation, weathering, increased exposure to low level shaking, cold-bonding and consolidation. All

[1] Youd, T. L., and Perkins, D. M. (1978), " Mapping Liquefaction-Induced Ground Failure Potential", Journal of Geotechnical Engineering, ASCE, Vol. 104, No. GT4, pp. 433-446.

of these processes tend to increase the liquefaction resistance of soils, but their effect can usually not be captured by penetration tests due to disturbance of the soil matrix during sampling.

In this case, the site is underlain by materials substantially older than considered susceptible to liquefaction by researchers. Nearly all known liquefaction features considered in the literature occur in Holocene-age strata (less than 11,000 years). Paleo-liquefaction features, or evidence of past liquefaction occurrence, have been discovered in the early Pleistocene-age (Q3 or younger) deposits of the lower coastal plain in South Carolina in connection with the 1886 Charleston earthquake, but not in any older terrace deposits within the study area around Charleston. Regional geologic mapping in the area indicate the terrace deposits to likely consist of Pliocene-era sediments laid down in excess of 1.8 million years ago. Soils of this age are considered very unlikely to experience liquefaction.

S&ME's opinion is that while liquefaction is computationally possible in scattered locations based on blow-count based empirical methods, these methods are not necessarily applicable to this site. It is our opinion that liquefaction does not represent a creditable geologic hazard for the design earthquake required by the 2006 IBC.

6. CONCLUSIONS AND RECOMMENDATIONS

Based on the recent topographic survey and the condition survey prior to construction of the Coliseum, it appears that as much as 10 feet of fill was required to grade the western portion of this site to present surface elevation. The deepest portion lies just north of the stairway leading down to Park Street. The cut/fill line appears to run generally along the western edge of the parking area. The recommendations given below for site preparation and for foundation and grade slab construction are dependent on the nature and extent of existing fill soils on site. For our recommendations given below to remain valid, prior to construction of grade slabs or foundations a representative of S&ME must evaluate the suitability of existing fill soils where encountered.

The following paragraphs include our conclusions and recommendations for site preparation, for fill placement and compaction, and for foundation types and design values. The conclusions and recommendations included in this report are based on our sampling of representative soils, on the information obtained during our subsurface exploration and on our experience with similar projects.

6.1 Site Preparation

The soil profile encountered at this site will likely require some modification before foundation construction begins. The following recommendations illustrate the site preparation requirements anticipated during construction on this site:

1. Site preparation should include the removal of all unsuitable surface materials within the building footprint. Strip and grub all existing vegetation and topsoil as

well as asphalt pavements. Stripped asphalt should be disposed of outside the perimeter of the new building footprint.

2. Old foundations or basement slabs, if encountered during site preparation, should be completely removed where they interfere with new construction. Undercut basements or pits should be backfilled with well-compacted structural fill, in accordance with Section 6.3. In addition, abandoned utilities should be removed or plugged prior to construction. If not removed or plugged, pipes may serve as conduits for subsurface erosion resulting in formation of voids below foundations or floor slabs. Where existing utilities are left in place and plugged within the building footprint, it may be necessary to undercut poorly-compacted utility backfill to provide adequate support for new footings or slabs. Existing utilities remaining in use should be rerouted around the proposed building footprint.

3. Avoid placing construction debris from the existing structures in the new building footprint. You may place broken concrete or asphalt material in fill portions of pedestrian or landscaped areas, provided no environmental regulations are thereby violated.

4. After stripping and cutting to grade elevation and undercutting of unsuitable material in the building footprint, the exposed subgrade where space permits should be proofrolled with a heavily loaded tandem-axle dump truck or similar rubber-tired equipment to identify areas that require stabilization. A representative of S&ME must be present during this evaluation. Assuming our recommendations for site preparation are followed, we do not expect widespread stabilization will be necessary unless surface soils are heavily reworked or allowed to become saturated during construction.

5. Existing fill soils, where encountered during site preparation, should be closely evaluated to determine their suitability for structural support. Such an evaluation may consist of visual observations, test pits, and hand auger borings with Dynamic Cone Penetrometer testing, in addition to proofrolling. A representative of S&ME must be present during this evaluation. Fill soils placed without engineering control may include organics, buried debris, or voids which could not be observed during our exploration. Existing fill soils that are not suitable for structural support should be replaced with well-compacted structural fill, in accordance with Section 6.3. As with any previously developed site, unexpected conditions will likely be encountered.

6. It will be necessary to provide sufficient drainage of water away from the building pad to protect the subgrade. Even during dry weather, the grading contractor should take measures so that periodic rain showers do not significantly affect grading. This includes diverting rainwater runoff away from the construction area and sealing the ground with rubber tire or steel drum equipment to help prevent

rainwater runoff from migrating below the surface soils. During construction, gravity-drained surface ditches should be installed around the site to promote surface runoff. Ditches should have at least six inches of relief per 100 feet of length to facilitate flow.

6.2 Site Excavation

Based on the planned site grades, as much as 30 feet of cut will be required near the northeast corner of the structure while excavation for the basement and auditorium spaces will vary from a few feet on the downslope (west) portion of the site to in excess of 30 feet near the slope coming down from Assembly Street. The boring data indicate that excavation will extend mainly through moderate consistency river terrace sands with gravel to cobble-sized rock lenses. Perched ground water will likely be encountered during basement excavation near the terrace sand/kaolin clay interface. Ground water, if encountered during site excavation, should be reduced and maintained at least 2 feet below the bottom of excavations prior to and during digging. Ground water levels should be maintained below the bottom of the excavation until the weight of the concrete placed is sufficient to overcome the uplift force of the groundwater.

Substantial cuts will be necessary adjacent to Assembly Street in the eastern portion of the site. Cuts near the existing retaining wall along Assembly Street may reach 35 feet in depth. Temporary excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

6.3 Fill Placement and Compaction

The clayey sands and sandy clays in cut areas of the site are likely suitable for re-use as structural fill. Sandy clays encountered in the river terrace stratum and some of the more cohesive clayey sands will be difficult to work with if allowed to become wet and will likely require moisture conditioning procedures during placement. These soils may not provide adequate support under footings or grade slabs if placed too wet of optimum.

All fill placed should be comprised of soils free of organic matter and other deleterious materials. The fill should be uniformly spread in relatively thin lifts (8 inches, loose) and compacted to at least 98 percent of the soil's maximum dry density as determined by a laboratory standard Proctor compaction test (ASTM D-698). The moisture content should be controlled to within plus to minus 3 percent of optimum. In addition to meeting the compaction requirement, fill material should be stable under movement of the construction equipment and should not exhibit rutting or pumping. In areas where less than 12 inches of new fill will be placed, the upper 8 inches of the existing material should be compacted to at least 98 percent of the soils maximum dry density per ASTM D-698.

After fill operations are complete, the exposed building pad surfaces should be again proofrolled under the supervision of the geotechnical engineer or his representative with a heavily loaded truck or pan. Areas of rutting or pumping soils may require selective undercutting or further stabilization prior to construction of building slabs.

6.4 Recommendations for Foundation Support

6.4.1 General Recommendations

Based on the results of our exploration, experience in the area, and the provided plans, shallow foundations appear suitable for support of the proposed structure. Shallow foundations may consist of spread footings supporting isolated columns, mat footings for supporting large area loads, combined footings for supporting loads from several columns, or strip footings for supporting walls. This assumes that the site preparations outlined above are followed and the estimated total and differential settlements given below can be tolerated by the structure.

The load differentials across bay spacings and somewhat irregular footing configurations and bearing elevations increase the potential for differential settlements to occur that push structural tolerance. The loads associated with the core shaft footings are also at the higher end for recommendations we have given in the past for shallow foundation support in downtown Columbia. Therefore, our recommendations given below will remain valid only if all excavated footings are examined by an S&ME representative prior to concreting to ensure that bearing soils are similar to what was encountered in our borings and that unsuitable soils have been removed from the footing subgrades.

It appears that most if not all foundations for the structure will bear on virgin soils. Assuming the western portion of the site is excavated to approximately El. +230 ft. for Level 0, and footings adjacent to the basement wall sunk to suitable elevations, most of the existing fill on site will likely be removed. However, the possibility exists that existing fill soils will be encountered near bearing depths in areas of the site not explored by our borings. The recommendations given below for foundation design are dependent on the nature and extent of existing fill soils on site. Prior to construction of foundations, a representative of S&ME must evaluate the suitability of existing fill soils where encountered at footing bearing depth.

Footings constructed near the Coliseum basement wall and adjacent to basement walls will impose lateral surcharge loads on the walls unless they are extended to sufficient depth. We recommend that footings in these areas be extended to bear at a depth such that a line projected downward at a 45 degree angle from the outer toe of the footing does not intersect the wall footing. Based on the plans provided to us, it does not appear that the footings along the southern wall will impose surcharge loads on the Coliseum wall using the method described above.

6.4.2 Allowable Bearing Pressure

We estimated bearing capacities for various foundation dimensions using our boring data and our experience with similar soils under similar loading conditions. Estimated ultimate bearing capacity exceeds recommended allowable bearing pressures by a safety factor of at least 3.0, provided that footings are designed and constructed as outlined in this report.

A net bearing pressure of 5,000 psf or less is recommended for core footings, assuming they bear at or below an elevation of about +224 ft. A net bearing pressure of 5,000 psf or less is recommended for column footings that bear at or below an elevation of +230 ft. This would include the columns within the Level 0 and Auditorium footprints. A net bearing pressure of 3,000 psf or less is recommended for Level 1 footings that are not adjacent to basement walls. Footings adjacent to core and basement walls should be extended to bear at a depth such that a line projected downward at a 45 degree angle from the outer toe of the footing does not intersect the wall or core footing. Based on our rough measurement, we expect that these footings would have to bear at an elevation of +234 ft. or below to meet this requirement. For these footings, a net bearing pressure of 3,000 psf or less is recommended if the bearing elevation is approximately +234 ft. A net bearing pressure of 5,000 psf or less is recommended if the footings are extended to bear at or below an elevation of +230 ft. Recommended allowable bearing pressures may be increased by 1/3 for transient conditions, such as wind or seismic loads.

6.4.3 Bearing Depth and Dimension

Minimum individual spread footing and wall footing widths should be at least 24 and 18 inches, respectively, with a minimum embedment depth of 24 inches below final grade. This recommendation is made to help prevent a "localized" or "punching" shear failure condition that could exist with very narrow footings.

6.4.4 Settlement

Using our subsurface data and the building information provided to us, the structural load and soil response were modeled using *Settle3D*™ version 2.01 by Rocscience, Inc. Response at the four core locations and the auditorium/lecture hall space was modeled using multiple column loads and the full soil profile. Unloading effects from the planned excavations were included in the model.

As part of our May 2011 exploration, laboratory one-dimensional consolidation tests were performed on seven relatively undisturbed samples recovered from the river terrace sands and underlying Cretaceous-age material. Graphical presentation of sample deformation at 100 percent consolidation versus load, expressed as void ratio, are presented for the samples in the laboratory data sheets attached in Appendix C. The graphical representation of the sample load-deflection curves was corrected for sample disturbance using the Schmertmann (1955) approach and the Becker (1997) work per unit volume approach. In-place vertical stresses were estimated to be in the range of 1.5 ksf to 5.5 ksf, depending on the sample depth.

Corrected data imply a preconsolidation stress on the order of 10 ksf in the Cretaceous-age materials, or roughly 2.5 times the stresses now applied by the overburden. Re-compression index (C_R) values below the preconsolidation stress were approximately 0.01, while virgin compression (C_c) index values ranged from 0.13 to 0.19 in the upper terrace sands and 0.06 to 0.09 in the Cretaceous clays and sands. Coefficient of consolidation (C_V) varied from about 1.3 to 17.0 ft^2/day in the Cretaceous material at stresses between the in-situ stress and the anticipated stress increase. In our analysis, a linear elastic deformation model was assumed for the upper terrace sands while a non-linear time-dependent model was assumed for the Cretaceous clays and sands.

Based on our subsurface data and the resulting models, we expect the cores to settle on the order of ½ to 1 inch total, with approximately 50 percent of the settlement occurring due to the self-weight of the core shell. This assumes a 5,000 psf bearing pressure and excavation to elevation +230 ft. The added weight of the core footing was neglected because the net load caused by replacing excavated soil with concrete is small compared to the expected structural loads. Settlement of the remaining columns is also expected to be on the order of ½ to 1 inch total. Based on our model, we expect higher settlements will be seen in the column footings that bear at higher elevations in the upper terrace sands. This material is generally not as stiff as the underlying Cretaceous-age clays and unloading effects caused by excavation will be small to non-existent. A further breakdown of estimated settlements calculated at various locations using various footing configurations is attached in tabular form in Appendix A. The settlement values are broken down into (nearly) immediate settlement and total settlement including time-dependent effects.

Considering a "beam on elastic subgrade" or Winkler approach in design of mat foundation reinforcing, a modulus of subgrade reaction of 25 lbs./in^3 may be assumed for computation of soil resistance to beam deflection.

6.4.5 Construction Sequencing and Monitoring

Although we expect settlement of the cores to be 1 inch or less given the assumptions described above, our estimate is highly dependent on unloading effects from removing approximately 22 feet of overburden soil from the core area. This phenomenon is difficult to predict and the response does not always match the theoretical models, especially if the excavation is relatively confined as it is with this project. Therefore, we recommend that the core footings and shell be constructed to full height before the remaining structural frame is attached. Settlement points should be established near the base of the cores and monitored for the duration of core construction. Attachment of the structural frame should not start until core settlements have essentially ceased. The geotechnical engineer of record, S&ME, must be retained to make this determination after review of settlement data. Our laboratory results suggest that no special wait period will be necessary after the cores are constructed, assuming it takes at least 45 days to cast the core columns to full height.

In order to construct the basement walls, excavations will have to be sloped back to comply with OSHA requirements. This may result in column footings, extended to bear at low elevations, where overburden is first removed then replaced to Level 1 grade. This will impose loads in addition to the structural loads associated with each footing. Therefore, we recommend that all backfilling activities behind basement walls be completed before structural connections are made to the columns in backfilled areas.

6.4.6 Foundation Lateral Capacity

Lateral capacity of footings includes a soil lateral pressure and coefficient of friction as described in IBC Section 1806. Footings will likely be embedded in material similar to those described as class 4 as described in Table 1806.2. Where footings are cast neat against the sides of excavations in natural soils or well-compacted fill, an allowable lateral bearing pressure of 150 psf per foot depth below natural grade may be used in computations. An allowable coefficient of friction of 0.35 at the base of the foundations may be used in the calculation of sliding resistance, assuming concrete cast directly against undisturbed virgin soil or existing fills similar to those encountered in our borings, or approved granular fill. An increase of one-third in the allowable lateral capacity may be considered for load combinations, including wind or earthquake, unless otherwise restricted by design code provisions.

6.4.7 Construction and Observation of Footings

The recommendations given above assume proper design and construction of the footings and that the site preparation recommendations given herein are followed. All excavated footings must be examined by an S&ME representative prior to concreting to ensure that bearing soils are similar to what was encountered in our borings and that unsuitable soils have been removed from the footing subgrades. Existing fill should be evaluated when encountered on a case by case basis. Where existing fill underlies footing subgrades, it may be necessary to remove and replace poorly compacted or debris laden fill with well-compacted structural fill. It also may be necessary to redesign footings in the field (e.g. widen or deepen footings) based on observed conditions.

When possible, concrete should be placed the same day footings are excavated to the planned bearing elevations. If footings must remain open overnight or if rainfall is imminent, place a 2 to 4-inch thick "mud-mat" of "lean" (2000 psi) concrete on the bearing soils before placing rebar. Remove soils softened by water intrusion or exposure before placing concrete.

6.4.8 Lightweight Backfill

Assuming a 5,000 psf bearing pressure is used for the core shafts, a mat foundation on the order of 30 ft. by 30 ft. would be required for the provided loads. Because this is larger than the bay spacing of 21 ft., a portion of the foundation will extend out and under the core/basement walls. Adding approximately 26 ft. of soil backfill atop a portion of the foundation may result in excessive bending stress. A lightweight aggregate, such as

STALITE, would lower this stress while providing some weight for overturning resistance. Any lightweight aggregate used should be structurally stable under the applied loads and wrapped in filter fabric to reduce contamination of the aggregate.

6.5 Grade Slab Support and Construction

After cut and fill placement operations are completed to achieve subgrade elevation for the building pad, the exposed surface should be proofrolled with a heavily loaded dump truck or pan. A representative of S&ME must be present during this evaluation. Areas of rutting or pumping soils may require selective undercutting or further stabilization prior to placement of the slab. Prior to construction of grade slabs, a representative of S&ME must also evaluate the suitability of existing fill soils where encountered.

Virgin soils or existing fill soils similar to those encountered in our borings, or new fill placed and compacted in accordance with Section 6.3, will provide adequate support to proposed soil-supported grade slabs. A modulus of subgrade reaction (k) of 200 psi/in may be used for reinforcing design, assuming a subgrade consisting of compacted soils without segregation by composition.

Place a blanket of at least 4 inches of compacted granular soils below slabs to provide a capillary break between the subgrade and the slab concrete. Soil used as capillary break material should contain 5 percent or less of fines passing the No. 200 sieve. A vapor barrier such as "Visqueen," or the equivalent, is advised for placement beneath the slabs to limit moisture infiltration into finished spaces. The vapor barrier should be placed below the capillary break material. In addition, provide joints in slabs around columns and along wall footings to accommodate minor differential settlements.

6.6 Retaining Wall Earth Pressures

The equivalent fluid pressures given below should be used to design proposed basement walls and retaining walls on site. We recommend that the "At rest" lateral earth pressure coefficient be used if the walls are restrained from rotation and that the "Active" lateral earth pressure coefficient be used if rotation is not restrained. Note that basement walls lower than 8 feet high are not considered relatively rigid or restrained walls. In addition to the lateral loads exerted by the soil against the walls, allowance should be included for lateral stresses imposed by any temporary or long-term surcharge loads, such as cars or trucks adjacent to the walls.

The values given in the following table assume placement and compaction of the backfill in accordance with Section 6.3. These values assume backfill generally classified as SC soils, according to the Unified Soil Classification system, as described in Table 1610.1 of the 2009 IBC. The static values in Table 4 are based on a moist unit weight of 120 pcf and a friction angle (ϕ) of 32 degrees.

Table 4: Equivalent Fluid Pressures for Retaining Walls

Support Condition	Equivalent Fluid Pressure (drained, level backfill)
Active Condition (Wall deflects laterally, as with a conventional cantilevered retaining wall)	40 pcf
At-rest Condition (Wall restrained from movement, as with a basement wall)	60 pcf
Passive Condition (Wall movement toward retained soil, as with a thrust block)	290 pcf
Coefficient of Sliding Friction (Tan δ)	0.35

1) An allowable maximum toe pressure of 5,000 psf may be used for planned basement walls. Note that this applies to pressures at the edge of the wall footing, not an average value across the footing.

2) The above values represent a fully-drained soil condition, as defined in IBC 2009 Section 1805.4.2. Where backfill soils are not drained using an appropriately designed toe drainage system, the lateral soil pressure must consider hydrostatic forces below the surface, and submerged soil unit weight.

3) Basement walls lower than 8 feet high are not considered relatively rigid or restrained walls.

4) Organic silts (OL or OH), inorganic elastic silts (MH), or inorganic highly plastic clays (CH) soils may not be used as backfill.

5) Footings near proposed basement or retaining walls will impose surcharge loads in addition to earth pressures tabulated above if not extended to sufficient depth. Alternatively, you may elect to extend footings to bear entirely below a line projected upward at a 45 degree angle from the inner toe of the wall to avoid placing surcharge pressures on the wall due to footing loads.

6) Compact backfill directly behind walls with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within 10 feet of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

6.7 Perimeter and Underslab Drains

Positive gravity drainage of basement wall backfill should be provided using a permanent toe drain to limit buildup of hydrostatic pressures in the backfill. Gravity drainage should consist of a minimum two-foot wide blanket of clean crushed stone or washed sand, separated from the backfill by a properly graded filter or approved filter fabric, or a

specially designed geotextile material such as Enka-drain, or equivalent. Vertical drains should be tied into a permanent "toe" drain installed at the base of the wall.

We recommend that underslab drains be installed on roughly 10 to 20 foot centers below the basement slab to intercept infiltrating groundwater not collected by the wall toe drain. The interior drains should be embedded in the stone base layer immediately below the floor slab. A non-woven geotextile fabric should first be placed on the slab subgrade. Once the fabric has been placed, perforated pipe (6 inches in diameter) should be installed atop a minimum 1-inch layer of washed aggregate (No. 57 stone) then additional stone placed atop the pipe. The perforated drain pipe should also be wrapped in a suitable geotextile sock.

We expect the underdrain system can be designed to connect with a catch basin in the general vicinity of the drain system. The underdrain system should drain by gravity toward the catch basin. Interior drains should be cross-connected between one another and into the perimeter toe drains at several locations. Provision should also be made for clean out ports at several locations within the basement to facilitate maintenance of the system over time.

6.8 Pavement Recommendations

Two soaked laboratory California Bearing Ratio (CBR) tests were performed on representative bulk samples obtained at depths of approximately 1.0 to 2.5 feet below the existing ground surface at the locations shown on the attached Figure 2. The samples were compacted (remolded) to approximately 97 percent of the standard Proctor maximum dry density near the optimum moisture content.

Based on the laboratory test results and considering the total soil profile affected by wheel loads, a CBR value of 3 percent is recommended for use at the Park Street drop-off while a CBR value of 8 percent is recommended for use at the Greene Street drop-off. This is assuming that pavement subgrades are prepared in accordance with Section 6.1 of our geotechnical report and that the upper 12 inches of subgrade material is compacted to at least 97 percent of the standard Proctor maximum dry density. This also assumes that any fill material placed within the proposed pavement areas is placed and compacted according to the recommendations given in Section 6.3 of our report. Imported fill should be tested to determine that it exhibits a CBR equivalent to or exceeding the value assumed in pavement design.

Design procedures are based on the AASHTO Guide for Design of Pavement Structures and associated literature. Based on the subsurface conditions and assuming our grading recommendations will be implemented as specified, the following presents our recommendations regarding typical pavement sections and materials.

6.8.1 Flexible Pavements

Our pavement analysis was performed using DARWin Pavement Design and Analysis System software. DARWin uses the AASHTO '93 Flexible Pavement Design Method

for analysis of the unreinforced pavement section. Structural design DARWin input data included an initial serviceability of 4.2, a terminal serviceability of 2.0, a reliability level of 75 percent, and an overall standard deviation of 0.45.

Traffic volumes were not made available as of the writing of this report, therefore assumed traffic volumes based on our experience with similar facilities have been used in analysis. These assumed values are not guaranteed to represent the actual traffic volumes. If actual traffic volumes differ from those assumed, the recommended pavement sections should be re-evaluated. The following assumptions were used for traffic volume:

Normal Duty Asphalt (No heavy truck traffic):

- A design life of 20 years with 22,000 Equivalent Single Axle Loads (ESAL) over the design life.
- Average Daily Traffic of 150 passenger cars per day with 0.006 ESAL per vehicle (seven days per week).
- Two single-unit delivery trucks per day with 1.5 ESALs per truck (office deliveries - five days per week).

Heavy Duty Asphalt Drive:

- A design life of 20 years with 45,000 Equivalent Single Axle Loads (ESAL) over the design life.
- Average Daily Traffic of 150 passenger cars per day with 0.006 ESAL per vehicle (seven days per week).
- Four single-unit delivery trucks per day with 1.5 ESALs per truck (five days per week).
- Two garbage trucks per week with 2.5 ESALs per truck.

It is our opinion that the flexible pavement should consist of a wearing course of hot mix asphaltic (HMA) concrete and a base course of graded aggregate material. Graded aggregate material is necessary for structural support and to help transport any rainwater that seeps below the pavement. The results of our design are summarized in the following table.

Table 5 – Recommended Flexible Pavement Section Thickness

Design Life ESAL (20 Years)	Graded Aggregate Base Course	Asphalt Binder Course	Asphalt Surface Course
Normal Duty - 22,000 ESALs (Passenger cars & light-duty trucks)	6.0 in.	-	2.0 in.
Heavy Duty – 45,000 ESALs (With heavy trucks)	6.0 in.	1.5 in.	1.5 in.

Pavement materials should conform with and be placed in accordance with the South Carolina DOT Standard Specifications for Highway Construction for Type 1 or Type C asphalt. The aggregate base course should consist of Macadam Base Course (Refer to SCDOT 2007 Standard Specifications). This base course should be compacted to at least 100 percent of the maximum dry density, as determined by the modified Proctor compaction test (ASTM D 1557-90 or AASHTO T 180-90). To confirm that the base course has been uniformly compacted, in-place field density tests should be performed by a qualified materials technician, and the area should be methodically proofrolled under his evaluation.

Although our analysis was based on a 20 year design life, our experience indicates that an overlay may be needed in approximately 7 to 10 years due to normal weathering of the asphaltic concrete. Also, some areas could require repair in a shorter time period.

6.8.2 Rigid Pavements

A rigid pavement consisting of reinforced concrete, and constructed in accordance with recommendations made in this report, is preferred for areas subject to repeated, heavy traffic loads. We also recommend that rigid concrete pavement be used for dumpster pads and in front of dumpster areas to help resist the damage caused by traffic with heavy static loads. DARWin's Pavement Design and Analysis System software has been utilized for rigid pavement recommendations. Our recommendations are based on the assumption that the subgrade has been prepared in accordance with Section 6.1 of our geotechnical report. Estimation of rigid pavement thickness assumed a 20 year design life, 80 percent reliability, 4.2 initial serviceability index and a 2.0 terminal serviceability index. Rigid pavement design used an overall standard deviation of 0.35 and assumed plain jointed concrete with a compressive strength of 4,000 psi at 28 days. Based on empirical relationships with CBR values and our past experience, a modulus of subgrade reaction of 125 pci was used for design. The load transfer coefficient, J, was estimated as 2.8, assuming dowels are installed as described below.

Based on these values, we recommend the following rigid pavement section:

Table 6 – Rigid Pavement Design

Pavement Materials	Thickness (in.)
4,000 psi Type I Concrete	6.0
Compacted Crushed Aggregate Base	4.0

Rigid pavement sections should be designed and constructed in accordance with appropriate American Concrete Institute (ACI) recommendations and with the applicable specifications of the South Carolina Department of Transportation Standard

Specifications for Highway Construction (2007 edition). The following comments should be considered for the recommended concrete pavement sections.

- All rigid pavements should be constructed with an aggregate base to reduce the potential for pumping through expansion or contraction joints. Soils such as those encountered on site are typically considered prone to pumping where infiltration of surface water through the pavement occurs often.

- Rigid pavement should extend in front of the dumpster pad such that the front tires of the truck are resting on the pad during unloading of the dumpster.

- Contraction joints should have a maximum spacing of about 30 times the thickness of the concrete slab, as per ACI. Individual concrete pavement panels should have length to width ratios (l/w) within the following range; $1.0 \leq l/w \leq 1.25$.

- An adequate number of smooth steel dowels should be provided at all expansion and contraction joints in areas expected to receive repeated heavy traffic loading. All dowels should be coated and lubricated and affixed with metal or plastic caps. The size and spacing of dowels should conform to ACI recommendations (see Section 3.8, ACI 330R-08).

- Isolation joints should be included for concrete pavement areas that abut fixed objects such as around light poles, curb inlets, etc. Preformed expansion joint material should extend the full depth of the pavement.

- Curb and gutter construction joints should match the joints scheduled in the pavement.

- Nominal steel reinforcement should be provided in the concrete slabs with length to width (l/w) ≥ 1.25 and non-rectangular shaped slabs to reduce cracking.

- All joints should be sealed with a flexible fuel resistant sealer, in accordance with SCDOT Section 501.2.6, to minimize surface water infiltration into the prepared sub-base. Joint reservoir should contain poly backer rod to prevent fine soils from entering the joint sawcut.

6.8.3 Subgrade and Drainage

Pavement performance is very dependent on subgrade condition. Drainage will have a major impact on subgrade condition. Drainage should be designed to result in subsurface water levels being at least 2 feet below the top of the pavement subgrade. Design should not result in water standing on the pavement surface or behind curbing. Design should result in positive drainage being available from the stone base material.

The performance of the pavement will be influenced by a number of factors including the actual condition of subgrade soils at the time of pavement installation, installed thicknesses and compaction, and drainage. The subgrade soils should be re-evaluated by proofrolling immediately prior to placement of base course stone and any unstable areas repaired. This recommendation is very important to the long-term performance of the pavements and slabs. Areas adjacent to pavements (embankments, landscaped island, ditching, etc.) which can drain water (rainwater or sprinklers) should be designed so that water does not seep below the pavements. This may require the use of French drains or swales. Sufficient tests and inspections should be performed during pavement installation to confirm that the required thickness, density, and quality requirements of the specifications are followed.

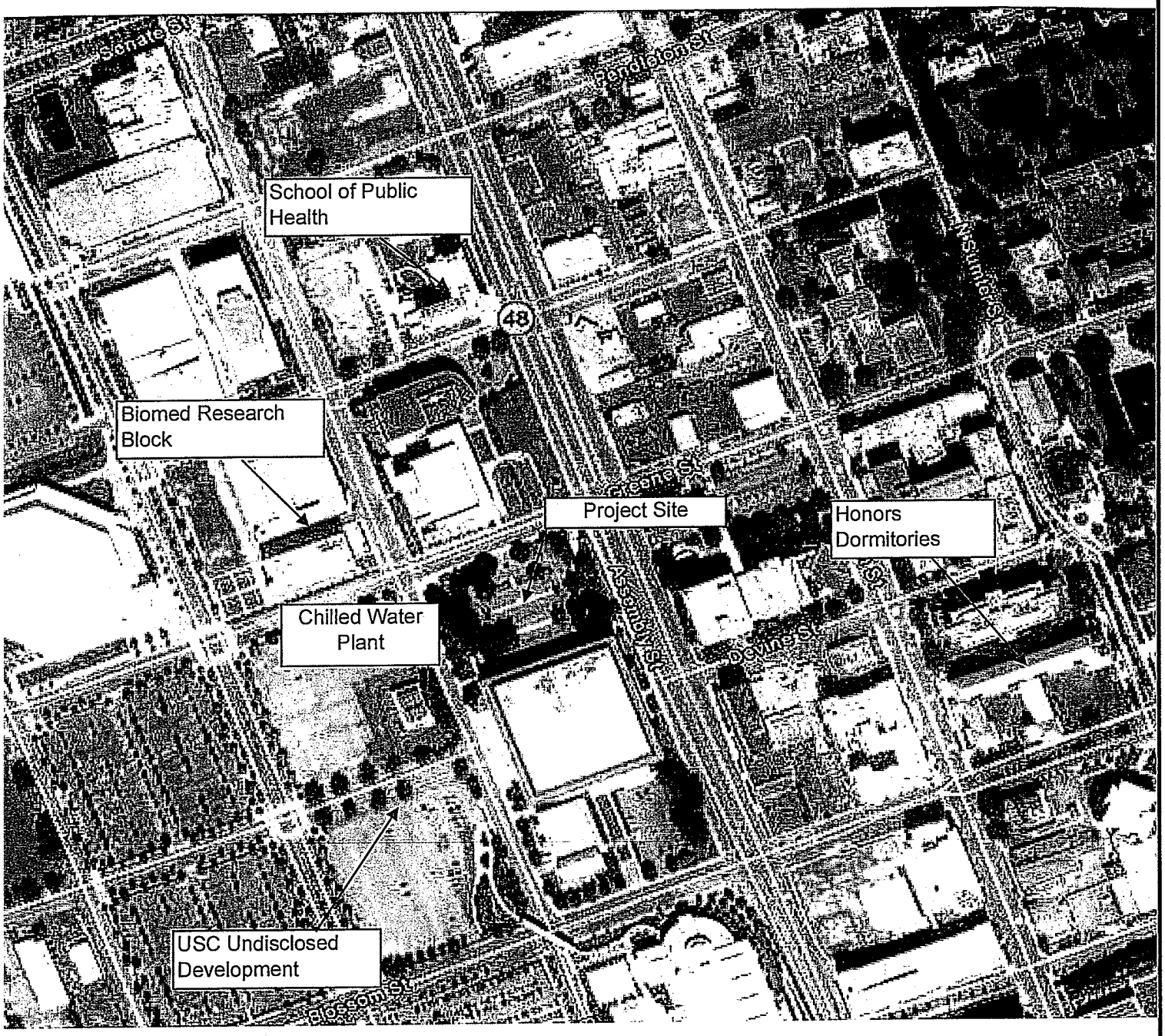
7. LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the proposed structure are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

We recommend that S&ME, Inc. be provided the opportunity to review the final design plans and specifications in order to ensure that earthwork and foundation recommendations are properly interpreted and implemented.

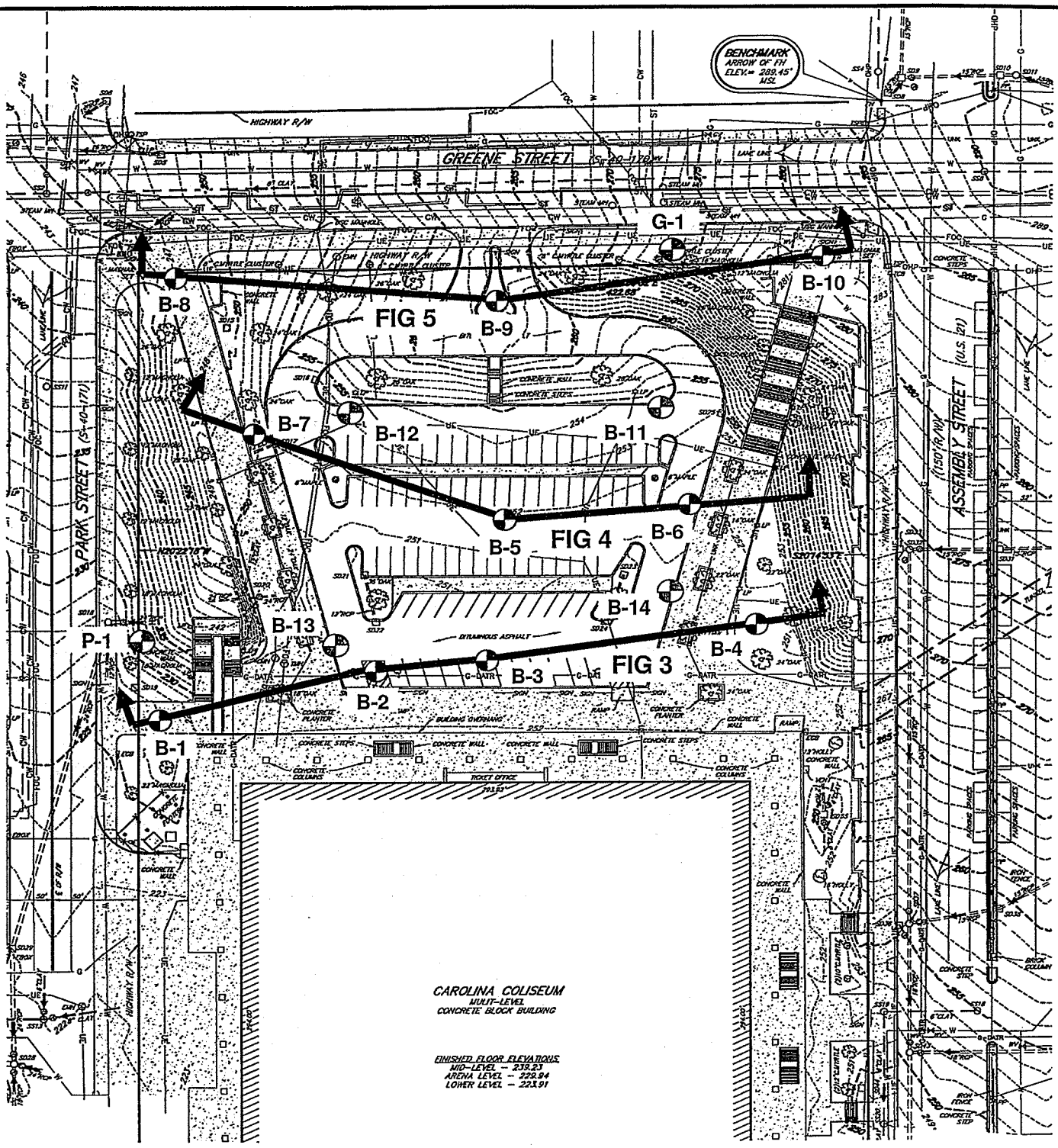
APPENDIX A



SOURCE: Google Earth

NOTE: Other sites noted on map are explorations conducted by S&ME or by others & provided to S&ME.

SCALE: NTS	S&ME	SITE VICINITY MAP Darla Moore School of Business Columbia South Carolina	FIGURE NO: 1
CHECKED BY: JCL			
DRAWN BY: MCG			
DATE: 12/9/10		JOB NO. 1611-10-426	



N

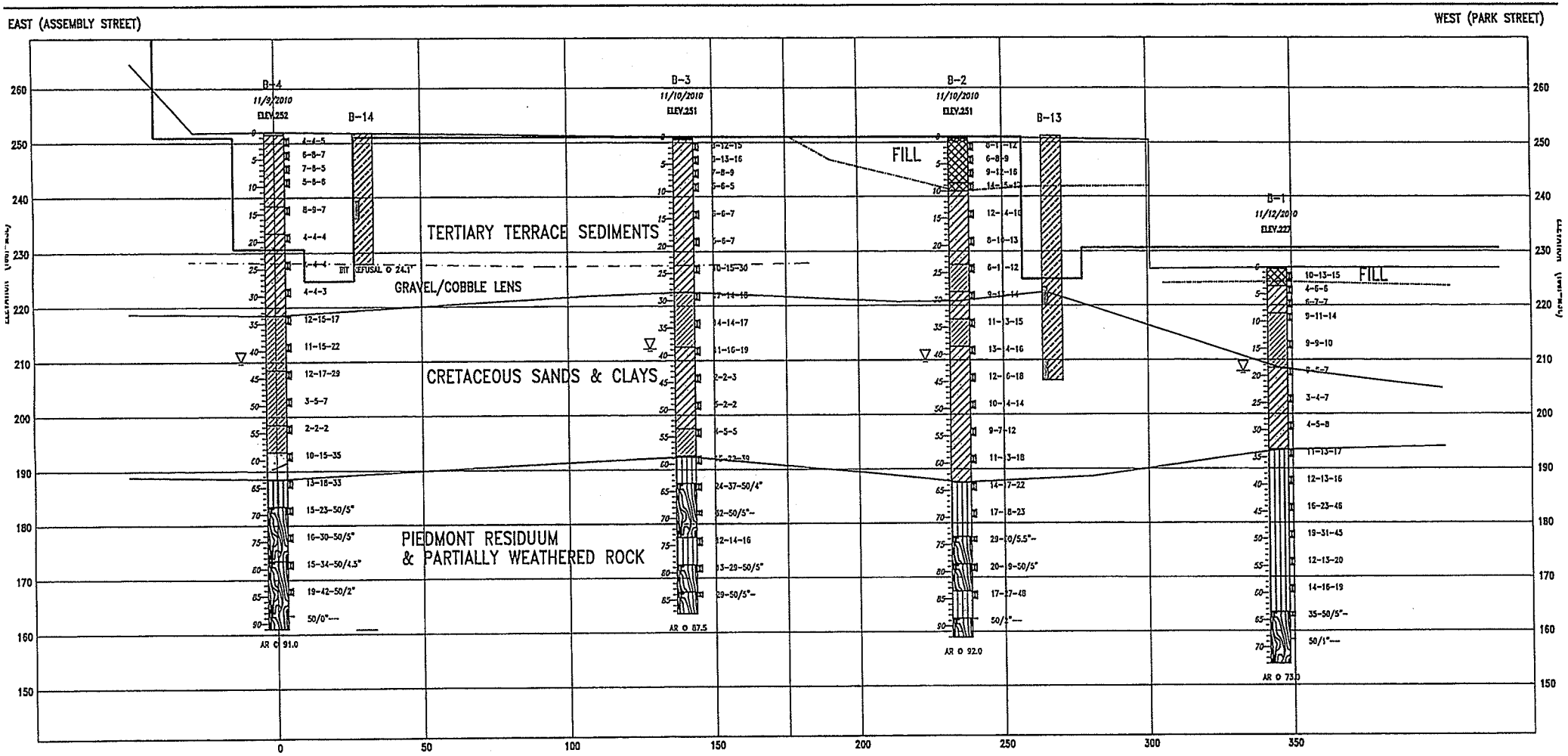
APPROXIMATE SPT BORING LOCATION (November 2010)

APPROXIMATE UD SAMPLE LOCATION (May 2011)

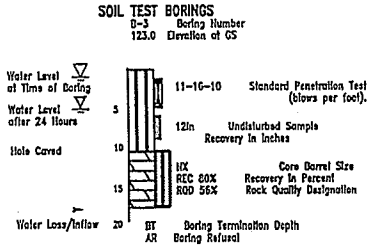
APPROXIMATE BULK SAMPLE LOCATION (April 2011)

SOURCE: B.P. Barber

SCALE: NTS	S&ME	**BORING LOCATION PLAN**	FIGURE NO.
CHECKED BY: JCL		Darla Moore School of Business	2
DRAWN BY: MCG		Columbia, South Carolina	
DATE: 10/12/2011		JOB NO. 1611-10-426rev1	



SOIL TEST BORINGS



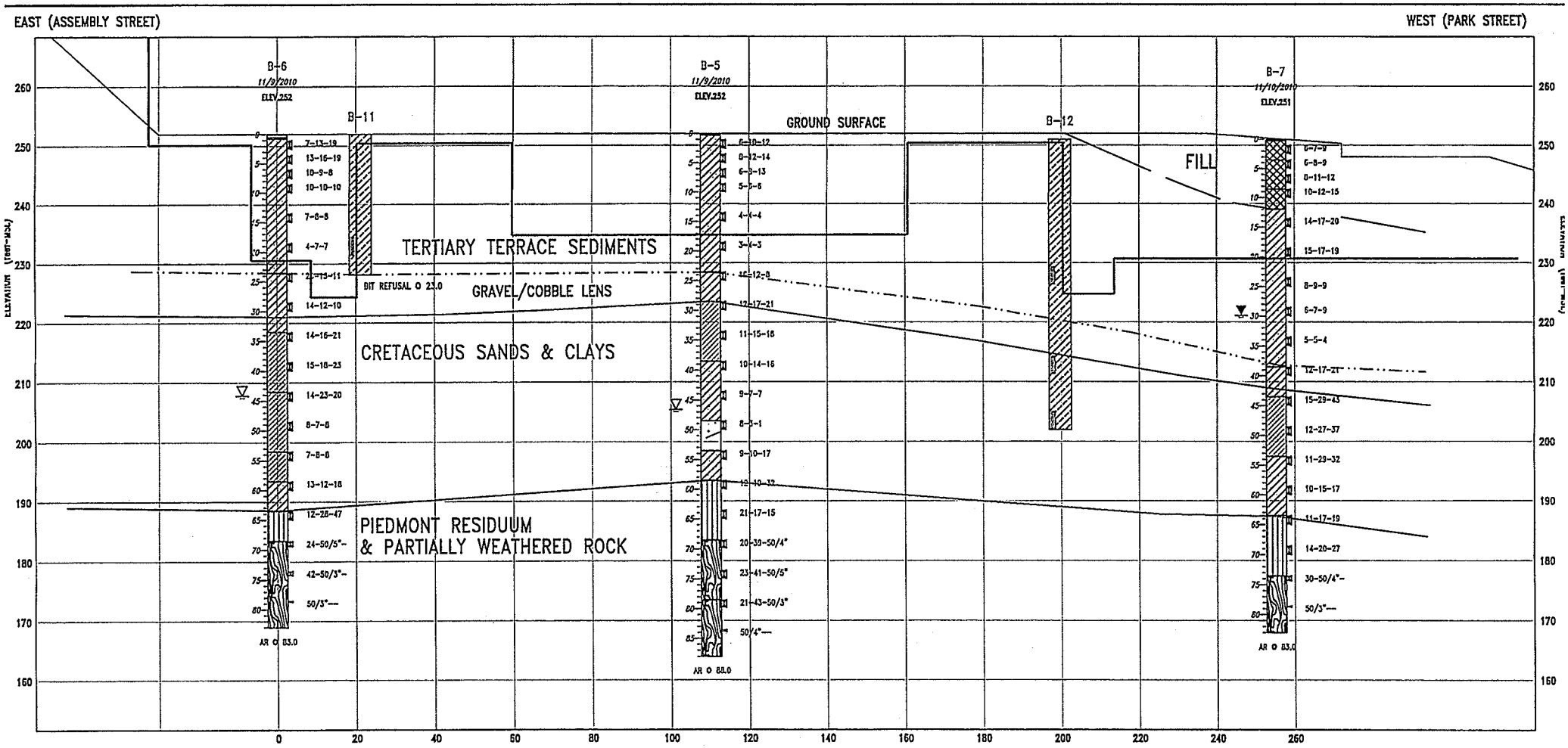
LEGEND OF MATERIAL GRAPHICS for SOIL TEST BORINGS

- Concrete
- ML, Low Plasticity Silt
- Fill
- SP/SC, Poorly-graded Sand with Clay
- PWR
- SM, Silty Sand
- SC, Clayey Sand
- Asphalt
- Topsoil
- CL, Low Plasticity Clay
- Aggregate Base Course

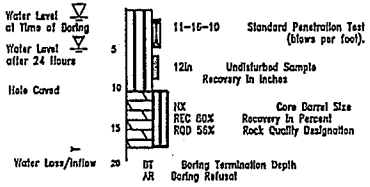
FIGURE 3

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.

SUBSURFACE PROFILE (E-W)	JOB NO: 1611-10-426rev1	S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES
PROJECT: Daria Moore School of Business	DATE: 10/12/11	
LOCATION: Columbia, SC		



SOIL TEST BORINGS
B-3 Boring Number
123.0 Elevation of GS



LEGEND OF MATERIAL GRAPHICS for SOIL TEST BORINGS

- Asphalt
- CH, High Plasticity Clay
- Topsoil
- Aggregate Base Course
- SP/SC, Poorly-graded Sand with Clay
- Fill
- CL, Low Plasticity Clay
- ML, Low Plasticity Silt
- SC, Clayey Sand
- Partially Weathered Rock

FIGURE 4

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.

SUBSURFACE PROFILE (E-W)

PROJECT: Daria Moore School of Business

LOCATION: Columbia, SC

JOB NO: 1611-10-426rev1

DATE: 10/12/11

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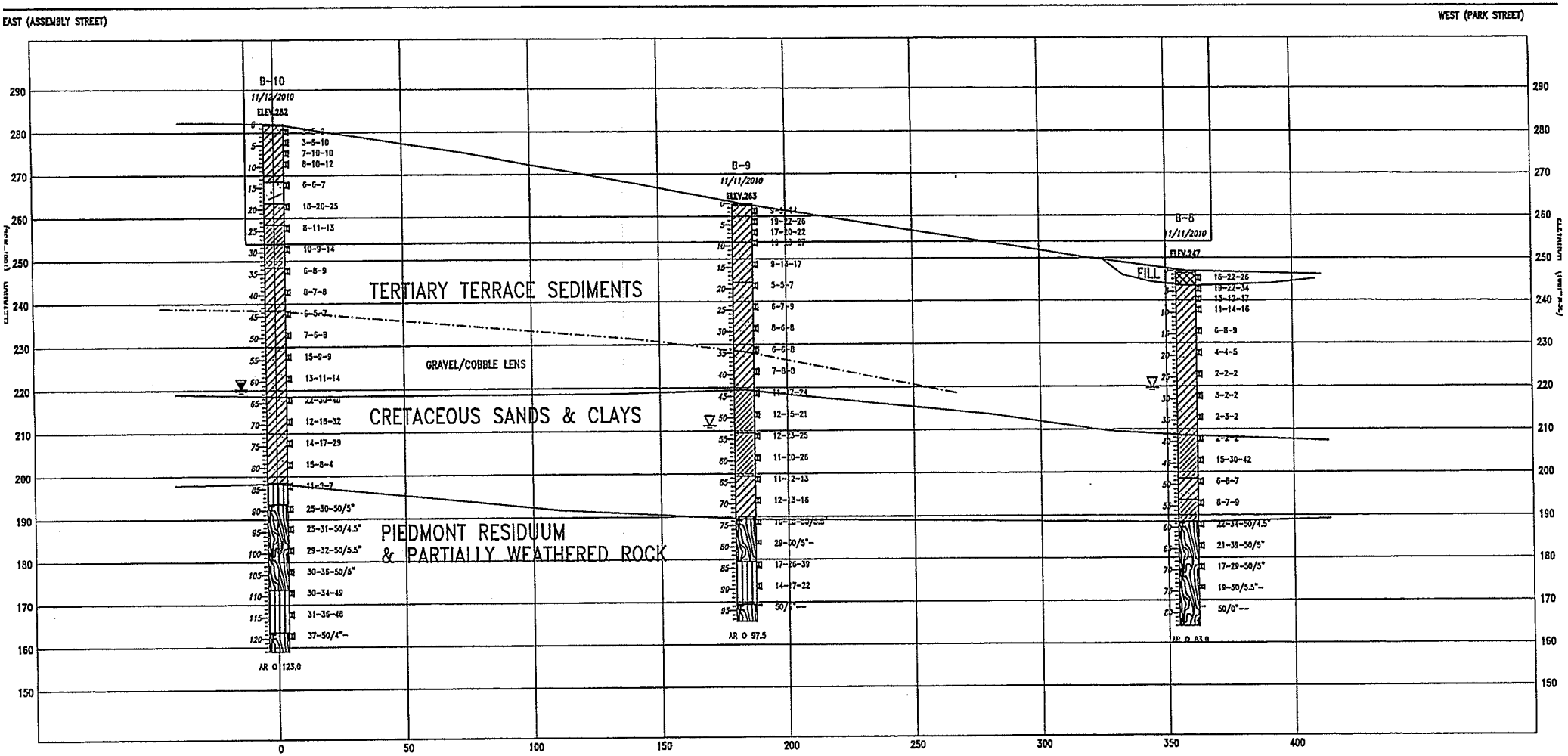

SOIL TEST BORINGS

B-3 Boring Number
123.0 Elevation at GS

Water Level at Time of Boring
Water Level after 24 Hours
Hole Caved
Water Loss/Inflow

11-16-10 Standard Penetration Test (blows per foot).
12in Undisturbed Sample Recovery in Inches
HX Core Barrel Size
REC 80% Recovery in Percent
RQD 56% Rock Quality Designation
BT Boring Termination Depth
AR Boring Refusal

LEGEND OF MATERIAL GRAPHICS for SOIL TEST BORINGS

- Concrete
- ML, Low Plasticity Silt
- SC, Clayey Sand
- PWR
- SP/SC, Poorly-graded Sand with Clay
- Fill
- CL, Low Plasticity Clay
- Topsoil

FIGURE 5

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.

SUBSURFACE PROFILE (E-W)

PROJECT: Darla Moore School of Business

LOCATION: Columbia, SC

JOB NO: 1611-10-426rev1

DATE: 10/12/11

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Darla Moore School of Business
S&ME Project No. 1611-10-426
Load-Settlement Summary by *Settle3D*
6/16/2011

Loc.	Column ID	Est. Load (kips) (DL + LL)	Allowable Bearing Pressure (psf)	Footing Size (ft.)	Bottom of Footing Elevation (est.)	Immediate Settlement (in.)[1,2]	Total Settlement (in.)[1,2]
Northwest	Core	4300	5000	30 x 30	224	0.90	0.98
		4300	4000	33 x 33	224	0.59	0.61
		4300	3000	38 x 38	224	0.23	0.25
	E4	265	3000	10 x 10	234	0.71	0.71
		265	5000	8 x 8	228	1.22	1.24
	D5	600	5000	11 x 11	228	0.37	0.40
Northeast	Core	4300	5000	30 x 30	224	0.14	0.40
		4300	4000	33 x 33	224	0.08	0.26
	R4	400	5000	9 x 9	228	0 (net)	0 (net)
	S4	330	3000	11 x 11	248	1.14	1.15
	N4	265	3000	10 x 10	234	0.85	0.90
		265	3000	10 x 10	228	0.20	0.30
	P5	600	5000	11 x 11	228	0.10	0.10
	N5	230	3000	9 x 9	234	0.79	0.82
		230	3000	9 x 9	228	0.18	0.25
Southwest	Core	4300	5000	30 x 30	224	0.08	0.12
	E9	295	3000	10 x 10	234	0.58	0.61
		295	5000	8 x 8	228	0.50	0.61
Southeast	Core	4300	5000	30 x 30	224	0.07	0.24
	S10	370	3000	11 x 11	248	0.92	0.93
	R10	490	5000	10 x 10	228	0 (net)	0 (net)
Auditorium	L8	875	5000	13 x 13	228	0.30	0.35
	M8	220	3000	9 x 9	234	0.85	0.90
		220	5000	7 x 7	228	0.40	0.53
	G6	645	5000	12 x 12	228	0.20	0.25
	E6	180	5000	6 x 6	234	0.80	0.85
		180	3000	8 x 8	228	0.20	0.25

[1]Net settlement incorporating unloading (heave) effect of excavation
[2]At center of fully flexible footing (does not account for foundation rigidity)

APPENDIX B

SUMMARY OF FIELD PROCEDURES

CONFIGURATION AND LAYOUT OF BORINGS

Layout Plan – S&ME was provided with a planned building footprint prior to drilling. Boring locations were laid out on site in accessible areas using the provided plan and measuring from existing site features.

Checks for Hazardous Conditions - After receiving notice to proceed, we notified the Palmetto Utility Protection Service (PUPS) of our intent to drill at the site. S&ME checked proposed sampling points for conflicts with marked utilities, overhead power lines, tree limbs, or man-made structures during reconnaissance of the site.

Staking of Borings - Boring locations were marked in the field with orange pin flags orange marking paint indicating the boring number. Boring locations indicated on the attached Boring Location Plan must be considered approximate.

Boring Elevations - Top-of-ground elevations at borings were interpolated from a site topographic survey provided to S&ME during the performance of our exploration. Boring elevations shown on the borings logs and subsurface profiles must be considered approximate.

BORING AND SAMPLING PROCEDURES

Field Boring Logs - The subsurface conditions encountered during drilling were reported on a field test boring log by the chief driller. The record contains information about the drilling method used, samples attempted and recovered, materials encountered in the borings, and materials encountered between sample intervals. Field boring records are retained at our office.

Soil Test Borings by Hollow Stem Auger - Soil sampling and penetration testing were performed in general accordance with ASTM D1586, "Standard Test Method for Penetration Test and Split Barrel Sampling of Soils". Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4 inch I. D., two-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six-inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Ground Water Measurements - Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Procedures for groundwater measurement in open boreholes generally followed those described in ASTM D 4750 using the weighted tape method.

Installation of Temporary PVC Casing (Observation Well) - In two of the borings, a temporary observation well was constructed by inserting 2" PVC casing to a depth below the ground water table. A slotted PVC well screen was attached to the bottom of the PVC pipe to allow subsurface water to enter the well. Fine sand was placed in the borehole annulus over the screened depth and a bentonite seal was installed above the sand pack. A flush mount monitoring well cap was installed on one of the observation wells.

Double Tube, Pitcher Type Sampling - Samples of highly compacted, hard, stiff uncemented or slightly cemented materials are obtained using a double tube soil core barrel with liner. The double-tube core barrel is advanced by rotating the outer barrel, which cuts a circular groove and loosens the soil material to be displaced by the two barrels. Drilling fluid was forced downward through the drill stem. The inner barrel, which does not rotate, moves downward over the relatively undisturbed core of soil formed by rotation of the outer barrel. A liner is inserted into the inner barrel before the sampler was assembled. After drilling the required length, the sampler is withdrawn and the liner removed, made airtight, and transported to the laboratory.

Borehole Closure – Following collection of relevant geotechnical data, boreholes were backfilled by pouring drilling cuttings into the open hole. The upper two feet of backfill was tamped as heavily as possible with a shovel handle.

Patching of Asphalt Surface – Penetrations of asphalt surfaces made during the drilling process were patched using compacted asphalt cold patch material. Cold patch asphalt was placed to provide a surface flush with existing pavement adjacent to the boring. Cold patch asphalt was compacted by tamping it into the boring with a shovel handle or similar hand held equipment.

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

- Fill
- Asphalt
- Concrete
- Topsoil
- Gravel
- Sand
- Silt
- Clay
- Organic
- Silty Sand
- Clayey Sand
- Sandy Silt
- Clayey Silt
- Sandy Clay
- Silty Clay
- Partially Weathered Rock
- Cored Rock

WATER LEVELS

(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

- Shelby Tube
- Split Spoon
- Rock Core
- No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

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PROJECT:	Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-1
DATE DRILLED: 11/12/10	ELEVATION: 227.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 73.0 ft	
DRILLER: Wessinger	WATER LEVEL: 19.1 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	SPT N-Value (bpf) ● / FINES % ▲ (PL NM LL; 10 20 30 40 50 60 70 80 90)	N VALUE
		Approximately 4 inches of concrete.										
		POORLY-GRADED SAND with CLAY (SP/SC) mostly fine sand, few non-plastic fines, medium dense, dry, light brown [FILL].			1		10	13	15			28
5		**CLAYEY SAND (SC)** mostly fine sand, little low plasticity fines, medium dense, dry to moist, reddish brown [TERTIARY TERRACE].		222.0	2		4	6	6			12
					3		6	7	7			14
10		**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sand, very stiff, moist, gray with red and brown.		217.0	4		9	11	14			25
15		- - - With rounded quartz gravel (3/4" maximum), light gray.		212.0	5		9	9	10			19
20		**CLAYEY SAND (SC)** mostly fine to coarse sand, some medium plasticity fines (interbedded kaolin seams), medium dense, wet, orange with light red and white [CRETACEOUS SANDS & CLAYS].	▽	207.0	6		9	6	7			13
25				202.0	7		3	4	7			11
30		- - - Mostly fine to medium sand.		197.0	8		4	5	8			13
35		**SANDY SILT (ML)** mostly low to medium plasticity fines, some fine to coarse sand, miaceous, very stiff, moist, white with red and brown [PIEDMONT RESIDUUM].		192.0	9		11	13	17			30
					10		12	13	16			29

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

NOTES:

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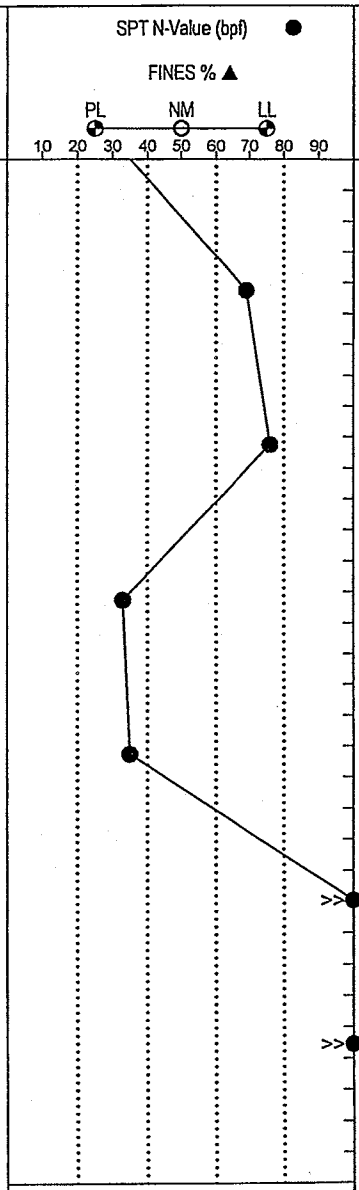
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-1

DATE DRILLED: 11/12/10	ELEVATION: 227.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 73.0 ft	
DRILLER: Wessinger	WATER LEVEL: 19.1 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	[PIEDMONT RESIDUUM]								
45	- - - Very hard, orange with yellow and white.	182.0	11		16	23	46		69
50		177.0	12		19	31	45		76
55	- - - Mostly low plasticity fines, hard, dark gray with yellow speckled.	172.0	13		12	13	20		33
60		167.0	14		14	16	19		35
65	**PARTIALLY WEATHERED ROCK** sampled as **SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular rock fragments, micaceous, very dense, moist, dark gray with yellow and orange.	162.0	15		35	50/5"			>>50/5"
70	- - - No recovery.	157.0	16		50/1"				>>50/1"
	- - - Auger Refusal at 73.0 feet. Boring terminated at 73 feet								



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

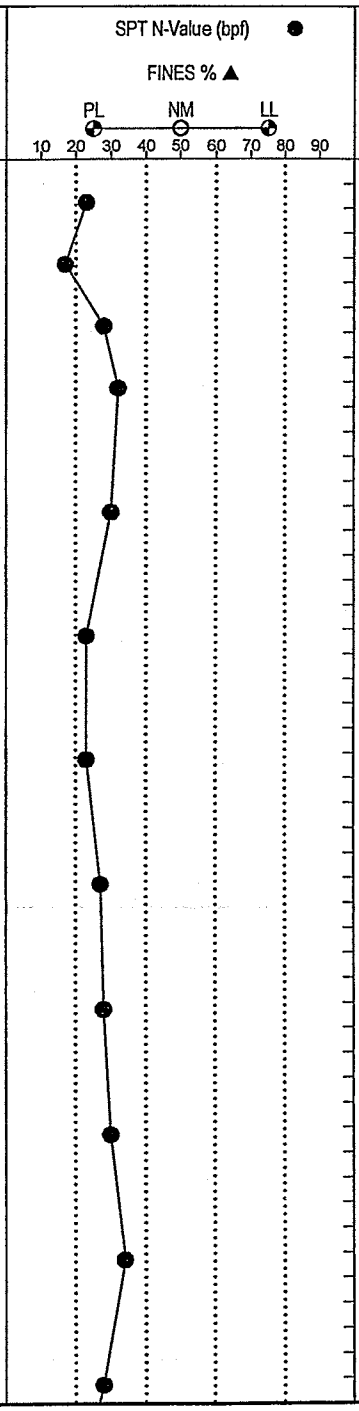
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-2

DATE DRILLED: 11/10/10	ELEVATION: 251.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 92.0 ft	
DRILLER: Wessinger	WATER LEVEL: 41 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 3 inches of asphalt.							
	Approximately 6 inches of stone base.							
	CLAYEY SAND (SC) mostly fine to coarse sand, some low to medium plasticity fines, with angular quartz fragments, medium dense, dry to moist, light reddish brown [FILL].		1	8	11	12		23
5		246.0	2	6	8	9		17
			3	9	12	16		28
	--- Brown with red.	241.0	4	14	15	17		32
10	**POORLY-GRADED SAND (SP)** mostly fine sand, trace non-plastic fines, dense, dry, light brown [FILL].							
15	**CLAYEY SAND (SC)** mostly fine to coarse sand, some low to medium plasticity fines, with fine angular quartz fragments, medium dense, dry to moist, light brownish red with white [TERTIARY TERRACE].	236.0	5	12	14	16		30
20		231.0	6	8	10	13		23
25	**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to coarse sand, very stiff, moist, orange with light gray.	226.0	7	6	11	12		23
30	**CLAYEY SAND (SC)** mostly fine to coarse sand, some low to medium plasticity fines, medium dense, moist, brownish red with light brown.	221.0	8	9	13	14		27
35	**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to coarse sand, micaceous, very stiff, moist, light gray with orange [CRETACEOUS SANDS & CLAYS].	216.0	9	11	13	15		28
40	**CLAYEY SAND (SC)** mostly fine to coarse sand, some medium plasticity fines, micaceous, medium dense, moist, light gray with orange.	211.0	10	13	14	16		30
45	--- Mostly fine sand, little low plasticity fines, dense, moist to wet.	206.0	11	12	16	18		34
	--- Medium dense.		12	10	14	14		28

WATER LEVEL: ▽



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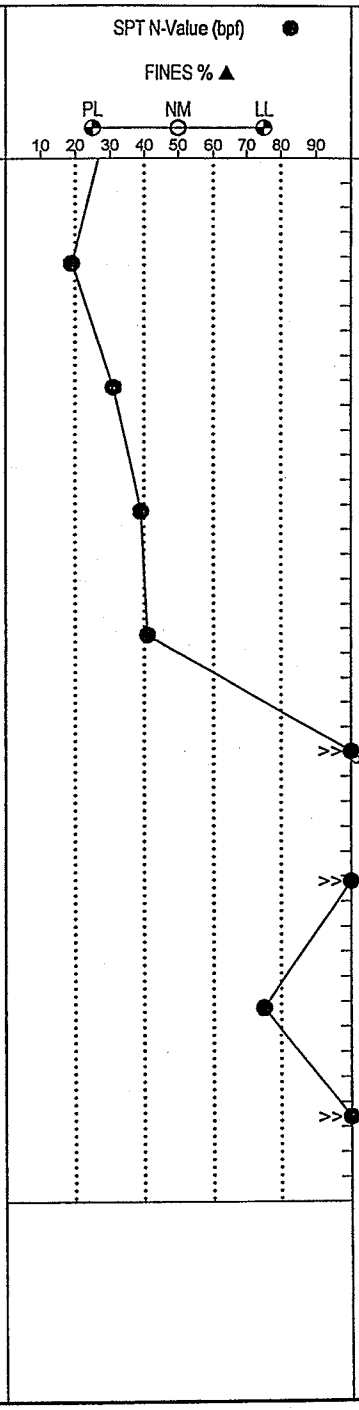
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426		BORING LOG: B-2
DATE DRILLED: 11/10/10	ELEVATION: 251.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 92.0 ft	
DRILLER: Wessinger	WATER LEVEL: 41 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
		[CRETACEOUS SANDS & CLAYS]									
55		--- Mostly fine to medium sand, some medium plasticity fines (interbedded kaolin seams), red with brown and white.		196.0	13		9	7	12		19
60		--- With 2" quartzite fragment in sample, dense, wet.		191.0	14		11	13	18		31
65		**SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, micaceous, hard, moist, light gray with orange [PIEDMONT RESIDUUM].		186.0	15		14	17	22		39
70				181.0	16		17	18	23		41
75		**PARTIALLY WEATHERED ROCK (PWR) sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, with angular quartz fragments, micaceous, very hard, moist, light gray with orange.		176.0	17		29	50/5.5'			>>50/5.5'
80		**PWR sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular quartz fragments, micaceous, very dense, moist, white with yellow and orange.		171.0	18		20	19	50/5"		>>50/5"
85		**SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular quartz fragments, micaceous, very dense, moist, white with yellow and orange.		166.0	19		17	27	48		75
90		**PWR sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular quartz fragments, micaceous, very dense, moist, white with yellow and orange.		161.0	20		50/2"				>>50/2"
		--- Auger Refusal at 92.0 feet. Boring terminated at 92 feet									



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2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

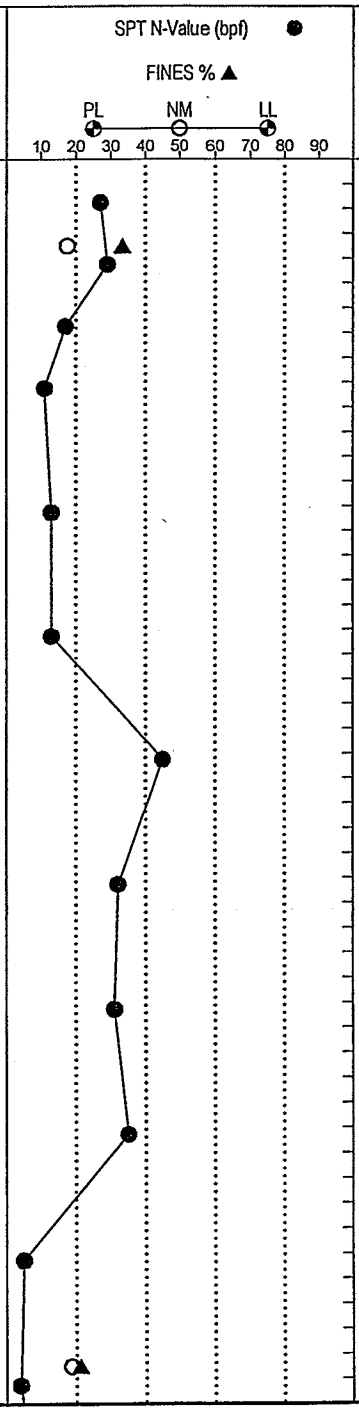
S&ME

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-3

DATE DRILLED: 11/10/10	ELEVATION: 251.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 87.5 ft	
DRILLER: Wessinger	WATER LEVEL: 38.8 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 3 inches of asphalt.							
	Approximately 3 inches of stone base.		1	8	12	15		27
5	**CLAYEY SAND (SC)** mostly fine to medium sand, some medium plasticity fines, medium dense, moist, red with brown [TERTIARY TERRACE].	246.0	2	8	13	16		29
	--- With light gray.		3	7	8	9		17
10	--- Some low plasticity fines, with angular quartz fragments, light brownish red with white.	241.0	4	5	6	5		11
15	--- Absent quartz fragments.	236.0	5	6	6	7		13
20		231.0	6	5	6	7		13
25	--- With rounded gravel in sample, moist to wet, dense.	226.0	7	10	15	30		45
30	**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sand, micaceous, hard, moist, light gray with orange [CRETACEOUS SANDS & CLAYS].	221.0	8	17	14	18		32
35		216.0	9	14	14	17		31
40	**CLAYEY SAND (SC)** mostly fine to coarse sand, some medium plasticity fines, micaceous, dense, wet, light gray.	211.0	10	11	16	19		35
45	--- Loose, with yellow.	206.0	11	2	2	3		5
	--- Little low to medium plasticity fines, very loose.		12	3	2	2		4



NOTES:

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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-3

DATE DRILLED: 11/10/10	ELEVATION: 251.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 87.5 ft	
DRILLER: Wessinger	WATER LEVEL: 38.8 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	SPT N-Value (bpf) ● / FINES % ▲ (PL NM LL; 10 20 30 40 50 60 70 80 90)	N VALUE
		[CRETACEOUS SANDS & CLAYS]										
55		**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sand (interbedded seams), stiff, wet, light gray with brownish red.		196.0	13		4	5	5			10
60		**SANDY SILT (ML)** mostly low to medium plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with orange [PIEDMONT RESIDUUM].		191.0	14		15	22	39			61
65		**PARTIALLY WEATHERED ROCK sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with gray and orange.		186.0	15		24	37	50/4"		>>	50/4"
70				181.0	16		32	50/5"			>>	50/5"
75		**SILT (ML)** mostly medium plasticity fines, few fine sands, very stiff, moist, dark red.		176.0	17		12	14	16			30
80		**PARTIALLY WEATHERED ROCK sampled as SILT (ML)** mostly medium plasticity fines, few fine sands, very hard, moist, dark red.		171.0	18		13	29	50/5"		>>	50/5"
85		**PARTIALLY WEATHERED ROCK sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, micaceous, very hard, moist, white with yellow.		166.0	19		29	50/5"			>>	50/5"
		- - - Auger Refusal at 87.5 feet. Boring terminated at 87.5 feet										

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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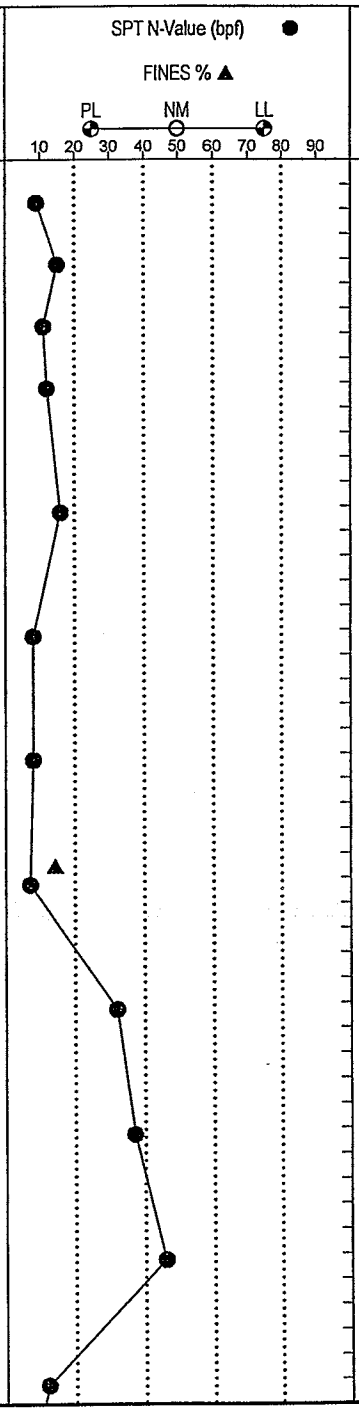
S&ME

PROJECT:	Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-4
DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 91.0 ft	
DRILLER: Wessinger	WATER LEVEL: 42 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 6 inches of topsoil.		1		4	4	5		9
5	**CLAYEY SAND (SC)** mostly fine to medium sand, some low to medium plasticity fines, loose, dry to moist, dark red with white [TERTIARY TERRACE].	247.0	2		6	8	7		15
	- - - Little low plasticity fines, medium dense, light brownish red with white.		3		7	6	5		11
10	- - - With fine angular quartz fragments.	242.0	4		5	6	6		12
15	**CLAYEY SAND with GRAVEL (SC)** mostly fine to coarse sand, little low plasticity fines, few angular quartz fragments (1.5" maximum), medium dense, moist, tan with white.	237.0	5		8	9	7		16
20	**CLAYEY SAND (SC)** mostly fine to medium sand, little low plasticity fines, loose, moist, orange.	232.0	6		4	4	4		8
25	- - - Fine to coarse sand, tan.	227.0	7		4	4	4		8
30	- - - Tannish orange.	222.0	8		4	4	3		7
35	**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to coarse sand, micaceous, hard, moist, gray with orange [CRETACEOUS SANDS & CLAYS].	217.0	9		12	15	17		32
40		212.0	10		11	15	22		37
45	**LEAN CLAY with SAND (CL)** mostly medium plasticity fines, little fine to medium sand, micaceous, hard, moist, light gray with orange.	207.0	11		12	17	29		46
	- - - With red mottles.		12		3	5	7		12

WATER LEVEL ▽



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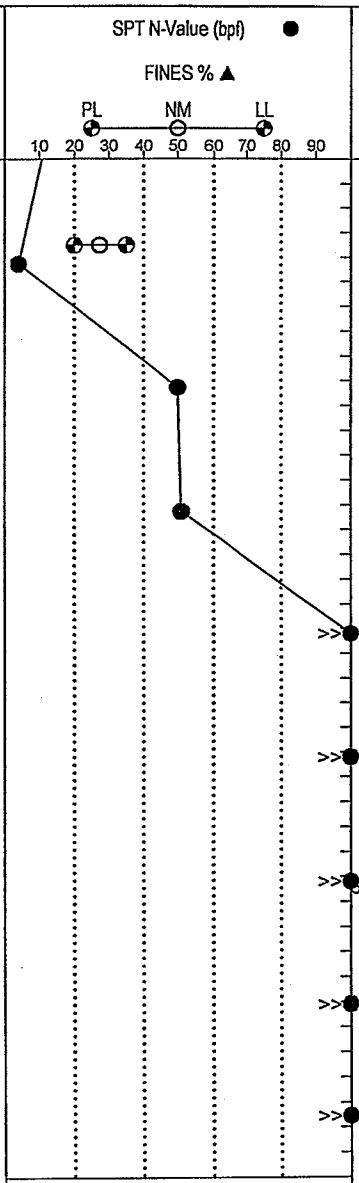
S&ME

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-4

DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 91.0 ft	
DRILLER: Wessinger	WATER LEVEL: 42 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
		[CRETACEOUS SANDS & CLAYS]									
55		**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to coarse sand, micaceous, soft, wet, white with light brown.		197.0	13		2	2	2		4
60		**POORLY-GRADED SAND with CLAY (SP/SC)** mostly fine to medium sand, few low plasticity fines, micaceous, dense, wet, white with light brown.		192.0	14		10	15	35		50
65		**SANDY SILT (ML)** mostly low to medium plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with orange [PIEDMONT RESIDUUM].		187.0	15		13	18	33		51
70		**PARTIALLY WEATHERED ROCK sampled as SANDY SILT (ML)** mostly low to medium plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with orange and yellow. - - - Increased sand content.		182.0	16		15	25	50/5"		>>50/5"
75				177.0	17		16	30	50/5"		>>50/5"
80		**PARTIALLY WEATHERED ROCK sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, micaceous, very dense, moist, white with orange and yellow. - - - Gray with dark gray banding.		172.0	18		15	34	50/4.5"		>>50/4.5"
85				167.0	19		19	42	50/2"		>>50/2"
90		- - - No recovery.		162.0	20		50/0"				>>50/0"
		- - - Auger Refusal at 91.0 feet. Boring terminated at 91 feet									



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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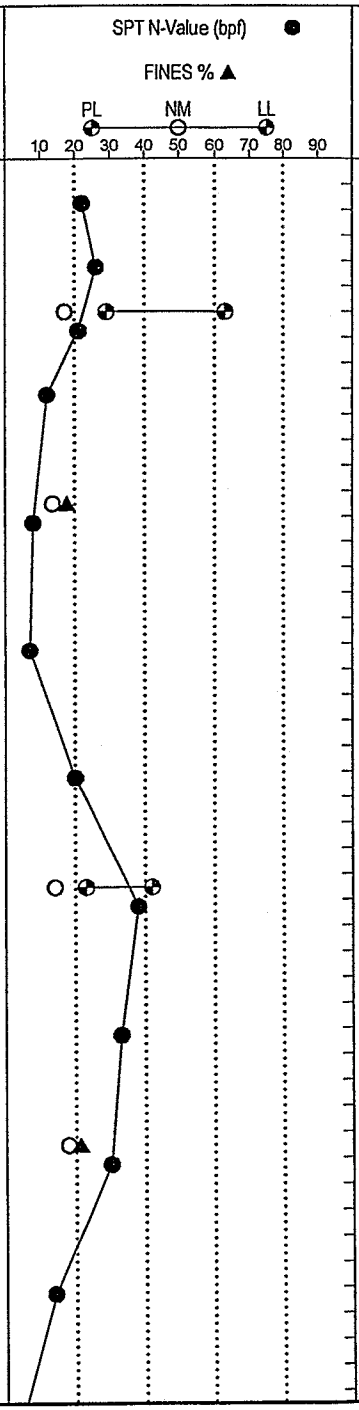
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-5

DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 88.0 ft	
DRILLER: Wessinger	WATER LEVEL: 46.6 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 1 inch of asphalt								
	Approximately 2 inches of stone base								
	CLAYEY SAND (SC) mostly fine to medium sand, some medium to high plasticity fines, medium dense, moist, red with brown and light gray [TERTIARY TERRACE].		1		6	10	12		22
		247.0	2		8	12	14		26
5			3		6	8	13		21
	- - - Some low to medium plasticity fines, with angular quartz fragments (1" maximum), light brownish red.	242.0	4		5	6	6		12
10									
	- - - Little low plasticity fines, with fine quartz fragments, loose, tannish orange with white.	237.0	5		4	4	4		8
15									
		232.0	6		3	4	3		7
20									
	CLAYEY SAND with GRAVEL (SC) mostly fine to coarse sand, little low to medium plasticity fines, few angular quartz fragments (2" maximum dimension) in sample, medium dense, moist to wet, tan.	227.0	7		16	12	8		20
25									
	SANDY LEAN CLAY (CL) mostly medium plasticity kaolinitic fines, some fine to medium sand, micaceous, moist, hard, light gray [CRETACEOUS SANDS & CLAYS].	222.0	8		12	17	21		38
30									
		217.0	9		11	15	18		33
35									
	CLAYEY SAND (SC) mostly medium to coarse sand, little medium plasticity kaolinitic fines, micaceous, medium dense, wet, light gray with light brown.	212.0	10		10	14	16		30
40									
	- - - Fine to medium sand, moist to wet.	207.0	11		9	7	7		14
45									

WATER LEVEL ▽



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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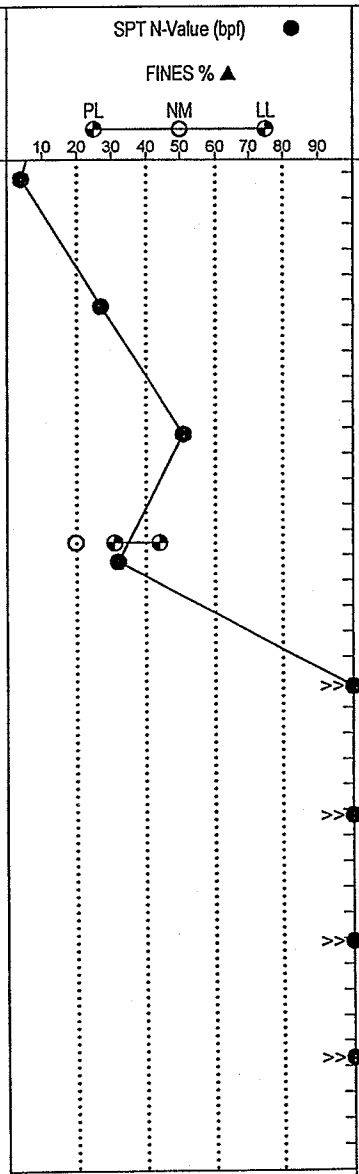
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-5

DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 88.0 ft	
DRILLER: Wessinger	WATER LEVEL: 46.6 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
50	**POORLY-GRADED SAND with CLAY (SP/SC)** mostly fine to medium sand, few low to medium plasticity fines (thin kaolin seams), very loose, wet, light red with white.	202.0	12		8	3	1		4
55	**CLAYEY SAND (SC)** mostly medium sand, some medium plasticity fines (interbedded kaolin seams), medium dense, wet, light brown with red and light gray.	197.0	13		9	10	17		27
60	**SANDY SILT (ML)** mostly low to medium plasticity fines, some fine to coarse sand, micaceous, very hard, white with tan and red [PIEDMONT RESIDUUM].	192.0	14		12	19	32		51
65	- - - With fine angular quartz fragments, hard.	187.0	15		21	17	15		32
70	**PARTIALLY WEATHERED ROCK** sampled as **SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, with fine angular quartz fragments, micaceous, very hard, moist, white with tan.	182.0	16		20	39	50/4"		>>50/4"
75		177.0	17		23	41	50/5"		>>50/5"
80	**PARTIALLY WEATHERED ROCK** sampled as **SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular quartz fragments, micaceous, very dense, moist, white with tan.	172.0	18		21	43	50/3"		>>50/3"
85		167.0	19		50/4"				>>50/4"
	- - - Auger Refusal at 88.0 ft. Boring terminated at 88 feet								



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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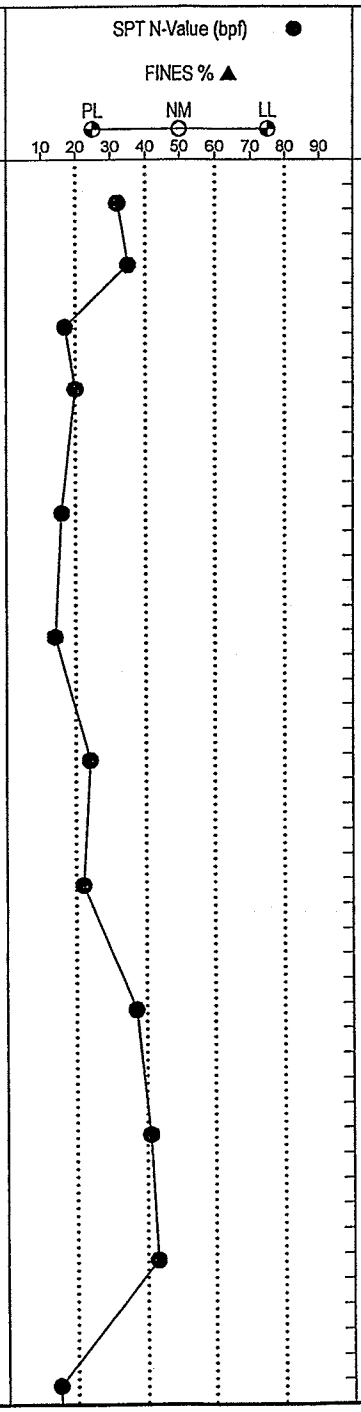
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-6

DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 44.2 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 6 inches of asphalt								
	Approximately 4 inches of stone base								
	CLAYEY SAND (SC) mostly fine to medium sand, some low to medium plasticity fines, dessicated, dense, dry to moist, light red with brown [TERTIARY TERRACE].		1		7	13	19		32
5	---- medium dense.	247.0	2		13	16	19		35
	---- with angular quartz fragments (1/2" maximum dimension), light red with white.		3		10	9	8		17
10		242.0	4		10	10	10		20
15	---- little low to medium plasticity fines, tannish orange.	237.0	5		7	8	8		16
20		232.0	6		4	7	7		14
25	**CLAYEY SAND with GRAVEL (SC)** mostly fine sand, little low plasticity fines, few angular quartz fragments (2" maximum), medium dense, dry, tan.	227.0	7		26	13	11		24
30	---- mostly fine to coarse sand, dry to moist, light brownish red.	222.0	8		14	12	10		22
35	**SANDY LEAN CLAY (CL)** mostly medium plasticity kaolinitic fines, some fine to coarse sand, micaceous, hard, moist, light gray with yellow [CRETACEOUS SANDS & CLAYS].	217.0	9		14	16	21		37
40	---- some fine to medium sand.	212.0	10		15	18	23		41
45	**LEAN CLAY with SAND (CL)** mostly medium plasticity kaolinitic fines, little fine to medium sand, micaceous, hard, moist, light gray with yellow. ---- stiff.	207.0	11		14	23	20		43
			12		8	7	8		15



WATER LEVEL

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S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-6

DATE DRILLED: 11/9/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 44.2 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	SPT N-Value (bpf) ● FINES % ▲ PL NM LL 10 20 30 40 50 60 70 80 90	N VALUE
		[CRETACEOUS SANDS & CLAYS]										
55		**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sands (interbedded seams), micaceous, very stiff, wet, light gray with light brownish red.		197.0	13		7	8	8			16
60		**CLAYEY SAND (SC)** mostly fine to medium sand, little low to medium plasticity fines, medium dense, wet, light brownish red.		192.0	14		13	12	18			30
65		**SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with orange [PIEDMONT RESIDUUM].		187.0	15		12	28	47			75
70		**PARTIALLY WEATHERED ROCK sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with orange.		182.0	16		24	50/5"			>>	50/5"
75		- - - - with fine angular quartz fragments.		177.0	17		42	50/3"			>>	50/3"
80				172.0	18		50/3"				>>	50/3"
		- - - Auger Refusal at 83.0 ft. Boring terminated at 83 feet										

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009 09 24.GDT 12/10/10

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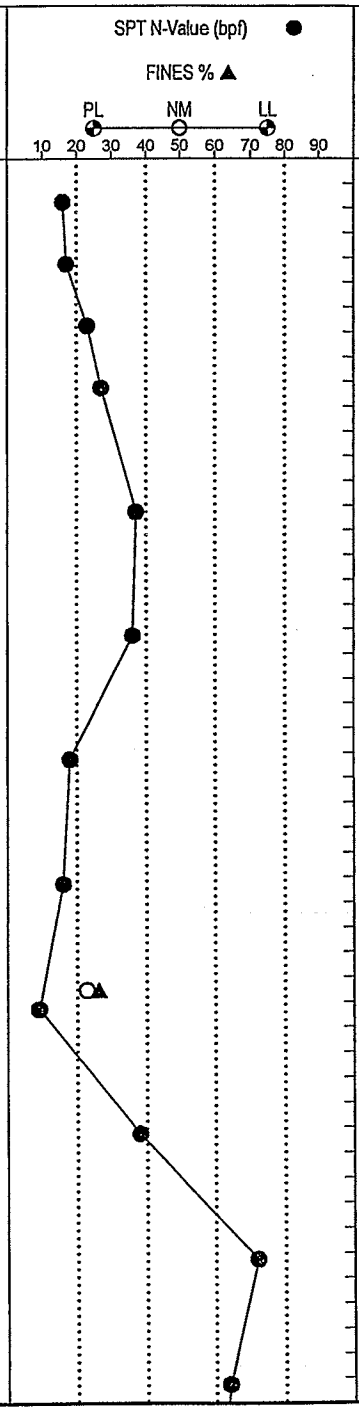
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-7

DATE DRILLED: 11/10/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 29.9' 11/11/10, 29.9' 12/7/10	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 3 inches of topsoil								
	SANDY LEAN CLAY (CL) mostly low to medium plasticity fines, some fine to medium sand, dessicated, very stiff, dry to moist, red with brown and gray [FILL].		1		6	7	9		16
5		247.0	2		6	8	9		17
			3		8	11	12		23
	CLAYEY SAND (SC) mostly fine to medium sand, some low to medium plasticity fines, medium dense, dry to moist, red with dark brown [FILL].								
10		242.0	4		10	12	15		27
	POORLY-GRADED SAND with DEBRIS (SP) mostly fine sand, with asphalt and angular stone (2" maximum) in sample, medium dense, dry, brown [FILL].								
15		237.0	5		14	17	20		37
	CLAYEY SAND (SC) mostly fine to medium sand, some low to medium plasticity fines, dessicated, dense, dry to moist, red with brown [TERTIARY TERRACE].								
20	--- With rounded gravel (1" maximum) in sample, moist, brown with red and light gray.	232.0	6		15	17	19		36
25	--- Fine to coarse sand, medium dense, light reddish brown with light gray.	227.0	7		8	9	9		18
30		222.0	8		6	7	9		16
35	--- Little medium plasticity fines, loose, wet, light reddish brown.	217.0	9		5	5	4		9
40	**CLAYEY SAND with GRAVEL (SC)** mostly fine to coarse sand, some medium plasticity fines, few subrounded gravels (1" maximum dimension), dense, moist to wet, reddish orange.	212.0	10		12	17	21		38
45	**LEAN CLAY with SAND (CL)** mostly medium to high plasticity kaolinitic fines, little fine to medium sand, micaceous, very hard, moist, light gray with yellow [CRETACEOUS SANDS & CLAYS].	207.0	11		15	29	43		72
			12		12	27	37		64



WATER LEVEL

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

NOTES:

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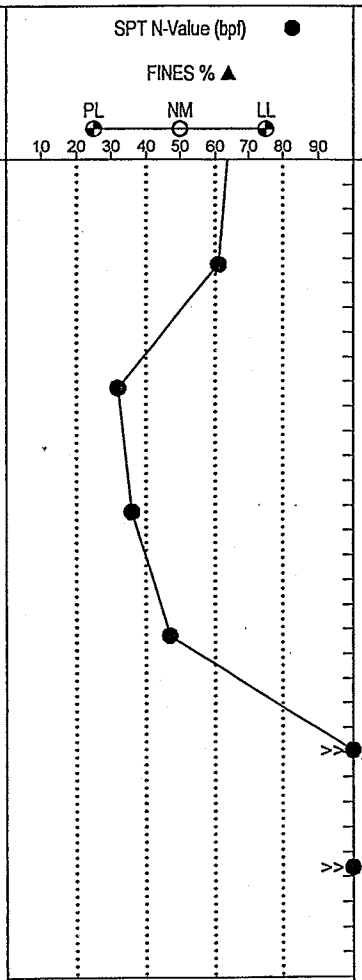
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-7

DATE DRILLED: 11/10/10	ELEVATION: 252.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 29.9' 11/11/10, 29.9' 12/7/10	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
		[CRETACEOUS SANDS & CLAYS]									
55		**CLAYEY SAND (SC)** mostly fine to medium sand, little low to medium plasticity fines, very dense, wet, tan.		197.0	13		11	29	32		61
60		--- Some medium plasticity kaolinitic fines, micaceous, dense, moist, light gray with tan.		192.0	14		10	15	17		32
65		**SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, hard, moist, white with yellow [PIEDMONT RESIDUUM].		187.0	15		11	17	19		36
70				182.0	16		14	20	27		47
75		**PARTIALLY WEATHERED ROCK sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, with fine angular quartz fragments, micaceous, very hard, moist, white with orange.		177.0	17		30	50/4"			>>50/4"
80				172.0	18		50/3"				>>50/3"
		--- Auger Refusal at 83.0 ft. Boring terminated at 83 feet									



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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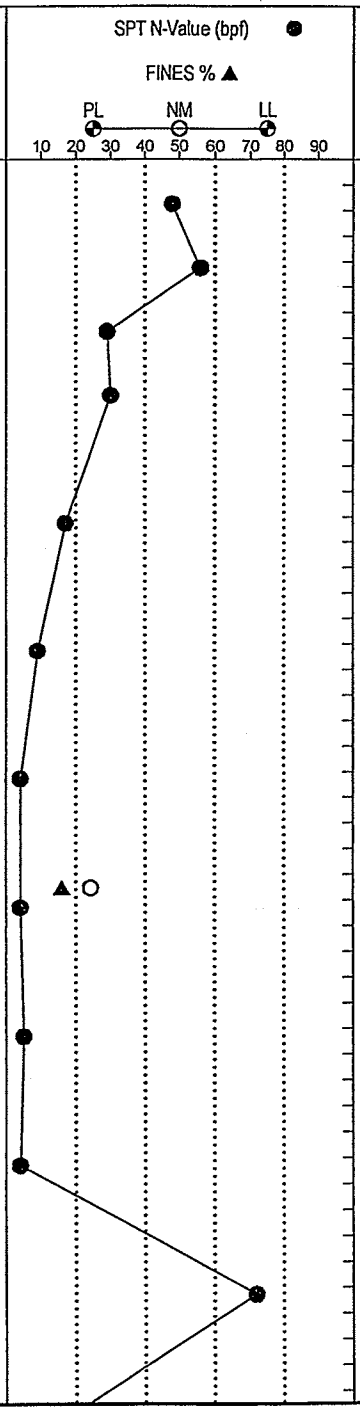
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-8

DATE DRILLED: 11/11/10	ELEVATION: 247.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 27.4 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 6 inches of concrete (sidewalk)		1	16	22	26		48
5	**POORLY-GRADED SAND (SP)** mostly fine sand, trace low plasticity fines, dense, dry, brown [FILL].	242.0	2	19	22	34		56
	CLAYEY SAND (SC) mostly fine to medium sand, some low to medium plasticity fines, dessicated, very dense, dry to moist, red with brown [TERTIARY TERRACE].		3	13	12	17		29
10	- - - With angular quartz fragments (2" maximum dimension), medium dense.	237.0	4	11	14	16		30
	- - - With light gray mottles.							
15	- - - Fine to coarse sand, with subrounded quartz pebbles, moist, light brownish red with white.	232.0	5	6	8	9		17
20	- - - Fine to medium sand, little low to medium plasticity fines, loose.	227.0	6	4	4	5		9
25	- - - Fine to coarse sand, very loose, wet, tannish orange.	222.0	7	2	2	2		4
	▽							
30	- - - Medium to coarse sand, with fine angular quartz gravels.	217.0	8	3	2	2		4
35		212.0	9	2	3	2		5
40	**LEAN CLAY with SAND (CL)** mostly medium plasticity kaolinitic fines, little fine sand, micaceous, soft, moist, gray with orange [CRETACEOUS SANDS & CLAYS].	207.0	10	2	2	2		4
45	- - - Very hard.	202.0	11	15	30	42		72



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S&ME

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-8

DATE DRILLED: 11/11/10	ELEVATION: 247.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 83.0 ft	
DRILLER: Wessinger	WATER LEVEL: 27.4 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: / EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	SPT N-Value (bpf) ● / FINES % ▲ (PL NM LL; 10 20 30 40 50 60 70 80 90)	N VALUE
50		**CLAYEY SAND (SC)** mostly fine to medium sand, little medium plasticity fines, micaceous, medium dense, wet, tannish gray with orange.		197.0	12		6	8	7			15
55		**SANDY LEAN CLAY (CL)** mostly medium plasticity kaolinitic fines, some fine to medium sand (interbedded seams), micaceous, very stiff, moist to wet, gray with orange.		192.0	13		8	7	9			16
60		**PARTIALLY WEATHERED ROCK sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, very hard, moist, white with yellow [PIEDMONT RESIDUUM].		187.0	14		22	34	50/4.5"			>>50/4.5"
65				182.0	15		21	39	50/5"			>>50/5"
70		- - - Orange with black.		177.0	16		17	29	50/5"			>>50/5"
75				172.0	17		19	50/5.5"				>>50/5.5"
80		- - - No recovery.		167.0	18		50/0"					>>50/0"
		- - - Auger Refusal at 83.0 feet. Boring terminated at 83 feet										

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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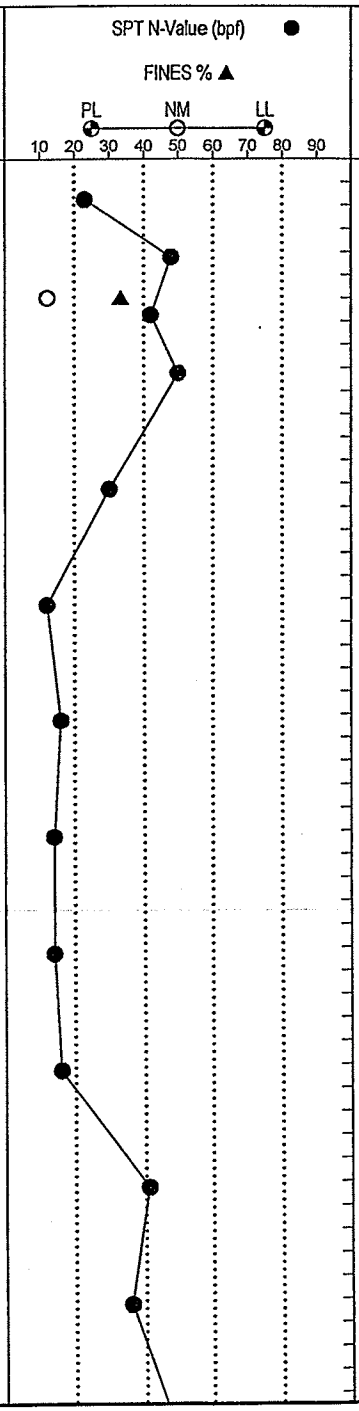
S&ME

PROJECT:	Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-9
DATE DRILLED: 11/11/10	ELEVATION: 263.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 97.5 ft	
DRILLER: Wessinger	WATER LEVEL: 51.8 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	Approximately 6 inches of topsoil.		1	9	9	14		23
	CLAYEY SAND (SC) mostly fine to medium sand, some medium plasticity fines, medium dense, dry, brownish red [TERTIARY TERRACE].	258.0	2	19	22	26		48
5	--- Dense, red with brown.		3	17	20	22		42
	--- Dry to moist, with light gray.	253.0	4	19	23	27		50
10								
15	--- Medium dense.	248.0	5	9	13	17		30
20	**CLAYEY SAND with GRAVEL (SC)** mostly fine to coarse sand, some low to medium plasticity fines, with rounded gravel and angular quartz fragments, medium dense, moist, light brownish red with white.	243.0	6	5	5	7		12
25		238.0	7	6	7	9		16
30		233.0	8	8	6	8		14
35	--- With 2" quartz fragment in sample.	228.0	9	6	6	8		14
40	--- Moist to wet.	223.0	10	7	8	8		16
45	**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sand, micaceous, hard, moist, orange and light gray [CRETACEOUS SANDS & CLAYS].	218.0	11	11	17	24		41
50	--- Some fine to coarse sand.	213.0	12	12	15	21		36

WATER LEVEL ▽



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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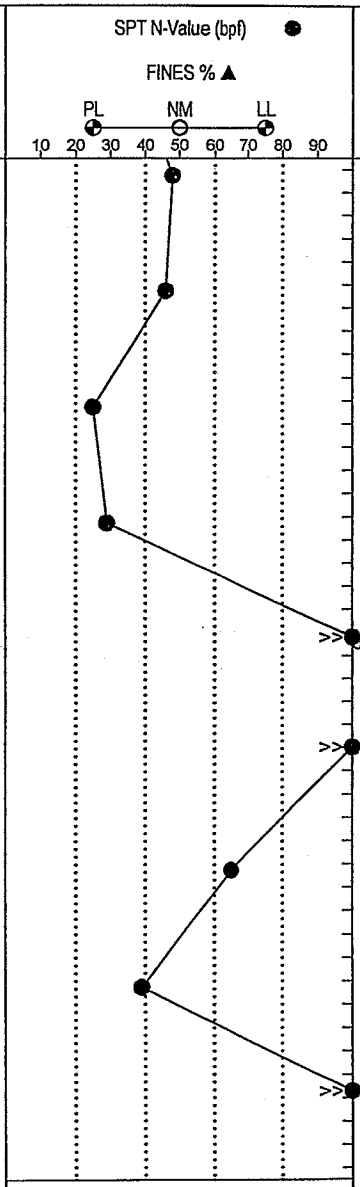
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-9

DATE DRILLED: 11/11/10	ELEVATION: 263.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 97.5 ft	
DRILLER: Wessinger	WATER LEVEL: 51.8 ft. @ TOB	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
55	**LEAN CLAY with SAND (CL)** mostly medium plasticity fines, little fine to medium sand, micaceous, hard, moist, light gray with orange [CRETACEOUS SANDS & CLAYS]	208.0	13		12	23	25		48
60		203.0	14		11	20	26		46
65	**CLAYEY SAND (SC)** mostly fine to medium sand, some medium plasticity fines, micaceous, medium dense, wet, light gray with orange.	198.0	15		11	12	13		25
70		193.0	16		12	13	16		29
75	**PARTIALLY WEATHERED ROCK (PWR) sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, micaceous, very hard, moist, white with yellow [PIEDMONT RESIDUUM].	188.0	17		16	28	50/5.5"		>>50/5.5"
80	- - - Some fine to coarse sand, with orange.	183.0	18		29	50/5"			>>50/5"
85	**SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, micaceous, very hard, moist, orange with white.	178.0	19		17	26	39		65
90	- - - Hard, dark gray and orange speckled.	173.0	20		14	17	22		39
95	**PWR sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to coarse sand, micaceous, very hard, moist to wet, dark gray with light gray.	168.0	21		50/5"				>>50/5"
	- - - Auger Refusal at 97.5 feet. Boring terminated at 97.5 feet								



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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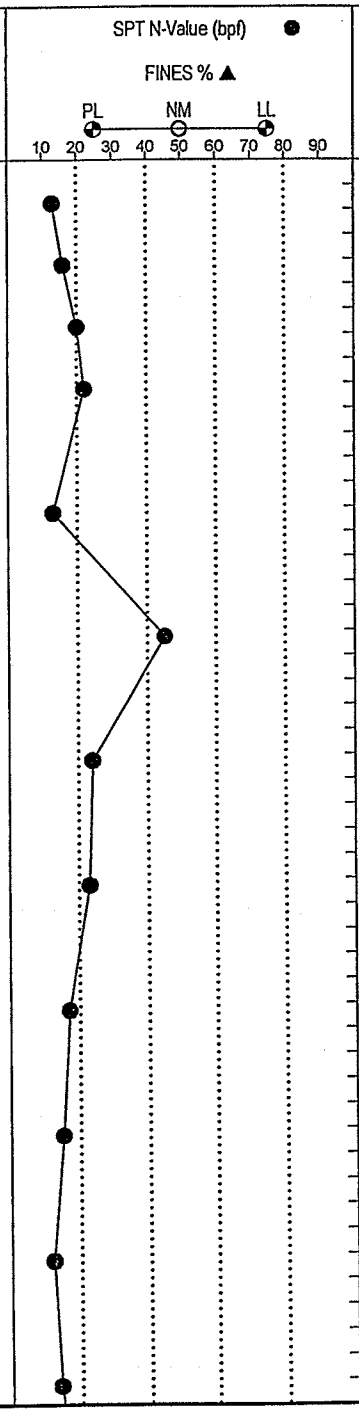
S&ME

PROJECT:	Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-10
DATE DRILLED: 11/12/10	ELEVATION: 282.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 123.0 ft	
DRILLER: Wessinger	WATER LEVEL: 61.8' @ TOB, 62.2' 11/15/10	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
		Approximately 4 inches of concrete									
		CLAYEY SAND (SC) mostly fine to medium sand, some low to medium plasticity fines, dessicated, medium dense, dry to moist, dark red [TERTIARY TERRACE]. - - - Little low plasticity fines.			1		3	5	8		13
					2		3	6	10		16
5				277.0	3		7	10	10		20
					4		8	10	12		22
10				272.0							
15		**POORLY-GRADED SAND with CLAY (SP/SC)** mostly fine to medium sand, few low plasticity fines, medium dense, dry to moist, brownish red.		267.0	5		6	6	7		13
20		**CLAYEY SAND (SC)** mostly fine to medium sand, some medium plasticity fines, dense, moist, red with brown and gray.		262.0	6		18	20	25		45
25		**SANDY LEAN CLAY (CL)** mostly medium plasticity fines, some fine to medium sand, very stiff, moist, light gray with red and brown.		257.0	7		8	11	13		24
30				252.0	8		10	9	14		23
35		**CLAYEY SAND (SC)** mostly fine sand, some low to medium plasticity fines, medium dense, moist, light brownish red.		247.0	9		6	8	9		17
40				242.0	10		8	7	8		15
45		**CLAYEY SAND with GRAVEL (SC)** mostly fine to coarse sand, some low to medium plasticity fines, with angular quartz fragments (2" maximum), medium dense, moist, light brown with gray.		237.0	11		6	5	7		12
					12		7	6	8		14



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

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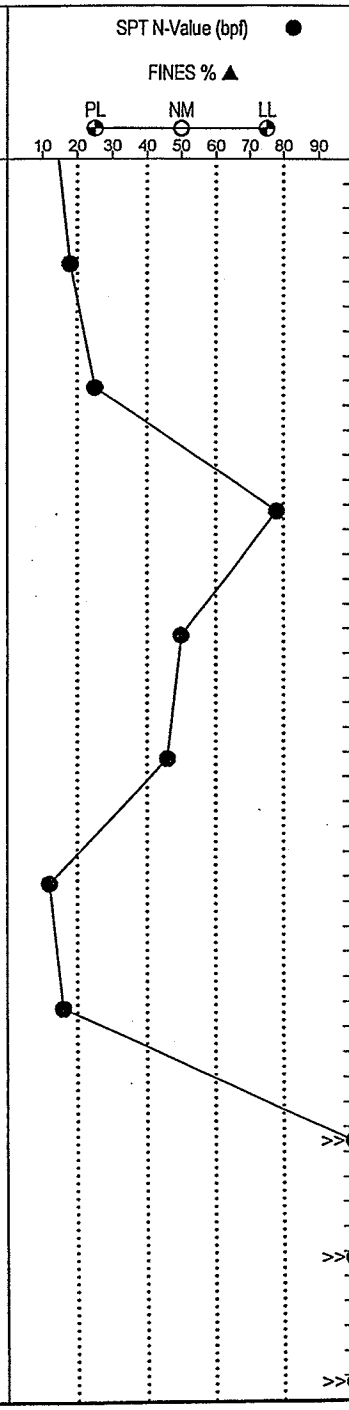
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426		BORING LOG: B-10
DATE DRILLED: 11/12/10	ELEVATION: 282.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 123.0 ft	
DRILLER: Wessinger	WATER LEVEL: 61.8' @ TOB, 62.2' 11/15/10	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
	--- Fine quartz fragments.								
	[TERTIARY TERRACE]								
55	--- Angular quartz fragments (2" maximum), light red with white.	227.0	13		15	9	9		18
60	--- With light brown and black.	222.0	14		13	11	14		25
65	**CLAYEY SAND (SC)** mostly fine to coarse sand, some medium plasticity fines, micaceous, very dense, moist to wet, light gray [CRETACEOUS SANDS & CLAYS].	217.0	15		22	30	48		78
70	--- Dense, with orange.	212.0	16		12	18	32		50
75		207.0	17		14	17	29		46
80	--- Little low to medium plasticity fines, medium dense, wet, with light red.	202.0	18		15	8	4		12
85	**SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, micaceous, very stiff, moist, white with yellow [PIEDMONT RESIDUUM].	197.0	19		11	9	7		16
90	**PARTIALLY WEATHERED ROCK (PWR) sampled as SANDY SILT (ML)** mostly low plasticity fines, some fine to medium sand, micaceous, very hard, moist, white with yellow and orange.	192.0	20		25	30	50/5"		>>50/5"
95		187.0	21		23	31	50/4.5"		>>50/4.5"
	--- Some fine sand, dark gray with light gray and yellow speckled.		22		29	32	50/5.5"		>>50/5.5"



WATER LEVEL

S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009 09 24.GDT 12/10/10

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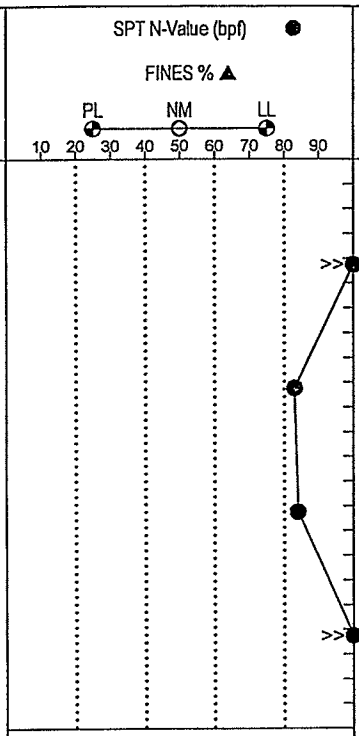
S&ME

PROJECT: Darla Moore School of Business Columbia, SC S&ME Project No. 1611-10-426	BORING LOG: B-10

DATE DRILLED: 11/12/10	ELEVATION: 282.0 ft	NOTES: Elevations estimated from provided site topographic plan. No survey of boring locations or elevations conducted by S&ME.
DRILL RIG: CME 45-B	BORING DEPTH: 123.0 ft	
DRILLER: Wessinger	WATER LEVEL: 61.8' @ TOB, 62.2' 11/15/10	
HAMMER TYPE: Safety	LOGGED BY: M. Glunt	
SAMPLING METHOD: Split spoon		NORTHING: EASTING:
DRILLING METHOD: 2¼" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	4th 6in	N VALUE
		[PARTIALLY WEATHERED ROCK]									
105				177.0	23		30	36	50/5"		>>50/5"
110		**SANDY SILT (ML)** mostly low plasticity fines, some fine sand, micaceous, very hard, moist, dark gray with black and yellow speckled.		172.0	24		30	34	49		83
115		- - - With angular quartz fragments, orange with white.		167.0	25		31	36	48		84
120		**PWR sampled as SILTY SAND (SM)** mostly fine to coarse sand, some low plasticity fines, micaceous, very dense, moist, gray with white.		162.0	26		37	50/4"			>>50/4"
		- - - Auger Refusal at 123.0 feet. Boring terminated at 123 feet									



S&ME BORING LOG - VOGTLE DMSB BORING LOGS.GPJ S&ME 2009_09_24.GDT 12/10/10

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

APPENDIX C

SUMMARY OF LABORATORY PROCEDURES

LABORATORY EXAMINATION AND ARCHIVING OF SAMPLES

Examination of Split Spoon Soil Samples – Recovered field samples and field boring logs were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, "Standard Practice for Description and Identification of Soils (Visual-Manual Method)." With this information, the geotechnical engineer prepared the final boring logs enclosed with this report.

Sample Retention - Recovered samples not suspected of contamination and not expended in laboratory tests are commonly retained in our laboratory for 90 days following completion of drilling. Samples are then disposed of at our convenience, unless specifically requested by our client.

LABORATORY PHYSICAL TESTS OF RECOVERED SAMPLES

Liquid and Plastic Limits Testing – The liquid limit of each sample was determined using the multipoint method (Method A) described in ASTM D 4318 Section 11. The plastic limit was determined using the procedure described in Section 17. Atterberg limits tests were performed to 1) assist in classification of soil samples using the Unified Soil Classification System, or 2) provide some empirical evaluation of suitability of the soils for use as compacted fill, or 3) evaluate suitability of the soils for use as subgrade material below floor slabs or pavements.

Percent Fines Determination of Samples – A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D 1140, "Standard Test Method for Amount of Material Finer than the No. 200 Sieve." Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the "percent fines" or percent clay and silt fraction.

Grain Size Analysis of Samples - The distribution of particle sizes was determined in general accordance with the procedures described by ASTM D 421, "Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants", and D 422, "Standard Test Method for Particle Size Analysis of Soils."

Compaction Tests of Soils Using Standard Effort – Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties, and for controlling construction to assure the required compaction and water contents are achieved. Test procedures generally followed those described by ASTM D 698, "*Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 lbf/ft^3).*"

Laboratory California Bearing Ratio Tests of Compacted Samples – This method is used to evaluate the potential strength of subgrade, subbase, and base course material, including recycled materials, for use in roadway pavements. Laboratory CBR tests were run in general accordance

with the procedures laid out in ASTM D 1883, "*Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.*"

Consolidation Tests of Undisturbed Samples - The data from the consolidation test are used to estimate the magnitude and rate of both total and differential settlement of a structure or earthfill. In this test method a saturated soil specimen is restrained laterally by a steel mold and loaded axially with total stress increments. As the specimen consolidates, measurements are made of the change in specimen height and plotted vs. time to determine the relationship between the effective stress and void ratio or strain, and the time rate at which consolidation occurs.

Procedures for determining the magnitude and rate of consolidation of laterally restrained soil generally followed those described in ASTM D 2435, "*Standard Test Method for One-Dimensional Consolidation of Soils.*" Extruded samples were each trimmed to a disc 2.5 inches in diameter and 1.0 inches thick as described in Section 9. Each disc was confined in a stainless steel ring and sandwiched between two porous stone plates. After application of a seating load of 100 lb/ft^2 to confine the specimen, the ring was placed in an oedometer and the sample immersed in water to full saturation.

Prepared specimens were loaded to the desired stress in accordance with one of the standard loading schedules ("A" or "B") described in Section 11.5 and indicated on the attached test reports, then unloaded in four equal decrements. Resulting deformation of the sample was measured using a micrometer dial gage.

Time deformation properties were plotted for each load increment using either the log time or square root of time methods described in Section 12.3 and the *coefficient of consolidation* C_v computed. Load deformation properties were plotted in terms of void ratio at 100 percent consolidation for each loading increment vs. applied load. The graphical representation of the sample load-deflection curves was corrected for sample disturbance using the Schmertmann (1955) approach and the Becker (1997) work per unit volume approach. The *preconsolidation stress* p_c of the specimen was estimated from this plot using the Casagrande construction described in Section 12.4.6. The *compression index* C_c was estimated from the straight line portion of the semilog consolidation curve, above the preconsolidation stress.

Form No: TR-D1140-2
Revision No. 0
Revision Date: 10/26/07

Material Finer than the #200 Sieve

S&ME

ASTM D1140

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/29/10
Project Name:	Darla Moore School of Business	Test Date(s):	11/23/10-11/29/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Sample by:	Matt Glunt	Sample Dates:	11/9/10
Sampling Method:	Borings		

Boring No. 3 Sample No. 2 Sample Depth: 3.5'-5.0'

Sample Description Clayey Sand (SC) low to medium plasticity, fine to medium sand, red with brown and gray

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	56	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**172.76**
	Wet Wt + T	203.01	After 200 Wash + Tare Wt. (C_T)	115.07
	Dry Wt + T	172.76	Dry Mass Retained on #200 Sieve (C)	**115.07**
	Moisture Content (MC)	**17.5%**	**% Passing #200 Sieve (A)**	**33.4%**

Boring No. 3 Sample No. 12 Sample Depth: 48.5'-50.0'

Sample Description Clayey Sand (SC) low to medium plasticity, fine to coarse sand, light gray with yellow

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	69	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**280.78**
	Wet Wt (W) + T	333.41	After 200 Wash + Tare Wt. (C_T)	221.45
	Dry Wt (D) + T	280.78	Dry Mass Retained on #200 Sieve (C)	**221.45**
	Moisture Content (MC)	**18.7%**	**% Passing #200 Sieve (A)**	**21.1%**

Boring No. 4 Sample No. 13 Sample Depth: 53.5'-55.0'

Sample Description Sandy Lean Clay (CL) low plasticity, fine to medium sand, light gray and white

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	61	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**64.06**
	Wet Wt (W) + T	81.54	After 200 Wash + Tare Wt. (C_T)	
	Dry Wt (D) + T	64.06	Dry Mass Retained on #200 Sieve (C)	**0.00**
	Moisture Content (MC)	**27.3%**	**% Passing #200 Sieve (A)**	

Balance ID. *21294* *Calibration Date:* *1/25/10-11* *#200 Sieve* *21601* *Calibration Date:* *7/18/10*

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Brian Urban		103699	11/30/2010
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Matt Glunt, P.E.		Engineer	11/30/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D1140-2
Revision No. 0
Revision Date: 10/26/07

Material Finer than the #200 Sieve

S&ME

ASTM D1140 — *Quality Assurance*

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/29/10
Project Name:	Darla Moore School of Business	Test Date(s):	11/23/10-11/29/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Sample by:	Matt Glunt	Sample Dates:	11/9/10
Sampling Method:	Borings		

Boring No. 4 Sample No. 8 Sample Depth: 28.5'-30.0'

Sample Description Clayey Sand (SC) low plasticity, fine to coarse sand, orange and tan

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	5	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**200.46**
	Wet Wt + T	219.97	After 200 Wash + Tare Wt. (C_T)	171.89
	Dry Wt + T	200.46	Dry Mass Retained on #200 Sieve (C)	**171.89**
	Moisture Content (MC)	**9.7%**	**% Passing #200 Sieve (A)**	**14.3%**

Boring No. 8 Sample No. 8 Sample Depth: 28.5'-30.0'

Sample Description Clayey Sand (SC) low to medium plasticity, medium to coarse sand, orange and brown

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	400	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**247.63**
	Wet Wt (W) + T	307.52	After 200 Wash + Tare Wt. (C_T)	208.03
	Dry Wt (D) + T	247.63	Dry Mass Retained on #200 Sieve (C)	**208.03**
	Moisture Content (MC)	**24.2%**	**% Passing #200 Sieve (A)**	**16.0%**

Boring No. 9 Sample No. 3 Sample Depth: 6.0'-7.5'

Sample Description Clayey Sand (SC) medium plasticity, fine to medium sand, dark red with brown

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	65	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**201.13**
	Wet Wt (W) + T	225.75	After 200 Wash + Tare Wt. (C_T)	133.96
	Dry Wt (D) + T	201.13	Dry Mass Retained on #200 Sieve (C)	**133.96**
	Moisture Content (MC)	**12.2%**	**% Passing #200 Sieve (A)**	**33.4%**

Balance ID. *21294* *Calibration Date:* *1/25/10-11* *#200 Sieve* *21601* *Calibration Date:* *7/18/10*

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Brian Urban		103699	11/30/2010
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Matt Glunt, P.E.		Engineer	11/30/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D1140-2
Revision No. 0
Revision Date: 10/26/07

Material Finer than the #200 Sieve

S&ME

ASTM D1140

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/29/10
Project Name:	Darla Moore School of Business	Test Date(s):	11/23/10-11/29/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Sample by:	Matt Glunt	Sample Dates:	11/9/10
Sampling Method:	Borings		

Boring No. 5 Sample No. 8 Sample Depth: 28.5'-30.0'

Sample Description Sandy Lean Clay (CL) med. plasticity, fine to medium sand, gray and white

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	22	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**58.69**
	Wet Wt + T	66.98	After 200 Wash + Tare Wt. (C_T)	
	Dry Wt + T	58.69	Dry Mass Retained on #200 Sieve (C)	**0.00**
	Moisture Content (MC)	**14.1%**	**% Passing #200 Sieve (A)**	

Boring No. 5 Sample No. 10 Sample Depth: 38.5'-40.0'

Sample Description Clayey Sand (SC) medium plasticity, medium to coarse sand, brownish-gray

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	72	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**237.63**
	Wet Wt (W) + T	280.28	After 200 Wash + Tare Wt. (C_T)	187.51
	Dry Wt (D) + T	237.63	Dry Mass Retained on #200 Sieve (C)	**187.51**
	Moisture Content (MC)	**17.9%**	**% Passing #200 Sieve (A)**	**21.1%**

Boring No. 5 Sample No. 5 Sample Depth: 13.5'-15.0'

Sample Description Clayey Sand (SC) low plasticity, fine to medium sand, orange with white

☐ *Auxiliary* *#200 Wash* Method A ☒ Method B ☐

	Tare #:	3	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**160.91**
	Wet Wt (W) + T	182.82	After 200 Wash + Tare Wt. (C_T)	132.28
	Dry Wt (D) + T	160.91	Dry Mass Retained on #200 Sieve (C)	**132.28**
	Moisture Content (MC)	**13.6%**	**% Passing #200 Sieve (A)**	**17.8%**

Balance ID. *21294* *Calibration Date:* *1/25/10-11* *#200 Sieve* *21601* *Calibration Date:* *7/18/10*

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Brian Urban		103699	11/30/2010
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Matt Glunt, P.E.		Engineer	11/30/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D1140-2
Revision No. 0
Revision Date: 10/26/07

Material Finer than the #200 Sieve

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ASTM D1140 — *Quality Assurance*

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/29/10
Project Name:	Darla Moore School of Business	Test Date(s):	11/23/10-11/29/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Sample by:	Matt Glunt	Sample Dates:	11/9/10
Sampling Method:	Borings		

Boring No. 5 — Sample No. 3 — Sample Depth: 6.0'-7.5'

Sample Description: Clayey Sand (SC) medium to high plasticity, fine to medium sand, dark red with brown

☐ *Auxiliary* — *#200 Wash* — Method A ☒ — Method B ☐

	Tare #:	222	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**98.01**
	Wet Wt + T	114.80	After 200 Wash + Tare Wt. (C_T)	
	Dry Wt + T	98.01	Dry Mass Retained on #200 Sieve (C)	**0.00**
	Moisture Content (MC)	**17.1%**	**% Passing #200 Sieve (A)**	

Boring No. 5 — Sample No. 15 — Sample Depth: 63.5'-65.0'

Sample Description: Sandy Silt (ML) low to medium plasticity, fine to coarse sand, white with tan

☐ *Auxiliary* — *#200 Wash* — Method A ☒ — Method B ☐

	Tare #:	208	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**49.13**
	Wet Wt (W) + T	58.81	After 200 Wash + Tare Wt. (C_T)	
	Dry Wt (D) + T	49.13	Dry Mass Retained on #200 Sieve (C)	**0.00**
	Moisture Content (MC)	**19.7%**	**% Passing #200 Sieve (A)**	

Boring No. 7 — Sample No. 9 — Sample Depth: 33.5'-35.0'

Sample Description: Clayey Sand (SC) medium plasticity, fine to coarse sand, yellowish-orange

☐ *Auxiliary* — *#200 Wash* — Method A ☒ — Method B ☐

	Tare #:	219	Soaked ☒	*Soak Time* 6 hrs.
	Tare Wt. (T)	0.00	Original Dry Mass of Sample (B)	**235.19**
	Wet Wt (W) + T	288.58	After 200 Wash + Tare Wt. (C_T)	173.57
	Dry Wt (D) + T	235.19	Dry Mass Retained on #200 Sieve (C)	**173.57**
	Moisture Content (MC)	**22.7%**	**% Passing #200 Sieve (A)**	**26.2%**

Balance ID. ***21294*** *Calibration Date:* ***1/25/10-11*** *#200 Sieve* ***21601*** *Calibration Date:* ***7/18/10***

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Brian Urban		103699	11/30/2010
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Matt Glunt, P.E.		Engineer	11/30/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D422-WH-1
Revision No. 1
Revision Date: 11/4/09

Sieve Analysis of Soils

ASTM D 422

S&ME

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia, SC 29210

Project #:	**1613-10-426**	Report Date:	30-Nov-11
Project Name:	Darla School of Business	Test Date(s):	11/28/2010 thru 11/29/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Document ID:	743 Greene Street, Columbia, South Carolina 29208		

Boring #: 5 Sample: 5 Sample Date: 19-Nov-10

Location: B-5 Elevation: 13.5'-15.0'

Sample Description: Clayey Sand (SC) low plasticity, fine to coarse sand, orange with white

Description of Sand & Gravel Particles: Rounded ☒ Angular ☒

Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Particle Size Analysis / Without Hydrometer Analysis				*Material Excluded:*	
Tare No.	3	Tare Wt.	**0.0**	Mass of Sample after Wash + Tare Wt.	**132.3**
Total Sample Wet Wt. + Tare Wt.			**182.8**	Mass of Sample after Wash	**132.3**
Total Sample Dry Wt. + Tare Wt.			**160.9**	Mass passing #200	**28.6**
Total Sample Dry Weight			**160.9**	% Passing #200 (D1140)	**17.8%**

Sieve Size		**Retained Weight**	**% Retained Between Sieves**	**% Retained**	**% Passing**	**SPECS**
Standard	*mm.*	*Cumulative*	*Individual*	*Cumulative Total Sample*		
2.0"	50.00	0.0	0.0%	0.0%	**100.0%**	
1.5"	37.50	0.0	0.0%	0.0%	**100.0%**	
1.0"	25.00	0.0	0.0%	0.0%	**100.0%**	
3/4"	19.00	0.0	0.0%	0.0%	**100.0%**	
1/2"	12.50	0.0	0.0%	0.0%	**100.0%**	
3/8"	9.50	5.4	3.3%	3.3%	**96.7%**	
#4	4.75	8.0	1.6%	5.0%	**95.0%**	
#8	2.360	15.9	4.9%	9.9%	**90.1%**	
#16	1.180	37.3	13.3%	23.2%	**76.8%**	
#30	0.600	69.6	20.1%	43.3%	**56.7%**	
#50	0.300	114.4	27.8%	71.1%	**28.9%**	
#100	0.150	125.6	7.0%	78.1%	**21.9%**	
#200	0.075	132.3	4.1%	82.2%	**17.8%**	
Pan	<0.075			**% Passing #200 (C136) =**		**17.8%**

D2487	Maximum Particle Size	3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	33.4%
Gravel	< 75 mm and > 4.75 mm (#4)	**5.0%**	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	38.9%
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	**4.9%**	% Silt & Clay	< 0.075 mm	17.8%

Notes / Deviations / References:

Matt Glunt, P.E.		Engineer	11/30/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/30/10
Project Name:	Darla Moore School of Business	Test Date(s)	11/29/10-11/30/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		

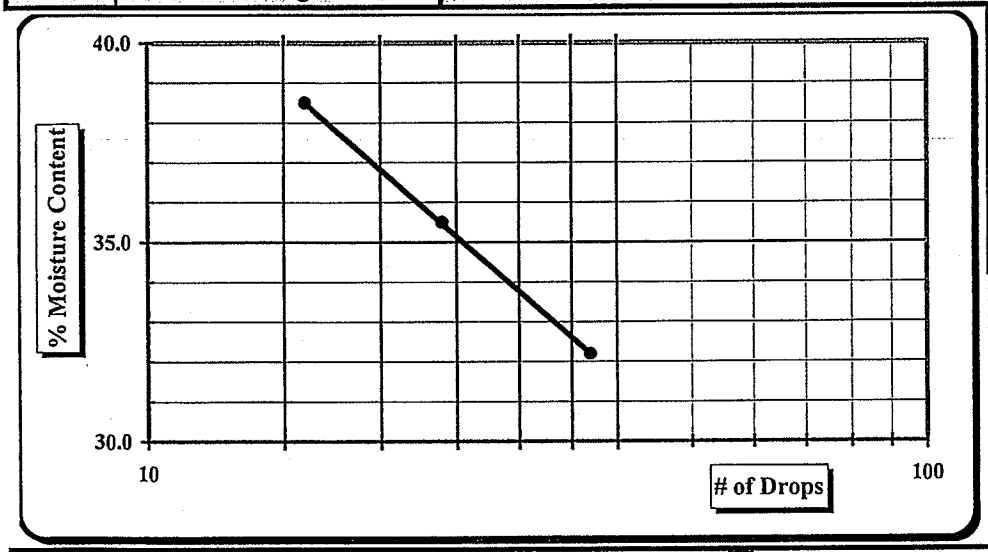
Boring #: 4 Sample #: 13 Sample Date: 11/9/10

Location: B-4 Elevation: 53.5'-55.0'

Sample Description: Sandy Lean Clay (CL) med plasticity, fine to coarse sand, white with light brown

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	15425	1/8/2010-11	Grooving tool	Batch 10-1	3/1/2010-11
LL Apparatus	19460	3/1/2010-11			
Oven	21226	3/1/10-11			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	230	128	237	4	5	6	226	115	9
A	Tare Weight	13.94	13.77	13.91				13.76	13.89	
B	Wet Soil Weight + A	27.01	26.14	26.27				20.58	21.17	
C	Dry Soil Weight + A	23.38	22.90	23.26				19.44	19.96	
D	Water Weight (B-C)	3.63	3.24	3.01				1.14	1.21	
E	Dry Soil Weight (C-A)	9.44	9.13	9.35				5.68	6.07	
F	% Moisture (D/E)*100	38.5%	35.5%	32.2%				20.1%	19.9%	
N	# OF DROPS	16	24	37				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**20.0%**		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **35**

Plastic Limit **20**

Plastic Index **15**

Group Symbol **CL**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Brian Urban	11/30/2010	Matt Glunt, P.E.	11/30/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/30/10
Project Name:	Darla Moore School of Business	Test Date(s)	11/29/10-11/30/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		

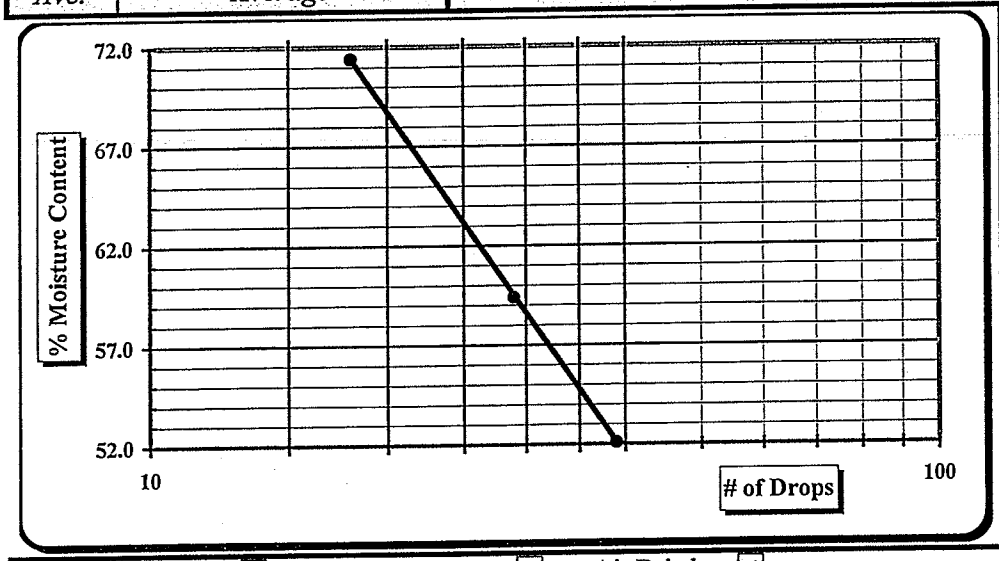
Boring #: 5 Sample #: 3 Sample Date: 11/9/10

Location: B-5 Elevation: 6.0'-7.5'

Sample Description: Clayey Sand (SC) medium plasticity, fine to medium sand, dark red with brown

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	15425	1/8/2010-11	Grooving tool	Batch 10-1	3/1/2010-11
LL Apparatus	19460	3/1/2010-11			
Oven	21226	3/1/10-11			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	147	106	233	4	5	6	122	209	9
A	Tare Weight	13.64	13.71	13.83				13.81	13.94	
B	Wet Soil Weight + A	21.20	22.03	21.60				16.92	16.71	
C	Dry Soil Weight + A	18.05	18.93	18.94				16.23	16.09	
D	Water Weight (B-C)	3.15	3.10	2.66				0.69	0.62	
E	Dry Soil Weight (C-A)	4.41	5.22	5.11				2.42	2.15	
F	% Moisture (D/E)*100	71.4%	59.4%	52.1%				28.5%	28.8%	
N	# OF DROPS	18	29	39				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**28.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **63**

Plastic Limit **29**

Plastic Index **34**

Group Symbol **SC**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Brian Urban	11/30/2010	Matt Glunt, P.E.	11/30/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/30/10
Project Name:	Darla Moore School of Business	Test Date(s)	11/29/10-11/30/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		

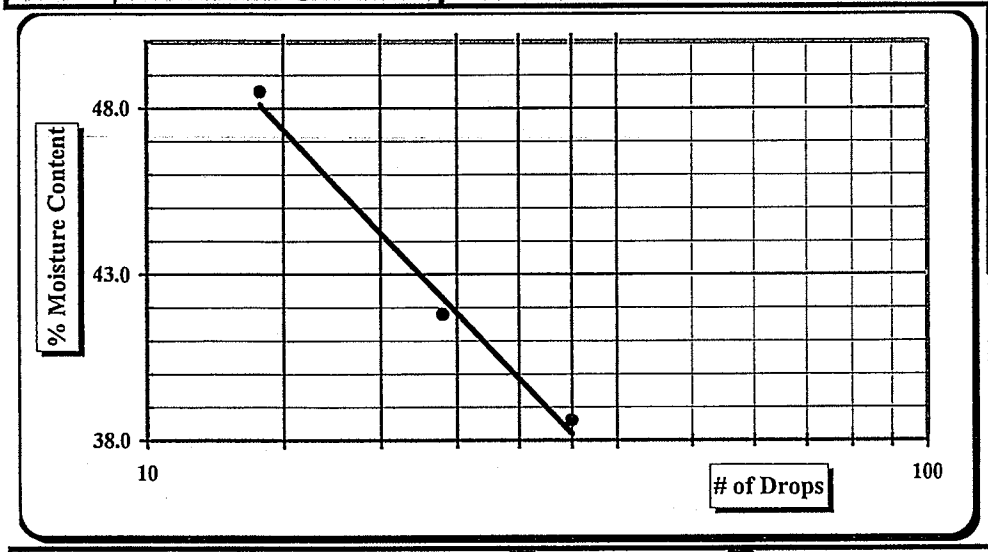
Boring #: 5 Sample #: 8 Sample Date: 11/9/10

Location: B-5 Elevation: 28.5'-30.0'

Sample Description: Sandy Lean Clay (CL) med. plasticity, fine to medium sand, gray and white

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	15425	1/8/2010-11	Grooving tool	Batch 10-1	3/1/2010-11
LL Apparatus	19460	3/1/2010-11			
Oven	21226	3/1/10-11			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	10	201	235	4	5	6	114	207	9
A	Tare Weight	13.83	13.78	13.83				13.90	13.86	
B	Wet Soil Weight + A	24.37	24.56	24.06				20.57	20.88	
C	Dry Soil Weight + A	20.93	21.38	21.21				19.33	19.59	
D	Water Weight (B-C)	3.44	3.18	2.85				1.24	1.29	
E	Dry Soil Weight (C-A)	7.10	7.60	7.38				5.43	5.73	
F	% Moisture (D/E)*100	48.5%	41.8%	38.6%				22.8%	22.5%	
N	# OF DROPS	14	24	35				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**22.7%**		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **42**

Plastic Limit **23**

Plastic Index **19**

Group Symbol **CL**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Brian Urban	11/30/2010	Matt Glunt, P.E.	11/30/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

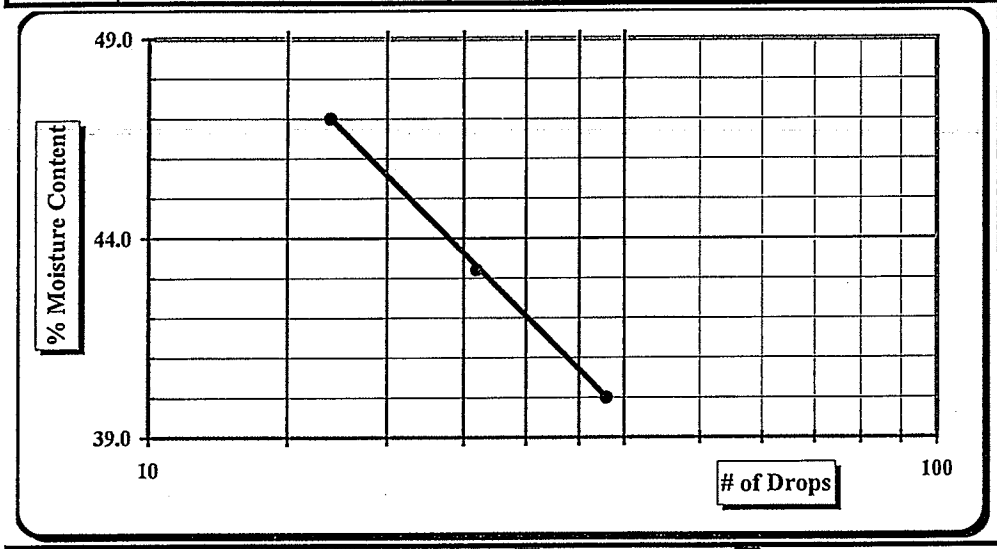
Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	11/30/10
Project Name:	Darla Moore School of Business	Test Date(s)	11/29/10-11/30/10
Client Name:	University of South Carolina, Campus Planning and Constr.		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Boring #: 5	Sample #: 15	Sample Date: 11/9/10	
Location: B-5		Elevation: 63.5'-65.0'	
Sample Description:	Sandy Silt (ML) low to medium plasticity, fine to coarse sand, white with tan		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	15425	1/8/2010-11	Grooving tool	Batch 10-1	3/1/2010-11
LL Apparatus	19460	3/1/2010-11			
Oven	21226	3/1/10-11			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	234	204	132	4	5	6	203	116	9
A	Tare Weight	13.64	13.96	13.71				13.83	13.78	
B	Wet Soil Weight + A	21.77	22.98	23.54				19.02	20.50	
C	Dry Soil Weight + A	19.17	20.26	20.73				17.79	18.92	
D	Water Weight (B-C)	2.60	2.72	2.81				1.23	1.58	
E	Dry Soil Weight (C-A)	5.53	6.30	7.02				3.96	5.14	
F	% Moisture (D/E)*100	47.0%	43.2%	40.0%				31.1%	30.7%	
N	# OF DROPS	17	26	38				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**30.9%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **44**

Plastic Limit **31**

Plastic Index **13**

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Brian Urban	11/30/2010	Matt Glunt, P.E.	11/30/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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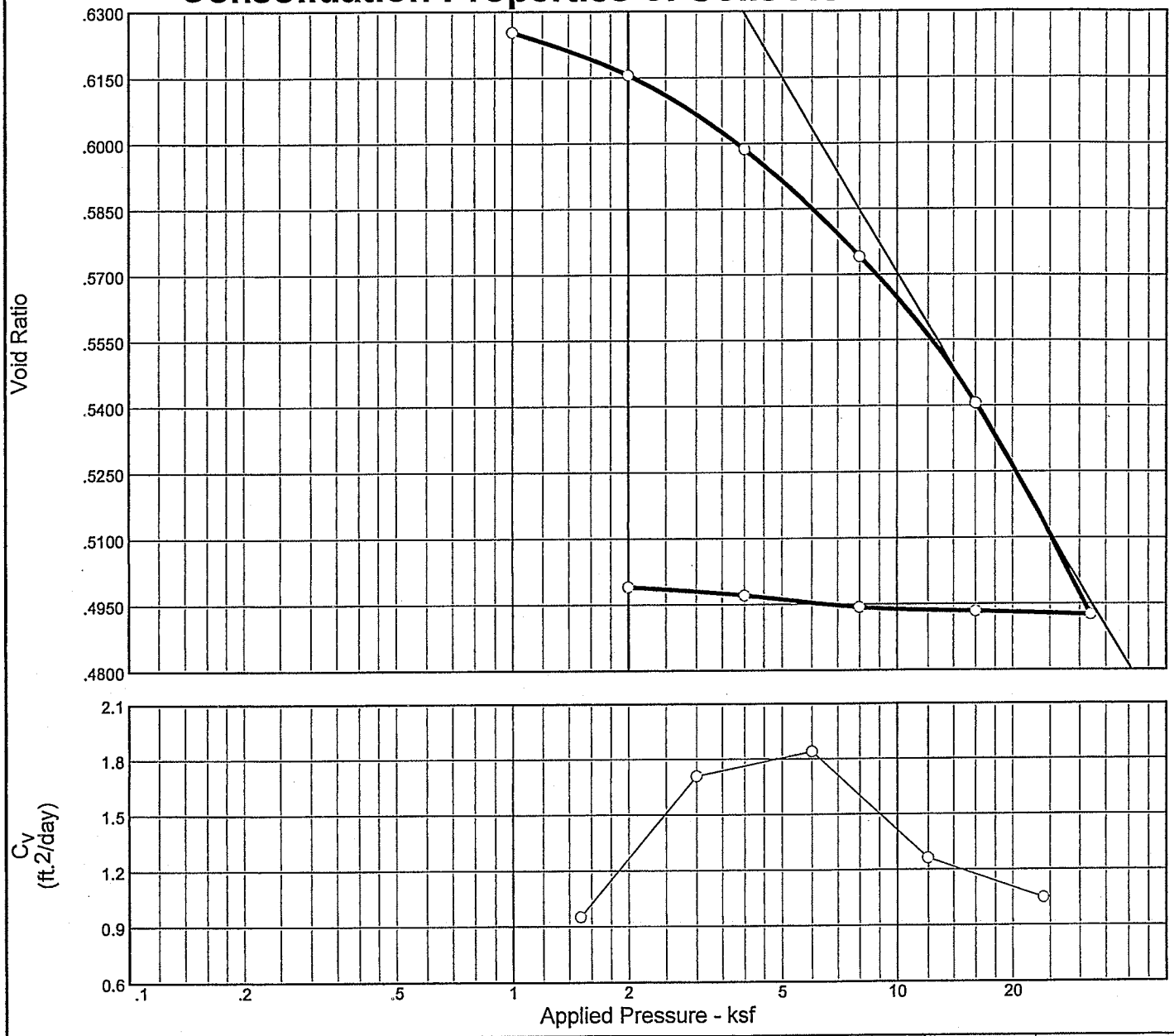
Consolidation Properties of Soils ASTM D2435



MATERIAL DESCRIPTION	USCS	AASHTO
Reddish Orange Clayey Sand (visual-manual)		

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (ksf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.70		103.6	114.8	18.9 %	17.2 %	81.4 %	93.2 %	0.626	0.499	5.77	0.15

	D2435 Method	C_r	Swell Press. (ksf)	Swell %
Preparation Process: Trimmed with a cutting ring				
Condition of Test: Inundated in the seat load	B	0.01		

Project No. 161110426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Location: B-11 / UD-1 / 18-20 ft

S & ME, INC.

Louisville, TN

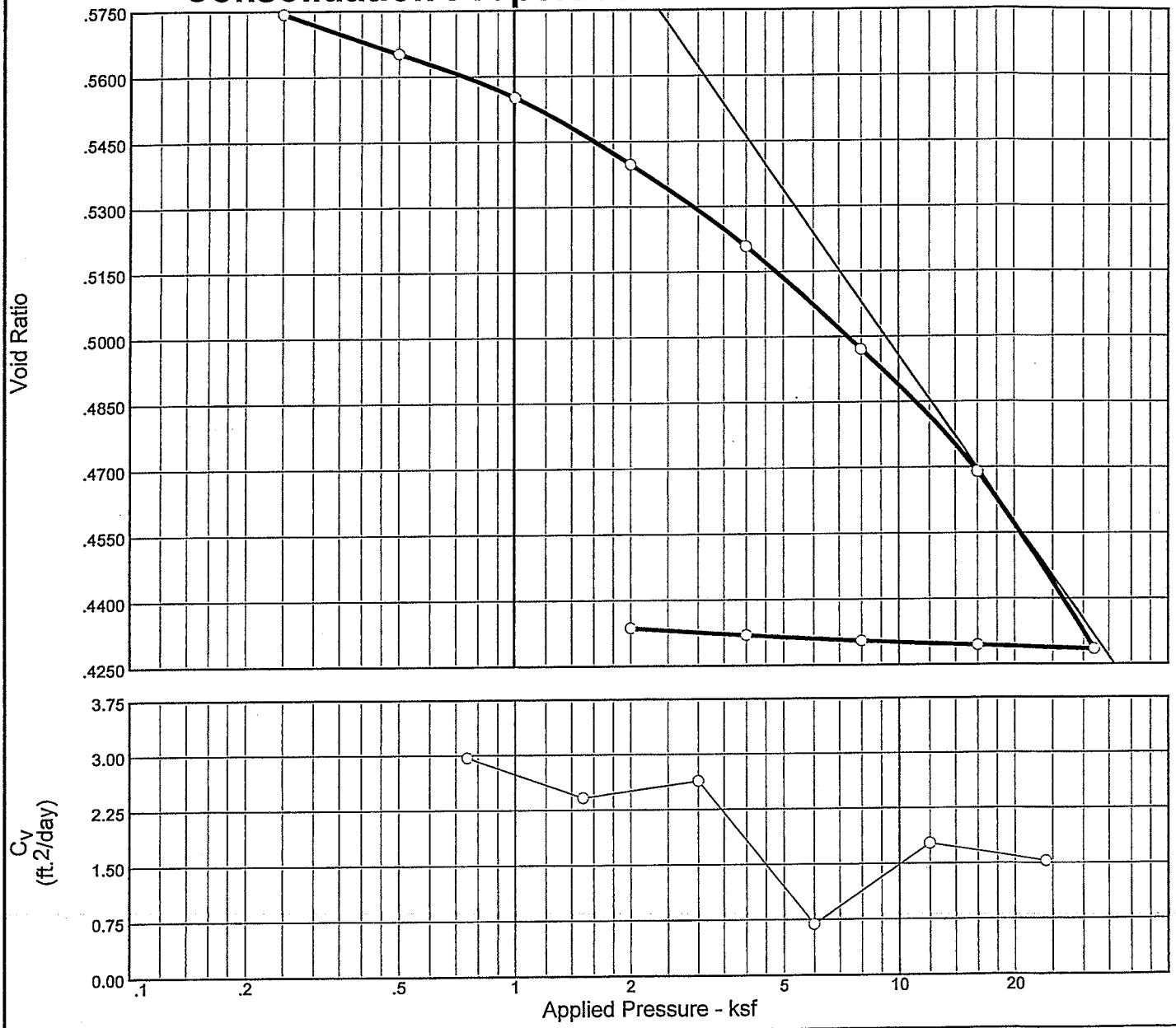
Remarks:

"Final density" is at final seat load. S.G. value is assumed.

Checked By: NRR, 6/8/11

Title: Lab Dept Manager

Consolidation Properties of Soils ASTM D2435



MATERIAL DESCRIPTION	USCS	AASHTO
Orangish Brown Sandy Clay (visual-manual)		

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (ksf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.70		106.4	115.7	16.3 %	16.5 %	75.2 %	100.0 %	0.585	0.434	4.32	0.13

Preparation Process: Trimmed with a cutting ring

Condition of Test: Inundated in the seat load

D2435 Method	C_r	Swell Press. (ksf)	Swell %
B	0.00		

Project No. 161110426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Location: B-12 / UD-1 / 23-25 ft

Remarks:
"Final densityh" is at final seat load. S.G. value is assumed.

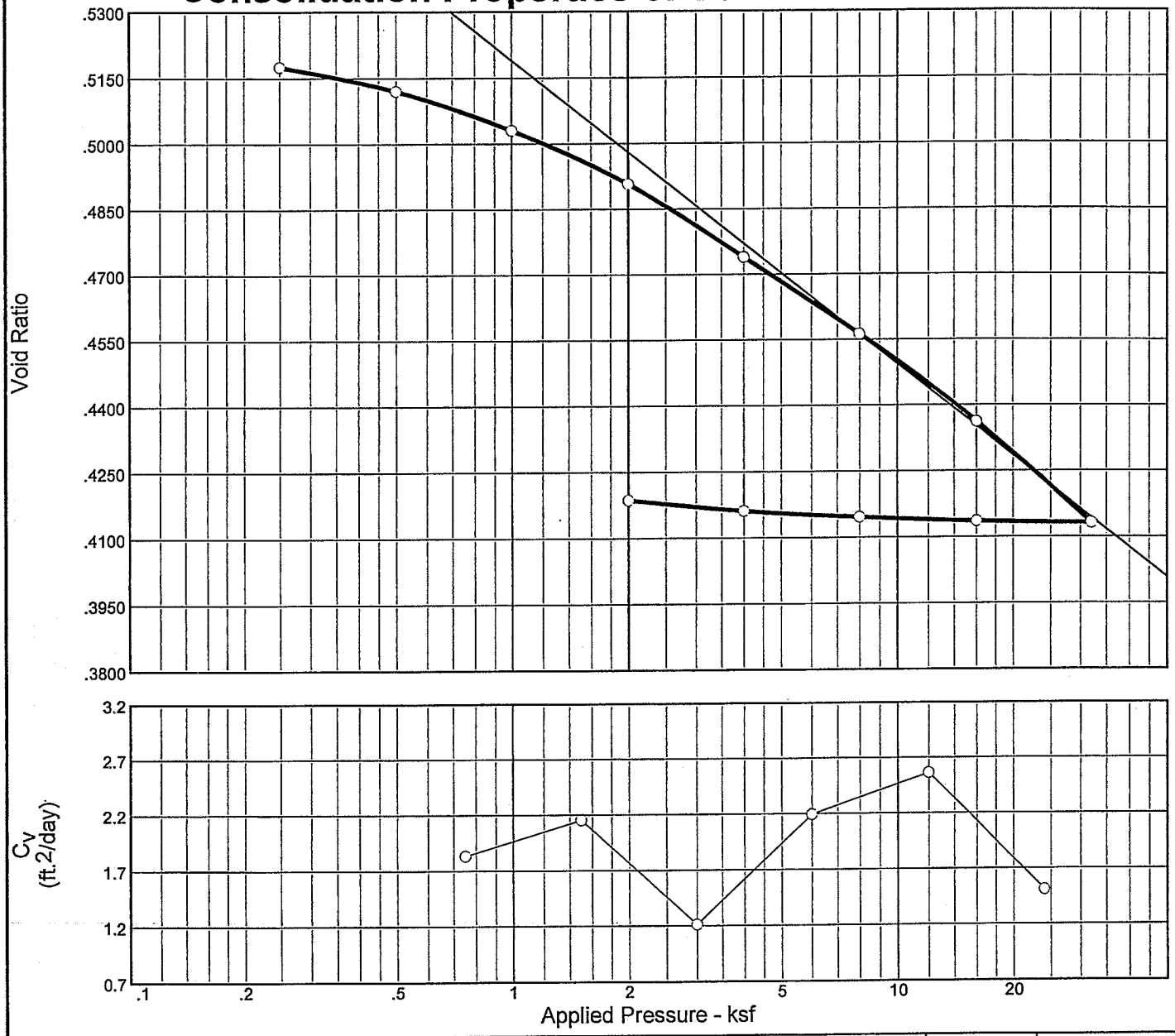
Checked By: NRR, 6/9/11

Title: Lab Dept Manager

S & ME, INC.

Louisville, TN

Consolidation Properties of Soils ASTM D2435



MATERIAL DESCRIPTION	USCS	AASHTO
Gray with Orange Sandy Clay (visual-manual)		

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (ksf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.70		110.8	117.6	15.1 %	15.7 %	78.2 %	100.0 %	0.521	0.419	2.91	0.07

Preparation Process: Trimmed with a cutting ring

Condition of Test: Inundated in the seat load

D2435 Method	C_r	Swell Press. (ksf)	Swell %
B	0.00		

Project No. 161110426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Location: B-12 / UD-2 / 38-40 ft

Remarks:
"Final density" is at final seat load. S.G. value is assumed.

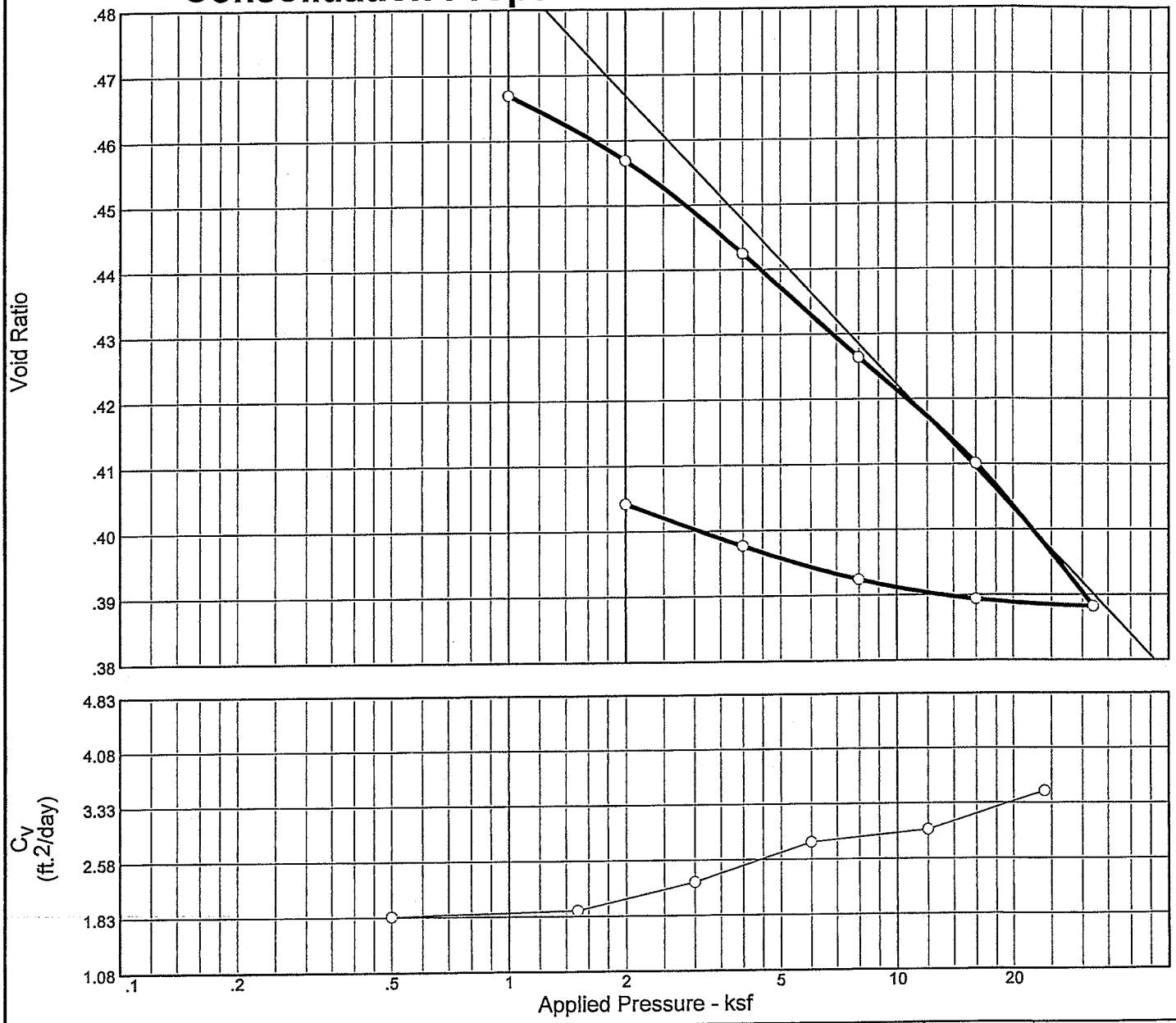
Checked By: NRR, 6/9/11

Title: Lab Dept Manager

S & ME, INC.

Louisville, TN

Consolidation Properties of Soils ASTM D2435



MATERIAL DESCRIPTION	USCS	AASHTO
Gray with Orange Silty Clay (visual-manual)		

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (ksf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.70		114.6	118.8	15.6 %	16.7 %	89.5 %	100.0 %	0.471	0.404	3.39	0.06

Preparation Process: Trimmed with a cutting ring

Condition of Test: inundated in the seat load

D2435 Method	C_r	Swell Press. (ksf)	Swell %
B	0.01		

Project No. 161110426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Location: B-12 / UD-3 / 48-50 ft

Remarks:
"Final density" is at final seat load. S.G. value is assumed.

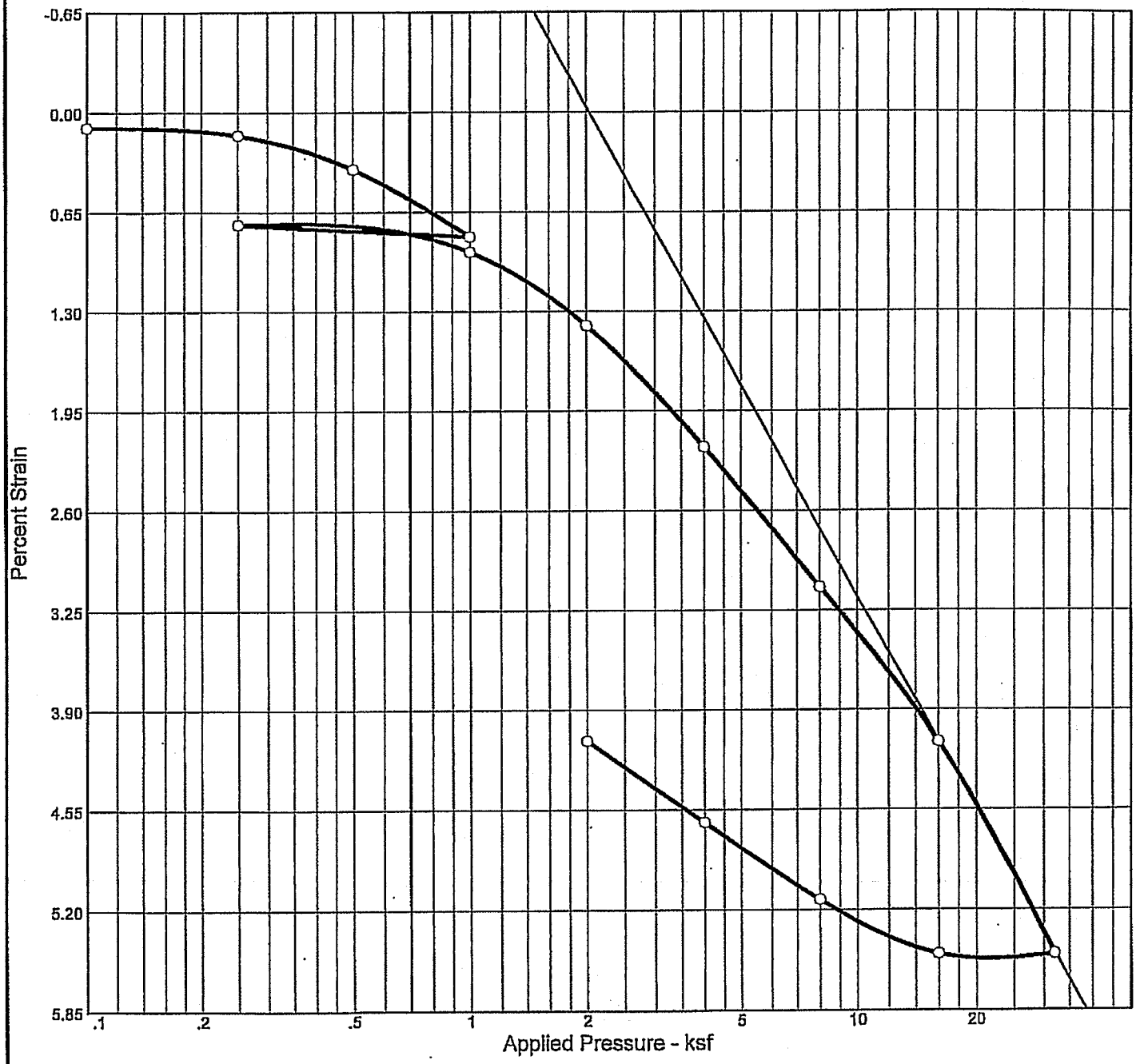
Checked By: NRR, 6/8/11

Title: Lab Dept Manager

S & ME, INC.

Louisville, TN

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
109.2 %	17.5 %	116.5	ND	ND	2.657		3.51	0.07	0.00	0.427

MATERIAL DESCRIPTION	USCS	AASHTO
Mottled Gray Orange Red Fine Sandy Clayey Silt		

Project No. 1611-10-426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Source: **Sample No.:** B-13 UD-1 **Elev./Depth:** 28-30'

S & ME, INC.

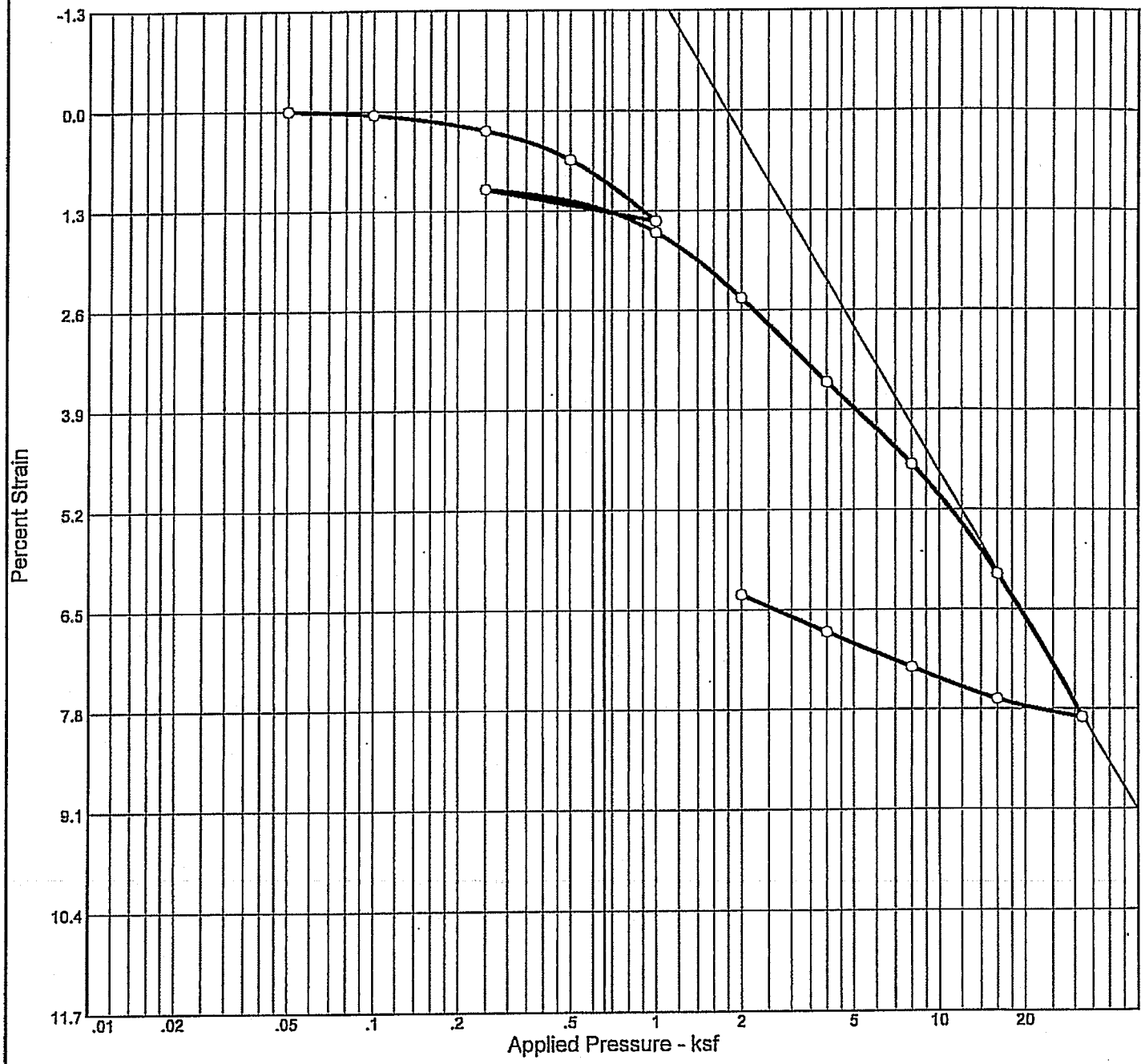
Charlotte, North Carolina

Remarks:

Saturated

Plate B-13 UD1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
134.2 %	25.0 %	103.7	ND	ND	2.624		3.49	0.09	0.01	0.489

MATERIAL DESCRIPTION	USCS	AASHTO
White Gray Fine Sandy Silt		

Project No. 1611-10-426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Source: **Sample No.:** B-13 UD-2 **Elev./Depth:** 43-45'

S & ME, INC.

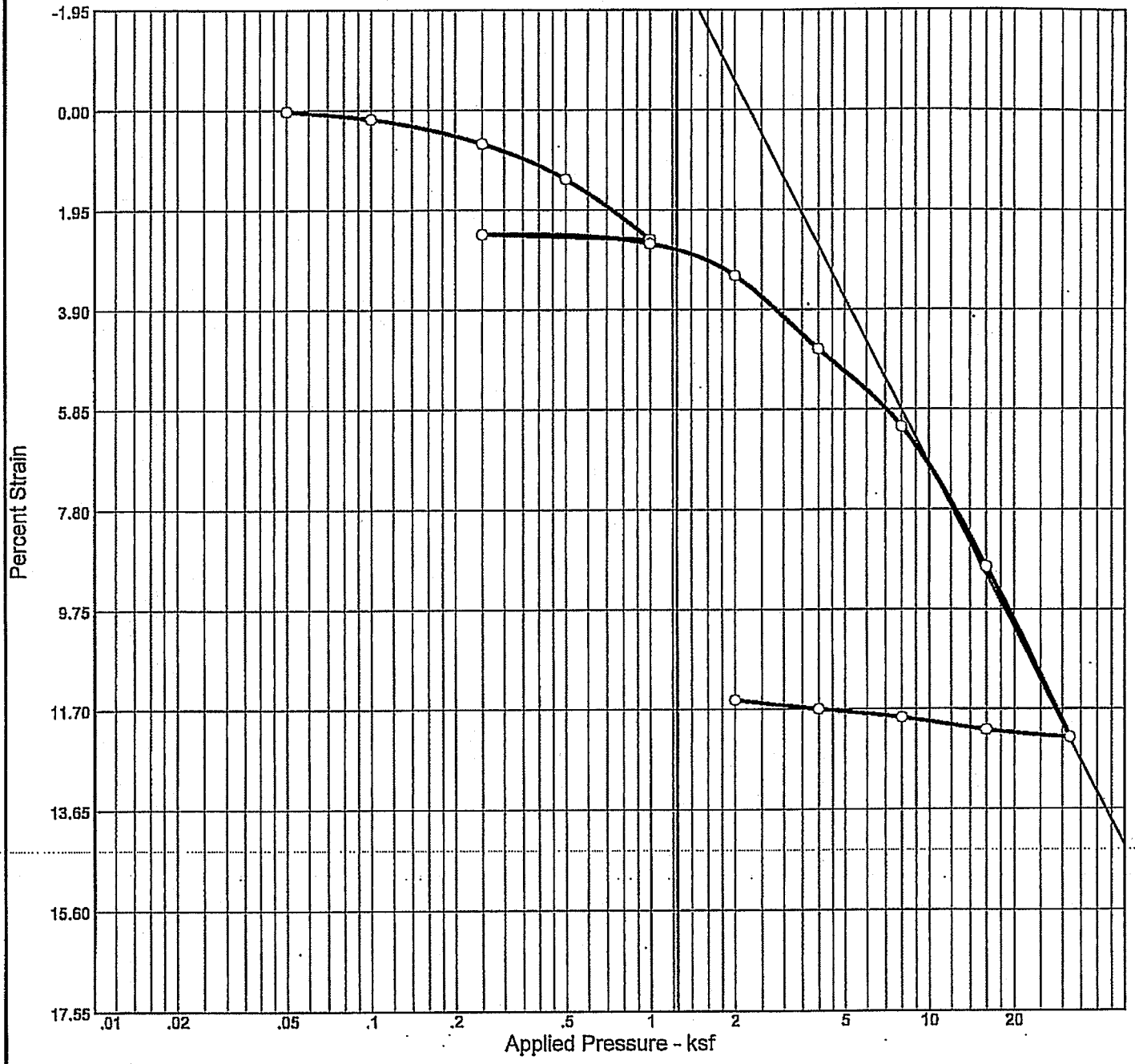
Charlotte, North Carolina

Remarks:

Saturated

Plate B-13 UD2

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
28.9 %	7.4 %	102.3	ND	ND	2.632		4.64	0.18	0.00	0.673

MATERIAL DESCRIPTION	USCS	AASHTO
Tan Orange Sl. Clayey Medium to Fine Sand		

Project No. 1611-10-426 **Client:** University of South Carolina

Project: Darla Moore School of Business

Source: **Sample No.:** B-14 UD-1 **Elev./Depth:** 13-15'

Remarks:
Unsaturated

S & ME, INC.

Charlotte, North Carolina

Plate B-14 UD1

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

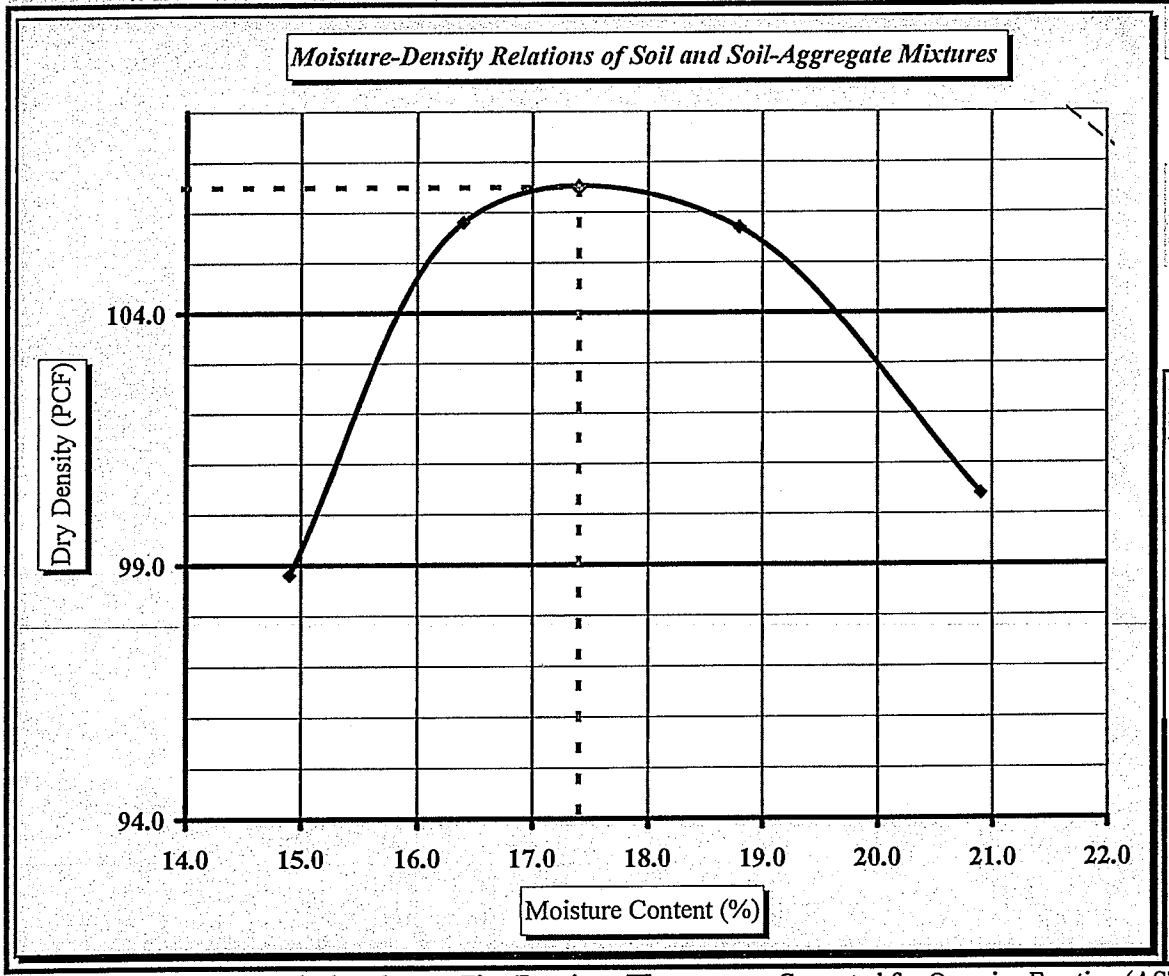
S&ME Project #:	**1611-10-426**	Report Date:	Apr.12, 2011
Project Name:	Darla Moore School of Business	Test Date(s):	Apr.12, 2011
Client Name:	University of South Carolina, Campus and Construction		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		

Proctor #:	2	Sample #:	Bulk 2	Sample Date:	Apr.8, 2011
Location:	Greene Street, G-1			Depth:	1.0'-2.5'

Sample Description: Clayey Sand (SC) medium plasticity, fine to medium sand, brownish-red

Maximum Dry Density 106.5 PCF. **Optimum Moisture Content 17.4%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content
Specific Gravity of Soil (D854)
Liquid Limit
Plastic Limit
Plastic Index

% Passing

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: ASTM D 854: Specific Gravity of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Matt Glunt, P.E.		Staff Professional	Apr.12, 2011
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D1883-T193-3
Revision No. 1
Revision Date: 9/29/08

CBR (California Bearing Ratio) of Laboratory Compacted Soil

ASTM D 1883

S&ME

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

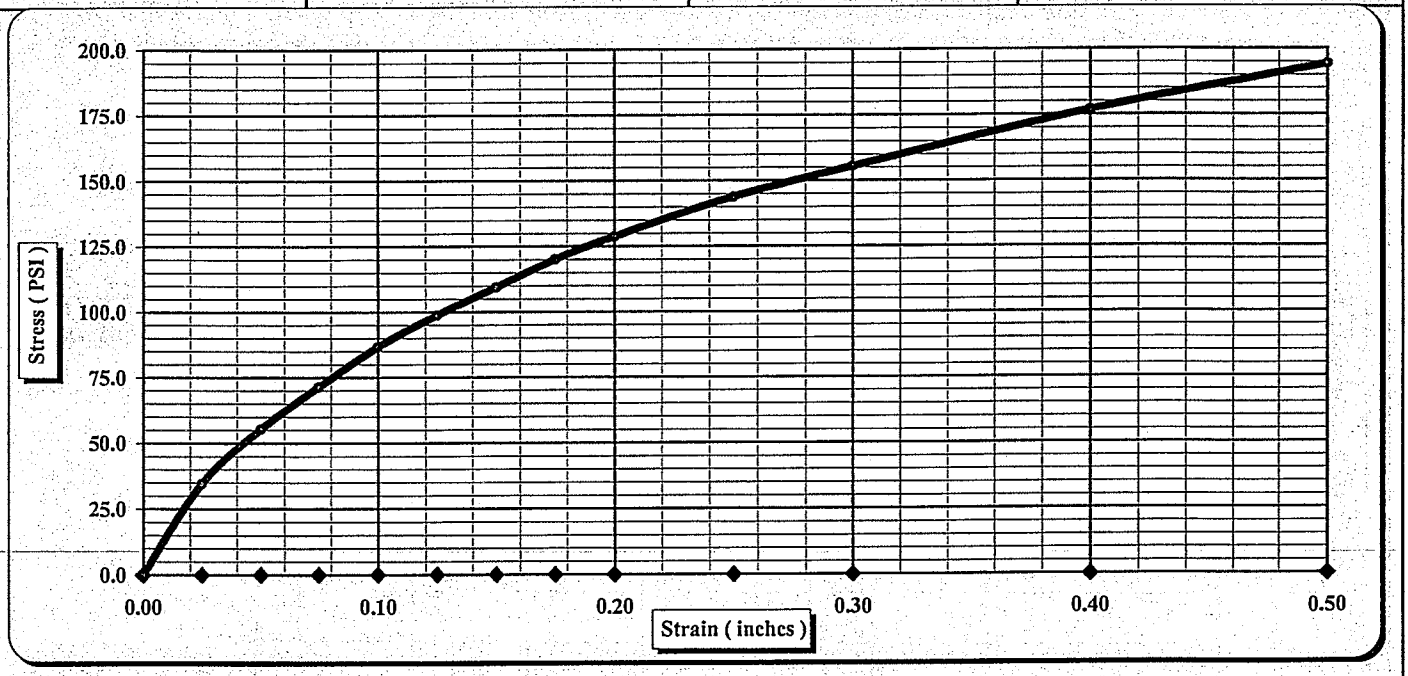
Project #:	**1611-10-426**	Report Date:	Apr.15, 2011
Project Name:	Darla Moore School of Business	Test Date(s)	Apr.11, 2011
Client Name:	University of South Carolina, Campus and Construction		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Boring #: G-1	Sample #: Bulk 2	Sample Date:	Apr.8, 2011
Location: G-1		Elevation:	1.0'-2.5'

Sample Description: Clayey Sand (SC), medium plasticity, fine to medium sand, brownish-red 98% Comp.

ASTM D 698 *Method A* Maximum Dry Density: **106.5 PCF** Optimum Moisture Content: **17.4%**

Compaction Test performed on the Fine Fraction only % Retained on the 3/4" sieve: **0.0%**

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 8.7	**CBR at 0.2 in. 8.6**	**CBR at 0.1 in. 0.0**	**CBR at 0.2 in. 0.0**



CBR Sample Preparation: *Performed on the fine fraction*

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	42	Final Dry Density (PCF)	99.9
Initial Dry Density (PCF)	114.6	Average Final Moisture Content	22.0%
Moisture Content of the Compacted Specimen	17.5%	Moisture Content (top 1" after soaking)	22.0%
Percent Compaction	97.4%	Percent Swell	0.1%

Soak Time: 96 Hours Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 51.0

Liquid Limit NP Plastic Index NP Apparent Relative Density

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Brian Urban	4/15/2011	Matt Glunt, P.E.	4/15/2011
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

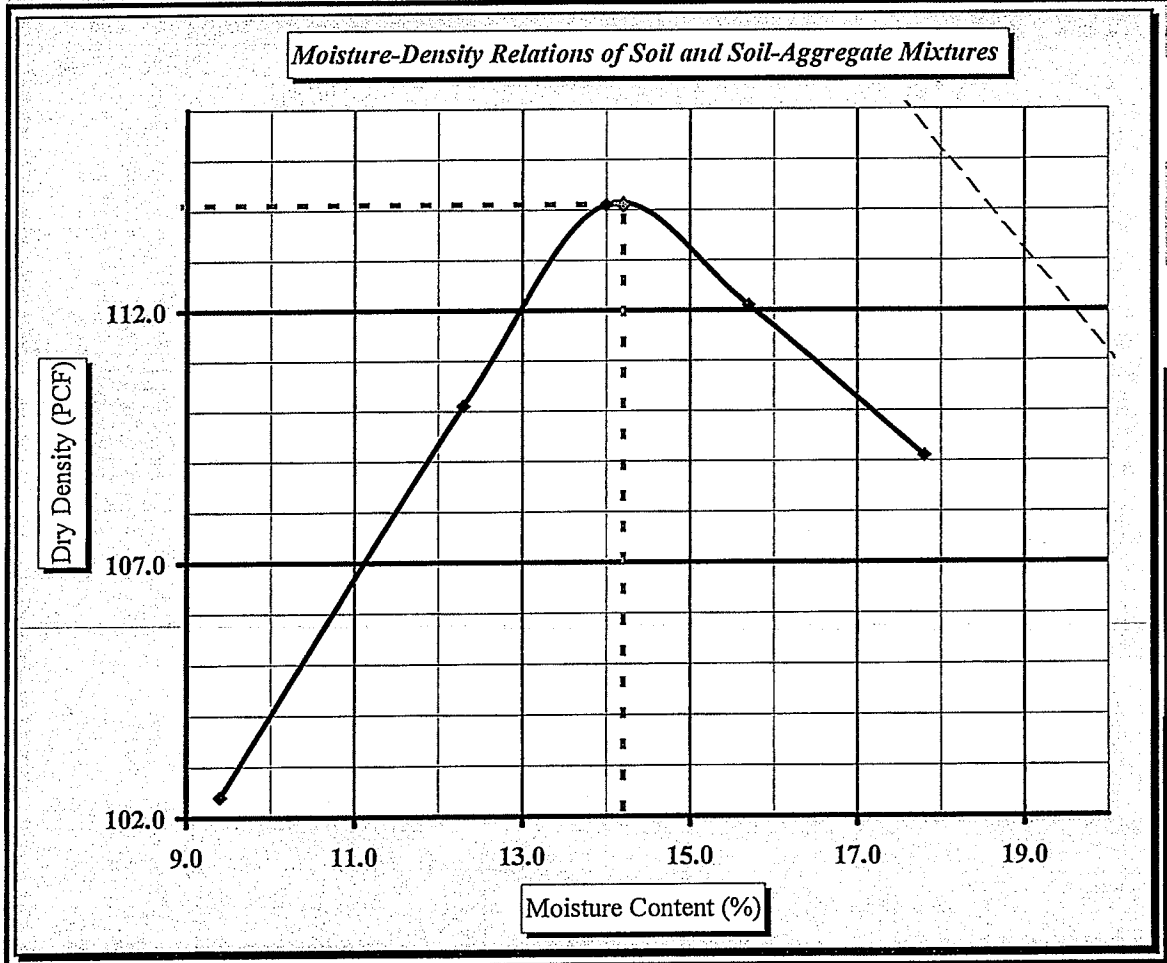
Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

S&ME Project #:	**1611-10-426**	Report Date:	Apr.12, 2011
Project Name:	Darla Moore School of Business	Test Date(s):	Apr.12, 2011
Client Name:	University of South Carolina, Campus and Construction		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		
Proctor #: 1	Sample #: Bulk 1	Sample Date:	Apr.8, 2011
Location:	Park Street, P-1	Depth:	1.0'-2.5'
Sample Description:	Clayey Sand (SC) low plasticity, fine to medium sand, brownish-red		

Maximum Dry Density 114.1 PCF. **Optimum Moisture Content 14.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content
Specific Gravity of Soil (D854)
Liquid Limit
Plastic Limit
Plastic Index

% Passing

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: ASTM D 854: Specific Gravity of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Matt Glunt, P.E.		Staff Professional	Apr.12, 2011
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D1883-T193-3
Revision No. 1
Revision Date: 9/29/08

CBR (California Bearing Ratio) of Laboratory Compacted Soil

ASTM D 1883

S&ME

Quality Assurance

S&ME, Inc. Columbia Branch, 134 Suber Road, Columbia SC 29210

Project #:	**1611-10-426**	Report Date:	Apr.15, 2011
Project Name:	Darla Moore School of Business	Test Date(s)	Apr.11, 2011
Client Name:	University of South Carolina, Campus and Construction		
Client Address:	743 Greene Street, Columbia, South Carolina 29208		

Boring #: P-1 Sample #: Bulk 1 Sample Date: Apr.8, 2011

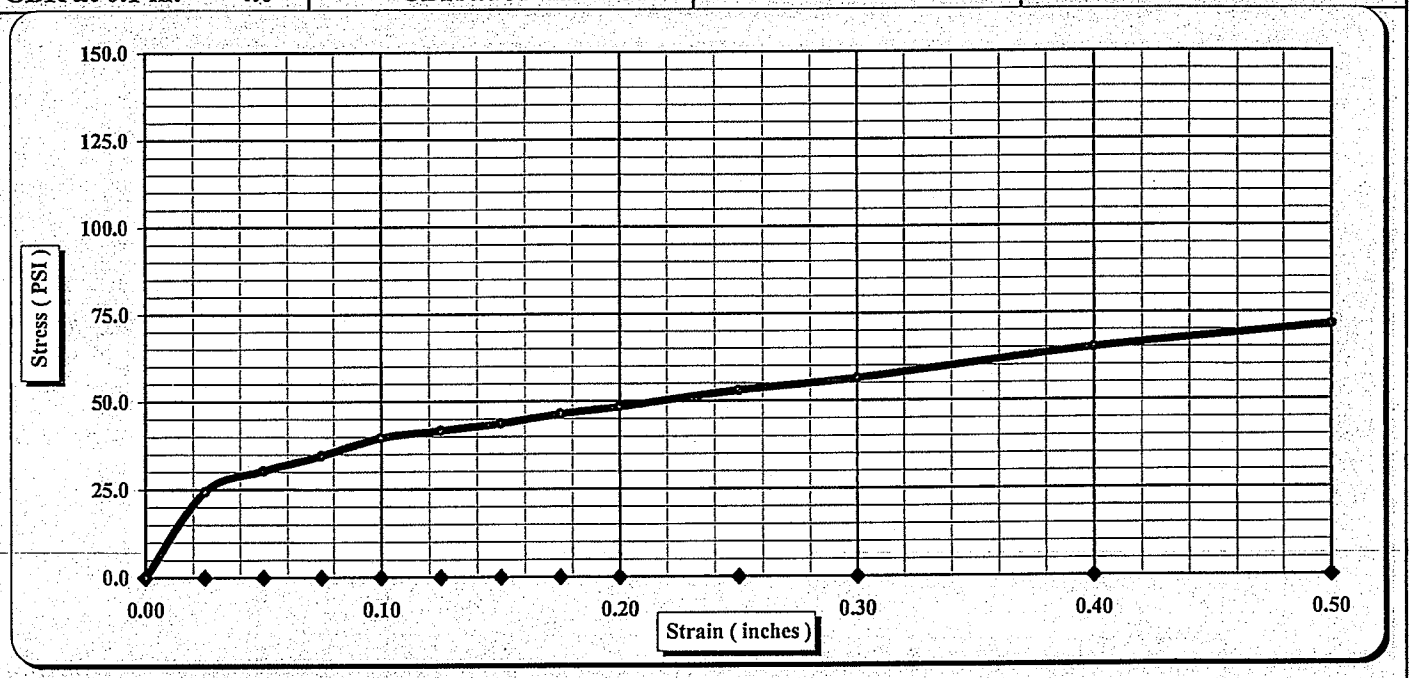
Location: P-1 Elevation: 1.0'-2.5'

Sample Description: Clayey Sand (SC) low plasticity, fine to medium sand, brownish-red 98% Comp.

ASTM D 698 *Method A* Maximum Dry Density: **114.1 PCF** Optimum Moisture Content: **14.2%**

Compaction Test performed on the Fine Fraction only % Retained on the 3/4" sieve: **0.0%**

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 4.0	**CBR at 0.2 in. 3.2**	**CBR at 0.1 in. 0.0**	**CBR at 0.2 in. 0.0**



CBR Sample Preparation: *Performed on the fine fraction*

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	38	Final Dry Density (PCF)	109.1
Initial Dry Density (PCF)	114.6	Average Final Moisture Content	15.3%
Moisture Content of the Compacted Specimen	14.1%	Moisture Content (top 1" after soaking)	15.3%
Percent Compaction	96.9%	Percent Swell	0.3%

Soak Time: 96 Hours Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 51.0

Liquid Limit NP Plastic Index NP Apparent Relative Density

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Brian Urban	4/15/2011	Matt Glunt, P.E.	4/15/2011
Technical Responsibility	*Signature*	*Position*	*Date*

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DIVISION 1 – SPECIAL REQUIREMENTS

Insert B: SWMBE Participation Reporting Forms

Form A:	Submit to Construction Manager within twenty one (21) days of Bid Opening
Form B:	If requested, complete and submit within seventy two (72) hours
Form C:	Complete and submit with each monthly payment application

FORM A
IDENTIFICATION OF LOCAL SMALL WOMEN AND MINORITY BUSINESS PARTICIPATION

I, _____,
(Name of Bidder)

do hereby certify that on this project, we will use the following Small, Minority, and Women Owned Business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.
(Attach additional sheets if required)

Firm Name, Address and Phone #	*Category	Work description	$ Amount

**Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Socially and Economically Disadvantaged (D), Local (L)*

The total value of Small, Minority, and Women Owned Business contracting will be $_____

The undersigned will enter into a formal agreement with Small, Minority, and Women Owned Business firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

State of South Carolina, County of _____

Subscribed and sworn to before me this _____day of _____20____

(Seal)

Notary Public _____

My commission expires_____

Contract No._____

FORM B - GOOD FAITH EFFORTS

If requested, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____
(Name of Bidder)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name & Phone Number	*Category	Work Description	Dollar Value	Response

**Categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Socially and Economically Disadvantaged (D), Local (L)*

Documentation of the Bidder's good faith efforts to secure SWMBE participation. Examples of documentation include, but are not limited to, the following evidence:

A. Copies of solicitation for quotes to at least three (3) Small, Minority, and Women Owned Business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. Documentation of any contacts or correspondence to Small, Minority, and Women Owned Businesses, community, or contractor organizations in an attempt to secure participation.

E. Copy of pre-bid roster.

E. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for Small, Minority, and Women Owned Businesses.

F. Letter detailing reasons for rejection of Small, Minority, and Women Owned Businesses due to lack of qualifications.

H. Letter documenting proposed assistance offered to Small, Minority, and Women Owned Businesses in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

State of South Carolina, County of _____

(Seal) Subscribed and sworn to before me this _____day of _____ 20____

Notary Public _____

My commission expires_____

FORM C - Monthly SMWBE Payments Form

The Contractor shall provide the following payment information to document participation by Small, Minority, and Women Owned Businesses on a Monthly basis prior to approval of Pay Requests:

Affidavit of _____
(Name of Bidder)

I do certify the attached documentation as true and accurate representation.

(Attach additional sheets if required)

UNIVERSITY OF SOUTH CAROLINA
DARLA MOORE SCHOOL OF BUSINESS CONSTRUCTION
SMWBE LISTING

PRIME CONTRACTOR: _____

DATE: _____

Name of Subcontractor	Address (Phone/Fax/Email)	Category *	Type of Work	Sub Awards	Net Amount Paid to Date

**Categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Socially and Economically Disadvantaged (D), Local (L)*

DIVISION 03 – CONCRETE

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slabs.
5. Building walls.

B. Related Sections:

1. Section 033300 "Architectural Concrete" for general building applications of specially finished formed concrete.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone, or in combination with fly ash, subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit IEQ 4.3: For liquid floor treatments and curing and sealing compounds, documentation including printed statement of VOC content.
3. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement, and for equivalent concrete mixtures that do not contain portland cement replacements.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Provide supporting test results from tests performed within the past 12 months to verify compliance with Chapter 5.3 of ACI 318 "Proportioning on the Basis of Field Experience and/or Trial Mixtures."

D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement prepared according to ACI 315 " Details and Detailing of Concrete Reinforcement." Include bar sizes, lengths, material and grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Include special reinforcement required for openings through concrete and masonry structures.

1. Submit newly prepared information, drawn accurately and to scale. Do not photocopy, electronically scan, or otherwise reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings. Doing so will result in rejection of the submittal without review. Electronic drawings files of the contract documents will not be provided.
2. Provide composite slab plans indicating the location of all steel reinforcing in accordance with the provided details.
3. Provide wall elevations with vertical and horizontal reinforcing indicated and located for each concrete and masonry wall. Indicate sizes, locations and elevations of all openings/penetrations required by the Architectural, Mechanical, Electrical plans, and applicable lintels.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Welding certificates.

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

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.

12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. Anchor bolt tolerances shall comply with AISC specifications.
4. Elevated slabs shall be placed "to elevation" to satisfy flatness tolerances as opposed to ACI 117 for thickness.

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Contractor shall have the following publications in the field office at the project site for reference:

1. ACI 301, "Specifications for Structural Concrete," field references manual ACI Publication SP-15.
2. ACI 117, "Specification for Tolerances for Concrete Construction and Materials."
3. ACI 318/318R, "Building Code Requirements for Structural Concrete and Commentary."

I. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, gray typical, white where specified. Supplement with the following:

   a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

   1. Maximum Coarse-Aggregate Size: 3/4 inch for walls and 1/2 inch for slabs nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330, 1/2-inch (13-mm) nominal maximum aggregate size.

D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 FIBER REINFORCEMENT

A. Carbon-Steel Fiber: ASTM A 820/A 820M, deformed, minimum of 1.5 inches (38 mm) long, and aspect ratio of 35 to 40.

   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      a. Fiber: Type 1, Cold-Drawn Wire:

         1) Bekaert; Dramix.
         2) Fibercon International, Inc.; Fibercon Drawn Wire.
         3) Nycon, Inc.; Nycon SF Type I.
         4) Propex Concrete Systems Corp.; Novocon 1050.
         5) Sika Corporation; Sika Fiber SH.

      b. Fiber: Type 2, Cut Sheet:

         1) Bekaert; Wiremix.
         2) Fibercon International, Inc.; Fibercon Cut Sheet.
         3) Nycon, Inc.; Nycon SF Type II.

B. Synthetic Micro-Fiber: fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Fibrillated Micro-Fibers:

1) Axim Italcementi Group, Inc.; Fibrasol F.
2) Euclid Chemical Company (The), an RPM company; Fiberstrand F.
3) FORTA Corporation; FORTA Ultra-Net.
4) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
5) Nycon, Inc.; ProConF.
6) Propex Concrete Systems Corp.; Fibermesh 300.
7) Sika Corporation; Sika Fiber PPF.

C. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. 3M; Scotchcast Polyolefin Fibers 2".
b. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
c. FORTA Corporation; FORTA FERRO.
d. Grace Construction Products, W. R. Grace & Co.; Strux 90/40.
e. Nycon, Inc.; XL.
f. Propex Concrete Systems Corp.; Fibermesh 650.
g. Sika Corporation; Sika Fiber MS.

2.7 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Greenstreak.
b. Williams Products, Inc.

2. Profile: Ribbed with center bulb.
3. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick); nontapered.

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
b. CETCO; Volclay Waterstop-RX.
c. Concrete Sealants Inc.; Conseal CS-231.
d. Greenstreak; Swellstop.
e. Henry Company, Sealants Division; Hydro-Flex.
f. JP Specialties, Inc.; Earth Shield Type 20.

2.8 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
b. Fortifiber Building Systems Group; Moistop Ultra 15.
c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
d. Insulation Solutions, Inc.; Viper VaporCheck 16.
e. Meadows, W. R., Inc.; Perminator 15 mil.
f. Raven Industries Inc.; Vapor Block 15.
g. Reef Industries, Inc.; Griffolyn 15 mil Green.
h. Stego Industries, LLC; Stego Wrap 15 mil Class A.

B. Bituminous Vapor Retarder to be used at level 0 (basement) slabs: 110-mil- (2.8-mm-) thick, semiflexible, 7-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weathercoating, and removable plastic release liner. Furnish manufacturer's accessories including bonding asphalt, pointing mastics, and self-adhering joint tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Meadows, W. R., Inc.; Premoulded Membrane Vapor Seal.

2. Water-Vapor Permeance: 0.00 grains/h x sq. ft. x inches Hg (0.00 ng/Pa x s x sq. m); ASTM E 154.
3. Tensile Strength: 140 lbf/inch (24.5 kN/m); ASTM E 154.
4. Puncture Resistance: 90 lbf (400N); ASTM E 154.

C. Granular Fill Below Vapor Retarder: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.9 LIQUID FLOOR TREATMENTS

A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ChemMasters; Chemisil Plus.
   b. ChemTec Int'l; ChemTec One.
   c. Curecrete Distribution Inc.; Ashford Formula.
   d. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
   e. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
   f. Kaufman Products, Inc.; SureHard.
   g. L&M Construction Chemicals, Inc.; Seal Hard.
   h. Meadows, W. R., Inc.; LIQUI-HARD.
   i. Metalcrete Industries; Floorsaver.
   j. Symons by Dayton Superior; Buff Hard.

2.10 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
   b. BASF Construction Chemicals - Building Systems; Confilm.
   c. ChemMasters; SprayFilm.
   d. Conspec by Dayton Superior; Aquafilm.
   e. Dayton Superior Corporation; Sure Film (J-74).
   f. Edoco by Dayton Superior; BurkeFilm.
   g. Euclid Chemical Company (The), an RPM company; Eucobar.
   h. Kaufman Products, Inc.; Vapor-Aid.
   i. Lambert Corporation; LAMBCO Skin.
   j. L&M Construction Chemicals, Inc.; E-CON.
   k. Meadows, W. R., Inc.; EVAPRE.
   l. Metalcrete Industries; Waterhold.
   m. Nox-Crete Products Group; MONOFILM.
   n. Sika Corporation; SikaFilm.
   o. SpecChem, LLC; Spec Film.
   p. Symons by Dayton Superior; Finishing Aid.
   q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
   r. Unitex; PRO-FILM.
   s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.11 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Styrofoam Fill in Slab: Dow high load 100 or approved equivalent product with 100 psi minimum compressive strength.

2.12 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a water-cementitious materials ratio below 0.50.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery.

B. Building and Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As noted at 28 days per plans.

2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
3. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Macro Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of 5.0 lb/cu. yd.

D. Suspended Slabs: Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days (4000 psi for topping slab).
2. Calculated Equilibrium Unit Weight: 115 lb/cu. ft. (1842 kg/cu. m), plus or minus 3 lb/cu. ft. (48.1 kg/cu. m) as determined by ASTM C 567.
3. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of 25 lb/cu. yd. (29.7 kg/cu. m).

2.15 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be

damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

C. Granular Course: Place vapor retarder over granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus 3/4 inch (19 mm).

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least two mesh spacings. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls at 25 feet on center max. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete in stair shafts and where otherwise indicated:

1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
   b. Specified overall values of flatness, F(F) 30; with minimum local values of flatness, F(F) 24; for suspended slabs.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

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

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.14 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts, anchor bolts, and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.

7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens plus one spare for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency

may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 30 00

SECTION 03 33 00 –ARCHITECTURAL CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
2. Work includes concrete materials, mix design, formwork, reinforcement, placement and finishing procedures in addition to the structural requirements of cast-in-place concrete indicated in The Cast-in-Place Concrete, Reinforcement & Formwork Sections.

B. Work of this Section includes all labor, materials, equipment and services necessary to complete the architectural cast-in-place concrete as shown on the drawings and/or as specified herein.

1.3 DEFINITIONS

A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.4 PRE-INSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Cast-in-place architectural concrete subcontractor.

2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.

1.5 SUBMITTALS

A. General: Do not proceed with the construction of the cast-in-place architectural concrete in the project, including fabrication of the formwork, until all samples, product data, mock-up and shop drawings have been approved by the Architect.

B. Form work Shop Drawings:

1. Submit drawings showing the layout and details of formwork for the work, including the mockups. Shop drawings shall show the following:

a. Layout of all form joints, crack control joints, construction & expansion joints, tie locations and exposed embedments.
b. Details of shop assembly of formwork and field assembly of construction and control joints, reveals, recesses, embedments, ties, back-up, clean out panels.
c. The means to be used to seal all joints, including back-up bracing, dry ties and brackets.
d. The means to be used to maintain alignment, including back-up bracing, etc.
e. Cover of all concrete over reinforcing steel.
f. Location of clear placing passages through the steel reinforcing for placing trunks and tremmies.

C. Placing: Submit layout or description of each placement showing sequence and projected time between deposits.

D. Product Data / Qualifications: Submit manufacturer's name and technical information for each of the following products and qualifications as listed below. Submit information for each specific use of each product to meet the architectural and structural performance of each type of material..

1. Cement.
2. Aggregates, each type.
3. Admixtures, each type.
4. Form surface material, each type
5. Foam gaskets.
6. Form release coating
7. Reinforcing accessories
8. Form ties and tie plugs
9. Curing compound.
10. Clean solution
11. Water repellent/Anti-graffiti sealer
12. Inserts and embedments, each type

E Concrete mix supplier certification

F. Qualifications for Concrete Carpenter, Laborer, Reinforcing Steel Foremen and designated Quality Control Technician.

G. Concrete mixes for review by the architect and Engineer.

1.6 SAMPLES

A. Cement: 3 to 6 oz. samples of dry cement / cementicious materials. Submit a sample with the approved design mix and submit a sample for each delivery of each cement type to the batch plant during construction. Samples shall be labeled as to the date of delivery, mill producing the cement, lot number, and bin or silo to which delivered. Submit for each type of concrete to meet the architectural and structural requirements for each type.

1. Formwork contact materials, each type, 12 inches square
2. Reveal form strips, each size, 12 inches long
3. Foam gaskets, 12 inches long
4. Form ties, one each type
5. Reinforcing supports, tie wire, one each type

B. Concrete Samples for color determination if required

C. Submit samples as follows for the cast-in-place architectural concrete:

1. Concrete color samples: 12"x12"x2-1/2", cast vertical, using specified plastic coated form material on both side. Submit as required to attain approval of the Architect.

a. Submit sample panels using mix material criteria specified herein. Cement replacement to be maximum allowed or less for color and strength. Color as selected by architect.

2. Finish samples as follows:

a. Samples shall match the texture of the surface in phase I in the designated area referenced in item c. above.
b. Cast samples in a form box with tightly sealed edges. Use gaskets and thread rod connectors to seal and maintain tight joints .

D. Final Concrete Samples: Final samples of approved color mix and finish treatment for record: Three 24"x24"x2-1/2" cast vertically for record set. Cast each panel simulating techniques to be used in production to reduce the surface air voids and achieve the specified criteria. Finish with the treatment approved in samples for color determination. For sample form box see drawing at end of section

1. Submit as required to attain approval of the Architect.
2. Sample Panel for formed Concrete:

a. Submit the proposed fine, coarse and cement materials for review and comment.
b. Submit design mixes using the proposed materials to be used in sample panels that will provide the best match of the material and proportions of the existing bush-hammered concrete.
c. After review and comment by the architect, and after joint discussions with parties concerned, submit samples of other material, or combination of materials, as required to obtain approval of the Architect.

E. Accelerated Curing Procedure for Samples:

1. In the event samples require accelerated curing to speed the submittal process use the following:
2. Remove the form as soon as the panels are self-stable.
3. Submerge in a bath of warm water (between 100 and 120 degrees F) for 24 hours.

4. Remove and dry using dehydrating equipment or air drying. When reasonably dry the color should be within color limits of slow cured concrete.

F. Mock-up for Formed Concrete Work :Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. After all samples, product data, and the shop drawings for the Mock-up are approved by the Architect, construct a mock-up of the work in a location approved by the Architect, as described below and with the requirements of the consultant drawings Contract Documents.

2. Mock-up shall consist of the following:

a. Foundation of a size and reinforcement adequate to support the work.
b. Walls as indicated and shall include: "L" shaped wall, 14'-0" x 6'-0" x 16'-0" high, cast in four placements with plastic faced panels on all formed surfaces.
c. One horizontal construction joint with a reveal.
d. One vertical construction joint at a wall corner.
e One vertical crack inducing joint at a butt form panel joint.
f. Form panel and tie layout as shown on the drawing. Opposite side to reflect construction and control joints on side shown. See mock-up drawing at the end of this section.
g. Reinforce as in a similar detail on the approved shop drawings and add necessary reinforcing and/or supports to maintain stability.
h. Use approved form face material, reinforcement and accessories and assemble formwork as intended for the building construction.
i. Place concrete in the wall with methods to be used for typical long wall in building, including anticipated time delays between deposit lifts.
j. Finish exposed hardened smooth surfaces of the walls with specified finishes when directed by the Architect and with the Architect, present. Finish as directed by the architect

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 03, Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"Sections 1 through 5 and Section 6, "Architectural Concrete."

2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."

E. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests.

1.8 PERFORMANCE REQUIREMENTS

A. Responsibility for the design of Cast-in-Place Architectural Concrete in conformance with the requirements of the drawings and specifications and performed using the highest standards of quality for visual and durable concrete rests with the Concrete Contractor.

B. Design of the mix and form work shall be performed by Concrete Contractor's registered professional Engineer, registered to the State of South Carolina, and submittals for the same shall be sealed by said Engineer.

C. Performance Criteria: All cast-in-place architectural concrete formwork shall be performed so that no evidence of the following will be evident when the concrete is subject to imposed loads, temperature and weather conditions:

1. Damage of any kind.
2. Cracking, other than at control joints, due to improper forming and placing.
3. Out of alignment or incorrect profiles.
4. Surface voids not completely covered by a circle 11/16 inches in dia. (10 cent coin) or more than 25 surface voids larger than 1/8 inch, in longest dimension, in any area 1 ft. square.
5. Voids, sand pockets or discoloration due to fluid loss through the formwork.
6. Rock pockets and honeycombs.
7. Discoloration caused from staining and from improper placing of the concrete.

D. If any of the above-mentioned deficiencies occur, the Architect may order the affected concrete replaced or repaired with acceptable concrete material and procedures. Repair only when directed by the Architect. Corrected deficiencies must meet with Architect approval.

PART 2 - PRODUCT

2.1 CONCRETE MATERIALS

A. Each concrete material shall be the product of a single plant and raw material source throughout project.

B. Cement: ASTM C-150, Type I or Type II

1. Cement shall be white portland cement.
2. Cement shall be consistent in color presentation throughout the duration of the project.

C. Coarse Aggregate: ASTM C-33.

1. Hard crushed stone or rock, maximum size ¾". If the aggregate has particles finer than passing a #20 sieve, the particles shall be white or light gray or tan in color and the fine particles shall be less than 0.05% by weight.
2. Provide aggregates from a single source throughout the project.

D. Fine Aggregate: ASTM C-33.

1. Hard, natural sand. If aggregate has particles finer than passing a #20 sieve, the particles shall be white or light gray or tan in color and the fine particles shall be less than 0.05% by weight.

2. Provide aggregates from a single source throughout the project.

E. Admixtures:

1. All admixtures must be certified to be compatible with the cement, aggregates, and all other constituent materials in the mix and shall contain less than 0.05% of Calcium Chloride.

2. Water Reducing Admixture: ASTM C494, Type F and G

   a. Regular Concrete: High Range (HRWR):
   b. BASF: "Rheobuild 1000"
   c. Euclid Chemicals: "EUCON 37", "EUCON 537"
   d. Or Equal

3. Self-Consolidating Concrete: Shall include polycarboxylic-ether based Hyperplasticiser material as the High Range Water Reducing Admixture

   a. BASF: "Glenium Series"
   b. Euclid Chemicals: "Plastol Series"
   c. Viscosity Enhancing Admixture
   d. Or Equal:

F. Admixture shall be manufactured by a company certified to conform to the requirements of the quality, environmental and occupational health & safety standards ISO 9002, iso 14001 and OHSAS 18001.

1. Acceptable admixtures are:

   a. BASF: "Rheomac VMA"
   b Euclid Chemicals: "Eucon ABS" or "Eucon WO"
   c. Sika: "Sika Stabilizer VMA"
   d. Or Equal

G. Cement Replacement/Color Admixture: use one of the following (as determined by samples)

1. White or light gray Blast Furnace Granulated Slag: "Newcem" Grade 80, 100 or 120 by LaFarge Corp.
2. Fly Ash containing more than 0.5% carbon or Silica Fume are not permitted in Architectural Concrete.

H Air Entraining Admixture: ASTM C260.

I. Admixtures for retardation and acceleration may be used if shown that there is no adverse effect on architectural requirements and are approved for use. Admixtures shall be certified in writing by the manufacturer to be in compliance with ASTM C-494.

J Color Admixtures: If a color admixture is required to meet the color matching requirements the admixture shall be powder (P) or Liquid (L) admixture. Powder admixture shall be manufactured specifically for this project, prepackaged in units for treatment of one cubic yard per unit, shall have integral dispersal agents and plasticizers and packaged in a degradable bag when added to the mix. The full amount of admixture shall be manufactured in one production run. Powder shall be "Cromix-P", group-3 by L.M. Scofield Co. Liquid color admixture shall be Cromix-L by BASF//Master Builders or approved equal

K. PRELIMINARY DESIGN MIX (Or equal approved material meeting requirements)

1. Cement: White Portland Cement
2. Slag: Newcem by LaFarge Corp
3. Fine Aggregate: Shalersville Natural Sand
4. Coarse Aggregate: #8 Marbleshead Limestone
5. HRWR: PS 1466
6. VMA: VMA 362 by BASF/Master Builders
7. Air Entrainment: Micro-Air by to match control samples approved by by Architect
8. Water: Potable conforming to ACI 301, Chapter 2, Paragraph 203

2.2 FORM WORK MATERIALS

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for formwork and other form-facing material requirements.

B. Form-Facing Panels for As - Cast and Exposed Finishes: Steel, glass-fiber-reinforced plastic,ABS plastic or other approved non-absorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints to resist plastic concrete loads without detrimental deformation.

1. Units of face design, texture, arrangement, and configuration to match design reference sample. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.

2. Product: Fitzgerald Form liners: Pattern 14303 1.5 Depth 2" O.C or equal of approved pattern.

C. Strips: Metal, rigid plastic, with sides beveled and back kerfed; nonstaining; in longest practicable lengths.

D. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.

E. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.

F. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.

G. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

I. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.

J. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic internally disconnecting or] removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish glass-fiber-reinforced plastic ties, not less than 1/2 inch in diameter, of color matching Architect's approved samples.

K. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

L. All material shall be supplied in sizes to cover surface areas between joint lines shown on approved shop drawings.

M. Form Ties: Shall be manufactured specifically for use as concrete ties and shall be designed to seal tightly to the form face material without fluid loss. Ties shall be of sufficient strength to resist fluid concrete placing pressures at the longest span of support used in project.

N. Tie Hole plugs shall be precast disks to fit the tie hole void at the recess diameter. Recess dimension of the plug shall be as designated by the architect.

2.3 JOINT SEALING MATERIAL:

A. Foam gaskets for sealing field erected corner form joints shall be highly compressible foam rubber or neoprene tape, paper backed, with pressure sensitive adhesive on one side, and shall be of sufficient width and thickness for specific use. Tape shall be as manufactured by Frost King, Patterson, NJ, or equal.

B. Sealant for sealing permanent shop or bench fabricated unrevealed joints shall be silicone caulking. Sealant shall be "Silpruf" as manufactured by General Electric; "Silicone caulk" by DAP Corp., or equal.

C. Reveal Form Strips:

1. Rigid Polyethylene: (white slick plastic) milled smooth on all contact drafted surfaces.
2. Contact surfaces shall not have projections, saw marks or deformities.

D. Form Release Coating: Colorless, non-staining and having no deleterious effects on the concrete, manufactured specifically for non-absorbent surfaces and for reducing surface voids. Release Coating shall be "Cretelese 880" by Cresset Chemical Co., Weston, OH.; "L&M Release" by L&M Construction Chemicals, Inc. Omaha, NE. or equal.

2.4 REINFORCING AND ACCESSORIES

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."

1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic- protected bar supports or as approved by Architect.

C. Accessories in contact with vertical form surfaces shall be high density plastic "wheels" with feet in contact with the form maximum of 1/8"x3/8". Center hole engaging reinforcing shall hold the wheel tight to the bar and maintain the dimension required under placing conditions. Multi-leg string spacers will not be permitted.

D. Tie wire used to secure reinforcing steel adjacent to architectural form surfaces shall be non-corrosive or plastic coated wire.

General: Comply with Division 03 Section "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

2.5 MISCELLANEOUS MATERIALS

A. Curing Material: VOC compliant (350 g/l), colorless, diffusive, blend of Sodium, Potassium and Meta Silicate and be able to retain water in concrete with minimal loss during high temperatures and without rapid loss of moisture. Shall not contain wax, resin or acid. Material shall be "L&M Cure" by L&M Construction Chemicals, Inc. Omaha, NE; "SealTight Med-Cure" by, W .R. Meadows, Inc., Hampshire, IL, "Super Diamond Clear VOX" or "Super Aqua Clear VOX" by the Euclid Company or approved equal.

B. Concrete Clean/Etch Solution: Shall be commercial concrete cleaner containing solvents, chloride acids and stain removers, with no more than 1.5% acid content.

C. Water Repellent sealer: shall be a low molecular, minimum 95% solid, Clear, Silane sealer. Sealer shall be Oleophobic where surfaces are accessible to public.

D. Sealant for Reveals: Shall be a one component, low modulus, non-sag, elastomeric, non-sag silicone sealant meeting the Federal Specification -TT-S-001534A.

E. Patching Additive: Shall be a liquid, acrylic-polymer bonding agent specifically made to be integrally mixed with mortar.

F. Waterstop for Vertical & Horizontal Construction Joints: shall be a Bentonite impregnated foam neoprene strip with paper backed, pressure sensitive, adhesive material.

G. Gasket adhesive remover shall completely remove any adhesive residue and shall not discolor concrete surface.

H. Sawcutting Material for Joints: shall be equipment specifically designed for cutting crisp edges in newly cast concrete (less than 12 hours old). The cutting machine shall be a high speed type (10,000 rpm min), self propelling without forcing the speed. The blade shall be minimum 4 inch diameter specifically made for the greenest concrete. Blades shall be designed to cut 1/8" wide joints.

2.6 REPAIR MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.

1. Types I and II, non-load bearing - Types IV and V, load bearing , for bonding hardened or freshly mixed concrete to hardened concrete.

PART 3 - EXECUTION

3.1 CONCRETE MIXTURES

A. Comply with the requirements of Section 03 30 00 for structural requirements and to architectural concrete requirements specified herein. Concrete shall be self-consolidating or regular concrete As approved by Architect

B. Basis of Design - Self Consolidating Concrete (SCC): Shall be as specified for regular concrete with a Hyper pasticiser HRWR plus the use of a Viscosity Modifying admixture. Concrete Contractor shall show by test panels and the mock-up (see part-1) that the mix and the placing methods have been developed to produce the required concrete quality.

C (Alternate)- Regular concrete: Shall have the specified Cement, White Cement Replacement admixture in amounts allowed to meet strength and color requirements, a High Range Water Reducing Admixture and a Color admixture. Concrete exposed to weather conditions in the finished work shall have an Air Entraining Admixture.

D. Mix shall be designed for minimum water content allowable for conditions (optimum slump prior to admixture: 2.0 inches or water/cement ratio of 0.40 or less).

1. For Regular Concrete fluidity shall be attained by the addition of HRWR to a slump spread of 6½"±1" (4"±1" at stairs and ramps).
2. For Self Consolidating Concrete (SCC) fluidity shall be attained by the addition of HRWR+VMA, to a Slump Flow and a Visual Static Stability Index as recommended by the admixture manufacturer for the materials used. Slump flow and Static Stability shall be measured by test method MB-RCD-01, specified in ASTM C143.

E Mix design shall indicate the optimum approximate duration of fluid stability for the mix for the maximum discharge time planned; the slump prior to the addition of the HRWRA and cementitious material

3.2 FORM WORK

A. Fabrication:

1. Comply with the requirements of Section 03 30 00 Cast-in-Place Concrete, and as specified herein.
2. Design formwork to permit easy removal. Prying against the concrete will not be permitted. Care shall be taken so as not to mar the concrete surface in cutting or removal of the forms.
3. Design form work for a full liquid head of pressure. The forms shall be completely rigid and strong enough to withstand without deflection, movement or leakage from the placing pressures that result from rapid filling and vibration.
4. Forms shall be fabricated so the concrete can be adequately placed, vibrated and finished to achieve the specified finishes.
5. Layout form ties, form joints, reveals and exposed embedments as shown on the approved shop drawings.

B. Install sealant in all fabricated butt joints of plastic overlay form panels to prevent fluid loss. At butting plywood panel edges place a bead of sealant (1/8" max) at back edge (away from contact face) of one panel prior to butting edge surfaces. Back fasten plastic face panels with screws to minimize the penetrations through the plastic faced panels, achieving a rigid gang form. Use one of the following:

1. Install a full backing sheet
2. Install wood or metal clips at supports where face panel seams are located and in other locations to maintain panel stability
3. Field erected joints shall be fabricated to seal tight and in line.

3.3 Reveals

A. Back screw horizontal reveals. Release screws prior to stripping and leave reveal form in concrete to be removed later.

B. Vertical reveals may be back screwed as in "a" above or fastened securely to form face to be stripped with the form panel.

C. Face nailing is not acceptable.

3.4 Form Erection:

A. Use only form units where face panels are in undamaged condition. Replace damaged panels as required to maintain surface in a condition to achieve the specified treatment.

1. Use screw type fastening devises to maintain alignment, and to tightly close joints at corners, end forms, square columns and at bulkheads. Apply pressure at joint to resist concrete placing pressure as close to the joint as possible.
2. Construction joints and control joints shall be at locations indicated
3. At the first placement of a vertical construction joint (at a bulkhead), support joint with intermediate wales and strong-backs where required to maintain a continuously tight joint resisting the liquid head of the concrete.
4. At the second placement of a vertical and horizontal construction joint (formwork connection to in-place concrete), lap forms onto the in-place concrete of the previous placement. Place support members across joint and anchor to both sides of joint to achieve and maintain a tight seal at joint during placing. Support joint with intermediate wales and strong-backs where required to maintain A continuously tight joint resisting the liquid head of the concrete. In a flush joint (no-reveal) place a gasket at the interface between the concrete and form surface.
5. At corner joints, assembled and disassembled in field, place a gasket in the form joint. Install gasket away from contact edge 1/16" to 1/8".

C. All corners, including square columns and piers, shall be formed with a tight seal (see item above) and with back-up support secured with screw connectors at sufficient intervals to maintain the seal under placing pressures. Install intermediate wales and strong-backs between tie rows as required to maintain joint seal. All square columns shall be yoked with wales and thread rods to apply pressure on corner joints.

D. Crack Control Joints (vertical surfaces):

1. Crack control devices shall be installed at all joints designated as crack control joints ocated as shown on the architectural and/structural drawings
2. Crack control joints shall be located at butt panel or revealed joint locations.

3. Reveals on exposed surfaces shall be of sizes shown . All revealed crack control joints shall have an internal crack inducing device installed between the back of the reveal and the reinforcing bars.
4. All control joints shall have a reveal on the unexposed surface directly opposite the face reveal or crack inducing device.
5. Reveals shall continue below grade at unexposed surfaces in lieu of the crack control device. Reveals shall be a minimum of 3/4" in depth. Reveals on unexposed surfaces shall be a shape at the contractor's option.

    a. Where allowed by the Structural Engineer, interrupt up to 50% of temperature reinforcing bars.

E. The internal crack control device shall interface and seal with the sealing system at intersecting floors and at the back of parapets to form a continuous seal of the building envelope. See details at the end of this section.

F Waterstops (vertical & horizontal) shall be as follows:

1. At construction joints exposed to weather install Bentonite waterstop strip at center of in-place concrete wall full height of wall. Do not install between reinforcing steel and form face.

G. Reveals on the exposed form surfaces shall be of the shape, width and depth shown on the approved shop drawings.

H. Ties:

1. Ties shall be located where shown on the drawings. Where placing loads are deemed excessive using locations shown tie layout shall be submitted for approval.
2. Drill tie holes in wood or plastic overlay form panels from contact face using brad point twist bit with edge cutters (scribes circle edge prior to surface cutting).

I. Coating of Forms:

1. Prior to use, all forms shall be coated with the specified form release coating in accordance with the manufacturer's written instructions.
2. Coat evenly and remove excess material from form surface with a damp absorbent cloth.
3. Surface applied with specified release agent shall not be oily to the touch.
4. Do not allow coating to come in contact with previously placed concrete or with reinforcing steel.

J. Formwork Tolerances:

1. Hydraulic pressures: Design forms to limit deflections of members supporting facing panels to L/400. Formwork shall be designed for full liquid head.

K. Finish Lines: Fabricate and position formwork to maintain hardened concrete finish lines within the following allowable variations.

1. From designed edge elevation in 10 ft. 1/4 inch (Total Variation)
2. From designed vertical plane in 10 ft. 1/4 inch (Total Variation)
3. Cross-Sectional Dimensions: Plus or Minus 1/4 inch (Total Variation)
4. Form surface to surface at any butt joint at formwork fabrication 1/32 inch
5. It is the intent of this specification that the formwork will be erected in such a manner that lines and surfaces are visually presentable without obvious defects. Where lines and planes require adjusting from one placement to another adjust the forms to realign in a visually acceptable manner.

6 Edges of plastic overlay form panels shall be square, flat and sealed. Seal all cut edges (end grain, including tie holes) with liquid polyurethane.

3.5 REINFORCEMENT

A. Comply with the requirements of Cast-in-Place Concrete Reinforcement Section, and as specified herein.

B. Support accessories are to be used at exposed vertical surfaces only when absolutely necessary to maintain cover. Place "wheel" supports at walls no closer than 6 ft. apart. It is the intention that the reinforcing will be erected and internally braced so that only supports at the top and bottom of the form will be required to maintain cover requirement.

C. Reinforcing support units at horizontal surfaces shall be laid out a minimum of 3 feet apart in a symmetrical pattern along the form panel joint lines and used with carrier bars spanning between to support bars. Multi-legged supports are not permitted.

D. Layout reinforcement to assure a clear passage from top to bottom of walls and spandrels at least 10 feet apart where placing regular concrete and as required for Self Consolidating concrete. Clear passage shall be free of bands, ties, conduit and other obstructions to allow easy insertion of the pump hose or placing trunks to the bottom of the form.

E. Tie wire for reinforcing steel shall be tied in a manner so that wire ends will point away from the architectural formwork surface and not project into the clear cover area between the bars and the form surface.

F. All reinforcing steel, including bands, shall be secured a minimum of 2" from the contact surface of the formwork prior to placing concrete.

3.6 MIXING AND TRANSPORTING CONCRETE

A. All concrete for each placement or a minimum of two truckloads shall be on the site prior to starting the placement. The concrete shall be completely discharged into the forms within the time determined by the design mixes to be the optimum duration of fluid stability provided by the mix design. In no case will the concrete be placed after excessive stiffening of the concrete has occurred. Discharge two trucks into the pump or bucket at one time in a manner that will enable one truck to be half full and discharging while the other is finished and being replaced with another truck.

3.7 PLACING CONCRETE

A. Before placing concrete in the forms, verify that all forms have met all requirements specified; that reinforcing steel, embedded materials are in place and securely anchored; that forms are absolutely clean; and that entire preparation has been approved by the Concrete Contractor's Concrete Quality Control Technician and has been reviewed by the Architect or Owner's Representative..

B. Cleaning and Protecting Forms: Immediately prior to placing concrete, clean all form interiors free of foreign material and debris.

1. Force debris out of forms prior to closing the last section with a jet stream of compressed air and/or water. Where form openings are not available, collect debris with vacuum cleaners and heavy duty magnets. Remove all wire clippings, sawdust and other debris from wall, beam and soffit bottoms.
2. Protect cleaned forms if placing does not commence immediately, covering openings with tarpaulins.

3. Do not allow direct sunlight to heat forms.

C. Placing Concrete

1. Concrete shall be cast in a continuous manner in a manner that no lift lines are evident. Place the concrete with one of the two following methods or an approved option.
2. Place each vertical section in one or more lengths with construction joints at the corners.
3. Place each vertical section using two or more pumps coordinated to attain a continuous placement in a timely manner avoiding delays between deposit layers.

D. Depositing Concrete:

1. Self Consolidating Concrete:

   a Deposit SCC by inserting the pump hose onto the form void at the center point of the placement to the bottom.
   b. Keep the end of the hose into the wet mix throughout the placement.
   c. At walls with openings above the base of the placement place the concrete to the bottom of the opening and then place one side to the midpoint of the opening, then the other side to the top of the opening. Then continue the placement full length of the form.
   d. At walls with openings starting at the base of the placement fill the void between the openings to the top of the opening and then continue the placement full length of the form.

2. Regular Concrete:

   a. Concrete for walls, columns and spandrels more than 3 ft deep shall be placed with trunks, or pump hoses inserted onto the form cavity.
   b. Deposit concrete as nearly as practical at its final position, but not farther than 5 ft. horizontally from the final position.
   c. Do not drop concrete more than 12 inches.
   d. Place concrete by inserting pump hose, or trunks into form to face of fresh concrete. Place an adequate number of trunks in wall and deep spandrel forms to enable a continuous placement without causing delays in moving trunks.
   e. Deposit layers in wall or deep spandrel placements shall not exceed 30 inches in height. Top deposit layer of a placement shall not exceed 18 inches in height.
   f. Deposits of concrete in walls, beams or slab placements shall have a subsequent deposit place on top and/or adjacent to the fresh face and consolidated within 15 minutes. Plan construction joints and placements so that the placing sequence will follow this requirement.

E. Concrete Vibration:

1. Self Consolidating Concrete: Place concrete in such a manner that no vibration is necessary to consolidate the concrete and produce a surface with minimal and small surface voids.
2. Regular Concrete

   a. All concrete shall be consolidated by internal vibration using two vibrators at each placement. One vibrator shall follow deposit location and consolidate concrete after deposit is leveled. Optimum diameter of vibrator head at shall be 1" to 1½". Vibrators shall be placed into the concrete vertically at a consistent spacing that will thoroughly blend the deposits, remove entrapped air, and consolidate the concrete. Vibrator head shall be inserted rapidly and withdrawn slowly and evenly to remove maximum amount of entrapped air (optimum withdrawal speed approx 2" to 4" per second). Do not jiggle vibrator up and down during consolidation, use continuous and even insertion and withdrawal of vibrator.

1. After top out leveling in walls and spandrels, the concrete shall be allowed to set 10 to 15 minutes and then shall be given a final vibration of the top 20 inches. Immediately thereafter the top surface shall be finished as required.
2. Caution must be exercised in using vibrators to prevent injury to the form surface material or displacement of embedded items.
3. Keep one spare working vibrator on site at all times.
4. Vigorously tap form facing panels just below deposit area during consolidation with rubber mallets. Strike in an even and consistent pattern to break up large entrapped air bubbles at the contact form face.

3.8 CURING AND FORM REMOVAL

A. Cure all concrete for a minimum of five days.

B. Cure formed concrete surfaces using the following method:

1. Immediately after stripping, fog the surface (fine mist nozzle on hose) and apply the specified curing compound.
2. Cover forms and concrete while in curing period to protect from direct sunlight.

C. Form Removal:

1. Comply with the stripping requirements of Cast-in-Place Concrete Section, and as specified herein.
2. Care shall be taken so as not to mar the concrete surfaces in removing the forms.

3.9 FINISHES FOR FORMED PLACEMENTS

A. All exposed work shall be finished with the approved finishes determined from sample tests executed in Part 1 on the mock-up. Finishes shall be as specified herein where indicated on the drawings. Minor defects may require fins to be removed (i.e. top edges) or minor patching performed, however, it is the intent of this specification that the work will be performed in such a manner that only the specified treatment, water repellent application, and tie hole finishing will be required after stripping.

B. General: Prior to treating, all surfaces shall receive the following preparation and cleanup.

1. All surfaces to receive treatment shall be a minimum of 21 days old. All surfaces can be treated at end of project. Concrete Contractor shall coordinate with Construction Manager for related construction and surface treatments.
2. Remove all stains using an appropriate non-abrasive stain remover for each type.
3. During operations, protect all adjacent work. At completion of day's work, leave the area clean. At completion of work, remove all equipment, waste and excess material and leave area clean.
4. Remove all fins larger than 1/16" without grinding or marring the concrete surface. This requirement does not apply to board form concrete at between the board fins.

C. Surface Designations:

1. Smooth out-of-form concrete with an Etch-Clean Treatment Finish

a. Surfaces designated on the drawings shall have a smooth out-of-form finish and be treated as follows:
b. Treat all vertical wall surfaces, horizontal soffit surfaces and exposed wall top surfaces.

c. Use specified cleaner solution full strength.
d. Apply cleaner in an even manner break to break and joint to joint of surface, allow to set for 3 to 5 minutes (time for the acid content to neutralize), and thoroughly flush with medium pressure fan nozzle spray (70 to 100 psi) in an even and consistent manner.
e. Treatment shall consist of up to three applications as determined on the mock-up.
f. Treatment shall produce a "matte" surface by just removing the surface of the cement skin.
g. Intended treatment shall not expose any aggregate larger than that passing a #20 sieve.

D. Water Repellant Treatment:

1. Treat all vertical wall surfaces and exposed wall top surfaces.
2. All surfaces receiving treatment shall be dry as required by the manufacturer's instructions.
3. All surfaces receiving treatment shall be clean and free of stains and laitance.
4. To all surfaces apply one wet coat of the specified sealer as per manufacturer's instructions.
5. Sealer shall be applied as soon as conditions allow.

E. Formed Square Corner Edge Treatment:

1. After concrete is hard, use a fine masons stone or fine grit sanding block on the edge to achieve an eased edge with a 1/16 inch radius. Take care not to scar the adjacent surface. This applies to two adjacent vertically formed corner surfaces and to a formed surface adjacent to a trowel finished top surface.

F. Tie Hole Treatment:

1. Plug all exposed-to-view tie holes with precast disks as follows.
2. Recess the plug face from the concrete surface as directed by the architect and as determined on the mock-up.
3. Apply structural silicone sealant to back and edge of disk and place into tie hole void. Take care not to allow sealant on the concrete face surfaces.

3.10 PATCHING:

A. Only areas designated by the Architect shall be patched. Where minor patching is required as approved by the Architect as a means of rendering the surface acceptable, it shall consist of patching with a texture matching technique and color matching mortar mix. Test patches shall be placed on the mock-up or other approved surface and approved by the Architect prior to commencing any patching of the work.

B. Final patching mortar shall be one part cement and two fine parts sand. Optimum aggregate size shall be graded from 50 sieve to 16 sieve. Mixture shall be pliable, but not thin. Mixture shall be mixed with a liquid acrylic-polymer bonding additive.

3.11 PROTECTION

A. Protect all Architectural Cast-in-Place Concrete surfaces from damage of any kind. Pay special attention to surfaces near work of other trades. All Architectural Concrete surfaces shall be free of damage at the time of acceptance. Allowing damage and patching at end of project is not acceptable. Cover surfaces with a self supporting stand-off panel system minimum 8' above floor surfaces and full height at surfaces where vulnerable to other trades access. Protection shall assure protection from paint, oils, rust, stains, impact, scarring or any other kind, including survey markings and graffiti.

B. Submit protection plan, including materials to be used and a plan for administrating continuous protection surveillance.

END OF SECTION 03 33 00

SECTION 03 90 00 – PENETRATING CONCRETE SEALER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sealing of interior concrete slabs, as indicated.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 ACTION SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013000 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: Submit the following information:

1. Sufficient technical data to prove compliance with the specified requirements.
2. Evidence that the proposed applicator is currently approved by the manufacturer of the specified product.

F. Samples for Initial Selection: 12 x 12 hand samples with ½ surface sealed and ½ unsealed showing the full range of finish effect..

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete floor topping.

1.6 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l)
4. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
5. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section

B. Field-Constructed Mock-Up: Before installing sealer work, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated, directed by Architect.
2. Provide mockup of not less than 100 sqft of surface area to include surface preparation, to demonstrate aesthetic effects, typical joints surface color, pattern, and texture to set quality standards for materials and execution.
3. Demonstrate the proposed range of aesthetic effects and workmanship.

   a. Simulate finished lighting conditions for mockup review

4. Obtain Architect's acceptance of mock-ups before start of final unit of work.

5. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

C. 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.

D. Use an applicator currently approved in writing by the manufacturer of the specified product.

E. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance.

1. Place only when ambient temperature and temperature as recommended by manufacturer.

1.9 WARRANTY

A. Upon completion of the work of this Section, and as a condition of its acceptance, the Contractor, together with the manufacturer of the penetrating concrete sealer, shall provide a warranty against water penetration, chloride salt damage, or scaling of sealed areas. If the treated surfaces show water penetration of structurally sound areas, or if spalling of the concrete occurs from chloride salt damage within the warranty period, the manufacturer shall supply labor and materials to repair spalled surfaces and to re-treat such problem areas, at no cost to the Agency.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hydrozo Coatings
2. ProSoCo.
3. Hilliard Chemical Corp.
4. Or equal.

B. Selected Product: Provide a 20% impregnating liquified silane or siloxane sealer solution as manufactured by Hydrozo Coatings; or approved equal by one of the specified manufacturers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of concrete floor topping.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 SURFACE CONDITIONS

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

1. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair bond.

2. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

3.3 APPLICATION

A. Preparation: The concrete deck shall be clean and free of debris, oils or particles which would prevent proper penetration of the sealer.

B. Installation: The sealant shall be applied at the rate of 350 square feet per gallon of material. Water curing and vinyl protection of the concrete is required with this system. If results appear to be spotty, apply additional coat at 50 sq. ft. per gallon to needed areas. Follow manufacturers recommended practices.

END OF SECTION 03 90 00

DIVISION 04 - MASONRY

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.5 PERFORMANCE REQUIREMENTS

A. Refer to Structural Drawings for indicated unit masonry net-area compressive strengths at 28 days.

1.6 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013300 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

F. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
2. Fabricated Flashing: Detail corner units, and other special applications.

G. Samples for Verification: For the following:

1. Full-size units for exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
2. Accessories embedded in the masonry.

H. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

I. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.

J. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcement.
4. Each type and size of anchor, tie, and metal accessory.

K. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.7 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section
4. Recycled Steel: Reinforcing bar, steel wire, welded wire fabric, and miscellaneous steel accessories shall contain a minimum of 35% (combined) pre-consumer/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
5. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Uses as a Mineral Admixture in Portland Cement Concrete
6. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete
7. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars
8. Standard Practice ACI 226.R1, Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Preconstruction Testing Service: The Agency will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made from the Inspection and Testing Allowance, as authorized by Change Orders. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
2. Grout Test: For compressive strength per ASTM C 1019.

F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings" and the following:

1. Coordinate equipment installation with wall construction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Weight Classification: Medium weight, unless otherwise indicated.
2. Compressive strength: Refer to Structural Drawings.
3. Size (Width): Manufactured to the following dimensions:

a. 4 inches nominal; 3-5/8 inches actual.
b. 6 inches nominal; 5-5/8 inches actual.
c. 8 inches nominal; 7-5/8 inches actual.
d. 12 inches nominal; 11-5/8 inches actual.

4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
5. Provide solid units and special shapes as required

2.2 CONCRETE AND MASONRY LINTELS

A. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below.

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 3 Section "Cast-in-Place Concrete."

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

1. For pigmented mortar, use a colored cement formulation as required to produce the color indicated or, if not indicated, as selected from manufacturer's standard formulations.

B. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

C. Aggregate for Grout: ASTM C 404.

D. Water: Potable.

2.4 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 616/A 616M, including Supplement 1, Grade 60.

2.5 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for interior walls.
2. Wire Size for Side Rods: W2.8 or 0.188-inch diameter.
3. Wire Size for Cross Rods: W2.8 or 0.188-inch diameter.
4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

2.6 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

B. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.

C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Partition Top anchors: 0.097-inch thick metal plate with 3/8-inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

1. Available Products:

a. PTA 420, - Hohmann & Barnard, Inc..
b. No. 419/421, - Heckmann Building Products Inc..
c. D/A 411, - Dur-O-Wal, Inc.
d. Or Equal

2.7 RIGID ANCHORS

A. General: Fabricate from steel bars as follows:

1. 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
2. Finish: Hot-dip galvanized to comply with ASTM A 153.

2.8 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:

1. Headed bolts.
2. Nonheaded bolts, bent in manner indicated.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.

1. Provide units with either two loops or four loops as needed for number of bars indicated.
2. Reinforcing Bar Positioners:

a. D/A 811 or D/A 816; Dur-O-Wal, Inc.
b. No. 376 Rebar Positioner; Heckman Building Products, Inc.
c. #RB Rebaror or #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
d. O-Ring Rebar Positioner, or Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
e. Or equal

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

1. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
2. For interior non-load-bearing reinforced masonry, use Type S, with minimum compressive strength of 1800 psi at 28 days.

C. Grout for Unit Masonry: Comply with ASTM C 476, with minimum compressive strength of 2000 psi at 28 days.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Thickness: Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

C. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
3. For conspicuous horizontal lines, such as exposed lintels, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

1. Provide firestopping at openings of fire-rated walls assemblies to comply with Division 7 Section "Firestopping."

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 8-inch horizontal face dimensions at corners or jambs.

C. Lay masonry with all units in a wythe in running. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 8-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

1. Comply with preinstallation conference requirements specified in Part 1 of this section for coordination of related Work performed by other trades.

F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

H. Build non-load-bearing interior partitions full height of story to underside of solid roof structure above, unless otherwise indicated.

1. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
2. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

a. Tool firestopping according to manufactures recommendations and as indicated in Division 7 Section "Firestopping" as to provide a uniform and clean finish.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses to be filled with grout.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Install preformed control-joint gaskets designed to fit standard sash block.
2. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
3. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete.

3.9 LINTELS

A. Provide concrete steel or masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.

1. Provide precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars indicated or required to support loads indicated. Cure precast lintels by the same method used for concrete masonry units.
2. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
3. Provide either of above at Contractor's option or provide precast or formed-in-place concrete lintels complying with requirements in Division 3 Section "Cast-in-Place Concrete."
4. Reference Structural drawings for steel lintels

B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Payment for these services will be made by Owner.
2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

B. Testing Frequency: One set of tests for each 1000 sq. ft. (465 sq. m) of wall area or portion thereof.

C. Prism Test: For each type of construction provided, per ASTM C 1314 at 7 days and at 28 days.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

END OF SECTION 04 20 00

DIVISION 05 – METALS

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
3. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
4. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.
5. Section 055100 "Metal Stairs."

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use LRFD; data are given at factored-load level.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of moment frame, braced frame, and shear walls.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings: Show fabrication of structural-steel components.

1. Submit newly prepared information, drawn accurately and to scale. Do not photocopy, electronically scan, or otherwise reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings. Doing so will result in rejection of the submittal without review. Electronic drawing files of the contract documents will not be provided.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment drawings.
4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
5. Identify all "AESS" members.
6. Include Shop Drawings and calculations signed and sealed by a qualified professional engineer responsible for their preparation, along with a signed and sealed letter from the Professional Engineer acknowledging that they have reviewed the connections indicated on the shop drawings submitted to the Architect/Engineer for review for compliance with their connection design.
7. Erection Drawings must clearly indicate:

    a. Location of pretensioned bolts.
    b. Locations of all bolts larger than ¾" diameter.
    c. Location of any ASTM A490 bolts.
    d. Location of all SLRS and protected zones.

8. Indicate with florescent blue paint on the beam web the location of all pretensioned bolted connections. Indicate locations of protected zones with florescent orange paint.
9. Clearly indicate any requested deviations from the contract documents.
10. Clearly identify revisions made to shop drawings during the review process.
11. Incomplete shop drawing submissions will be rejected without review. Submittals shall include all relevant steel including beams, girders, columns, and detail steel. The following are the only permissible submittal packages, further division will not be acceptable:

    a. Product data, reports, mill test and print data.
    b. Anchor bolts.
    c. Embedments.
    d. Structural steel for the main building between column splices and connection design documentation.
    e. Miscellaneous steel (partition supports, loose lintels, roof opening frames, etc).
    f. Shop testing and quality control reports.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer, fabricator and professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Source quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code—Steel" and AWS 1.8 where applicable.

1. Present evidence that each welder has satisfactorily passed AWS qualification tests for the welding processes involved within the past 12 months, in addition to meeting the AWS minimum qualifications.
2. Weld symbols are to be shown on both fabrication and erection drawings before submittal review.

D. Contractor shall have the following publications in the field office on the project site:

1. AISC, "Manual of Steel Construction," (13th or 14th Edition).
2. AISC, "Code of Standard Practice for Steel Buildings and Bridges."
3. AWS D1.1, "Structural Welding Code - Steel."
4. AWS D1.3, "Structural Welding Code - Sheet Steel."
5. AWS D1.8, "Structural Welding Code – Seismic Supplement."

E. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the state of South Carolina and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

F. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings."
3. AISC's "Specification for the Design of Steel Hollow Structural Sections."
4. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
6. AWS D1.1 "Structural Welding Code-Steel."
7. AWS D1.3 "Structural Welding Code-Sheet Steel."

G. Erector shall be responsible for providing bolt testing/calibration equipment and performing pre-installation verification testing under the observation of the owner's testing/inspection agency.

H. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.9 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 36, unless noted otherwise.

1. Configuration: Straight.
2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Amscot Structural Products Corp.
   b. Fluorocarbon Company Limited.
   c. R.J. Watson Bridge & Structural Engineered Systems.
   d. Seismic Energy Products, L.P.
   e. Conslide.

3. Mating Surfaces: PTFE and PTFE.
4. Coefficient of Friction: Not more than 0.03.
5. Design Load: Not less than 5,000 psi (34 MPa).
6. Total Movement Capability: 4 inches.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time. Minimum 28 day compressive strength shall be 8000 psi.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, unless noted otherwise.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Owner may engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports to supplement those indicated.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Shop inspections listed in this section shall be performed and documented by the fabrication shop utilizing inspectors qualified in accordance with Section 3.5A. Reports shall be submitted to the EOR, Special Inspection Coordinator and Building Code Official in accordance with the Statement/Schedule of Special Inspections.

C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

D. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1(and AWS D1.8 for lateral force resisting connections) and the following inspection procedures, at testing agency's option:

1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
2. Ultrasonic Inspection: ASTM E 164.

F. Shop Weld Testing Frequency:

1. Shop fillet welds shall have 100% visual weld evaluation.
2. Shop fillet welds shall have 10% magnetic particle testing.
3. 25% of all partial penetration welds not used in the SLRS (Seismic Load Resisting System) shall be ultrasonically tested.
4. 25% of all complete penetration welds not used in the SLRS (Seismic Load Resisting System) shall be ultrasonically tested; if a failure rate of more than 5% is found then these connections shall be 100% tested at the Contractor's expense.
5. 100% of all complete penetration and partial penetration welds that are part of the SLRS shall be ultrasonically tested per AISC 341-02 Part 1, Section 16.

G. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts: for type of bolt and type of joint specified.

1. Joint Type: Snug tightened for standard shear connections, Pre-tensioned for all braced frame member connections, moment frame connections, and connections with tensile forces specified, unless noted otherwise.
2. A minimum of 2 bolts in each connection shall be tested. If tension indicating washers are used, verify bolt tension in accordance with approved procedure for this product and verify position of washers and method of tightening nut. If snap-off bolts are used, verify all knurled ends have been snapped off. Periodically verify snap-off torque.

B. Weld Connections: Comply with AWS D1.1 (and AWS D1.8 for lateral force resisting systems) for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and " Load and Resistance Factor Design Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

   a. Grind butt welds flush.
   b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
2. Testing firm's steel inspectors shall be American Welding Society (AWS) certified, Welding Inspectors (CWI) and American Society of Non-Destructive Testing (ASNT) certified in accordance with ASNT-TC-1A. Qualifications to be reviewed and approved by Structural

Engineer of Record. Inspectors overseeing welding of the lateral force system shall also be qualified in accordance with AWS D1.8.

3. Daily Field Reports are to be faxed to Structural Engineer of Record in a timely manner.

B. Bolted Connections: Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. Per IBC Chapter 17 Table 1704.3, continuous inspection of the following welding procedures are required:

a. Complete and partial penetration welds.
b. Multi pass fillet welds.
c. Single pass fillet welds over 5/16".

2. In addition to visual inspection, field welds will be tested according to AWS D1.1 and AWS D1.8 and the following inspection procedures, at testing agency's option on method:

a. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
b. Ultrasonic Inspection: ASTM E 164.

D. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

E. Field Weld Testing Frequency:

1. Field fillet welds shall have 100% visual weld evaluation.
2. Field fillet welds shall have 10% magnetic particle testing.
3. 25% of all field partial penetration welds not used in the SLRS (Seismic Load Resisting System) shall be ultrasonically tested.
4. 50% of all field complete penetration welds not used in the SLRS (Seismic Load Resisting System) shall be ultrasonically tested; if a failure rate of more that 10% is found then these connections shall be 100% tested at a the Contractor's expense.

F. In addition to 100% visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05 12 00

SECTION 05 12 13 – ARCHITECTURAL EXPOSED STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. AESS (Architectural Exposed Structural Steel) where indicated.

B. Related work under this Section include the following:

1. Section -051200

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 REFERENCE STANDARDS

A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions, most recent revisions, and recommendations of the following:

1. AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, Load and Resistance Factor Design" (including all supplements).
2. AISC "Code of Standard Practice for Steel Buildings and Bridges", except in Paragraph 4.2.1, delete the first and second sentences.
3. Industrial Fasteners Institute "Fastener Standards Book", Sections E, High-Strength Structural Bolting.
4. AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
5. AWS D 1. 1 "Structural Welding Code".
6. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications".
7. AISC Code of Practice , Section 10 AESS in Article 3
8. ASTM A6;/A6M in Article 3

B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

1.5 SUBMITTALS

A. Shop Drawings: Submit shop and erection drawings for all structural steel components showing the following:

1. Types of materials, including sizes and weights of members.
2. Location, types and details of connections.
3. Openings.
4. Cleaning, surface preparation and painting schedules.
5. AESS Shop Drawings: In addition to above requirements, show complete details of bolted and welded joints, and each item or component which is directly fastened or secured to architecturally exposed structural steel. Include elevations at 1/4 inch scale. typical elevations at 1 inch scale and details at full scale.

B. Calculations: Submit calculations of all connections according to the requirements shown on the Drawings. Calculations shall bear the sea] of a Professional Engineer registered in the State of South Carolina

C. Reports

1. Submit certified copies of mill test reports for all steel furnished. Perform mechanical and chemical tests for all material regardless of thickness or use. No part of the ASTM Specifications will be waived without written consent of the Engineer.
2. Submit copies of prequalified and other welding procedures in form prescribed in "Structural Welding Code".
3. Provide certified fastener test reports for each component lot of high-strength structural fasteners used in the project, including those for any A325 and A490 bolts, F436 washers, F959 DTI's, A563 nuts, or F1852 twist-off bolts.

   a. Certified test results of rotational capacity tests performed on galvanized structural fasteners shall be provided when such fasteners are specified or used.

D. Manufacturer's Data: Submit product data or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. High-strength bolts (each type), including nuts and washers.

   a. Include Direct Tension Indicators.

2. Structural steel paint.
3. Shrinkage-resistant grout.

E. AESS Samples: Submit samples showing each weld type of 8 inch length, and surface preparation for the work. Finish samples of 1 foot long shapes and 1 foot square plates as applicable. Review of samples by Architect will be only for visual appearance quality.

F. LEED Submittals:

1. Documentation of waste diversion quantities for Credit MR2.
2. Product Data for LEED Credit MR4 on Material Report from Section 01352, including percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for LEED Credit MR5 on Material Report from Section 01352, indicating location of material manufacturer for regionally manufactured materials.

   a. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
   b. Include statement indicating cost and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.

1.6 QUALITY ASSURANCE

A. AESS Fabricator Qualifications: Fabricator shall have ten years minimum certifiable experience in designing, engineering, detailing, fabricating, erecting and finishing of architecturally exposed structural steel of type and scope similar to this project.

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

   1. Schedule of testing: Listing of all testing and documentation of each testing requirements to be performed

C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

D. AESS Pre-Fabrication Meeting: Contractor shall conduct a pre-fabrication meeting prior to purchasing products, to review conditions associated with performing the work. Include review of fabrication and construction conditions, surface preparation and protective coating work, environmental requirements and coordination requirements for performing the work. Meeting participants shall include Architect/Engineer, representative of fabricator and installer of AESS work, and installers of related work. Proceed with fabrication and installation only when everyone concerned agrees That required conditions can be provided and maintained.

E. Manufacturer's identification tags or marks are not acceptable on surfaces That will remain exposed to view after installation. Evidence of patching after removal of tags or marks is not acceptable.

F. Erection marks or other painted marks shall not be made on those surfaces of AESS members that are to be. exposed in the completed structure.

G. Stamped or raised manufacturer's identification marks shall not be filled, ground or otherwise removed.

H. Seams of hollow structural sections shall be acceptable as produced only if approved by The Owner/Architect- Seams shall be oriented away from view or as directed in the Contract Documents.

1.7 PRODUCT HANDLING

A. Do not handle structural steel until paint has thoroughly dried. Care shall be exercised to avoid abrasions and other damage.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Prior to installation and tightening, fastener components shall be protected from dust, dirt, moisture and other jobsite conditions detrimental to their lubricants and finish. Fastener components that accumulate rust or dirt resulting from j ob-site conditions shall not be used unless they are cleaned and relubricated (Twist-off bolts shall only be relubricated by the original manufacturer).

C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

D. Stack material out of mud and dirt and provide for proper drainage. Protect from damage or soiling by adjacent construction operations.

E. The Fabricator shall use special care to avoid bending, twisting or otherwise distorting the Architecturally Exposed Structural Steel.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel, Plates and Bars: ASTM A572, Grade 50 unless otherwise shown.

C. High-Strength Structural Fasteners:

1. Heavy hex structural Bolts: Use only ASTM A325 or A490 bolts manufactured by Infasco or Vermont Fasteners.
2. Alternate design fasteners: ASTM F 1852 twist-off type tension control bolts produced by either manufacturer in 2.01 Ca above may be used in lieu of standard structural bolts.
3. Hardened washers: Use only through-hardened ASTM F436 washers manufactured by Infasco, Vermont Fasteners, Technical Stamping, Prestige or Wrought Washer.
4. Direct Tension Indicators: Use only ASTM F959 DTI's manufactured by Turnasure or Bethfast.
5. Heavy hex nuts: Use only ASTM A563 heavy hex nuts manufactured by Infasco, Vermont Fasteners, or Unitite.
6. Where shown or noted as galvanized, threaded components shall be hot-dip galvanized complying with ASTM A153, with nuts lubricated in accordance with S2.1 of ASTM A563, and with rotational capacity tests performed on each assembly lot provided..

D. Direct Tension Indicators: ASTM F959, type as required.

1. Use on all A325 and A490 bolts on connections that are slip critical, including those using F 1852 twist-off type bolts..
2. Prior to fabrication and erection, representatives of the engineer, the owner's testing agency, the bolt and DTI manufacturers shall meet at the site to ensure that bolting methods and requirements (including inspection) for tensioning of high strength structural connections are fully understood and agreed to.

E. Filler Metal

1. Electrodes for Carbon Steel: Conform to AWS "Structural Welding Code".

F. Stud Shear Connectors: ASTM A 108, Grade 10 15 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications and complying with "Structural Welding Code", type and size as shown.

G. Non-metallic Shrinkage Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining, shrinkage resistant product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621 and ASTM C 1107, free of gas-producing or gas-releasing agents, oxidizing catalysts, inorganic accelerators and chlorides. Provide one of the following.

1. "Five Star Grout" (U.S. Grout Corp.).
2. "Masterflow 713" (Master Builders Co.).
3. "Crystex" (L&M Construction Chemicals, Inc.).
4. "Sure Grip Grout" (Dayton Superior).
5. Or equal.

H. Paint

1. For All Steel Not Otherwise Specified: Provide the following primer at all interior steel, including bar joists, compatible with the finish coats of paint; final color to be approved by Architect. One of the following:

   a. "4-55 Versare" (Tnemec Co. Inc.); 2.0 - 3.5 mils d.f.t.
   b. "GP-818" (Carboline Co.); 2.0 mils d.f.t.
   c. "Amercoat 5105" (Ameron Protective Coatings); 2.0 - 3.0 mils d.f.t.
   d. "Dulux, 67-Y-834" (E.I. DuPont de Nemours); 2.0 mils d.f.t.
   e. "Ferrox 25" (Con-Lux Coatings, Inc.); 2.0 - 3.0 mils d.f.t
   f. Or equal.

2. Milled Surfaces: Light oil coating or strippable protective coating: apply as per AISC requirements prior to shipment.
3. For all steel which is in contact with subgrade, all columns starting 6 inches above finished floor down to the base plate. Provide finish coat compatible with prime coat noted above. Touch-up in field.

I. Galvanizing: All exterior structural steel, including cooling tower dunnage and roof top screen wall support steel, shall be hot dipped galvanized after fabrication and touch-up galvanized in the field after erection.

J. Threaded rebar fasteners/couplings: Threaded inserts and couplings for rebar splices, to develop at least 125% of the specified rebar's yield strength. F.C. Dayton Barsplice, Inc. couplings or approved equal.

K. Epoxy Filler for AESS:

1. Solvent resistant, two component metal and epoxy compound suitable for repair of steel and compatible with required protective coating system.
2. Acceptable Products:

   a. Devcon Corp., Plastic Steel
   b. 3M Company, Scotch-Weld Adhesive 1751.

c. Or equal.

L. Blasting Abrasive for AESS: Type, grade, hardness and size gradation necessary to achieve requirements of Contract Documents, subject to approval of prime coating manufacturer. Blasting abrasive shall be new, not recycled; uncontaminated, free of harmful materials, dry and uniformly graded.

M. Finish Protective Coating System - Exposed Surface of AESS:

1. Two components, moisture cured, organic zinc polyurethane prime coat with zinc content of 87 % minimum by weight in dry film, meeting requirements of SSPC PS 12.01, two component epoxy polyamide intermediate coat, two component high build acrylic polyurethane enamel, semi-gloss sheen finish coats.

   a. Intermediate Coat: Color shall approximate finish coat color, except shall be different tint from finish coat color. Sheen shall be of a degree that will not be detrimental to inter-coat adhesion.
   b. Finish Coat: Color and sheen shall be as selected by Architect. Sheen shall be in semi-gloss range as acceptable to Architect.

2. Acceptable Products:

   a. Tnemec Company, Inc, Or equal:

      1) Prime Coat. 90-97 Theme-Zinc
      2) Intermediate Coat: Series 66 It-Build Epoxoline
      3) Finish Coat: Series 73 Endura-Shield M
      4) Or Equal

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Mill column and bearing stiffeners to give full bearing over the cross section. Mill contact surfaces of bearing and base plates. It is not necessary to plane bottom surfaces of plates on grout beds.

C. Drill or punch holes at right angles to the surface of the metal, not more that 1/16 in. larger than the connector diameter. Do not make or enlarge holes by burning. Drill material having a thickness in excess of the connector diameter and material thicker than 7/8 in. Holes shall be clean-cut without torn or ragged edges. Remove outside burrs resulting from drilling operations.

D. Provide holes in members to permit connection of the work of other trades. Use suitable templates for proper location of these holes. Steel requiring adjustment shall be provided with slotted holes as shown.

E. Provide holes, slots and openings required by other trades together with necessary reinforcing as shown. Use suitable templates for proper location of these opening. Where openings are shown on the Drawings or shop drawings no change in location will be permitted without prior approval.

F. Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provide the cut is within 1/8 in. of the required line.

G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

2.3 FABRICATION OF AESS

A. General:

1. Fabricate AESS work with special care for best appearance and as required by Contract Documents. Apply techniques as applicable to produce and maintain quality of work within required tolerances.
2. Pre-assemble AESS components in shop so as to minimize field splicing and assembly of units at project site. Disassemble components only to extent necessary for shipping and handling. Mark components for reassembly and coordinate installation, except do not apply marks on exposed surfaces.
3. The permissible tolerances for out-of-square or out-of-parallel, depth, width and symmetry of rolled shapes shall be as specified In ASTM A6/A6M. Unless otherwise specified in the Contract Documents, the exact matching of abutting cross-sectional configurations shall not be necessary. The as fabricated straightness tolerances of members shall be one-half of the standard camber and sweep tolerances in ASTM A6/A6M
4. The tolerances on overall profile dimensions of members that are built-up from a series of Standard Structural Shapes, plates and/or burs by welding shall be taken as the accumulation of the variations that are permitted for the component parts in ASTM A6/A6M. The as fabricated straightness tolerances for the member as a whole shall be one-half the standard camber and sweep tolerances for rolled shapes in ASTM A6/A6M

B. Steel Surfaces: Surfaces of steel which will be exposed, shall be smooth and free of blemishes, pitting, seam marks, roller marks, rolled trade names, roughness and other like conditions or imperfections. Remove such blemishes by welding, grinding or other method prior to starting surface preparation. Sequence work with surface preparation operation.

1. Filler, calk or body putty type materials. other than filler metal deposited by welding process, are not acceptable for remedial work.
2. Epoxy filer may be applied to pockets, voids, pitting or other blemishes on exposed surfaces of interior steel to be painted, including welds.

C. Size: Steel members shall be one piece units and dimensions required as applicable for application.

D. Joints and Connections

1. Joints and connections shall be uniform and consistent. Match abutting cross-sectional configurations, except as otherwise indicated in drawings.
2. Joints and connections exposed to weather shall be of detail to exclude water infiltration.

3. Joints and connections, including corners and seams shall be continuously welded, except where members are indicated to be anchored with threaded fasteners.
4. Conceal fasteners for making joints and connections, except as otherwise required.
5. Form exposed connections of members to be anchored with threaded fasteners with hairline joints which are flush and smooth.

E. Workmanship

1. Form exposed work true to line and level with accurate angles and surfaces, and straight sharp edges. Ease edges to a uniform radius approximately 1/32 inch.
2. Form bent steel corners to smallest radius possible without causing metal grain separation or otherwise impairing work.
3. Cut. drill and tap steel work to receive fasteners, hardware and other like devices.
4. Complete cutting, fitting, forming, drilling, grinding and other fabrication operations, and remove arrises from cut edges and provide eased edges and comers, prior to starting surface penetration.
5. Edges of steel forming perimeter of cutout areas shall be ground smooth and comers square.

F. Assembly: Maintain true continuity of line and accurate relation of planes and joints and connections with hairline fit of contacting members.

G. Welding

1. Perform welding meeting requirements of AWS D1.1.

   a. Minimum size of fillet weld shall be 1/4 inch.
   b. Avoid discoloration of parent steel.
   c. Weld show-through, surface bleed of back side welding, on exposed surfaces is not acceptable.
   d. Make welds to metal embedments installed in concrete construction with electrodes of size and by methods that will ensure against damage to adjacent construction due to heat input to and connection from embedded metal.

2. Grind exposed welds smooth. Where flush butt welds, plug welds and puddle welds are required, make welds slightly oversized and grind flush with adjacent surfaces and flat. Dress welds smooth, uniform and consistent, and otherwise treat as required to match and blend with adjoining surfaces of parent steel.

2.4 CONNECTIONS

A. Connections shall be of the types shown on the Drawings unless prior approval is obtained from the Engineer. Design connections for the capacities and according to the requirements shown on the Drawings. Employ a qualified Structural Engineer licensed in the State of Michigan to perform the structural design and detailing of connections. The general details shown on the drawings are conceptual only and unless specifically noted, do not indicate the required number of bolts or weld sizes.

B. All connections shall be one of the following:

1. High-strength structural bolts.
2. Welds.

2.5 BOLTING

A. Bolts shall be of a length that will extend not less than 1/4 in. beyond the nuts. Enter bolts into holes without damaging the thread.

B. Use high-strength structural bolts in bearing and/or friction as shown. Make high-strength bolted joints without the use of erection bolts. Bring members tightly together with sufficient high-strength "fitting-up" bolts which shall be retightened as all the bolts are finally tightened. Manual torque wrenches will not be accepted for final tightening. Protect bolt heads from damage during placing. Bolted connections that have been completely tightened and are ready for inspection shall be marked for identification.

C. Final tightening of high-strength structural bolts shall be by properly calibrated and sufficiently powerful air-impact, hydraulic or electric wrenches capable of generating ample torque for the diameter and grade of fasteners to be tensioned, unless turn-of-nut method is specifically permitted. Each wrench shall be checked for accuracy at least once daily.

2.6 WELDING

A. Do not begin structural welding until joint elements are bolted or tacked in intimate contact and adjusted to dimensions shown on Drawings, or both, with allowance for any weld shrinkage that is expected. Weld heavy sections and those having a high degree of restraint with low hydrogen type electrodes. No members are to be spliced without prior review by the Engineer.

B. Welding shall be performed by operators who have been qualified within the preceding one year period under AWS standard qualification procedure for the type of work required. All field welders shall be recertified for this project at the job site.

2.7 SURFACE PREPARATION

A. Clean all surfaces not otherwise specified in accordance with SSPC Surface Preparation Specification No. 3 Power Tool Cleaning.

B. Cleaning shall be done after fabrication and immediately prior to shop painting or shipment. Apply shop coat of paint within 4 hours after cleaning and before rust-bloom occurs.

C. Blast cleaning operations shall not be conducted when the relative humidity of the air is greater than 85% or when the surface temperature of the steel is less than 5 deg. F. above the temperature at which condensation will occur, or when these conditions are anticipated. Remove all traces of blast residue and dust in a manner that will not contaminate the surfaces. Take every precaution to prevent contamination of surfaces. Workmen shall wear gloves free of grease and/or oil when handling blast cleaned steel.

2.8 SHOP PAINTING

A. All structural steel shall receive a shop coat of paint except as follows:

1. Contact surfaces of welded connections and areas within 2 in. of field welds.
2. Contact surfaces of high-strength bolted connections.
3. Surfaces receiving stud shear connectors.
4. Members to be galvanized.
5. Members to receive spray on fireproofing.

B. Treat milled surfaces as specified under "Materials".

C. Apply specified primer to provide a minimum dry film thickness as recommended by the paint manufacturer except for milled surfaces. No painting shall be done when the surface temperature of the steel is below the temperature at which condensation will occur. Apply paint thoroughly and evenly to dry surfaces in accordance with manufacturer' s directions.
   1. Fabricator shall provide compatible primer for use with intmescent paint.

D. Architecturally Exposed Structural Steel

   1. Surface Preparation: Comply with primer manufacturer's requirements, with minimum SSPC SP6.
   2. Shop or Field Primer: Specified zinc rich primer.

      a. Dry Film Thickness: 2 to 3.5 mm.

   3. Field Intermediate: Specified high-build, high-solids catalyzed epoxy coating, chemical and corrosion resistant, semi-gloss finish.

      a. Dry Film Thickness: 1 coat at 4 to 9 mm per coat.

   4. Field Topcoat: Specified high-solids, high-build acrylic polyurethane enamel, highly resistant to abrasion, corrosive fumes and chemical contact, gloss finish.

      a. Dry film Thickness. Minimum 2 coats required at 2 to 5 mm per coat.

2.9 SOURCE QUALITY CONTROL

A. Testing and inspection of structural steel will be performed by a testing agency retained by the Owner. Provide the testing agency with the following:

   1. A complete set of accepted documents required under Paragraph "Submittals".
   2. Cutting lists, order sheets, material bills, and shipping bills.
   3. Information as to time and place of all rollings and shipment of material to shops.
   4. Representative sample pieces as requested by the testing agency.
   5. Full and ample means and assistance for testing all materials.
   6. Proper facilities, including scaffolding, temporary work platforms, etc., for inspection of the work in the mills, shop and field.
   7. AESS compliance for surface finish and erection tolerances

B. Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that inspector can refer back to the person acceptable inspection criteria for tension. Use of stick-wax' lubricant can facilitate ease of tightening.

C. The Inspector will perform his duties, when possible, in such a way that fabrication and erection are not unnecessarily delayed or impeded, and as follows:

   1. The inspector will make all tests and inspections as required by all applicable federal, state and local Building Laws. The inspector shall make all the tests and inspections indicated on the Drawings.
   2. The technique for radiographic inspection will be in accordance with Section 6, Part B of the "Structural Welding Code". A double film technique will be used. One copy of each film will be sent to the Engineer, the other will be retained by the Inspector.
   3. Ultrasonic inspection will be performed in accordance with Section 6, Part C of the "Structural Welding Code".

4. Shop welds will be inspected in the shop before the work is painted or approved for shipment.
5. The inspector will make all tests and inspections of high strength structural bolt connections as required by AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".

    a. Under tensioned A325 and A490 bolts are to be further tightened until they meet acceptable inspection criteria for tension. Use of stick-wax' lubricant can facilitate ease of tightening.
    b. Under tensioned F1852 twist-off bolts, evidenced by shearing of the 'break-neck' prior to minimum required clamp force, shall be removed and replaced with new twist-off bolts. (Under no circumstances is lubrication of twist-off bolts permitted other than by the original manufacturer.

6. Where inspection reveals defects, the extent of inspection will be increased as much as necessary to assure that the full extent of the defects in a joint have been found and to assure that the same defects are not present on similar parts or under similar circumstances.
7. Work that is not acceptable will be designated by "Repair" or "Reject", as applicable.
8. The Inspector will maintain a daily record of the work he has inspected and its disposition. One copy of each of the reports will be submitted to the Engineer on a weekly basis.

    a. Welding reports of test will be made in form prescribed in the "Structural Welding Code".

PART 3 - EXECUTION

3.1 CONDITION OF SURFACE

A. Examine the substrates, adjoining construction and the conditions under which the Work is to be installed. Do not proceed with the Work until unsuitable conditions have been corrected. Consider all conditions which will affect the satisfactory erection of the structural steel systems.

B. Visit the project site and advise Engineer of any discrepancy or conflict. Field verify existing construction requirements, existing conditions, restrictions and clearances which may affect structural steel systems erection. Assume responsibility for all errors of detailing and fabrication and for the correct fitting and erection of the structural steel systems.

3.2 ERECTION

A. Check the alignment and elevations of all column supports and location of all anchor bolts with transit and level instruments before starting erection. Notify Engineer of any errors. Obtain Engineer's approval of methods proposed for correcting errors prior to proceeding with corrections and erection.

B. Drift Pins may be used only to align the several parts. They shall not be used in such manner as to distort or damage the metal.

C. Oxygen cutting of structural steel for "fitting-up" purposes shall not be done except with the acceptance of the Engineer.

D. Make all necessary provisions for temporary shoring and bracing with connections of sufficient strength to bear imposed loads and for completion of erection where structural members are temporarily left out for erection at a later date. Provide temporary planking and working platforms as necessary to effectively complete the work.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
4. For proprietary grout materials, comply with manufacturer' s instructions.

F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

3.3 ERECTION OF AESS

A. The Erector shall use special care in unloading, handling and erecting of AESS to avoid marking or distorting the AF-SS- Care shall also be taken to minimize damage to any shop paint. If temporary braces or erection clips are used, care shall be taken to avoid the creation of unsightly surfaces upon removal. Tack welds shall be ground smooth and holes shall be filled with weld metal or body solder and smoothed by grinding or filing. The Erector shall plan and execute all operations in such a manner that the close fit and neat appearance- of the structure will not be impaired.

B. Methods

1. Perform operations in a manner that close fit and appearance of steel and structure will not be impaired.
2. Provide steel within required tolerances. Compensate for temperature variations, cumulative welding draw, construction loadings, sequential applications of permanent dead loads or any predictable condition that could cause distortions to exceed required tolerances.
3. Do not cut, trim or weld components during erection in a manner that will damage finish, decrease strength or result in visual imperfection or failure in performance of the work.
4. Repair imperfections in steel surfaces as specified for shop work of AESS and finish repaired to meet requirements of Contract Documents.

C. Joints and Connections- Perform fitting required for installation of components. Fit connections accurately together to form tight, hairline joints.

D. Assembly: Install components level, plumb, true to line, in alignment with established lines and elevations, and with uniform joints and reveals with specified tolerances.

E. Threaded Fasteners: Provide silicone lubricant on surfaces of non-structural threaded fasteners in contact with finish paint system.

3.4 CONNECTIONS

A. Connections shall comply with requirements specified in Part 2 - Products. Bolts, nuts and washers shall be clean of dirt and rust and lubricated immediately prior to installation (except twist-off bolts, which if used, may not be lubricated by anyone other than the original manufacturer).

B. Stud shear connectors shall be attached in accordance with requirements of "Structural Welding Code".

3.5 FIELD PAINTING

A. Field painting shall comply with the requirements specified in Part 2 - Products, "Shop Painting" and in accordance with the following LEED requirements.

1. All Interior touch-up or field-applied paint shall meet requirements for LEED Credit EQ4.2.

B. After erection, clean exposed surfaces of field connections, unpainted areas adjacent to field connections and damaged areas in the shop coat to the same standards as required for the shop coat and paint with the same primer used in the shop coat.

3.6 ERECTION TOLERANCE

A. Individual pieces shall be plumbed, leveled and aligned in accordance with the requirements of the "Code of Standard Practice for Steel Buildings and Bridges" except as follows.

1. Plumbness of individual columns shall be held to 1: 1000.
2. All columns adjacent to elevators shall be within I inch of the theoretical centerline.
3. All exterior columns shall be within 1 inch of the theoretical centerline either toward or away from the building.
4. The centerline of any two (2) adjacent exterior columns shall be within 3/4 inch of each other either toward or away from the building.
5. All intermediate exterior columns shall be within 3/4 inch of a line between the corner columns.
6. All measurements relating to the above shall be on the theoretical centerline of the columns.

B. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.

C. AESS Tolerances: In addition to the above requirements AESS shall not exceed following tolerances,

1. Location Variation: Variation from location of established lines for a member shall not exceed 1/8 inch in 20 feet, any direction, and not more than 3/8 inch for total length, any direction.
2. Line Variation: Variation form plumb, level or line shall not exceed 1/8 inch in 10 feet for vertical or angular run, or 1/8 inch in 20 feet horizontal run, and not more than 1/4 inch in 40 feet, any direction.
3. The line of vertical or raking components shall be within 1 in 600 and within 3/8 inch of the specified line in every direction.

4. Offset Variations: Variations in offset of end-to-end and edge-to-edge alignment of adjoining and consecutive members which form planes, and continuous runs and profiles shall not exceed the following:

   a. 1/ 16 inch in flush alignment for members which are to be ½ inch or less out-of-flush, or separate 2 inches or less by a reveal or protrusion in plane.
   b. 1/8 inch in flush alignment for members which are to be more that ½ inch out of flush or separated more than 2 inches by a reveal or protrusion in plane.
   c. 1/32 inch in flush alignment for glass framing members at corners of glazing rabbits.

5. Steel with Infills in Same Plane:

   a. Vertical Opening Dimensions. +/- 1- 1:750
   b. Horizontal Opening Dimensions: +/- 1:750
   c. Variation of Perimeter Columns from Longitudinal Axis in Floor to Floor Height: +/- 1:1000
   d. Variation from Flushness of Adjoining Members: 1/16 inch maximum.

6. Verification of Tolerances: After welding each tier of steel members, check by transit for horizontal and vertical line and variation from plane to ensure erection of completed members within required dimensions and tolerances, before erection and welding next tier above.

3.7 SURVEY

A. Make an accurate survey of actual locations and elevations immediately upon the completion of every second level of steel and immediately submit same to the engineer. Resurvey shall include level below. Should column locations vary beyond the allowable tolerances, take necessary corrective measures prior to proceeding to next level and modify details and/or procedure as required.

B. Survey all beam elevations at each end and at center span as applicable as required to establish the in-place camber both prior to following pouring the supported concrete slab areas. Immediately submit same to engineer.

3.8 FIELD QUALITY CONTROL

A. Field testing and inspection requirements shall comply with Part 2 - Products, "Source Quality Control".

END OF SECTION 05 12 13

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

B. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Canam United States; Canam Group Inc.
2. CMC Joist & Deck.
3. Consolidated Systems, Inc.; Metal Dek Group.
4. Epic Metals Corporation.
5. Marlyn Steel Decks, Inc.
6. New Millennium Building Systems, LLC.
7. Nucor Corp.; Vulcraft Group.
8. Roof Deck, Inc.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40 (275), G90 (Z275) zinc coating.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped.

2.3 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Canam United States; Canam Group Inc.
2. CMC Joist & Deck.
3. Consolidated Systems, Inc.; Metal Dek Group.
4. Epic Metals Corporation.
5. Marlyn Steel Decks, Inc.
6. New Millennium Building Systems, LLC.
7. Nucor Corp.; Vulcraft Group.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40 (275), G60 (Z180) and G90 (Z275) zinc coating where indicated.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: Triple span or more.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten composite deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter: As indicated.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: As indicated on the plans.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least one weld at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

E. Miscellaneous Roof-Deck Accessories: Install finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: As indicated.
2. Weld Spacing: Space and locate welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: As indicated on plans.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Butted.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds and mechanical attachments will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Support angles for elevator door sills.
3. Shelf angles.
4. Loose bearing and leveling plates.
5. Steel weld plates, angles and channels for casting into concrete not specified in other Sections.
6. Miscellaneous steel trim including steel angle corner guards steel edgings and edge angles.
7. Abrasive metal nosings and thresholds.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance, General: Provide metal fabrications and other items to comply with the Building Code for structural performance.

B. Structural Performance for Floor Plates and Gratings: Capable of withstanding a uniform load of 200 lbs. per sq. ft., unless otherwise indicated.

C. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013300 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Metal nosings and treads.
3. Paint products.
4. Grout.
5. Shop Drawings: Show fabrication and installation details for metal fabrications.
6. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
7. Provide setting drawings and templates for anchors and bolts specified for installation under other Sections.
8. Structural calculations for Contractor designed supports and bracing.

F. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

G. Welding certificates.

1.6 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. Steel materials used for work in this section shall contain a minimum of 35% (combined) pre-consumer/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the LEED Building Submittal Requirements of this Section.
4. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. AWS D1.6, "Structural Welding Code--Stainless Steel."

C. Engineer Qualifications: Professional engineer licensed to practice in the State of North Carolina and experienced in structural engineering of metal fabrications similar to those indicated for this Project.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Steel Tubing: ASTM A 500, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

F. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.

1. Size of Channels: As indicated.
2. Material: Steel complying with ASTM A 1008/A 1008M, 0.0528-inch minimum thickness; hot-dip galvanized after fabrication.

G. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

D. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 9 Section "High-Performance Coatings."

C. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 5000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts if units are installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Galvanize miscellaneous framing and supports where indicated.

E. Prime miscellaneous framing and supports with zinc-rich primer where not to be galvanized indicated.

2.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. Provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.

2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.11 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

D. Prime interior miscellaneous steel trim, where indicated with zinc-rich primer.

1. Refer to Division 9 Section "High Performance Coatings" for additional requirements.

2.12 ABRASIVE METAL NOSINGS THRESHOLDS

A. Cast-Metal Units: Cast aluminum, with an integral abrasive finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions.

1. Available Manufacturers:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Barry Pattern & Foundry Co., Inc.
d. Granite State Casting Co.
e. Safe-T-Metal Co.
f. Wooster Products Inc.
g. Or equal.

B. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions.

1. Available Manufacturers:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Granite State Casting Co.
d. Wooster Products Inc.
e. Or equal,

2. Provide solid-abrasive-type units .
3. Product: Balco DST-330 or approved equal.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Drill for mechanical anchors and countersink. Locate not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.

1. Provide 2 rows of holes for units more than 5 inches wide, with 2 holes aligned at ends and intermediate holes staggered.

E. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.

F. Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into concrete.

G. Provide metal nosing at all metal stairs with no subsequent finish such as carpet, tile etc.

2.13 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Refer to Division 9 Section "High Performance Coatings" for additional requirements.

2.15 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Satin Finish: No. 4, unless otherwise indicated.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.16 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified), unless otherwise indicated.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING NOSINGS, AND THRESHOLDS

A. Center nosings on tread widths.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealants" to provide a watertight installation.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 51 00 - METAL STAIRS

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. Work Included: The Work of this Section shall include, but is not limited to, the following:

1. Manufactured Pre-engineered metal stairs with concrete fill treads and landings
2. Handrails and railings attached to metal stairs.
3. Handrails attached to walls adjacent to metal stairs.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.

1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress.
2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

    a. Concentrated load of 200 lbf applied at any point and in any direction.
    b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
    c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

    a. Concentrated load of 200 lbf applied at any point and in any direction.
    b. Uniform load of 50 lbf/ft. applied in any direction.
    c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including, intermediate rails or other elements composing infill area.

    a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

C. Seismic Performance: Provide metal stairs capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" and as supplemented by the Building Code.

1.5 SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Metal-pan stair treads.
2. Abrasive nosing.
3. Paint products.
4. Grout. and concrete fill
5. Metal types and finish
6. Paint products.
7. Grout.

B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show hanger details, anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1. Stair plans, elevations, details, methods of installation and anchoring.
2. Show members, sizes and thickness, anchorage locations and accessory items.
3. Furnish setting diagrams for anchorage installation as required.
4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

5. Samples: Submit as follows:
6. Two samples, minimum size 6 inches square, representing actual product, finish and patterns for each finished tread product specified.
7. Concrete treads.
8. Abrasive nosing (reference Division 5 Metal Fabrications)
9. Railings and hardware
10. Metal finish samples for decorative metal railings

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.

1. American Institute of Steel Construction (AISC) Certified firm having 10 years experience manufacturing components similar to or exceeding requirements specified in scope of project.
2. Having sufficient capacity to produce and deliver required materials without causing delay in work.
3. Installer: Acceptable to manufacturer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.

C. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.7 DELIVERY, STORAGE & HANDLING

A. Delivery and Acceptance Requirements:

1. Deliver material in accordance with with manufacturer's written instructions.
2. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.

B. Storage and Handling Requirements:

1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

C. Packaging Waste Management:

1. Separate waste materials for [reuse] [and] [recycling] in accordance with Construction Waste Management and Disposal requirements
2. Remove packaging materials from site and dispose of at appropriate recycling facilities.
3. Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] packaging material [in appropriate onsite bins] for recycling.
4. Fold metal and plastic banding; flatten and place in designated area for recycling.

1.8 COORDINATION

A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Preassembled Stairs:

a. Alfab, Inc.
b. American Metal Works, Inc.
c. Sharon Companies, Ltd. (The).
d. Or equal

2.2 FERROUS METALS

A. General: Combined post-consumer and pre-consumer recycled content of all steel fabrication materials in this section must be no less than 60 percent.

B. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

E. Steel Pipe: ASTM A 53, Type F, or Type S, Grade A, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

1. Black finish, unless otherwise indicated

F. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

G. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569/A 569M; or structural quality, complying with ASTM A 570/A 570M, Grade 30, unless another grade is required by design loads.

H. Brackets, Flanges and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

I. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coating, Grade 33, unless another grade is required by design loads.

2.3 ABRASIVE NOSINGS

A. Extruded Units: Extruded-aluminum units with luminescent abrasive filler consisting of alumi-num oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions.

1. Available Manufacturers:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Granite State Casting Co.
d. Wooster Products Inc.
e. Or equal.

B. Provide solid-abrasive-type units as selected

1. Product: Reference Division 5 Metal Fabrications

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into concrete.

2.4 FASTENERS, WELDING MATERIALS AND ANCHORS

A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

B. Machine Screws: ASME B18.6.3.

C. Lag Bolts: ASME B18.2.1.

D. Plain Washers: Round, carbon steel, ASME B18.22.1.

E. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.

F. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength and compatibility in fabricated items.

G. Fasteners for Anchoring Handrails and Railings to Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to stairs other types of construction indicated and capable of withstanding design loads.

1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

H. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for handrails and railings indicated.
2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

J. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

2.5 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior applications.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, handrails, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding, unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Commercial class, unless otherwise indicated.

C. Shop Assembly: Pre-assemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously, unless otherwise indicated.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

H. Provide brackets, flanges, fittings and anchorage devices to interconnect handrail members to other work and for connecting handrails to existing masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails. Coordinate anchorage devices with supporting structure.

I. Provide braces, clip angles, tap screws and other accessories required for wire work. Set and secure wire work in place.

2.7 STEEL-FRAMED STAIRS AND PLATFORMS

A. Stair Framing: Fabricate stringers of 12 gauge min. structural-steel channels as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

1. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal Risers, and Subplatforms: Form to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 14 Gauge

1. Steel Sheet: Uncoated cold-rolled steel sheet, unless otherwise indicated.
2. Form risers of same material as sheet steel backing of precast treads, unless otherwise indicated.
3. Provide sub-platforms of configuration indicated or, if not indicated, the same as subtreads. Weld sub-platforms to platform framing.

a. Smooth Soffit Construction: Construct sub-platforms with smooth soffits.

2.8 STAIR HANDRAILS AND RAILINGS

A. General: Comply with applicable requirements in Division 5 Section "Pipe Railings" for handrails and railings, and as follows:

1. Rails: 1 1/2 inches (38.1 mm) diameter × 13 gage (2.3 mm) minimum round steel tube, continuous multi-strand type, equally spaced with not more than 3 15/16 inches (100 mm) clearance between strands and with a minimum extension per code at top and bottom risers. Wrap rail continuously past space between flights to form guardrail as required by building code. Terminate rail ends with radiused returns, newel posts or safety terminations approved by local code. Provide not less than 1 1/2 inches (38.1 mm) clearing between rail and wall.
2. Rail Posts: 1 1/2 inches (38.1 mm) square × 11 gage (3 mm) tubing. Rail posts to fasten to side of plate stringers per manufacturer's shop drawings. Manufacturer to pre-weld erection aid to rail post for proper height to aid stair erector. Erection aid (setting block) to be removed and weld-ground smooth after installation.

B. Fabrication:

1. Use preformed or prefabricated bends.
2. Butt weld tee and cross intersections in tubing. Cope and weld intersections in pipe. Miter elbows.
3. Mechanically fasten internal sleeves and fittings.
4. Provide minimum 12 gage (2.7 mm) welded steel plate closures or hemispherical closure fittings on all exposed rail ends.Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of handrails and railings.

C. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

D. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

2.9 FINISHES

A. General: All field applied anti-corrosive and anti-rust primers and coatings applied to interior ferrous metal substrates must not exceed 250 g/L VOC content limit in accordance with Division 1 Section "LEED Requirements."

B. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

C. Finish metal stairs after assembly.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed products:

1. Interiors Stairs (SSPC Zone 1A): SSPC SP 3, "Power Tool Cleaning."

E. Apply shop primer to prepared surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Field Finishes: Refer to Section 09900 - Painting, for field- applied finishes to items indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates built into masonry, unless otherwise indicated.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

1. Grind exposed field welds and joints smooth and touch up abraded shop paint coats. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted field connections.

E. Railings and Handrails:

1. Fit exposed connections together to form tight, hairline joints.
2. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

3. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
4. Align rails so variations from level for horizontal members and from parallel with rake of stair for sloping members do not exceed ¼ inch in 12 feet.
5. Adjust handrails and guard railings before anchoring to ensure matching alignment at abutting joints.
6. Attach handrails to walls with wall brackets. Provide bracket with 1-1/2-inch (38 mm) clearance from inside face of handrail and finished wall surface. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is ¼-inch (6 mm) or less. Secure wall brackets to building construction as follows:

    a. For solid masonry anchorage, use drilled-in expansion shields.
    b. For hollow masonry use toggle bolts.

F. Fillers: Provide fillers made from steel plate, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

G. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05 51 00

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 07 13 26 - FOUNDATION WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Work Included:

1. Waterproofing systems of cast-in-place concrete foundation walls and similar below grade structures, as indicated on Drawings.
2. Blind-side foundation waterproofing of below-grade foundations abutting existing building foundations and other inaccessible conditions, as indicated.
3. Protection board and waterproofing accessories.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide foundation sheet waterproofing systems that prevent the passage of liquid water under hydrostatic pressure and comply with requirements as demonstrated by testing performed by an independent testing agency of manufacturer's current sheet membrane.

1.5 DEFINITIONS

A. General: Foundation sheet waterproofing systems shall include all primary and secondary materials required to complete the indicated work, and as recommended by the manufacturer. Materials and accessories not specifically indicated or specified but are recommended by, or required by the primary materials manufacturer to complete the "systems" shall be included as part of the specified waterproofing system.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's product data including manufacturer's printed instructions for evaluating, preparing and treating waterproofing substrates, technical data, specifications and tested physical and performance properties for each waterproofing material required.

1. Include data substantiating compliance with requirements.

B. Samples: Submit 6 inch by 12 inch samples of each sheet waterproofing, protection board and auxiliary materials as requested by the Architect.

1. Include similar sized samples of the manufacturer's standard sheet seaming and splicing details.

C. Shop Drawings: Provide shop drawings showing locations and extent of foundation waterproofing; include sheet layout drawings, flashing profiles and terminations, reglets, accessories, splicing and seaming details, substrate preparation (including details for substrate joints and cracks), penetrations, and similar conditions.

1. Provide general sheet layout drawings at 1/4 inch scale; details, flashing and similar special conditions shall be prepared at full scale.
2. Clearly identify/indicate the sub-drainage, insulations and other work not specified herein, but required for coordination purposes and the overall system sucess.

D. Installer Certificates: Provide installer certificates signed by primary material manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article.

E. Product Test Reports: Submit product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.7 QUALITY ASSURANCE

A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.

B. Installer Qualifications: A firm which has specialized in this type of foundation waterproofing and which is acceptable to manufacturer of primary sheet waterproofing materials.

1. Installer shall have not less than 10 years of successful experience in the installation of waterproofing systems similar to those specified for this Project. The qualified installer shall also have completed 3 projects in the past 5 years similar in size and scope.

C. Source Quality Control: Obtain primary waterproofing materials from a single manufacturer (regardless of conventional, or blind side application) with not less than 10 years of successful experience in foundation sheet waterproofing work and having qualified field personnel.

1. Provide secondary (accessory) materials as manufactured by the primary materials manufacturer; where secondary materials are not produced by the primary materials manufacturer, provide products recommended by the primary materials manufacturer.

D. Mockup: Before installing system, construct mockup of form of construction required to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed work.

1. Locate mockup in the location indicated or, if not indicated, as directed by Architect. Build mockup of the complete waterproofing systems, from top of foundation wall to footing, 15 lineal feet wide, including each different type waterproofing membrane system, accessory material (including protection board), in-plane drainage mat (refer to Section 02711), and foundation insulation.
2. Notify Architect one week in advance of the date and time when mockup will be constructed.
3. Demonstrate workmanship.
4. Obtain Owner Representative's approval of mockup before starting installation of Work.
5. Maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.

    a. Protect mockup from weather and from construction activities. Provide waterproof coverings for construction materials not intended to be permanently exposed to the weather.
    b. Approved mockup in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

E. Potential subcontractors/installers of foundation waterproofing shall attend a mandatory conference to review specific Project details, and each typical and atypical foundation condition prior to submitting their proposals.

F. Preinstallation Conference: Conduct a pre-installation conference at the Project site to comply with requirements of General and Supplemental Requirements.

1. Before installing the foundation waterproofing systems, meet at the site with the Architect and other concerned entities whose work is directly related to or penetrating the each waterproofing system.
2. Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details (including penetrations, flashing, terminations and similar conditions), installation procedures, inspection and testing procedures, foundation drainage interface, and protection and repairs.
3. Notify participants at least 7 days before conference.

1.8 JOB CONDITIONS

A. General: Proceed with Work of this Section only after substrate construction and penetrating work have been completed. Apply foundation waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply sheet waterproofing in snow, rain, fog, or mist.

B. Ventilation: Provide ventilation to remove fumes during application and cure of waterproofing system components in enclosed spaces, and maintain ventilation until such components have thoroughly cured and fumes have dissipated.

1. Waterproofing system specified for the work of this section utilizes a water-based latex surface conditioner; the use of solvent based products shall be prohibited, unless acceptable to the primary materials manufacturer and the Architect.

C. Weather: Proceed with foundation sheet waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and installer agrees to repair or replace components of the foundation waterproofing systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Water penetrating the building or structure resulting from substrate cracking of up to 1/8 inch.
b. Deteriorated or displaced waterproofing materials.

2. Warranty Period: Five years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include but are not limited to the following:

1. Henry
2. Carlisle
3. W.R. Grace.
4. Or equal.

B. Selected Systems: Provide the following, unless otherwise indicated on the Drawings.

1. Conventional Applications: Provide conventionally installed foundation waterproofing applied vertically over properly prepared (new) concrete foundation wall, as indicated. Provide "Bituthene System 4000" as manufactured by W. R. Grace & Co.; or equal, meeting the following minimum performance criteria:

a. Description: A foundation waterproofing system comprised of a 56 mil thick sheet of self-adhering rubberized asphalt integrally bonded to a 4 mil thick sheet of cross laminated, high density polyethylene, formed into uniform flexible sheets measuring 60 mils thick.
b. Tensile Strength: 325 psi min; ASTM D 412.
c. Ultimate Elongation: 300 percent min; ASTM D 412.
d. Pliability Temperature (100 cycles): Minus 25 deg. F; ASTM D 836; unaffected.
e. Puncture Resistance: 50 lbs.; ASTM E 154.
f. Hydrostatic Head Resistance: 230 feet min; ASTM D 5385.
g. Permeance: 0.05 perms maximum; ASTM E 96 (Method B).
h. Water Absorption: Not more than 0.1 percent weight gain after 48 hours of immersion at 70 deg F; ASTM D 570.

2. Blind-Side Applications: Provide blind-side waterproofing applied vertically over properly prepared existing concrete building foundations, as indicated. Provide "Preprufe 300R Membrane" as manufactured by W. R. Grace & Co., or equal; meeting the following minimum performance criteria:

   a. HDPE Sheet: 56-mil-thick, uniform, flexible sheets consisting of 30-mil-thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, a detackifying surface treatment, an uncoated self-adhering side lap strip, and a release liner.
   b. Tensile Strength, Film: 4000 psi minimum; ASTM D 412.
   c. Low-Temperature Flexibility: Pass at minus 10 deg F; ASTM D 1970.
   d. Peel Adhesion to Concrete: 5 lbf/in.; ASTM D 903, modified.
   e. Lap Adhesion: 2.5 lbf/in.; ASTM D 1876, modified.
   f. Hydrostatic-Head Resistance: 231 feet; ASTM D 5385, modified.
   g. Vapor Permeance: 0.01 perms; ASTM E 96, Water Method.

2.2 MISCELLANEOUS MATERIALS

A. General: Where specific products are named in the following paragraphs, provide either the named products or equals acceptable to the Architect which are compatible with the installed waterproofing system, as recommended by the system manufacturer.

B. Adhesives, Cant Strips, and Edge Strips: Provide types of adhesive compound, cant strips, and edge strips recommended by sheet waterproofing manufacturer for bonding to substrate, for waterproof sealing of seams in sheet, and for waterproof sealing of joints between sheet and flashing, adjoining surfaces, and projections through sheet.

C. Sheet Flashing: Self-adhering, rubberized-asphalt composite sheet of same material, construction, and thickness as waterproofing sheet membrane.

D. Liquid Membrane: Elastomeric, 2-component, liquid, cold fluid-applied, trowel grade or low viscosity as recommended by waterproofing manufacturer for application.

E. Patching Membrane: Low-viscosity, 2-component, asphalt-modified coating.

F. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

   1. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side; Preprufe Tape; W.R. Grace & Company, or equal as recommended by the waterproofing materials manufacturer.

G. Penetration Seal: Self-adhering reinforced membrane, 2-1/2 inches wide, with a tack-free protective adhesive coating on 1 side and a release film on self-adhering side.

H. Metal Termination Bars: Stainless steel bar assemblies, approximately 1 by 1/8 inch thick, predrilled at 9 inch centers. Provide stainless steel embedments and fasteners for attachment to supporting substrates, unless otherwise indicated.

I. Primers/ Conditioners: Provide the manufacturers standard latex-based surface primer/ conditioner for concrete substrates; Bituthene 400 Surface Conditioner, as manufactured by W.R. Grace & Company, or equal as recommended by the waterproofing materials manufacturer.

J. Protection Board: Provide the manufacturer's standard premolded, semi-rigid, 1/4 inch thick, asphalt impregnated protection board Bituthene Asphaltic Hardboard as manufactured by W.R. Grace & Company or equal as recommended by the waterproofing materials manufacturer.

1. Include manufacturer's recommended adhesive for attachment of the specified protection boards.

PART 3 - EXECUTION

3.1 INSPECTION OF SUBSTRATES

A. Examine substrates, adjoining construction and conditions under which the Work is to be installed. Prepare and submit written report to the Contractor describing conditions which would adversely affect systems. Do not proceed with the Work until unsatisfactory conditions have been corrected.

1. Do not proceed with installation until after minimum concrete curing period recommended by waterproofing manufacturer.
2. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Notify Architect in writing of anticipated problems using waterproofing over substrate.

B. Pre-Installation Meeting: Prior to installation of sheet waterproofing, but following submittal and acceptance of required submittal, meet at the Project site to review the material selections, installation procedures and coordination of the Work with other trades.

C. The manufacturer of the sheet waterproofing and the applicator shall inspect the substrates to review their acceptability for the application of the waterproofing systems specified.

D. Final Inspection: After all sheet waterproofing work is completed, an inspection shall be made by the sheet membrane manufacturer's representative. He shall certify that the sheet waterproofing has been installed according to the specifications and manufacturer's requirements.

3.2 PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

1. Remove grease, oil, form release agents, paints, and other penetrating contaminants from concrete.
2. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
3. Prepare, fill, prime, and treat joints and cracks in substrate. Remove dust and dirt from joints and cracks according to ASTM D 4258.

B. Do not proceed with installation until drains, and other projections through the wall have been installed. Holes, honeycombs and cavities shall be pointed or filled and finished flush in accordance with manufacturer's directions utilizing materials recommended by the manufacturer of the sheet waterproofing. Fill gaps or voids greater than 0.5 in. Remove standing water prior to membrane applications.

C. Rubberized Asphalt Sheet Waterproofing: Apply primer/ conditioner to concrete at rate recommended by sheet manufacturer. Prime only area which will be covered by sheet waterproofing in same working day; reprime areas not covered by sheet waterproofing within 24 hours.

D. HDPE Sheet Waterproofing: Install drainage composite tightly against sheeting in strict compliance with installation instructions in manufacturer's published literature, and in accordance with requirements specified in Section 334600 - Sub-Drainage.

E. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to waterproofing manufacturer's written instructions.

1. Treat expansion joints and discontinuous deck-to-wall or deck-to-deck joints, per the manufacturers recommendations.

F. Prevent compounds from entering drains and conductors, and from spilling or migrating onto surfaces of other work.

3.3 INSTALLATION, GENERAL

A. At the start of the installation and periodically as work progresses, employ the services of the manufacturer's technical representative at the job site as often as deemed necessary by the manufacturer to advise on and supervise all phases of this Work.

B. Install the sheet waterproofing in accordance with manufacturer's written instructions, except where more stringent requirements are shown or specified to provide a sheet waterproofing system which does not permit water penetration into the structure.

C. Provide flashing materials at cracks and penetrations and with such materials and designs as recommended by the manufacturer of the sheet waterproofing.

D. Fill non-moving cracks and joints with sealant or other compounds as recommended by the sheet waterproofing materials manufacturer for compatibility.

E. Prime/ condition concrete per the manufacturer's instructions. Use specified products, and comply with methods recommended by the sheet waterproofing materials manufacturer.

F. Flashing: Install elastomeric flashing using products and systems specified in the sheet waterproofing materials manufacturer's requirements.

G. Pipe Seals: Furnish and install pipe seal assemblies and covers in compliance with manufacturer's instructions.

3.4 RUBBERIZED ASPHALT SHEET WATERPROOFING INSTALLATION

A. General: Comply with manufacturers' instructions, except where more stringent requirements are indicated.

B. Install rubberized asphalt sheet according to waterproofing manufacturer's written instructions.

C. Apply primer/ conditioner to substrate at required rate and allow to dry. Limit priming to areas that will be covered by waterproofing membrane in same day. Reprime areas exposed for more than 24 hours.

1. Do not proceed with the membrane installation over primed/ conditioned surfaces until surfaces have completely cured.

D. Apply and firmly adhere sheet membrane over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2 inch minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

E. Apply sheet membrane from the lowest point and work upward to the highest point; to ensure side laps shed water.

F. Apply continuous sheet membrane over membrane strips bridging each type of joint to dimensions indicated or required by manufacturer.

G. Seal exposed edges of membrane terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.

1. Seal daily terminations with a troweled bead of the manufacturer's recommended mastic.

H. Repair tears, voids, and lapped seams in waterproofing not meeting requirements. Slit and flatten fishmouths and blisters. Patch with sheet membrane extending 6 inches beyond repaired areas in all directions.

3.5 HDPE SHEET INSTALLATION

A. Strictly comply with installation instructions in manufacturer's published literature.

B. Vertical Applications:

1. Apply membrane with the HDPE film facing the drainage composite. Remove the release liner and fasten membrane along uncoated edge to drainage composite with large head nails.
2. Apply succeeding sheets by overlapping the previous sheet 3 inches along the uncoated edge of the membrane. Firmly roll side laps to ensure a tight seal. Apply Preprufe tape at all laps including untaped factory laps.
3. Overlap the ends of the membrane 3 inches. Apply Preprufe tape centered over the end lap and roll firmly to ensure a tight seal. Remove release liner.
4. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detailing tape.

C. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

D. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

E. Install waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet membrane and firmly secure with detail tape.

G. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.6 PROTECTION COURSE INSTALLATION

A. General: Install protection course over waterproofing membrane using recommended adhesive according to manufacturer's written instructions and before commencing subsequent construction operations. Minimize exposure of membrane.

1. Note: The in-plane drainage panels specified in Section 33 46 00 - Sub-Drainage may be used in lieu of the specified asphalt impregnated protection course to the foundation waterproofing system when the following criteria is met:

a. Obtain written approval from the primary waterproofing materials manufacturer.
b. When drainage panel installation is closely coordinated with the waterproofing installation, minimizing the membrane exposure. Exposure of membrane and coordination of these installations is subject to the Architect's approval.

B. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

C. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

D. Install waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

E. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet membrane and firmly secure with detail tape.

F. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.7 CLEANING AND PROTECTION

A. Protect completed waterproofing systems from damage and wear during application and remainder of construction period, according to manufacturer's written instructions. Inspect waterproofing systems for damage just prior to backfilling or placement of concrete and make repairs in accordance with manufacturer's recommendations.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Clean up and legally dispose of all debris resulting from the waterproofing installation. Remove waterproofing equipment and similar appurtenance from the project site.

3.8 PROTECTION

A. Provide for protection of completed waterproofing installation during the installation of other materials on or about the waterproof sheet membrane system; and throughout the remainder of construction period.

END OF SECTION 07 13 26

SECTION 07 16 10 – UNDERSLAB VAPOR RETARDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Work Included: The Work of this Section shall include, but is not limited to, the following:

1. Under-slab vapor barrier.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, general recommendations and installation instructions for vapor barrier materials required.

B. Certification: Submit written certification, prior to the commencement of the work, signed by the Contractor and each of the prime materials manufactures stating that the vapor barrier systems as detailed, and applications indicated are in compliance with the manufacturer's recommendations, and do not exceed the performance limitations of the materials specified.

1.4 FIELD CONSTRUCTED MOCK-UP

A. Prepare mock-up test panel of vapor barrier specified. Locate mock-up as directed by the Architect. Mock-up should remain intact, until otherwise directed by Architect, and serve as the established standard of quality in the work.

1. Mock-up should illustrate each different condition anticipated in the work, including taping of all seams.

PART 2 - PRODUCTS

2.1 UNDER SLAB VAPOR RETARDERS

A. Polyethylene Vapor Barrier: Minimum 15-mil thick polyolefin geo-membrane.

1. Water Vapor Barrier: ASTM E-1745 Meets or exceeds Class A.
2. Permeance Rating: ASTM E 96 0.036 gr./ft2/hr. or lower.
3. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches as recommended by vapor-barrier manufacturer for sealing joints and penetrations in vapor barrier.
4. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

B. Products:

1. "Stego Wrap (15 mil) Vapor Barrier" as manufactured by Stego Industries LLC.

C. Vapor-Barrier Tape: Pressure sensitive tape of type as recommended by the vapor barrier manufacturer, for sealing of seams, penetrations and joints in polyethylene vapor barriers.

2.2 INSTALLATION ACCESSORIES

A. General: Provide installation accessories indicated; if not indicated as recommended by the system manufacturer. Accessories shall include, but not be limited to, fasteners, adhesives, tapes and sealants.

1. Low VOC: All adhesives shall comply with South Coast Air Quality Management District (SCAQMD) Rule #1168.

B. Prefabricated Pipe Boot: Provide manufacturer's prefabricated pipe boot and clamp for installation at penetrations through slab.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure in place with anchorage system as indicated.

3.2 UNDER SLAB VAPOR BARRIER INSTALLATION

A. General: Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor barrier to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
2. Coordinate the installation of the vapor barrier with the work of Division 31 Earthwork and Division 33 Utilities

B. Seal vertical joints in vapor barriers over framing by lapping not less than two wall studs. Fasten vapor barriers to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches.

1. Where indicated, seal overlapping joints in vapor barriers with adhesives or vapor-barrier tape according to vapor-barrier manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-barrier tape. Locate all joints over framing members or other solid substrates.

C. Firmly attach vapor barriers to substrates with mechanical fasteners or adhesives as recommended by vapor-barrier manufacturer.

1. No penetration of the Vapor Barrier is allowed except for reinforcing steel and permanent utilities.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barriers with vapor-barrier tape to create an airtight seal between penetrating objects and vapor barrier.

E. Repair any tears or punctures in vapor barriers immediately before concealment by other work. Cover with vapor-barrier tape or another layer of vapor barrier.

3.3 PROTECTION

A. General: Protect installed vapor barrier from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where vapor barrier is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 16 10

SECTION 07 16 16 - CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes :

1. Crystalline waterproofing system at elevator pits and where indicated.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013300 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: Include material descriptions and installation instructions for crystalline waterproofing.

F. Product Certificates: For crystalline waterproofing, signed by product manufacturer.

G. Qualification Data: For Installer and manufacturer.

H. Material Test Reports: For crystalline waterproofing.

I. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l)
4. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
5. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Coordination: Coordinate crystalline waterproofing work with concrete work to ensure a waterproof installation.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions and warranty requirements.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F or above during work and cure period, and space is well ventilated and kept free of water.

1.7 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer and Installer agrees to repair or replace components of crystalline waterproofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to maintain watertight conditions within specified warranty period.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Crystalline Waterproofing:

a. Anti-Hydro International, Inc.; Hydro Cap.
b. AQUAFIN, Inc.; Aquafin-1C.
c. Vandex International Ltd.; Vandex Super.
d. Or equal.

2.2 MATERIALS

A. Crystalline Waterproofing: A prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates by capillary action into concrete or masonry and reacts chemically with free lime in the presence of water to develop crystalline growth within concrete or masonry capillaries to produce an impervious, dense, waterproof concrete or masonry with properties meeting or exceeding the following criteria:

1. Permeability: 0 for water at 33 feet when tested according to CE CRD-C 48 at 28 days.
2. Compressive Strength: 10200 psi at 28 days when tested according to ASTM C 109/C 109M.
3. Flexural Strength: 730 psi at 28 days when tested according to ASTM C 348.
4. Bond Strength: 690 psi at 14 days when tested according to ASTM C 321.

B. Water: Potable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Conditions: Examine substrates, with Applicator present, where waterproofing is to be applied.

1. Proceed with application only after unsatisfactory conditions have been corrected.
2. Notify the Architect in writing of active leaks or structural defects that would affect system performance.

3.2 PREPARATION

A. Protect other work from damage from cleaning, preparation, and application of crystalline waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Stop active water leaks according to waterproofing manufacturer's written instructions.

C. Repair damaged or unsatisfactory concrete or masonry according to manufacturer's written instructions.

D. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, curing compounds, and form-release agents to ensure that waterproofing bonds to concrete or masonry surfaces.

1. Clean concrete surfaces according to ASTM D 4258.

a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
b. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.

2. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

A. Apply waterproofing to both horizontal and vertical surfaces where required for a continuous waterproof envelope, in accordance with manufacturer's instructions.

1. Surfaces: Uniformly apply waterproofing on vertical and horizontal surfaces in not less than two slurry coatings at a rate of 2.5 to 3.0 lbs. of waterproofing per sq. yd.
2. Vertical Construction Joints: Apply two slurry coatings of waterproofing immediately prior to placing contiguous concrete.
3. Cracks, Tie Holes and Honeycombs: Apply slurry coating and fill depressions with waterproofing mortar in laminating layers.
4. Reglets, Wall and Slab Junctions and Repairs: Fill with waterproofing mortar in laminating layers.
5. Coves: Apply waterproofing mortar to form coved intersections at junctures of vertical and horizontal surfaces.

B. Moisture cure all waterproofing for a minimum of two days as recommended by manufacturer. After waterproofing has aged for at least two weeks, neutralize all waterproofed surfaces that will remain exposed, as recommended by waterproofing manufacturer.

C. Form a continuous waterproof envelope which will prevent leakage. Take immediate remedial measures to stop water infiltration during the construction and warranty periods.

3.4 PROTECTION

A. Protect applied crystalline waterproofing from rapid drying, severe weather exposure, and water accumulation. Maintain completed Work in moist condition for not less than three days by procedures recommended in writing by waterproofing manufacturer. Protect waterproofing from temperatures below 36 deg F.

3.5 FIELD QUALITY CONTROL

A. Inspection: Manufacturer's representative to inspect completed application and to provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 07 16 16

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:

   a. Joints in exterior finish systems
   b. Perimeter joints between materials
   c. Control and expansion joints .
   d. Other joints as indicated.

2. Exterior joints in the following horizontal traffic surfaces:

   a. Joints in paving and concrete
   b. Control and expansion joints.
   c. Other joints as indicated.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

   a. Control and expansion joints.
   b. Perimeter joints between interior wall surfaces interior metal assemblies
   c. Adjoining walls and floors
   d. Other joints as indicated.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 PERFORMANCE REQUIREMENTS

A. Provide joint sealants for exterior and interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013300 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: For each joint-sealant product indicated.

F. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

G. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

H. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer certifying that materials meet or exceed specification requirements, and application requirements for this Project.

I. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

J. Qualification Data: For Installer and testing agency.

K. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

L. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

M. Field Test Report Log: For each elastomeric sealant application.

N. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

O. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l)
4. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
5. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section

B. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

D. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

E. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Notice to Proceed with the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

F. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:

   a. Each type of elastomeric sealant and joint substrate indicated.
   b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

   a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.

      1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

G. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

C. Warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Neutral- and Basic-Curing Silicone Sealant :

1. Available Products:

   a. Dow Corning Corporation; 791.
   b. Dow Corning Corporation; 795
   c. GE Silicones; SilPruf NB SCS9000.
   d. GE Silicones; UltraPruf II SCS2900.
   e. Pecora Corporation; 865.
   f. Pecora Corporation; 895.
   g. Pecora Corporation; 898.
   h. Or equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

   a. Use O Joint Substrates Metals, masonry and precast concrete.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

D. Single-Component Nonsag Urethane Sealant :

1. Available Products:

   a. Sika Corporation, Inc.; Sikaflex - 1a.
   b. Sonneborn, Division of ChemRex Inc.; Ultra.
   c. Sonneborn, Division of ChemRex Inc.; NP 1.
   d. Tremco; Vulkem 116.
   e. Or equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

   a. Use O Joint Substrates exterior paving.

E. Single-Component, Nonsag, Urethane Joint Sealant :

1. Available Products:

a. Tremco Incorporated; Dymonic FC, fast skinning, low modulus polyurethane.
b. Or equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class 100/50.
4. Use Related to Exposure: NT (nontraffic)
5. Use: At new aluminum monumental doors and windows SC-113 and Sc-214.
6. Color: As selected.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Butyl-Rubber-Based Solvent-Release Joint Sealant : Comply with ASTM C 1085.

1. Available Products:

a. Bostik Findley; Bostik 300.
b. Fuller, H. B. Company; SC-0296.
c. Fuller, H. B. Company; SC-0288.
d. Pecora Corporation; BC-158.
e. Polymeric Systems Inc.; PSI-301
f. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
g. Tremco; Tremco Butyl Sealant.
h. Or equal.

2.5 LATEX JOINT SEALANTS

A. Latex Sealant : Comply with ASTM C 834, Type P, Grade NF.

B. Available Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.
6. Or equal.

C. Acrylic-Emulsion Sealant: One part, nonsag sealant complying with ASTM C 834, paintable and recommended for interior applications with joint movement of not more than plus or minus 5 percent.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Acrylic-Emulsion Sealant:

a. "Chem-Calk 600"; Bostik Construction Products Div.
b. "AC-20"; Pecora Corp.
c. "Tremco Acrylic Latex 834"; Tremco Inc.
d. Or equal

2.6 MISCELLANEOUS JOINT SEALANTS

A. Structural Sealant: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in assemblies indicated.

B. Butyl-Polyisobutylene Sealant: Manufacturer's standard, solvent- release-curing, butyl-polyisobutylene sealant complying with AAMA 809.1, recommended for concealed joints.

C. Butyl-Polyisobutylene Tape Sealant: Manufacturer's standard, solvent-free, butyl-polyisobutylene tape sealant with a solids content of 100%; complying with AAMA 804.1; nonstaining, paintable, and non-migrating; packaged on rolls with a release paper on one side; with reinforcement thread to prevent stretch.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Butyl-Polyisobutylene Sealant:

a. "PTI 404"; Protective Treatment, Inc.
b. Or equal

2. Butyl-Polyisobutylene Tape Sealant:

a. "Extru-Seal Tape"; Pecora Corp.
b. "PTI 606"; Protective Treatments, Inc.
c. "Tremco 440 Tape"; Tremco Inc.
d. Or equal

2.7 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System : Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Available Products:

a. Dow Corning Corporation; 123 Silicone Seal.
b. GE Silicones; UltraSpan US1100.
c. Pecora Corporation; Sil-Span.
d. Tremco; Spectrem Ez Seal.
e. Or equal.

B. Preformed Foam Sealant : Manufacturer's standard preformed, precompressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with butyl sealant; is factory produced in precompressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:

1. Available Products:

a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
b. illbruck Sealant Systems, Inc.; Wilseal 600.

c. Polytite Manufacturing Corporation; Polytite B.
d. Polytite Manufacturing Corporation; Polytite Standard.
e. Sandell Manufacturing Co., Inc.; Polyseal.
f. Or equal.

2. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

a. Density: Manufacturer's standard

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

   a. Concrete.
   b. Masonry.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

   a. Metal.
   b. Insert other nonporous joint substrate.

B. Joint Priming: Prime joint substrates, using methods and materials recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

   a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

H. FIELD QUALITY CONTROL

I. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:

   a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
   b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to [Method A, Field-Applied Sealant Joint Hand Pull Tab] [Method B, Exposed Surface Finish Hand Pull Tab] [Method C, Field-Applied Sealant Joint Hand Pull Flap] [or] [Method D, Water Immersion] in Appendix X1 in ASTM C 1193[, as appropriate for type of joint-sealant application indicated].

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect tested joints and report on the following:

a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
b. Whether sealants filled joint cavities and are free of voids.
c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

J. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or non-compliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

DIVISION 9 – FINISHES

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Surface preparation and field application of high-performance coating systems to items and surfaces scheduled
2. Coating for exposed metal and fabrications indicated

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The Agency requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.4 DEFINITIONS

A. Standard coating terms defined in ASTM D 16 apply to this Section.

B. Gloss ranges used in this Section include the following:

1. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

B. A completed LEED BUILDING MATERIALS CERTIFICATION FORM, per Section 013300 – Submittal Requirements under the LEED BUILDING Submittal Requirements article of these specifications. Information to be supplied includes:

1. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
2. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).

3. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
4. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

C. Product Cut Sheets for all materials that meet the LEED BUILDING Performance Requirements this Section.

D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

E. Product Data: For each coating system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.

F. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.

G. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

1. Provide stepped Samples defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. List of material and application for each coat of each sample. Label each sample for location and application.
3. Submit samples on the following substrates for Architect's review of color and texture:

a. Ferrous Metal: Provide two 4-inch- square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

H. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.6 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.
3. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l)

4. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 01115: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.
5. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section

B. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

C. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

1. Name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.8 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.

1.9 EXTRA MATERIALS

A. General: Furnish additional (extra materials/attic stock) high-performance coating system materials from the same production run as materials applied and in quantities described below. Package coating materials in unopened, factory-sealed containers for storage and identify with labels describing contents.

1. Quantity: Furnish attic stock coating system materials in quantities indicated below:

a. Polyamide Epoxy (Primer/Intermediate Coat): 2 gallons of each type/color applied.
b. Aliphatic Acrylic Polyurethane (Finish/Topcoat): One case of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: The following manufacturers are referred to in the coating system descriptions by shortened versions of their names shown in parenthesis:

1. Moore: Benjamin Moore & Co. (Moore).
2. Pittsburgh Paint; PPG Industries, Inc. (PPG).
3. Sherwin Williams; Industrial and Marine Coatings (S-W).
4. Tnemec Company, Inc. (Tnemec).
5. Or equal.

2.2 COATINGS MATERIALS, GENERAL

A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2. Performance: As per manufacturers data sheet

C. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that have a VOC classification of 450 g/L or less.

D. Chemical Components of Interior Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Non-Flat Paints and Coatings: VOC content of not more than 150 g/L.
3. Anticorrosive Coatings: VOC content of not more than 250 g/L.

4. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
5. Restricted Components: Paints and coatings shall not contain any of the following:

    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1,2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.
    s. Methyl ethyl ketone.
    t. Methyl isobutyl ketone.
    u. Methylene chloride.
    v. Naphthalene.
    w. Toluene (methylbenzene).
    x. 1,1,1-trichloroethane.
    y. Vinyl chloride.

2.3 COLORS

A. Colors: Match the Architect's samples.

2.4 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS

A. General: The manufacturers and products listed represent the basis of design. Equal products of listed or other manufacturers are accepted provided the products of one manufacturer are used for a specified scheduled system.

B. Ferrous Metal: Provide the following finish systems over exterior ferrous-metal surfaces:

1. Semi-Gloss Finish: One finish coat over a field applied intermediate coat over a shop applied primer and intermediate coat.

    a. Primer and Intermediate Coats (Shop Applied): Epoxy primer applied at spreading rate scheduled, but not less than as recommended by manufacturer.

        1) Tnemec: "Series N27 S.T. Typoxy" (polyamide epoxy).
        2) Or Equal

    b. First Coats (Field Applied): Epoxy primer/paint applied at spreading rate scheduled, but not less than as recommended by manufacturer.

1) Tnemec: "Series N27 S.T. Typoxy" (polyamide epoxy).
2) Or equal

c. Finish/Topcoat: Aliphatic polyurethane enamel applied at spreading rate scheduled, but not less than as recommended by manufacturer.

1) Tnemec: "Series 73 Endura-Shield" (aliphatic acrylic polyurethane).
2) Or Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.

1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.

B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.

1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:

a. Confirmation of primer's suitability for expected service conditions.
b. Confirmation of primer's ability to be top coated with materials specified.

2. Notify the Architect about anticipated problems before using the coatings specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

B. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminates from cleaning process will not fall on wet, newly coated surfaces.

C. Surface Preparation: Clean and prepare all steel surfaces, in the fabricator's shop, to be coated according to manufacturer's written instructions for each substrate condition and as specified.

1. Ferrous-Metal Substrates: Clean ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.

    a. Commercial Blast Clean steel surfaces as recommended by coating manufacturer and according to SSPC-SP 6/NACE No. 3.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming in accordance with the coating system manufacturer's recommendations.
    c. Touch up bare areas and shop-applied coatings that have been damaged. Wire brush, solvent clean, and touch up with coating identical to those shop applied.

D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
3. Use only the type of thinners approved by manufacturer and only within recommended limits.

E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply high-performance coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
4. Provide finish coats compatible with primers used.
5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

    a. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
    b. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required is the same regardless of application method.

a. Omit primer on metal surfaces that have been shop primed and touchup painted.
b. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
c. Where manufacturer's written instructions require sanding, sand between applications to produce a smooth, even surface.
d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.

C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.

a. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
b. Brush out and work brush coats into surfaces in an even film.
c. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.
3. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.

a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
b. Apply each coat to provide the equivalent hiding of brush-applied coats.
c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.

D. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.

1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 96 00

DIVISION 31 – EARTHWORK

SECTION 31 20 00 – EARTH MOVING

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. Section Includes:

1. Topsoil stripping, stockpiling, respreading, and removal.
2. Rough Grading and preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
3. Finish Grading for slabs-on-grade, walks, pavements, lawns, and plantings.
4. Dressing of shoulders and banks.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The University of South Carolina requires the Contractor to implement practices and procedures to meet the project's environmental performances goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions shall not be allowed if such changes comprise the stated LEED BUILDING Performance Criteria.

1.4 REFERENCES

A. ANSI/ASTM D698 – Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures, using 5.5 lbs. Rammer and 12-inch drop.

B. ANSI/ASTM D1556 – Test Method for Density of Soil in Place by Sand-Cone Method.

C. SCDOT – Standard Specifications for Highway Construction, South Carolina Department of Transportation; 2000 Edition.

1.5 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations indicated.

1. Unauthorized Excavations: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at the Contractor's expense.
2. Additional Excavations: Excavation below subgrade elevations as directed by the Architect/Engineer.

   a. When excavations have reached required subgrade elevations, notify the Architect/Engineer and Testing Agency, who will make an inspection of conditions. If the Architect/Engineer and Testing Agency determine that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated materials by the Architect/Engineer and Geotechnical Engineer.
   b. The Contract Sum may be adjusted by an appropriate Contract Modification.
      1) Removal of unsuitable material and its replacement, as directed, will be paid on basis of Conditions of Contract relative to changes in Work. Notify the Architect/Engineer prior to removal of any unsuitable materials.

3. Muck: Materials unsuitable of carrying loads due to high organic content or saturation to the extent that it is somewhat fluid and must be removed by dragline, dredge or other special equipment, are designated as Muck.

4. Bulk Excavation: Excavations more than 10-feet in width and pits more than 30-feet in either length or width.

G. Fill: Soil materials used to raise to subgrade elevations indicated.

H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1-c.y. for bulk excavation or ¾-c.y. for trench and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Trenches and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbs. and stick-crowd force of not less than 18,700 lbs.; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 45,000-lbs. breakout force; measured according to SAE J-732.

I. Structures: Buildings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2-inches in diameter; and free of weeds, roots, and other deleterious materials.

M. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.6 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Drainage fabric.
3. Separation fabric.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curves according to ASTM D698 for each on-site or borrow soil material proposed for fill and backfill.
3. Laboratory compaction curves according to ASTM D1557 for each on-site or borrow soil material proposed for fill and backfill.

C. Project Record Documents: Accurately record actual locations and make as as-built drawing of all utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.7 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Perform Work in accordance with State of South Carolina Highway Department Standard Specifications.

1. Maintain one copy on site.

C. 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.

D. Geotechnical Testing and Inspection Service: The Owner will employ and pay for a qualified independent Geotechnical Testing Agency to perform soil testing and inspection services during earthwork operations. The Contractor shall schedule his work in such a manner to permit a

reasonable amount of time for testing to be performed before placing succeeding lifts of fill material and shall keep the Testing Agency informed of all progress.

1. The Owner shall pay for the cost of initial testing, subsequent tests, which are required as a result of a test failure, shall be paid for by the Contractor.

E. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock-definition testing, as documented according to ASTM D3740 and ASTM E548.

F. Use of Explosives: Use of explosives is NOT permitted on the Owner's property.

G. Pre-Excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Specification Sections.

1.8 PROJECT CONDITIONS

A. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

1. DO NOT BEGIN ANY TRENCH/PIT EXCAVATION BEFORE CALLING 'PALMETTO UTILITY PROTECTION SERVICE' AT 1-800-922-0983. Call 72-Hours before any planned excavation activities. Utilities within Public Properties and Easements will be located by P.U.P.S. Failure to notify P.U.P.S., will result in the Contractor being liable for any repairs to utilities which are damaged.
2. In the event uncharted, or incorrectly charted, piping or other utilities are encountered during excavation, consult utility owner immediately for directions. Cooperate with the Owner and utility companies in keeping respective services in operations. Repair damaged utilities to the satisfaction of the utility owner.
3. Do not interrupt existing utilities serving facilities occupied by the Owner or others, during occupied hours, except when permitted in writing by the Architect/Engineer and then only after acceptable temporary utilities have been provided.
4. Provide a minimum of 48-hours notice to the Architect/Engineer, and receive written notice to proceed before interrupting any utility.

B. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
3. Perform excavation by hand within drip line of large trees to remain. Protect root systems from damage or dry-out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with moistened burlap.

C. Dust Control: Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to others working on or near the site.

D. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, pavements, curbs, gutters, and other structures from excavation equipment and vehicular traffic.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Soil materials used as fill, backfill, subgrades for structures or pavements, embankments, or grading shall consist of suitable materials as found available on site until such supply of on-site material is depleted.

1. Provide suitable materials free of organic matter and deleterious substances, containing no rocks or lumps over 6-inches in the largest dimension, and with not more than 15% of rocks or lumps larger than 2-1/2 inches in the greatest dimension.
2. Do not permit rocks having a dimension greater than 1-inch in the upper 6-inches of fill or embankment.

B. In the event that the quantity of suitable on-site materials is insufficient to complete the Work, suitable borrow materials, as approved by the Architect/Engineer, shall be provided by the Contractor at no additional expense to the Owner.

C. Satisfactory Soils: ASTM D2487 soil classification groups CL, GW, GP, GM, ML, SC, SM, and SW, or a combination of these group symbols; Graded, free of debris, waste, frozen materials, vegetation, and other deleterious matter.

D. Unsatisfactory Soils: ASTM D2487 soil classification groups CH, GC, ML, MH, SP, OL, OH, and PT, or a combination of these group symbols. All highly organic soils will be considered unsuitable.

1. Excess water in soil materials will cause soil to be determined unsuitable regardless of normal classification. Unsatisfactory soils also include satisfactory soils not maintained within 2-percent of optimum moisture content at time of compaction.
2. The acceptability of composite sand-clay, sand-silt, and silt-clay soils will be determined by the Geotechnical Engineer.

E. Subsoil Materials: Excavated material, graded free of lumps larger than 6-inches and rocks larger than 3-inches and debris.

F. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2-inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

G. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90-percent passing a 1-1/2-inch sieve and not more than 12-percent passing a No. 200 sieve.

H. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 95-percent passing a 1-1/2-inch sieve and not more than 8-percent passing a No. 200 sieve.

I. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100-percent passing a 1-inch sieve and not more than 8-percent passing a No. 200 sieve.

J. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100-percent passing a 1-1/2- inch sieve and 0 to 5-percent passing a No. 8 sieve.

K. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100-percent passing a 1-inch sieve and 0 to 5-percent passing a No. 4 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6-inches wide and 4-mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6-inches wide and 4-mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30-inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sanitary and Storm Sewer systems.

C. Filter Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to SCDOT Standard Specifications Section 804.11 (2000), ASTM D4759, and referenced standard test methods:

1. Grab Tensile Strength: 90 lbs.; ASTM D4632.
2. Tear Strength: 40 lbs.; ASTM D4533.
3. Puncture Resistance: 40 lbs.; ASTM D4833.
4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D4491.
5. Apparent Opening Size: No. 50; ASTM D4751.
6. Acceptable Products (or equal):

   a. AMOCO Fabrics and Fibers Co.
   b. Mirafi, Inc.
   c. Reemay Inc., Typar Geotextile Fabric.

D. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to SCDOT Standard Specifications Section 804.11 (2000), ASTM D4759, and referenced standard test methods:

1. Grab Tensile Strength: 200 lbs.; ASTM D4632.
2. Tear Strength: 80 lbs.; ASTM D4533.
3. Puncture Resistance: 80 lbs.; ASTM D4833.
4. Water Flow Rate: 4 gpm per sq. ft.; ASTM D4491.
5. Apparent Opening Size: No. 30; ASTM D4751.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey benchmarks, existing grades and contours, and intended elevations for the Work are as indicated.

B. Examine the areas and conditions under which the Work of this Section will be preformed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

C. All site preparation work, topsoil and subsoil excavation, and filling work shall be performed in strict accordance with this specification and in accordance with the subsurface investigation report. The strictest requirements shall apply if discrepancies occur.

3.2 PREPARATION

A. Verify that grubbing operations are completed before commencing the Work of this Section.

B. Complete any demolition and/or removal work as may be required prior to grading operations.

C. Identify required lines, levels, contours, and datum.

D. Stake and flag locations of known utilities.

E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

F. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

G. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

H. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

I. Establish the gravel Construction Entrance.

J. Sampling and Preliminary Testing:

1. Prior to beginning any grading operations, the Contractor shall submit to the Architect/Engineer a proposed sequence of excavation operations.
2. Based upon the sequence of excavations, samples of the anticipated fill materials will be obtained as excavations proceed and tested for grain size, permeability, and moisture-density relationships using the Standard Proctor Method (ASTM D698, Method A).
3. Allow sufficient time for completion of laboratory tests of the soils being tested before beginning any fill operations with the soil in question.

3.3 DEWATERING

A. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.4 EXPLOSIVES

A. Explosives: Do not use explosives.

3.5 GENERAL EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. Suitable excavation material shall be transported to and placed in fill areas within the limits of the Work.

C. Unsuitable materials encountered under the building pad must be excavated to the extent as directed by the Architect/Engineer and replaced with suitable materials from on-site or off-site borrow excavations.

D. Unsuitable materials encountered in areas to be paved shall be excavated to a minimum of 2-feet below finish grade and replaced with suitable materials from on-site or off-site borrow excavations.

E. Unsuitable and surplus excavation materials, not required for subsequent fill or backfill, shall be disposed of off-site.

3.6 STABILITY OF EXCAVATIONS

A. General: Comply with all local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope side of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated. Maintain sides and slopes of excavations in safe condition until completion of backfill.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross bracing, in good serviceable condition. Maintain shoring and bracing in excavations during the entire time period excavations will be open. Extend shoring and bracing as excavation progresses.

3.7 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials and stockpile for latter use.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable materials.
2. Where existing trees are indicated to remain, leave existing topsoil in-place within the drip line to prevent damage to root systems.

B. Stockpile in areas designated on site.

C. Do not remove topsoil when wet.

D. Stockpile topsoil to height not to exceed 8-feet. Cover to protect from erosion.

E. Do not allow topsoil to be mixed with subsoils.

3.8 SOIL EXCAVATION (CUTS)

A. Perform excavating of every type or material encountered, within the limits of the Work, to the lines, grades, and elevations indicated and specified.

B. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

C. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

D. When excavating through roots, perform work by hand and cut roots with a sharp axe.

E. Benching Slopes: Horizontally bench existing slopes greater than 4:1 (4-horizontal to 1-vertical) to key fill material to slope for firm bearing.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

G. Rock Excavation:

1. Notify the Architect/Engineer upon encountering rock or similar materials that cannot be removed or excavated by conventional earth moving or ripping equipment.
2. Do not use explosives on the Owner's Property without written permission from the Architect/Engineer.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

B. Stockpile excavated materials acceptable for backfill and fill where directed.

C. Stockpile excavated topsoil to be reused on-site; remove remainder from site.

D. Stockpile excavated subsoil, not placed directly into fill areas and to be reused at a later time, on-site; remove remainder from site.

3.10 BACKFILL AND FILL

A. Use fills consisting of suitable materials placed in loose lifts of 8-inches or less and rolled and/or vibrated with suitable equipment until compacted.

B. Do not place materials containing rocks or clumps that will pass through a 6-inch diameter ring within the top 12-inches of the surface of the completed fill. Do not place materials containing rocks that will not pass through a 1-inch ring within the top 6-inches of the completed fill.

C. Fill materials containing broken concrete or broken asphaltic pavements will not be acceptable.

D. General: Place and compact soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

1. Under grass and planted areas; use satisfactory excavated or borrow soil material.
2. Under walks and pavements; use satisfactory excavated or borrow soil material and appropriate subbase material.
3. Under steps and ramps; use satisfactory excavated or borrow soil material and appropriate subbase material.
4. Under building slabs; use satisfactory excavated or borrow soil material and appropriate granular drainage fill subbase material.
5. Under footings and foundations; use satisfactory excavated or borrow soil material.

3.11 PLACEMENT AND COMPACTION

A. Fill area to contours and elevations with unfrozen, dry materials.

B. 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 4-horizontal to 1-vertical (4:1) such that fill materials will bond with existing surface.

C. When existing ground surface has a density less than that specified under "Compaction" for a particular area classification, break up ground surface, pulverize, moisture-condition to within 2-percent of optimum moisture content, and compact to required depth and percentage of maximum density.

D. Place backfill and fill materials in layers not more than 8-inches loose depth for material to be compacted by heavy compaction equipment, and not more than 4-inches loose depth for material to be compacted with hand-operated tampers.

E. Before compaction, moisten or aerate each layer as necessary to within 2-percent of optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

F. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or

conduit by carrying material uniformly around structure, piping, or conduit to approximately the same elevation in each lift.

G. Control soil and fill compaction, providing a minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by the Architect/Engineer if soil density tests indicate inadequate compaction.

H. Percentage of Maximum Density Requirements: Compact soils to not less than the following percentages of maximum density per Modified Proctor.

1. Under structures, building slabs, steps, and pavements; compact top 12-inches of existing subgrade and each subsequent layer of backfill or fill material to 98-percent maximum density.
2. Under walkways; compact top 6-inches of existing subgrade and each subsequent layer of backfill or fill material to 95-percent maximum density.
3. Under lawn or unpaved areas; compact top 6-inches of existing subgrade and each subsequent layer of backfill or fill material to 90-percent maximum density.
4. Under existing pavements to be removed and replaced for utility installation; compact top 24-inches of existing subgrade and each subsequent layer of backfill or fill material to 98-percent maximum density.

I. 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. Apply water in minimum quantities as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil materials that are wet to permit compaction to specified density.
2. Stockpile or spread soil materials that have been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory level.

J. Slope grades away from buildings a minimum of 3-inches in 10-feet, unless noted otherwise.

K. Make grade changes gradual. Blend slopes into level areas.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Remove debris, roots, branches, and stones in excess of 1/2-inch in size. Remove soil contaminated with petroleum products.

C. Site Grading Outside Building Lines: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Shape surfaces to receive topsoil to within not more than 0.1-foot.
2. Walks: Shape surface of areas under walks to line, grade, and cross-section to within not more than 0.1-foot.

3. Pavements: Shape surface of areas under pavements to line, grade, and cross-section to within not more than 1/2-inch.

D. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

E. Compaction: After grading, compact subgrade surfaces to depth and indicated percentage per "Placement and Compaction."

F. Surface Roughening:

1. Where topsoil is to be placed, scarify surface to depth of 3-inches.
2. In areas where vehicles or equipment have compacted soils, scarify surface to a depth of 3-inches.
3. Cuts, Fills, and Graded Areas that will be Mowed:

a. Make slopes to be mowed no steeper that 3-horizontal to 1-vertical (3:1).
b. Roughen these areas with shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of any such tillage implement on the contour.
c. Make grooves formed by such implements close together (less than 10-inches) and not less than 1-inch deep.
d. Excessive roughness is undesirable for areas to be mowed.

4. Roughening with Tracked Machinery:

a. Limit roughening with tracked machinery to sandy soils to avoid undue compaction of the soil surface. Tracking is generally not as effective as the other roughening methods described.
b. Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during final grading operations.

3.13 FINISH GRADING

A. General: Finish grading consists of preparation of all disturbed areas outside of structures, paving and other surfaces for the establishment of lawn areas.

B. Before Finish Grading:

1. Verify building and trench backfilling has been inspected.
2. Verify subgrade has been contoured and compacted.

C. Degree of finish shall be that ordinarily obtainable from a blade-grader, supplemented with hand raking and finishing.

D. Loosen subgrade of lawn areas to minimum depth of 4-inches. Remove stones measuring over 1-1/2 inches in any dimension. Remove sticks, roots, rubbish, and other extraneous matter. Limit preparation to areas that will be planted promptly after preparation.

E. Spread topsoil to minimum depth required to meet lines, grades, and elevations shown, after light rolling and natural settlement.

F. Place topsoil in areas where seeding, sodding, planting, and other landscaped areas are indicated.

G. Place topsoil to the following compacted thickness:

1. Areas to be Seeded with Grass: 6-inches.
2. Areas to be Sodded with Grass: 4-inches.

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and other foreign material while spreading.

J. Near existing plants, buildings and other features spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contours of subgrade.

3.14 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.1-foot from required elevation.

B. Top Surface of Finish Grade: Plus or minus 1/2-inch from required elevation.

3.15 SUBBASE AND BASE COURSES

A. General: Subbase courses consist of placing subbase material, in layers of specified thicknesses, over subgrade surfaces to support a pavement base course.

1. Base courses, subbase courses, and drainage base courses are specified in Section 02721 - Aggregate Base Courses.

B. Excavation for Pavements: Cut surface under pavement to comply with cross-section, elevations, and grades as indicated.

C. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

D. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12-inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: The Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

B. Allow Testing Agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing Agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2922, and ASTM D2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one (1) test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three (3) tests.

D. When Testing Agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

E. Proofrolling: The Contractor shall proofroll subgrade areas that will receive paving, structures on fill or impervious lining material.

1. Make at least three (3) passes with a 25 to 50-ton rubber tired vehicle over the entire area.
2. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory materials and compacted as specified.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by the Architect/Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 20 00

SECTION 31 31 16 – TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Chemical Soil Treatment for Subterranean Termite Control.

1. Below slabs-on-grade.
2. Under, and at the perimeter of, interior and exterior foundations.

1.3 REFERENCES

A. Title 7, United States Code, 136 through 136y – Federal Insecticide, Fungicide and Rodenticide Act; United States Code; 1947 (Revised 1988).

1.4 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

1.5 SUBMITTALS

A. See Division 1 Specification Sections for submittal procedures.

B. Product Data: Treatments and application instructions, including EPA-Registered Label.

1. Indicate toxicants to be used, composition by percentages, dilution schedule, and intended application rates.
2. Indicate caution requirements and include Manufacturer's labels and seals identifying contents.

C. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

1. Indicate regulatory agency approval reports when required.
2. Certify that toxicants meet or exceed specified required and all requirements of authorities having jurisdiction.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:

1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.

F. Maintenance Data: Indicate re-treatment schedule and warranty period.

G. Warranties: Submit manufacturer's warranty and ensure that forms have been completed in the Owner's name and registered with the manufacturer.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

1. Company specializing in performing the Work of this Section with minimum 3-years documented experienced, approved by manufacturer, and licensed in the State of South Carolina.
2. All termite pesticides shall be provided in strict accordance to South Carolina Pesticide Control Act (SC Law 46-13 and Amendments) and Federal Regulations.

1.7 REGULATORY REQUIREMENTS

A. All termite pesticides shall be provided in strict accordance to South Carolina Pesticide Control Act (SC Law 46-13 and Amendment(s) and Federal Regulations. The contractor shall notify Clemson University Pesticide Regulation and Controls Program prior to beginning of treatment and application 864.646.2121).

B. Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

C. Conform to applicable State of South Carolina codes for requirements for application, application licensing, and authority to use toxicant chemicals in accordance with EPA regulations.

D. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.9 COORDINATION

A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1. Apply toxicant a minimum of 12-hours prior to installation of vapor barrier under slabs-on-grade or finish grading work outside foundation walls.

1.10 WARRANTY

A. See Division 1 Specification Sections for additional warranty requirements.

B. General Warranty: Special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

C. Special Warranty: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

D. Warranty Period: Five years from date of Substantial Completion.

E. Inspect and report annually to the Owner in writing. Provide inspection services for the entire Warranty Period stipulated from the Date of Substantial Completion.

1.11 MAINTENANCE SERVICE

A. Continuing Service: Provide a proposal for continuing service, including monitoring, inspection, and re-treatment for occurrences of termite activity, from applicator to Owner, in the form of a standard yearly (or other period) continuing service agreement, starting on the date of the end of the Warranty Period. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 TOXICANTS

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions

that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Chloropyrifos:

   a. Dursban TC, DowElanco.
   b. Cheminova.
   c. Garda.
   d. Or equal.

2. Permathrin:

   a. Dragnet FT, FMC Corp.; Pest Control Specialties.
   b. Torpedo, ICI Americas, Inc.
   c. Surrender.
   d. Or equal.

3. Cypermethrine:

   a. Prevail FT, FMC Corp.; Pest Control Specialties.
   b. Demom, ICI Americas, Inc.
   c. Cynoff.
   d. Or equal.

4. Fenvalerate:

   a. Gold Coast Tribute, DuPont.
   b. AgroEvo.
   c. Tribute.
   d. Or equal.

5. Isofenphose:

   a. Pryfon, Mobay Corp.
   b. Prelude.
   c. Prevail.
   d. Or equal.

C. Dilutant: As recommended by toxicant manufacturer.

2.2 MIXES

A. Mix toxicant chemical with dilutant in ratios as specified in manufacturer's written instructions for each type of application and as required by governing authorities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

B. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

C. Verify that final grading is complete.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

B. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Treat under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Treat adjacent soils including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electrical conduit penetrating slab, and around interior column footings, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids in masonry foundation walls.
4. Penetrations: Treat at expansion joints, control joints, and areas where slabs will be penetrated.

C. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

D. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

E. Post warning signs in areas of application.

F. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

G. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.4 PROTECTION OF FINISHED WORK

A. Do not permit soil grading over treated work.

END OF SECTION 31 31 16

DIVISION 33 – UTILITIES

SECTION 33 46 00 - SUBDRAINAGE

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. Section Includes:

1. Subdrainage systems for the following:

a. Foundations.
b. Retaining walls.

1.3 LEED BUILDING GENERAL REQUIREMENTS

A. The University of South Carolina requires the Contractor to implement practices and procedures to meet the project's environmental performances goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions shall not be allowed if such changes comprise the stated LEED BUILDING Performance Criteria.

1.4 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene.

B. HDPE: High-density polyethylene.

C. PE: Polyethylene.

D. PP: Polypropylene.

E. PS: Polystyrene.

F. PVC: Polyvinyl chloride.

1.5 SUBMITTALS

A. Product Data: For drainage conduit, drainage panels, and geotextile fabrics.

1. Perforated pipe.
2. Drainage panels.
3. Geotextile fabrics.

1.6 COORDINATION

A. Drainage panel materials and installation shall be compatible with waterproofing of walls below grade.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to various application articles in Part 3 for applications of pipe, tube, fitting, and joining materials.

2.2 DRAINAGE PIPES AND FITTINGS

A. Perforated, PVC Sewer Pipe and Fittings: ASTM D2729, bell-and-spigot ends, for loose joints.

2.3 DRAINAGE CONDUIT

A. Pipe and Fittings: Perforated, smooth PVC complying with ASTM D 4216 and ASTM D 2729.

1. Size: 6-inches high by approximately 2-1/4 inches thick with a minimum flow rate equal to NPS 4 pipe.
2. Fittings: PVC with NPS 4 outlet connection.
3. Couplings: PVC.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Wick Drain Corporation.
2. Grace, W. R. & Co.; Construction Products Div.
3. GREENSTREAK/Western Textile Products.
4. JDR Enterprises, Inc.

5. Ling Industrial Fabrics, Inc.
6. TC Mirafi.

B. Description: Prefabricated, composite panels, 36- to 60-inches wide, and manufactured with geotextile facing laminated to molded-plastic drainage core.

C. Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS.

1. Minimum Compressive Strength: 10,000-lbf/sq. ft. when tested according to ASTM D1621.
2. Minimum Flow Rate: 2.8-gpm per at hydraulic gradient of 1.0 and compressive stress of 25-psig when tested according to ASTM D4716.

D. Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50-percent; complying with the following properties determined according to AASHTO M 288:

1. Survivability: Class 2.
2. Apparent Opening Size: No. 70 sieve, maximum.
3. Permitivity: 0.1 per second, minimum.

E. Film Backing: Polymeric film bonded to drainage core surface.

2.5 FABRIC DRAINAGE PANELS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Akzo Nobel Geosynthetics Co.
2. GSE Lining Technology, Inc.
3. JDR Enterprises, Inc.
4. Strata Systems, Inc.
5. Tensar Earth Technologies, Inc.

B. Description: Prefabricated, composite drainage panels, made with drainage core and filter fabric, for use as part of foundation and retaining-wall drainage system.

C. Drainage Core: Open-construction, resilient, 0.8-inch-thick, nylon-filament mesh.

1. Minimum Flow Rate: 2.4-gpm per foot at hydraulic gradient of 1.0 and normal pressure of 3,600-psig when tested according to ASTM D4716.

D. Drainage Core: 3-dimensional, PE strand, 0.25-inch-thick, nonwoven net.

1. Minimum Flow Rate: 5-gpm per foot at hydraulic gradient of 1.0 and normal pressure of 3,600-psig when tested according to ASTM D4716.

E. Filter Fabric: Nonwoven geotextile filter fabric of PP or polyester fibers, or combination of both. Flow rates range from 120- to 200-gpm per sq. ft. when tested according to ASTM D4491.

2.6 INSULATION DRAINAGE PANELS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Diversifoam Products.
2. Dow Chemical Company (The).
3. Owens Corning.
4. Tenneco Building Products.

B. Description: Extruded-polystyrene board insulation complying with ASTM C 578; fabricated with tongue-and-groove edges and with one side having grooved drainage channels, faced with manufacturer's standard, nonwoven geotextile filter fabric.

1. Type IV, 1.6-lb/cu. ft. minimum density and 25-psig minimum compressive strength.

2.7 SOIL MATERIALS

A. See Section 312000 for additional information.

B. Impervious Fill: Clay, gravel, and sand mixture.

C. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D448, coarse aggregate, Size No. 57, with 100-percent passing 1-1/2-inch sieve and not more than 5-percent passing No. 8 sieve.

2.8 GEOTEXTILE FILTER FABRICS

A. Woven or nonwoven geotextile filter fabric of PP or polyester fibers, or combination of both. Flow rates range from 110- to 330-gpm per sq. ft. when tested according to ASTM D4491. Available styles are flat and sock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00, 31 50 00 and 33 46 00.

3.3 SUBDRAINAGE SYSTEM APPLICATIONS

A. NPS 4 Piping:

1. Perforated, PVC sewer pipe and fittings for loose, bell-and-spigot joints.

3.4 FOUNDATION DRAINAGE INSTALLATION

A. Bottom Impervious Fill: Place impervious fill material on subgrade adjacent to bottom of footing after concrete footings have been cured and forms removed. Place and compact impervious fill to dimensions indicated, but not less than 6-inches deep and 12-inches wide.

B. Drainage Fill: Place supporting layer of drainage fill over compacted subgrade to compacted depth of not less than 4-inches. After installing drainage piping, add drainage fill to width of at least 6-inches on side away from wall and to top of pipe to perform tests. After satisfactory testing, cover piping to width of at least 6-inches on side away from footing and above top of pipe per details. Place drainage fill in layers not exceeding 3-inches in loose depth; compact each layer placed.

1. Before installing drainage fill, lay flat-style geotextile filter fabric in trench and overlap trench sides. After installing drainage fill, wrap top of drainage fill with flat-style geotextile filter fabric.
2. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with electrical tape.

C. Install vertical drainage panel as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated, PE or PVC drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. Mark horizontal calk line on wall at a point 6-inches less than panel width above footing bottom. Before marking wall, subtract footing width.
4. Separate 4-inches of fabric at beginning of roll and cut away 4-inches of core. Wrap fabric around end of remaining core.
5. Wrap bottom of panel around drainage pipe.
6. Attach panel to wall at horizontal mark and at beginning of pipe. Place core side of panel against wall. Use concrete nails with washers through product cylinders to attach panel to wall. Place nails from 2- to 6-inches below top of panel, approximately 48-inches apart. Some manufacturers use construction adhesives, metal stick pins, or double-sided tape. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
7. If another panel is required on the same row, cut away 4-inches of installed panel core and wrap fabric over new panel.
8. If additional rows of panel are required, overlap lower panel with 4-inches of fabric.
9. Cut panel as necessary to keep top 12-inches below finish grade.
10. For inside corners, bend panel. For outside corners, cut core to provide 3-inches for overlap.
11. Do not use drainage panels as protection over waterproof membrane, unless otherwise approved by waterproofing membrane manufacturer.

D. Fill to Grade: Place native fill material over compacted drainage fill. Place material in loose-depth layers not exceeding 6-inches. Thoroughly compact each layer. Fill to finish elevations and slope away from building.

3.5 RETAINING-WALL DRAINAGE INSTALLATION

A. Drainage Fill: Place supporting layer of drainage fill over compacted subgrade to compacted depth of not less than 4-inches. After installing drainage piping, add drainage fill to width of at least 6-inches on side away from wall and to top of pipe to perform tests. After satisfactory testing, cover piping to width of at least 6-inches on side away from footing and above top of pipe per details. Place drainage fill in layers not exceeding 3-inches in loose depth; compact each layer placed.

1. Before installing drainage fill, lay flat-style geotextile filter fabric in trench and overlap trench sides. After installing drainage fill, wrap top of drainage fill with flat-style geotextile filter fabric.
2. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with electrical tape.
3. After installing drainage fill, place one layer of flat-style geotextile filter fabric over top of drainage fill, overlapping edges at least 4-inches.

B. Install vertical drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated, PE or PVC drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. If weep holes are used in lieu of drainage pipe, cut 1/2-inch-diameter holes on core side at weep-hole locations. Do not cut fabric.
4. Mark horizontal calk line on wall at a point 6-inches less than panel width above footing bottom. Before marking wall, subtract footing width.
5. Separate 4-inches of fabric at beginning of roll and cut away 4-inches of core. Wrap fabric around end of remaining core.
6. Wrap bottom of panel around drainage pipe.
7. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Use nails from 2- to 6-inches below top of panel, approximately 48-inches apart. Do not penetrate waterproofing.
8. If another panel is required on the same row, cut away 4-inches of installed panel core and wrap fabric over new panel.
9. If additional rows of panel are required, overlap lower panel with 4-inches of fabric.
10. Cut panel as necessary to keep top 12-inches below finish grade.
11. For inside corners, bend panel. For outside corners, cut core to provide 3-inches for overlap.
12. Do not use drainage panels as protection over waterproof membrane, unless otherwise approved by waterproofing membrane manufacturer.

C. Fill to Grade: Place native fill material over compacted drainage fill. Place material in loose-depth layers not exceeding 6inches. Thoroughly compact each layer. Fill to finish grade.

3.6 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5-percent and with a minimum cover of 36-inches, unless otherwise indicated.

2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping pitched down in direction of flow, at a minimum slope of 0.5-percent and with a minimum cover of 36-inches, unless otherwise indicated. However, when water discharges through wall weep holes, pipe may be installed with a minimum slope of zero percent.
3. Lay perforated pipe with perforations down.
4. Lay open-joint pipe spaced as indicated on Drawings or, if not indicated, with 1/4-inch space between ends. Cover top two-thirds of joint opening with open-joint screening material and tie with corrosion-resistant wire.
5. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PVC piping according to ASTM D2321.

3.7 PIPE JOINT CONSTRUCTION

A. Join perforated, PVC pipe and fittings according to ASTM D2729, with loose, bell-and-spigot joints.

3.8 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.9 FIELD QUALITY CONTROL

A. Testing: After installing drainage fill to top of pipe, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 33 46 00