

USC Aiken Outdoor Storage Building USC project # FP00000362

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PROJECT NUMBER: FP00000362

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SE-310

INVITATION FOR DESIGN-BID-BUILD CONSTRUCTION SERVICES

AGENCY/OWNER: University of South Carolina	
PROJECT NAME: USC Aiken Outdoor Storage Buil	lding
PROJECT NUMBER: FP00000362 CONS	STRUCTION COST RANGE: $$200,000$ to $$240,000$ N/A
PROJECT LOCATION: 471 University Parkway Ai	ken SC 29801
	rojects consists of constructing a new "L-Shape" pre-engineered outdoor
· · · · · · · · · · · · · · · · · · ·	pproximaltey 4000SF, Small and Minority business participation highly
encouraged.	TENME 10.00 NUMBER OF CORES 1
BID/SUBMITTAL DUE DATE: 5/21/2020 PROJECT DELIVERY METHOD: Design-Bid-Bu	TIME: 10:00am NUMBER OF COPIES: 1
AGENCY PROJECT COORDINATOR: Hatice Hil	
EMAIL: hikmeth@mailbox.sc.edu	TELEPHONE: 803-777-9994
DOCUMENTS MAY BE OBTAINED FROM: purc	nasnig.sc.edu
DID CECUDITY IS DECLIDED IN AN AMOUNT	NOT LESS THAN 50/ OF THE DASE DID
BID SECURITY IS REQUIRED IN AN AMOUNT	<u> </u>
PERFORMANCE BOND REQUIRED? Yes	No PAYMENT BOND REQUIRED? Yes No D
DOCUMENT DEPOSIT AMOUNT: \$ 0.00	_ IS DEPOSIT REFUNDABLE Yes \(\subseteq \text{No} \subseteq \text{N/A} \text{ \text{\infty}}
	source(s) to be listed as an official plan holder. Bidders that rely on copies obtained from with official plan holders & bidders will be via email or website posting.
Agency WILL NOT accept Bids sent via email.	
All questions & correspondence concerning this Invitation shall be as	ddressed to the A/E.
A/E NAME: USC Aiken	
A/E CONTACT: Brian Enter	
EMAIL: brianen@usca@usca.edu	TELEPHONE: 803-641-3254
PRE-BID CONFERENCE: Yes No	MANDATORY ATTENDANCE: Yes ☐ No ☐
PRE-BID DATE: 5/5/2020	TIME: 10:00am
PRE-BID PLACE: Conference Call (800) 7	65-1965 ACcess code 777-7162
	rian enter at 803-641-3254. Visitors will be limited to 1 per appointment.
• • • • •	astic gloves is mandatory. Six-foot social distancing rules apply fully.
Meeting location: USCA baseball stadium par	king lot located at 1116 Proud Pacer Drive.
BID OPENING PLACE: Conference Call (800) 765	-1965 ACcess code 777-7162
BID DELIVERY ADDRESSES:	
HAND-DELIVERY:	MAIL SERVICE:
Attn: Hatice Hikmet (Bid Enclosed FP00000362)	Attn: Hatice Hikmet (Bid Enclosed FP00000362)
925 Gadsen Street	
columbia, SC 29208	Columbia, SC 29208
IS PROJECT WITHIN AGENCY CONSTRUCTION CE	CRTIFICATION? (Agency MUST check one) Yes No 🗆
APPROVED BY:	DATE:
(OSE Project Manager)	

South Carolina Division of Procurement Services, Office of the State Engineer Version of $^{\bullet}AIA^{\circ}$ Document A701 $^{\top}M$ – 1997

Instructions to Bidders

This version of AIA Document A701™-1997 is modified by the South Carolina Division of Procurement Services, Office of the State Engineer ("SCOSE"). Publication of this version of AIA Document A701-1997 does not imply the American Institute of Architects' endorsement of any modification by SCOSE. A comparative version of AIA Document A701-1997 showing additions and deletions by SCOSE is available for review on the SCOSE Web site.

Cite this document as "AIA Document A701™ – 1997, Instructions to Bidders — SCOSE Version," or "AIA Document A701™ –1997 — SCOSE Version."

South Carolina Division of Procurement Services, Office of the State Engineer Version of MAIA Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:

(Name and location or address)
USC Aiken Outdoor Storage Building
650 Trolley Line Rd, Graniteville, SC 29829

THE OWNER:

(Name, legal status and address)
University of South Carolina Aiken
471 University Pkwy
AIKEN, SC 29801

The Owner is a Governmental Body of the State of South Carolina as defined by Title 11, Chapter 35 of the South Carolina Code of Laws, as amended.

THE ARCHITECT:

(Name, legal status and address)
Jumper Carter Sease Architects, PA
412 Meeting St,
W Columbia, SC 29169

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This document has important legal consequences, Consultation with an attorney is encouraged with respect to its completion or modification.

ARTICLE 1 DEFINITIONS

- § 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, Supplementary Instructions to Bidders, the Bid Form, the Notice of Intent to Award, 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 and 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 AIA Document A101TM_2007 Standard Form of Agreement Between Owner and Contractor, SCOSE edition. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean AIA Document A201TM_2007 General Conditions of the Contract for Construction, SCOSE edition.
- § 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.
- § 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.
- § 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- § 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.
- § 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.
- § 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- § 1.8 A Bidder is a person or entity who submits a Bid.
- § 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

- § 2.1 The Bidder by submitting a Bid represents that:
- § 2.1.1 The Bidder has read and understands the Bidding Documents and Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction. 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.
- § 2.1.2 The Bid is made in compliance with the Bidding Documents.
- § 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents 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.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

§ 2.1.5 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.

§ 2.1.5.1 By submitting a 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:
 - .1 those prices;
 - .2 the intention to submit a bid; or
 - .3 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 a bid for the purpose of restricting competition.
- § 2.1.5.2 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 Section 2.1.5.1 of this certification; or
 - .2 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 Section 2.1.5.1 of this certification [As used in this subdivision, the term "principals" means the person(s) in the bidder's organization responsible for determining the prices offered in this bid];
 - .3 As an authorized agent, does certify that the principals referenced in Section 2.1.5.2.2 of this certification have not participated, and will not participate, in any action contrary to Section 2.1.5.1 of this certification; and
 - .4 As an agent, has not personally participated, and will not participate, in any action contrary to Section 2.1.5.1 of this certification.
- § 2.1.5.3 If the bidder deletes or modifies Section 2.1.5.1.2 of this certification, the bidder must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

§ 2.1.6 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.

§ 2.1.7 CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS

§ 2.1.7.1 By submitting a Bid, Bidder certifies, to the best of its knowledge and belief, that:

- 1 Bidder and/or any of its Principals-
 - .1 Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;
 - .2 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
 - Are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in Section 2.1.7.1.1.2 of this provision.
- .2 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.

- "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).
- § 2.1.7.2 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.
- § 2.1.7.3 If Bidder is unable to certify the representations stated in Section 2.1.7.1, Bidder 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.
- § 2.1.7.4 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 Section 2.1.7.1 of this provision. The knowledge and information of a Bidder is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- § 2.1.7.5 The certification in Section 2.1.7.1 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.

§ 2.1.8 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 the 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, the 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.

§ 2.1.9 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.

- § 2.1.9.1 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.
- § 2.1.9.2 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.
- § 2.1.9.3 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.

§ 2.1.10 OPEN TRADE REPRESENTATION (JUN 2015)

By submitting an Offer, the Offeror represents that Offeror is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [02-2A083-1]

ARTICLE 3 BIDDING DOCUMENTS § 3.1 COPIES

- § 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 (10) 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.
- § 3.1.2 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- § 3.1.3 The Owner has made copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.
- § 3.1.4 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.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- § 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.
- § 3.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least ten (10) days prior to the date for receipt of Bids.
- § 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by written Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them. 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.

§ 3.3 SUBSTITUTIONS

- § 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. 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.
- § 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 (10) 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.

- § 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
- § 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 ADDENDA

- § 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.
- § 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- § 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.
- § 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.
- § 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, the 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.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

- § 4.1.1 Bids shall be submitted on the SE-330 Bid Form included with the Bidding Documents.
- § 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.
- § 4.1.3 Sums shall be expressed in figures.
- § 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid. 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.
- § 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 shall be used for both Alternates and Base Bid Work if Alternates are accepted.

- § 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 identify only those 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.
- § 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.

§ 4.2 BID SECURITY

- § 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.
- § 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.
- § 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.
- § 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.

§ 4.3 SUBMISSION OF BIDS

- § 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.
- § 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.
- § 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

- § 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.
- § 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.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

- § 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.
- § 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.
- § 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.
- § 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS § 5.1 OPENING OF BIDS

- § 5.1.1 Bids received on time will be publicly opened and will be read aloud. The Owner will not read aloud Bids that the Owner determines, at the time of opening, to be non-responsive.
- § 5.1.2 At bid opening, the Owner will announce the date and location of the posting of the Notice of Intended Award.
- § 5.1.3 The 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 the Owner determines to award the Project, the 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, the Owner will open and consider the Bid.

§ 5.2 REJECTION OF BIDS

- § 5.2.1 The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
- § 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.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION § 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.

§ 6.2 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 E (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].

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND § 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 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.

§ 7.2 TIME OF DELIVERY CONTRACT, CERTIFICATES OF INSURANCE AND FORM OF BONDS

§ 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 (7) days thereafter. The Bidder shall deliver the required bonds and certificate of insurance to the Owner not later than three (3) 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.

§ 7.2.2 The bonds shall be dated on or after the date of the Contract.

§ 7.2.3 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor, SCOSE edition.

ARTICLE 9 MISCELLANEOUS

§ 9.1 NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING IMPORTANT TAX NOTICE - NONRESIDENTS ONLY

- § 9.1.1 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.
- § 9.1.2 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
- § 9.1.3 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 (Available through SC Department of Revenue).

§ 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

- § 9.3.1 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that the 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.
- § 9.3.2 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that the Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act.
- § 9.3.3 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that the Bidder contends is protected by Section 11-35-1810.
- § 9.3.4 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.
- § 9.3.5 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.

- § 9.3.6 In determining whether to release documents, the State will detrimentally rely on the Bidders' marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED".
- § 9.3.7 By submitting a response, the 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

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

Room or Area of Posting: Lobby

Building Where Posted: U of SC Facilities Design & Construction Address of Building: 1300 Pickens Street Columbia, SC 29201 WEB site address (if applicable): http://purchasing.sc.edu

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

§ 9.5 PROTEST OF SOLICITATION OR AWARD

§ 9.5.1 Any prospective bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the solicitation of a contract shall protest within fifteen (15) 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 (10) 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.

- § 9.5.2 Any protest must be addressed to the CPO, Office of State Engineer, and submitted in writing:
 - .1 by email to protest-ose a mmo.sc.gov,
 - .2 by facsimile at 803-737-0639, or
 - 3 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

Bidders 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.

§ 9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS

§ 9.8.1 Pursuant to Section 12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The

taxpayer is eligible to claim the credit for 10 consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. The credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return.

§ 9.8.2 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.

§ 9.8.3 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

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

BID	SUBMITTED BY: (Bidder's Name)
RID	SUBMITTED TO: University of South Carolina
υщ	(Owner's Name)
FOR	R: PROJECT NAME: USC Aiken Outdoor Storage Building
	PROJECT NUMBER: FP00000362
OFF	ER
§ 1.	In response to the Invitation for Construction Services 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 SC Code § 11-35-3030(1), 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: (Bidder, check all that apply. Note, there may be more boxes than actual addenda. Do not check boxes that do not apply) ADDENDA: #1 #2 #3 #4 #5
§ 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):
	, which sum is hereafter called the Base Bid. (Bidder to insert Base Bid Amount on line above)

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

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

ALTERNATE # 1 (Brief Description):	
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$	
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)	
ALTERNATE # 2 (Brief Description):	
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$	
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)	
ALTERNATE # 3 (Brief Description):	
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$	
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)	

§ 6.3 UNIT PRICES:

BIDDER offers for the Agency's consideration and use, the following UNIT PRICES. The UNIT PRICES offered by BIDDER indicate the amount to be added to or deducted from the CONTRACT SUM for each item-unit combination. UNIT PRICES include all costs to the Agency, including those for materials, labor, equipment, tools of trades and labor, fees, taxes, insurance, bonding, overhead, profit, etc. The Agency reserves the right to include or not to include any of the following UNIT PRICES in the Contract and to negotiate the UNIT PRICES with BIDDER prior to including in the Contract.

No.	ITEM	UNIT OF MEASURE	ADD	DEDUCT
<u>1.</u>			\$	\$
2.			\$	
<u>3.</u>			\$	
4.			\$	\$
<u>5.</u>			\$	
6.			\$	

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§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED

(See Instructions on the following page BF-2A)

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

(A) SUBCONTRACTOR LICENSE CLASSIFICATION or SUBCLASSIFICATION NAME (Completed by Owner)	(B) LICENSE CLASSIFICATION or SUBCLASSIFICATION ABBREVIATION (Completed by Owner)	(C) SUBCONTRACTOR and/or PRIME CONTRACTOR (Required - must be completed by Bidder)	(D) SUBCONTRACTOR'S and/or PRIME CONTRACTOR'S SC LICENSE NUMBER (Requested, but not Required)
	<u> </u>	ASE BID	
	ALTI	ERNATE #1	
	ALTI	ERNATE #2	
ALTERNATE #3			
			•

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.

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INSTRUCTIONS FOR SUBCONTRACTOR LISTING

- 1. Section 7 of the Bid Form sets forth an Owner-developed list of subcontractor license classifications or subclassifications for which Bidder is required to identify the entity (subcontractor(s) and/or himself) Bidder will use to perform this work.
 - **a.** Columns A & B: The Owner fills out these columns to identify the subcontractor license classification/subclassification and related license abbreviation for which the Bidder must list either a subcontractor or himself as the entity that will perform this work. In Column A, the subcontractor license classification/subclassification is identified by name and in Column B, the related contractor license abbreviation (per Title 40 of the SC Code of Laws) is listed. Abbreviations of licenses can be found at: https://llr.sc.gov/clb/PDFFiles/CLBClassificationAbbreviations.pdf. If the owner has not identified a subcontractor license classification/subclassification, the Bidder does not list a subcontractor.
 - b. Columns C and D: In these columns, the Bidder identifies the subcontractors it will use for the work of each license listed by the Owner in Columns A & B. Bidder must identify only the subcontractor(s) who will perform the work and no others. Bidders must make sure that their identification of each subcontractor is clear and unambiguous. A listing that could be any number of different entities may be cause for rejection of the bid as non-responsive. For example, a listing of M&M without additional information may be problematic if there are multiple different licensed contractors in South Carolina whose names start with M&M.
- 2. **Subcontractor Defined:** 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 pursuant to a contract with the prime contractor. Bidder should not identify sub-subcontractors in the spaces provided on the bid form but only those entities with which Bidder will contract directly. Likewise, do not identify 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).
- 3. Subcontractor Qualifications: Bidder must only list subcontractors who possess a South Carolina contractor's license that includes the license classification and/or subclassification identified by the Owner in Columns A & B. The subcontractor license must also be within the appropriate license group for the work. If Bidder lists a subcontractor who is not qualified to perform the work, the Bidder will be rejected as non-responsible.
- **4. Use of Own forces:** If, under the terms of the Bidding Documents and SC Contractor Licensing laws, Bidder is qualified to perform the work of a listed subcontractor classification or subclassification and Bidder does not intend to subcontract such work but to use Bidder's own employees to perform such work, the Bidder must insert itself in the space provided.

5. Use of Multiple Subcontractors:

- a. If Bidder intends to use multiple subcontractors to perform the work of a single license classification/subclassification, 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 license classification/subclassification and to use one or more subcontractors to perform the remaining work, Bidder must insert itself and each subcontractor, preferably separating them with the word "and". Bidder must use each entity listed for the work of a single license classification/subclassification in the performance of that work.
- b. Optional Listing Prohibited: Bidder may not list multiple subcontractors for a license classification/subclassification in a form that provides the Bidder the option, after bid opening or award, to choose one or more but not all the listed subcontractors to perform the work for which they are listed. A listing, which on its face requires subsequent explanation to determine whether it is an optional listing, is non-responsive. If Bidder intends to use multiple entities to perform the work for a single listing, Bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word "and" between the names of each entity listed. Agency 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 Agency may reasonably interpret as an optional listing.
- **6.** If Bidder is awarded the contract, Bidder must, except with the approval of the Agency for good cause shown, use the listed entities to perform the work for which they are listed.
- 7. 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.
- 8. Bidder's failure to identify an entity (subcontractor or himself) to perform the work of a subcontractor listed in Columns A & B will render the Bid non-responsive.

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§ 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 Construction Services, 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

§ 9.

	§ 1	1-35-3020(b)(i).
§ 9.	TI	ME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES
	a)	CONTRACT TIME
		Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work within 120 Calendar Days
	b)	from the Date of Commencement, subject to adjustments as provided in the Contract Documents. LIQUIDATED DAMAGES
		Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the amount of \$ \) for each Calendar Day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This amount is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.
§ 10.	AC	GREEMENTS
	a)	Bidder agrees that this bid is subject to the requirements of the laws 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.	EL	ECTRONIC BID BOND
	and Bio	signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, I Bond, included in the Bidding Documents.
		ECTRONIC BID BOND NUMBER:

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CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATION SC Contractor's License Number(s): Classification(s) & Limits: Subclassification(s) & Limits: By signing this Bid, the person signing reaffirms all representation and certification made by both the person signing and the Bidder, including without limitation, those appearing in Article 2 of the SCOSE Version of the AIA Document A701, Instructions to Bidders, is expressly incorporated by reference. BIDDER'S LEGAL NAME: ADDRESS: TELEPHONE: EMAIL: SIGNATURE: DATE: PRINT NAME: TITLE:_____

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AIA A101-2007

Standard Form of Agreement between Owner and Contractor South Carolina Division of Procurement Services, Office of Sate Engineer Version

Original AIA Document on file at the office of
University of South Carolina
1300 Pickens Streeet
Columbia, South Carolina 29208

South Carolina Division of Procurement Services, Office of the State Engineer Version of \overline{AIA} Document A201TM – 2007

General Conditions of the Contract for Construction

This version of AIA Document A201™–2007 is modified by the South Carolina Division of Procurement Services, Office of the State Engineer ("SCOSE"). Publication of this version of AIA Document A201–2007 does not imply the American Institute of Architects' endorsement of any modification by SCOSE. A comparative version of AIA Document A201–2007 showing additions and deletions by SCOSE is available for review on the SCOSE Web site.

Cite this document as "AIA Document A201™-2007, General Conditions of the Contract for Construction—SCOSE Version," or "AIA Document A201™-2007 — SCOSE Version."

South Carolina Division of Procurement Services, Office of the State Engineer Version of AIA Document A201 $^{\text{TM}}$ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)
USC Aiken Outdoor Storage Building
650 Trolley Line Rd, Graniteville, SC 29829

THE OWNER:

(Name, legal status and address)
University of South Carolina Aiken
471 University Pkwy
AIKEN, SC 29801

The Owner is a Governmental Body of the State of South Carolina as defined by Title 11, Chapter 35 of the South Carolina Code of Laws, as amended.

THE ARCHITECT:

(Name, legal status and address)
Jumper Carter Sease Architects, PA
412 Meeting St,
W Columbia, SC 29169

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- 1 GENERAL PROVISIONS
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- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 GENERAL PROVISIONS § 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings. Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean AIA Document A101TM_2007 Standard Form of Agreement Between Owner and Contractor, SCOSE edition. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean AIA Document A201TM_2007 General Conditions of the Contract for Construction, SCOSE edition.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 NOTICE TO PROCEED

The 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.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

- § 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. 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.
- § 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.
- § 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

- § 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.
- § 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner. Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER § 2.1 GENERAL

- § 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 § 8.3 of the Agreement.]
- § 2.1.2 The Owner shall furnish to the Contractor within fifteen (15) 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.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

- § 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.
- § 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
- § 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.
- § 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services; 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.
- § 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one electronic copy (.pdf format) of the Contract Documents. The Contractor may make reproductions of the Contract Documents pursuant to Section 1.5.2.
- § 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.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor 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 Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

- § 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.
- § 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- § 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. 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.
- § 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.
- § 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.
- § 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from latent errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed by the Owner in writing to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

- § 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.
- § 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

- § 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
- § 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.
- § 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. 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. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. The Contractor shall comply with the requirements of Title 12, Chapter 8 of the South Carolina Code of Laws, as amended, regarding withholding tax for nonresidents, employees, contractors and subcontractors.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or

negotiations concluded. 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.

- § 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.
- § 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.
- § 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.
- § 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. 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.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

- § 3.8.2 Unless otherwise provided in the Contract Documents.
 - .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
 - .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances: and
 - .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs, as documented by invoices, and the allowances under Section 3.8.2.1.
- § 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent, acceptable to the Owner, and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 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 whether the Owner has reasonable objection to the proposed superintendent. Failure of the Owner to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall notify the Owner, in writing, of any proposed change in the superintendent, including the reason therefore, prior to making such change. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 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 primaveratype 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.

§ 3.10.4 The Owner's review and acceptance of the 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.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- § 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
- § 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- § 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- § 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.
- § 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.
- § 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 for review and approval. A copy of the shop drawings will also be sent to OSE for information. 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 for approval.
- § 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- § 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.
- § 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.
- § 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, who shall comply with reasonable requirements of the Owner regarding qualifications and insurance and whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

- § 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.
- § 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 which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

§ 3.14 CUTTING AND PATCHING

- § 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.
- § 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withheld from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

- § 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.
- § 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 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.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents. 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.

§ 4.2.2 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. However, the Architect will not be required to make exhaustive or

continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 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. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

- § 4.2.5 Based on the Architect's evaluations of the Work completed and correlated with the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.
- § 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.
- § 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- § 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.
- § 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

- § 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.
- § 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. The Architect's response to such requests will be made in writing with reasonable promptness.
- § 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, and will not show partiality to either. Except in the case of interpretations resulting in omissions, defects, or errors in the Instruments of Service or perpetuating omissions, defects, or errors in the Instruments of Service, the Architect will not be liable for results of interpretations or decisions rendered in good faith. 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.
- § 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.
- § 4.2.14 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.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

- § 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.
- § 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- § 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 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.
- § 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.

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- § 5.2.3 If the Owner has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.
- § 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner makes reasonable objection to such substitution. The Contractor's request for substitution must be made to the Owner in writing accompanied by supporting information.
- § 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.

§ 5.3 SUBCONTRACTUAL RELATIONS

- § 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 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.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

- § 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that
 - .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
 - .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.
- § 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.
- § 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.
- § 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.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS § 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

- § 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.
- § 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.
- § 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Reserved.

§ 6.2 MUTUAL RESPONSIBILITY

- § 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- § 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable

for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

- § 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.
- § 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.
- § 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK § 7.1 GENERAL

- § 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.
- § 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone. 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.
- § 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

- § 7.2.1 A Change Order is a written instrument prepared by the Architect (using Form SE-380 "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.
- § 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 expenditure 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.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 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.
- § 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.
- § 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
- § 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
- § 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:
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work.
- § 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.
- § 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. 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.
- § 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

§ 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.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

- § 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- § 8.1.2 The date of commencement of the Work is the date established in the Agreement.
- § 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.
- § 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

- § 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
- § 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.
- § 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

- § 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.
- § 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.
- § 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION § 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. All changes to the Contract Sum shall be adjusted in accordance with Section 7.3.3.

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§ 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.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 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.

- § 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.
- § 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.
- § 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing provided such materials or equipment will be subsequently incorporated in the Work. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site. 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.
- § 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated in both the Application for Payment and, if required to be submitted by the Contractor, the accompanying current construction schedule and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, or (3) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect shall withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. 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. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- 6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

- § 9.6.2 Pursuant to Chapter 6 of Title 29 of the South Carolina Code of Laws, as amended, the Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.
- § 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.
- § 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.
- § 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.
- § 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.
- § 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 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 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.

§ 9.8 SUBSTANTIAL COMPLETION

- § 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use and when all required occupancy permits, if any, have been issued and copies have been delivered to the Owner.
- § 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive written list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
- § 9.8.3 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 re-inspections or, at the Owner's option, the costs may be deducted from payments due to the Contractor.

- § 9.8.3.1 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.
- § 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.
- § 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

- § 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.
- § 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 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 re-inspections 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.

§ 9.10.2 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.

§ 9.10.3 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. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

- § 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from
 - .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
 - .2 failure of the Work to comply with the requirements of the Contract Documents; or
 - .3 terms of special warranties required by the Contract Documents.

§ 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.

§ 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.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY § 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Subsubcontractors; and
- 3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- § 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- § 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.
- § 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- § 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.
- § 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.
- § 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

- § 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.
- § 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or

who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up. 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.

- § 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.
- § 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.
- § 10.3.5 In addition to its obligations under Section 3.18, the Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 Reserved.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. 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.

ARTICLE 11 INSURANCE AND BONDS § 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;

- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 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
	Products/Completed Operations	
(c)	Personal and Advertising Injury	\$1,000,000
(d)	Each Occurrence	\$1,000,000
	Damage to Rented Premises (ea occurrence)	
(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.

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

- .1 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;
- .2 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
- .3 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, the 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.

§ 11.1.4 A failure by the Owner to either (i) demand a certificate of insurance or written endorsement required by Section 11.1, or (ii) 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.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 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. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Subsubcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 Reserved.

§ 11.3.1.3 Reserved.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 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 be named insureds.

§ 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.

§ 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.

§ 11.3.5 Reserved.

§ 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.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, subsubcontractors, 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. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, subsubcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

- § 11.3.8 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. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.
- § 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.
- § 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.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 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.

- § 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.
- § 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.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK § 12.1 UNCOVERING OF WORK

- § 12.1.1 If a portion of the Work is covered contrary to the requirements specifically expressed in the Contract Documents, including inspections of work-in-progress required by all authorities having jurisdiction over the Project, it must, upon demand of the Architect or authority having jurisdiction, be uncovered for observation and be replaced at the Contractor's expense without change in the Contract Time.
- § 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

- § 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.
- § 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.
- § 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2 unless otherwise provided in the Contract Documents.
- § 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents. 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.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS § 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.

§ 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.

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

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Unless expressly provided otherwise, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

- § 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
 - 15.6.5 Service of Process

§ 13.5 TESTS AND INSPECTIONS

- § 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.
- § 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.
- § 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.
- § 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.
- § 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.
- § 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 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.

§ 13.7 Reserved

§ 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 subsubcontractors; 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)

§ 13.17 OPEN TRADE (JUN 2015)

During the contract term, including any renewals or extensions, Contractor will not engage in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [07-7A053-1]

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT § 14.1 TERMINATION BY THE CONTRACTOR

§ 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
- § 14.1.2 The Contractor may terminate the Contract if, 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, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.
- § 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages. Any adjustment to the Contract Sum pursuant to this Section shall be made in accordance with the requirements of Article 7.
- § 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 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.

- § 14.2.2 When any of the above reasons exist, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
 - .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
 - .2 Accept assignment of subcontracts pursuant to Section 5.4; and
 - .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.
- § 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.
- § 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.
- § 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.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

- § 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.
- § 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Any adjustment to the Contract Sum made pursuant to this section shall be made in accordance with the requirements of Article 7.3.3. No adjustment shall be made to the extent
 - .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
 - .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

- § 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.
- § 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.
- § 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and 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.

§ 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 State Fiscal Accountability Authority 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.

ARTICLE 15 CLAIMS AND DISPUTES § 15.1 CLAIMS § 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. 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. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 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.

§ 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.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary. 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.

- § 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.
 - 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) 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 and days the contractor was already scheduled to work. 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.

§ 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.
- § 15.1.6.3 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).

§ 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).

§ 15.2 Reserved.

§ 15.3 Reserved.

§ 15.4 Reserved.

§ 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.

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 S Building Inspections are required and are not part of the Contract			
The inspections required for this Work are:			
(Indicate which services are required and the provider)			
☐ Civil:			
Structural:			
Mechanical:			
Plumbing:			
Electrical:			
Gas:			
Other (list):			
Remarks:			

§ 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, or enter NONE)

§ 16.3 Requirements for Record Drawings, if any. (Refer to attachments as needed, or enter NONE)
§ 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, or enter NONE)
§ 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, or enter NONE)
§ 16.6 Requirements for Project Cleanup in addition to the Contract, if any. (Refer to attachments as needed, or enter NONE)
§ 16.7 List all attachments that modify these General Conditions. (If none, enter NONE)

Project Name: USC Aiken Outdoor Storage Building

Project Number: FP00000362

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

USC SUPPLEMENTAL GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS

WORK AREAS

- 1. The Contractor shall maintain the job site in a safe manner at all times. This includes (but is not limited to) the provision and/or maintenance of lighting, fencing, barricades around obstructions, and safety and directional signage.
- 2. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies, stairs and exterior walks. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the work area. Providing safe, accessible, plywood-shielded pedestrian ways around construction may be required if a suitable alternative route is not available.
- 3. At the beginning of the project, the USC Project Manager will establish the Contractor's lay-down area. This area will also be used for the Contractor's work vehicles. The lay-down area will be clearly identified to the contractor by the Project Manager, with a sketch or drawing provided to USC Parking Services. In turn, Parking Services will mark off this area with a sign containing the project name, Project Manager's 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 Project Manager. The area will be maintained in a neat and orderly fashion.
- 4. Work vehicles parked in the lay down area (or designated parking areas) will be clearly marked and display a USC-furnished placard for identification. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site. Personal vehicles must be parked in the perimeter parking lots or garages. Temporary parking permits can be obtained at the Contractor's expense at the USC Parking Office located in the Pendleton Street parking garage. Refer to the CAMPUS VEHICLE EXPECTATIONS (below) for additional information.
- 5. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied on a regular basis. 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.
- 6. The Contractor shall be responsible for erosion and sediment control measures where ground disturbances are made.

PROJECT FENCING

- 7. All construction projects with exterior impacts shall have construction fencing at the perimeter. Fencing shall be 6' chain link with black or green privacy fabric (80-90% blockage). For fence panels with footed stands, sandbag weights shall be placed on the inside of the fence. Ripped sandbags shall be replaced immediately.
- 8. For projects with long fencing runs and/or high profile locations, decorative USC banners shall be used on top of privacy fabric; banners should be used at a ratio of one banner for every five fence panels. USC Project Manager will make arrangements for banner delivery for Contractor to hang.
- 9. The use of plastic safety fencing is discouraged and shall only be used on a temporary basis (less than four weeks) where absolutely necessary. Safety fencing shall be a neon yellow-green, high-

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- visibility fencing equal to 'Kryptonight' by Tenax. Safety fencing shall be erected and maintained in a neat and orderly fashion throughout the project.
- 10. Vehicles and all other equipment shall be contained within a fenced area if they are on site for more than 3 consecutive calendar days.

BEHAVIOR

- 11. Fraternization between Contractor's employees and USC students, faculty or staff is strictly prohibited.
- 12. 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.
- 13. Contractor's employees must adhere to the University's policy of maintaining a drug-free and tobacco-free campus.

HAZARDOUS MATERIALS & SAFETY COMPLIANCE

- 14. A USC Permit to Work must be signed prior to any work being performed by the general contractor or sub-contractor(s).
- 15. 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). Upon request, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.
- 16. Contractor must notify the University immediately upon the discovery of suspect material which may contain asbestos or other such hazardous materials. These materials must not be disturbed until approved by the USC Project Manager.
- 17. In the event of an OSHA inspection, the Contractor shall immediately call the Facilities Call Center, 803-777-4217, and report that an OSHA inspector is on site. An employee from USC's Safety Unit will arrive to assist in the inspection.

LANDSCAPE & TREE PROTECTION

- 18. In conjunction with the construction documents, the USC Arborist shall direct methods to minimize damage to campus trees. Tree protection fencing is required to protect existing trees and other landscape features to be affected by a construction project. The location of this fence will be evaluated for each situation with the USC Arborist, Landscape Architect and Project Manager. Tree protection fencing may be required along access routes as well as within the project area itself. Fence locations may have to be reset throughout the course of the project.
- 19. The tree protection fence shall be 6' high chain link fence with 80-90% privacy screening unless otherwise approved by USC Arborist and/or Landscape Architect. If the tree protection fence is completely within a screened jobsite fence perimeter, privacy fabric is not required. In-ground fence posts are preferred in most situations for greater protection. If utility or pavement conflicts are present, fence panels in footed stands are acceptable. See attached detail for typical tree protection fencing.
- 20. No entry, vehicle parking, or materials storage will be allowed inside the tree protection zone. A 4"

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layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone.

- 21. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following protective measures shall be taken:
 - a. For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over 4" of mulch.
 - b. For single loads over 9,000 lbs., two layers of 3/4" plywood shall be placed over 4" of mulch.
 - c. Plywood sheets shall be replaced as they deteriorate or delaminate with exposure.
 - d. For projects requiring heavier loads, a construction entry road consisting of 10' X 16' oak logging mats on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep matting structurally functional.
- 22. Damage to any trees during construction shall be assessed by the USC Arborist, who will stipulate what action will be taken for remediation of damage. The cost of any and all remediation will be assumed by the contractor at no additional cost to the project. Compensation for damages may be assessed up to \$500 per caliper inch of tree (up to 8") and \$500 per inch of diameter at breast height (for trees over 8").
- 23. Damage to trunks and limbs, as well as disturbance of the root zone under the dripline of tree, including compaction of soil, cutting or filling, or storage of materials, shall qualify as damage and subject to remediation.
- 24. Any damage to existing pavements or landscaping (including lawn areas and irrigation) will be remediated before final payment is made.

TEMPORARY FACILITIES

- 25. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.
- 26. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.

CAMPUS KEYS

27. 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.

WELDING

28. A welding (hot work) permit must be issued by the University Fire Marshall before any welding can begin inside a building. The USC Project Manager will coordinate.

PROJECT EVALUATION & CLOSE-OUT

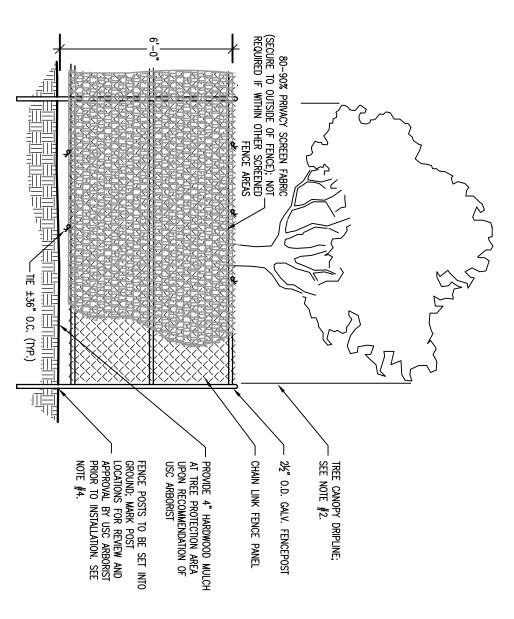
- 29. For all projects over \$100,000, including IDCs, a Contractor Performance Evaluation (SE 397) will be reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed by the USC Project Manager and a Construction Performance rating will be established.
- 30. 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

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this is completed.

CAMPUS VEHICLE EXPECTATIONS

- Personal vehicles must be parked in the perimeter parking lots or garages. Temporary parking permits can be obtained at the Contractor's expense at the USC Parking Office located in the Pendleton Street parking garage.
- 32. All motorized vehicle traffic on USC walkways and landscape areas must be approved by the USC Project Manager and Parking Division, have a USC parking placard, and be parked within the approved laydown area. Violators may be subject to ticketing, towing and fines.
- 33. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.
- 34. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held responsible for damages and restoration expense.
- 35. 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.
- 36. All drivers of equipment and vehicles shall be respectful of University landscape, equipment, structures, fixtures and signage.
- 37. All incidents of property damage shall be reported to Parking Services or the Work Management Center.



NOTES:

- PROVIDE PROTECTION FENCING FOR ALL TREES WITHIN AREA OF DISTURBANCE AND CONSTRUCTION ACCESS.
- 2. PROTECTION FENCING SHALL BE IN PLACE PRIOR TO BEGINNING CONSTRUCTION.
- 3. PROTECTION FENCING TO BE PLACED AT THE OUTSIDE OF THE CANOPY DRIPLINE, OR AT A DISTANCE OF ONE FOOT PER ONE INCH OF TREE DIAMETER, MEASURED AT BREAST HEIGHT, WHICHEVER IS LARGER, UNLESS OTHERWISE INDICATED ON LANDSCAPE PLAN OR APPROVED BY UNIVERSITY ARBORIST.
- 4. IN—GROUND POSTS ARE STANDARD. IF EXISTING ROOTS, UTILITIES OR PAVEMENT PRECLUDE USE OF IN—GROUND POSTS, FOOTED STANDS ARE ACCEPTABLE. SAND BAGS SHALL BE PLACED ON THE INSIDE OF FENCE.
- 5. DAMAGE TO ANY TREES DURING CONSTRUCTION SHALL BE ASSESSED BY UNIVERSITY ARBORIST AND THE UNIVERSITY ARBORIST SHALL STIPULATE WHAT ACTION WILL BE TAKEN FOR REMEDIATION OF DAMAGE. THE COST OF ANY AND ALL REMEDIATION WILL BE ASSUMED BY CONTRACTOR AT NO ADDITONAL COST TO THE PROJECT.
- 6. DISTURBANCE OF ROOT ZONE UNDER DRIPLINE OF TREE, INCLUDING COMPACTION OF SOIL, CUTTING OR FILLING OR STORAGE OF MATERIALS SHALL QUALIFY AS DAMAGE AND SUBJECT TO REMEDIATION.

SE-355

PERFORMANCE BOND

	MEN BY THESE PRESENTS, that (Insert ful	l name or legal title and address of Contractor)
Name:		
Address:		
hereinafter ref	ferred to as "Contractor", and (Insert full name and	address of principal place of business of Surety)
Name:		
Address:		
hereinafter cal	lled the "surety", are jointly and severally held	and firmly bound unto (Insert full name and address of Agency)
Name:	University of South Carolina	
Address:	1300 Pickens Street	
	Columbia, SC 29208	
of the Bond t	ferred to as "Agency", or its successors or assig o which payment to be well and truly made, s, successors and assigns, jointly and severally,	gns, the sum of(\$\\), being the sum the Contractor and Surety bind themselves, their heirs, executors, firmly by these presents.
WHEREAS,	Contractor has by written agreement dated	entered into a contract with Agency to construct
•	•	ing
•	ject Number: <u>FP00000362</u>	
	scription of Awarded Work: This projects consi- ity. The facilty includes electricity and is approx	sts of constructing a new "L-Shape" pre-engineered outdoor storage kimaltey 4000SF
in accordance	with Drawings and Specifications prepared by	(Insert full name and address of A/E)
Name:		
Address:		
which agreem	ent is by reference made a part hereof, and is h	ereinafter referred to as the Contract.
		ng to be legally bound hereby, subject to the terms stated herein, do behalf by its authorized officer, agent or representative.
	day of, 2	BOND NUMBER
CONTRAC	TOR	SURETY
D.,,		D.,,
Бу:	(Seal)	By:(Seal)
Print Name	:	Print Name:
Print Title:		Print Title: (Attach Power of Attorney)
Witness		Witness:
· · · · · · · · · · · · · · · · · · ·		**1111033*

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

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 si entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract
- 11.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform the Contract or otherwise to comply with the terms of the Contract.

SE-357

LABOR & MATERIAL PAYMENT BOND

KNOW ALL	MEN BY THESE PRESENTS, that (Insert fu	ll name or legal title and address of Contractor)
Name:		
Address:		
hereinafter ref	ferred to as "Contractor", and (Insert full name and	l address of principal place of business of Surety)
Name:		
Address:		
hereinafter cal	lled the "surety", are jointly and severally held	and firmly bound unto (Insert full name and address of Agency)
Name:	University of South Carolina	
Address:	1300 Pickens Street	
	Columbia, SC 29208	
of the Bond to	ferred to as "Agency", or its successors or assign owhich payment to be well and truly made, s, successors and assigns, jointly and severally,	gns, the sum of(\$), being the sum the Contractor and Surety bind themselves, their heirs, executors, firmly by these presents.
WHEREAS,	Contractor has by written agreement dated	entered into a contract with Agency to construct
State Proj	ject Name: USC Aiken Outdoor Storage Build	ing
State Proj	ject Number: <u>FP00000362</u>	
	scription of Awarded Work: This projects consists. The facilty includes electricity and is approxi-	itss of constructing a new "L-Shape" pre-engineered outdoor storage ximaltey 4000SF
in accordance	with Drawings and Specifications prepared by	(Insert full name and address of A/E)
Name:		
Address:		
which agreem	nent is by reference made a part hereof, and is h	nereinafter referred to as the Contract.
		ng to be legally bound hereby, subject to the terms stated herein, do tecuted on its behalf by its authorized officer, agent or representative.
DATED this	day of, 2	BOND NUMBER
CONTRAC	TOR	SURETY
By:		By:
	(Seal)	(Seal)
Print Name	:	Print Name:
Print Title:		Print Title:
		(Attach Power of Attorney)
Witness:		Witness:

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

LABOR & MATERIAL PAYMENT BOND

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

- 1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency to pay for all labor, materials and equipment required for use in the performance of the Contract, which is incorporated herein by reference.
- 2. With respect to the Agency, this obligation shall be null and void if the Contractor:
- 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and
- 2.2 Defends, indemnifies and holds harmless the Agency from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract.
- **3**. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
- **4.** With respect to Claimants, and subject to the provisions of Title 29, Chapter 5 and the provisions of §11-35-3030(2)(c) of the SC Code of Laws, as amended, the Surety's obligation under this Bond shall arise as follows:
- 4.1 Every person who has furnished labor, material or rental equipment to the Contractor or its subcontractors for the work specified in the Contract, and who has not been paid in full therefore before the expiration of a period of ninety (90) days after the date on which the last of the labor was done or performed by him or material or rental equipment was furnished or supplied by him for which such claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of such suit and to prosecute such action for the sum or sums justly due him
- 4.2 A remote claimant shall have a right of action on the payment bond upon giving written notice by certified or registered mail to the Contractor within ninety (90) days from the date on which such person did or performed the last of the labor or furnished or supplied the last of the material or rental equipment upon which such claim is made.
- 4.3 Every suit instituted upon a payment bond shall be brought in a court of competent jurisdiction for the county or circuit in which the construction contract was to be performed, but no such suit shall be commenced after the expiration of 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.

SE-380

CHANGE ORDER NO.:____

СН	ANGE ORDER TO DESIGN-BID-BUILD CONSTR	CUCTION CO	ONTRACT
AGI	ENCY: University of South Carolina		
	OJECT NAME: USC Aiken Outdoor Storage Building		
	DJECT NUMBER: FP00000362		
CON	TTRACTOR:	CONTRACT	DATE:
This	Contract is changed as follows: (Insert description of change in space provided below)		
AD	JUSTMENTS IN THE CONTRACT SUM:		
1.	Original Contract Sum:		\$
2.	Change in Contract Sum by previously approved Change Orders:		
3.	Contract Sum prior to this Change Order		\$ 0.00
4.	Amount of this Change Order:		
5.	New Contract Sum, including this Change Order:		\$ 0.00
AD.	JUSTMENTS IN THE CONTRACT TIME:		
1.	Original Substantial Completion Date:		
2.	Sum of previously approved increases and decreases in Days:		Days
3.	Change in Days for this Change Order		Days
4.	Total Number of Days added to this Contract including this Change Order		0 Days
5.	New Substantial Completion Date:		
CON	TRACTOR ACCEPTANCE:		
BY	· :	Date:	
Pri	(Signature of Representative) int Name of Representative:		
	RECOMMENDATION FOR ACCEPTANCE:		
BY		Date:	
Pri	(Signature of Representative) int Name or Representative:		
AGE I cer	NCY ACCEPTANCE AND CERTIFICATION: tify that the Agency has authorized, unencumbered funds available for obligation to this contract.		
BY	:(Signature of Representative)	Date:	
	(Signature of Representative) int Name of Representative:		
Chan	ge is within Agency Construction Contract Change Order Certification of:		Yes
APPI	ROVED BY:	DATE:	
	(OSE Project Manager)		

SUBMIT THE FOLLOWING TO OSE

- SE-380, fully completed and signed by the Contractor, A/E and Agency;
 Detailed back-up information, with OH&P shown, from the Contractor/Subcontractor(s) that justifies the costs and schedule changes shown.
 If any item exceeds Agency certification, OSE will approved the SE-380 and return to Agency.

Description:

The intent of this project is to construct an exterior "L-Shape" storage building near the new maintenance building for USC Aiken. Using previously design drawings as a reference to provide and install all related materials, labor and equipment to construct outdoor building per the drawings. This storage building construction will need to be coordinated with new maintenance building construction and final site grades.

SCOPE:

- 1. Outtdoor Storage Building and Wash Pad Scope of Work:
 - Grade for building slab-on-grade
 - Monolithic footings and 6-inch-thick concrete slab-on-grade over 4-inch-thick crusher run stone base consisting of 4,000psi concrete, 60 ksi reinforcing steel, W2.9xW2.9 welded wire mesh reinforcing, and associated anchor bolts for the proposed building columns per the updated structural drawings.
 - Supply and install 6-inch x 6-inch concrete curb within a 22' x 17' area for the proposed fuel tanks. Curb will consist of keyway into slab, drill and epoxy dowels into slab, 4,000psi concrete with 1 run #4 bar continuous, and water stop at keyway.
 - Wash pad will consist of an approximate 20' x 20' x 6-inch-thick 4,000psi concrete pad with W2.9 x W2.9 welded wire mesh over 4-inch crusher run stone base.
 - Saw-cut control joints within the slabs.
 - Cure concrete slabs with a dissipating water-based curing compound.
 - Supply and erect one (1) each approximately 4,549 sq. ft. "L" shaped, 3-sided pre-engineered metal building with a 16'-9" high eave height on the open side and 2/12 roof pitch. Building will consist of standing seam roof, exposed fastener metal siding on 3 sides, gutter and downspouts, and associated rake and eave trim.
 - Downspout adapters, leaders, and piping to the detention pond per the drawings.
 - Twenty-Two (22) light fixtures and three each 0-6-hour Mark time switches for the lights per the drawings.
 - Eight (8) each weatherproof rated GCFI receptacles per the drawings.
 - Provide and install in a Class I Div. I location for the gas pumps, (1) 240-volt three phase 30 amp fusible disconnect, (1) weatherproof rated GFCI receptacle, and (4) empty conduits to panel EQL.
 - Provide and install building steel grounding.
 - Paint color on outdoor building and roof to match existing maintenance building.
 - Coordinate slab grades and footing elevations for new storage building with contractor constructing maintenance facility.

Do NOT include the following within the outdoor building construction:

- 1. 15 mil vapor barrier under the slab-on-grade. This is an exterior slab and this vapor barrier is not necessary.
- 2. Seal control joints with semi-rigid epoxy joint filler.
- 3. Chain link between building bays

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. Various submittals require hard copies. Refer to the individual specification sections and coordinate with the architect prior to any submittal. Submittals will not be considered complete until the related physical samples are provided.

B. Related Sections:

- 1. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

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

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings may be provided by Architect upon contractor's request for Contractor's use in preparing submittals.
 - 1. Architect may furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.

- c. The architectural drawings for shop drawing purposes may be furnished upon the architect's receipt of the Licensing Agreement and upon receipt of payment equal to \$1,000.00 per AutoCad Xref drawing or \$1,500.00 per Revit Model. The purchaser is responsible for adding all addenda items and changes and providing/verifying field measurements. Most drawings are in Revit. Any conversions will be by the contractor parties and not the Design Team.
- d. Drawings of the architect's consultants may not be available.
- e. The architect reserves the right to reject any request or digital drawing files.
- f. Any and all digital/electronic submittals must be clearly organized and bookmarked. Any submittal received that is mot bookmarked will be rejected. NO EXCEPTIONS.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.
 - 1. Initial Review: Allow 15 working days for initial review of each submittal. 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 same manner as initial submittal.
 - 3. Re-submittal Review: Allow 15 working days for review of each re-submittal.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Construction Manager.
 - 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.

- Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
- j. Number and title of appropriate Specification Section.
- k. Drawing number and detail references, as appropriate.
- I. Location(s) where product is to be installed, as appropriate.
- m. Other necessary identification.
- E. Options: Identify options requiring selection by the Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
- H. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and Construction Manager will return submittals, without review, or discard submittals received from sources other than Contractor.
 - 1. Transmittal Form: Use AIA Document G810 or other form acceptable to the architect.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- I. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- J. 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.
- K. Use for Construction: Use only final submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

- 1. Action Submittals: Submit three paper copies of each submittal, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
- 2. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect and Construction Manager will not return copies.
- 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
- Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - Provide a notarized statement on original paper copy certificates and certifications where indicated.
- 5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before or concurrent with Samples.
 - 6. Submit Product Data in the following format:
 - a. Three paper copies of Product Data, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.

- b. Schedules.
- c. Compliance with specified standards.
- d. Notation of coordination requirements.
- e. Notation of dimensions established by field measurement.
- f. Relationship and attachment to adjoining construction clearly indicated.
- g. Seal and signature of professional engineer if specified.
- 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm).
- 3. Submit Shop Drawings in the following format:
 - a. Three opaque copies of each submittal. Architect and Construction Manager will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
 - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will retain two Sample sets: remainder will be returned.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least five sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Submit product schedule in the following format:
 - a. Three paper copies of product schedule or list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
 - 1. Submit subcontract list in the following format:
 - a. PDF electronic file.
 - b. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
- J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- T. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the

responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

 Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. Submittals that are determined to be stamped approved, but not actually reviewed, will be returned to the contractor with out architect's review. Any effects on the project schedule for any such occurrence will be the sole responsibility of the contractor.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

- A. General: Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

ELECTRONIC FILE AGREEMENT



PROJECT NAME: FACILITY AND AUXILIARY SERVICES BUILDING

JCS COMMISSION NUMBER: 18103

DATE OF AGREEMENT:

ELECTRONIC FILES TO BE TRANSMITTED:

DELIVERED VIA: email

At your request, Jumper Carter Sease/Architects PA (JCS) will provide electronic files for your convenience and use related to the project noted subject to the following terms and conditions. By your signature you agree to these terms and conditions.

- 1. JCS files are compatible with the software version they were created in. JCS makes no representation as to the compatibility of these files with other hardware or software used.
- 2. Data contained within the electronic files are part of JCS's instruments of service and shall not be used by anyone receiving this data for purposes other than as a convenience in the preparation of work for the subject project. Any other use or reuse is strictly forbidden.
- **3.** Purchaser agrees to indemnify and hold harmless JCS from all claims, damages, losses and expenses, including attorney's fees, arising from the use of the subject files.
- **4.** The electronic files are not contract documents. By use of the electronic files, purchaser is responsible for complying with the contract documents including but not limited to the need to check, confirm and coordinate all dimensions and details, field measurements, verification of field conditions and coordination of work with others.
- **5.** The Architect's title block or other information identifying the Architect or the Architect's professional consultants will not be provided on the electronic files and this agreement grants no right to reproduce or otherwise utilize such information.
- **6.** JCS may require a service/handling fee prior to delivery of the requested electronic files.
- 7. Under no circumstances shall delivery of the electronic files for use be deemed a sale by JCS, and JCS makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall JCS be liable for any loss of profit or any damages. Purchaser acknowledges and assumes all such risks.
- 8. Electronic files are in AutoCAD 2013 format.

ELECTRONIC FILE AGREEMENT



Item	Sheet Name	Drawing Number	

IN WITNESS WHEREOF, THE Engineer and Purchaser have caused this Agreement to be executed by their duly authorized representatives, as of the date set forth above.

ARCHITECT: Jumper Carter Sease/Architects, P.A.	PURCHASER:
Ву:	By (print name):
Title:	Title:
Date:	Date:
Email:	Email:
Signature:	

Make checks payable to "Jumper Carter Sease/Architects PA." There may be a service/handling fee for the files.

Signed electronic file agreement and check can be mailed to:

Jumper Carter Sease, PA 412 Meeting Street West Columbia, South Carolina 29169

Electronic files are available for the above project. The files will be either emailed or burned on a CD depending on the contractor's preference. **NO FILES WILL BE TRANSFERRED WITHOUT FIRST** receiving a signed copy of the electronic file agreement and a check or cash money for the full amount shown on the electronic file agreement.

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.
- B. This Section includes administration and procedural requirements for compliance with the 2015 IBC, Chapter 1 Inspections and Chapter 17 Special Inspections.
- C. South Carolina Office of State Engineers (OSE) "MANUAL FOR PLANNING & EXECUTION OF STATE PERMANENT IMPROVEMENTS PART II", 2016 EDITION or latest edition.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -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 other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Pre-construction Conference: Upon receipt of the "Notice-to-Proceed" and prior to the start of construction, the contractor shall conduct a Pre-construction Conference. It is the responsibility if the construction manager to notify the architect of the date and time of this conference in a timely manner so that the architect can notify the Office of State Engineers (OSE). A representative from OSE along with representatives from the testing company(ies) and the Chapter 1 and Chapter 17 inspection agencies must be present.
- D. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Schedule" for developing a schedule of required tests and inspections. The special inspector shall continually coordinate with the construction manager for the time and requirements of required inspections.
 - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Agency Approval: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by South Carolina Office of State Engineers (OSE).
- B. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- C. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- D. Mockups: Full-size, physical assemblies that are constructed on-site. 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. Approved mockups establish the standard by which the Work will be judged.
- E. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- F. 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.
- G. 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.
- H. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- I. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- K. 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 tradespeople of the corresponding generic name.
- L. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five (5) 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.

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 special inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.
- D. Where conflict exists between the construction documents and approved shop drawings submittal data, the construction documents shall govern unless the shop drawing/submittal data are more restrictive. All conflicts shall be brought to the attention of the architect.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Recognized Agency: For the purposes of this work, only companies utilizing certified inspectors as designated by the South Carolina Office of the State Engineer will be accepted for these special inspections. These Companies are listed on their web site however may not be current. Documentation of the individual's certificates scheduled to perform inspections for this project must be submitted for review by the architect prior to award of this work.
- C. Special Inspectors shall keep and distribute records of inspections. The special inspector shall furnish inspection reports to OSE, contractor, architect and owner. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of OSE and to the architect prior to the completion of the phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and OSE. Prior to the start of work.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

- E. Reports: Prepare and submit certified written reports that include, but are not limited to, the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and re-inspecting.
- F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. 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.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect through the Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
 - 2. Notify Architect and Construction Manager seven (7) days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven (7) days for initial review and each re-review of each mockup.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 2 through 33.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least Forty Eight (48) hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
 - 6. The contractor shall be responsible for costs of: Re-testing and re-inspection of materials, work and/or products that do not meet requirements of the construction documents and shop drawings/submittal data.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. 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 replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with the Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

- 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
- 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
- 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 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.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within thirty (30) days of date established for commencement of the Work the Notice to Proceed.
 - 1. Distribution: Distribute schedule to Owner, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Shall be as listed herein.
- B. Special Tests and Inspections: Conducted by a qualified **special inspector designated by the South Carolina Office of State Engineers (OSE)** as indicated in individual Specification Sections, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and re-inspecting corrected work.

CHAPTER 1 AND CHAPTER 17 SPECIAL INSPECTIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

Acceptable companies shall be as designated by the South Carolina Office of State Engineers (OSE).

- 3.2 SPECIAL INSPECTIONS REQUIRED CHAPTER 17:
 - A. Seismic Design Category: The Seismic Design Category for this project is "C".
 - B. Facility Classification: As stated in Section 1604.5 of the 2015 IBC, this facility is classified as a "Non-Essential Facility".
 - C. IBC 2015 Chapter 17 Inspections, INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

STATEMENT OF SPECIAL INSPECTIONS				
MATERIAL	TYPE OF INSPECTION	FREQUENCY	SPECIFICATION	INSPECTION BY
			REFERENCE	
SEISMIC RESISTANCE				
Nonstructural components	Nonstructural components, supports, or attachments	Per 1705.13.2	1705.13.2	3rd Party Special Inspector
FIRE-RESISTANT PENETRATIONS AND JOINTS				
Penetration firestops	Verify appropriate system speci- fied and installed	Periodic	1705.17.1 / ASTM E2174	3rd Party Special Inspector
Fire-resistant joint systems	Verify appropriate system speci- fied and installed	Periodic	1705.17.2 / ASTM E2293	3rd Party Special Inspector

3.3 INSPECTIONS REQUIRED CHAPTER 1:

- A. IBC Chapter 1 Inspections
 - 1. Chapter 1 Inspections for this project shall be provided by individuals approved by Office of State Engineers. The required Inspections for this project include but are not limited to:
 - 110.3.1 Footing and foundation inspection
 - 110.3.2 Concrete slab or under floor inspection
 - 110.3.3 Lowest floor elevation
 - 110.3.4 Frame inspection
 - 110.3.5 Lath, gypsum board and gypsum panel product inspection
 - 110.3.6 Fire- and smoke-resistant penetrations
 - 110.3.7 Energy efficiency inspections
 - 110.3.8 Other inspections
 - S406.6 Inspection of fill. Placement of the fill material shall be inspected by the code official.

RR109.1.1. Foundation inspection: Inspection of the foundation shall be made after poles or piers or trenches or basement areas are excavated and any required forms

erected and any required reinforcing steel is in place prior to the placing of concrete. The foundation inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or equipment.

RR109.1.2 Plumbing, mechanical, gas and electrical systems inspection: Rough inspection of plumbing, appliances are set or installed, and prior to farming inspection.

Mechanical Code: M107.1 Required Inspections

- 1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
- 2. Rough-in inspection shall be made after the roof, framing, fireblocking, and bracing are in place and all ducting and other components to be concealed are completed, and prior to the installation of wall or ceiling membranes.

Plumbing Code: P107.1 Required Inspection and testing.

- 1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
- 2. Rough-in inspection shall be made after the roof, framing, fireblocking, and bracing are in place and all ducting and other components to be concealed are completed, and prior to the installation of wall or ceiling membranes.

Electrical Code:

- 1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
- 2. Rough-in inspection shall be made after the roof, framing, fire-blocking, and bracing are in place and all ducting and other components to be concealed are completed and prior to the installation of concealing construction.

3.4 TEST AND INSPECTION LOG AND FORMS

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours
- C. Maintain all logs, inspection reports and related summary sheets as required by Office of State Engineers (OSE).

3.5 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 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.

3.6 TESTING AND INSPECTON

A. Reference related specifications for the minimum level of inspections and testing. Provide additional inspections and testing as necessary to determine compliance with the construction drawings and to satisfy IBC requirements for Chapter1 Inspections and Chapter 17 Special Inspections.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Section:

1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 working days of receipt of request, or seven working days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."

PRODUCT REQUIREMENTS

- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

- 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
- 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

- 1. Store products to allow for inspection and measurement of quantity or counting of units.
- 2. Store materials in a manner that will not endanger Project structure.
- 3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
- 4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
- 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

PRODUCT REQUIREMENTS

- 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

- 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless pre-approved prior to the bid.
 - b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

PRODUCT REQUIREMENTS

Manufacturers:

- a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless pre-approved prior to the bid.
- b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, which 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.

OUTDOOR STORAGE BUILDING
USC AIKEN, STATE PROJECT NO.: FP00000036

SECTION 01 6000 PRODUCT REQUIREMENTS

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Sections:

- 1. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- 2. Division 07 Section "Caulking & Sealants" for firestopping use in patching penetrations in fire-rated construction.

1.2 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

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1.3 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
 - Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

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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. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

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- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

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- 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
- 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
- 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an evenplane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

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- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

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

END OF SECTION 01 7300

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PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.

B. Related Sections:

- 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- 3. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

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

- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for final completion.

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 - 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 - 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 4. Submit pest-control final inspection report and warranty.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Submit list of incomplete items in the following format:
 - a. Three paper copies, unless otherwise indicated. Architect will return two copies.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. 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 (215-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.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a 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. Sweep concrete floors broom clean in unoccupied spaces.
- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. 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 other required labels and identification, including mechanical and electrical nameplates.
- m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- r. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

END OF SECTION 01 7700

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Product maintenance manuals.
 - 4. Systems and equipment maintenance manuals.

B. Related Sections:

1. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

- A. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect.
 - Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 - 2. Three (3 or number requested by Owner up to maximum 3) paper copies AFTER the Electronic copy has been approved as complete and acceptable by architects and engineer. One (1) complete PDF electronic submittal of the hard copy for Owner ad One (1) complete PDF electronic submittal of the hard copy for Architect and Engineers. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- B. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion. Architect will return copy with comments.
 - Correct or modify each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

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- 1. Title page.
- 2. Table of contents.
- Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Architect.
 - 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 - 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION MANUALS

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

- 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
- 2. Performance and design criteria if Contractor is delegated design responsibility.
- 3. Operating standards.
- 4. Operating procedures.
- Operating logs.
- 6. Wiring diagrams.
- 7. Control diagrams.
- 8. Piped system diagrams.
- 9. Precautions against improper use.
- 10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

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

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

- 1. Startup procedures.
- 2. Equipment or system break-in procedures.
- 3. Routine and normal operating instructions.
- 4. Regulation and control procedures.
- 5. Instructions on stopping.
- 6. Normal shutdown instructions.
- 7. Seasonal and weekend operating instructions.
- 8. Required sequences for electric or electronic systems.
- 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:

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- 1. Product name and model number.
- 2. Manufacturer's name.
- 3. Color, pattern, and texture.
- 4. Material and chemical composition.
- 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

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- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

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

END OF SECTION 01 7823

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - Record Product Data.

B. Related Sections:

- Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal: Contractor shall submit one paper copy set of marked-up record prints. Architect will review and indicate whether general scope of changes and additional information recorded are acceptable.
 - b. Final Submittal: Contractor shall submit within 30 days after substantial completion, one durable reproducible record drawing set showing all significant changes to the Work made during construction. Drawings shall be stamped as "Project Record Drawings". Print each Drawing, whether or not changes and additional information were recorded. In addition, the contractor shall provide one electronic file copy of the record documents in PDF format.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it.

- c. Record and check the markup before enclosing concealed installations.
- 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
- 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints and newly prepared and record Drawings into a durable reproducible manageable set. Bind the set with a durable paper cover sheet. Include identification on cover sheets.
 - 2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 01 7839

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: For each type of manufactured material and product, including forming and reinforcement accessories, admixtures, waterstops, joint systems, joint fillers, curing compounds, and others if requested.
- C. Design Mixes: For each concrete mix.
 - 1. Provide laboratory tests of materials and mix design tests.
 - 2. Indicate amounts of mix water, if any, to be withheld for later addition at Project site.
 - 3. For lightweight concrete mixes, indicate calculated equilibrium unit weight as determined by ASTM C 567, section 9.2.
 - 4. Specify the location of the batch plant where the concrete will be mixed and the approximate distance from the job site.
- D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, spacings, bent bar diagrams, arrangement, and supports of concrete reinforcement.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete work similar to that indicated for this Project with a record of successful in-service performance.

- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the state where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- D. Source Limitations: Obtain each type of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each type of admixture from the same manufacturer.
- E. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 318, "Building Code Requirements for Structural Concrete."
 - 3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material.
- B. 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. Structural 1, B-B, or better, mill oiled and edge sealed.
 - b. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, unless otherwise indicated.
- D. 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.
- E. 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 metal closer than 1 inch to the plane of the exposed concrete surface.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, 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 fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
 - 2. Precast concrete supports or concrete bricks may be used only for concrete members cast on earth. Reinforcement shall be wire-tied to these type supports periodically to prevent it from becoming dislodged during concrete placement.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 36. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Cement shall contain no more than 0.60% total alkalis.
- B. Fly Ash: ASTM C 618, Class C or F.
- C. Normal Weight Aggregate: ASTM C 33.
- D. Lightweight Aggregate: ASTM C 330.
- E. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

- A. General: 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.
- B. Air-Entraining Admixture: ASTM C 260.

- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. Retarding Admixture: ASTM C 494, Type B.
- E. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- F. High-Range Water-Reducing Admixture: ASTM C 494, Type F.
- G. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
- H. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.6 FLOOR AND SLAB TREATMENTS

A. Penetrating Liquid Floor Treatment: Chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

2.7 CURING MATERIALS

- A. Contractor shall verify that curing and sealing materials applied to floor slabs are compatible with all floor stains, coatings, tile, and other finish materials.
- B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry. (Burleen non-staining mats).
- D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B. Acceptable products include, but are not limited to:
 - 1. 1100-CLEAR, W.R. Meadows, Inc.
 - 2. W.B. Resin Cure, Conspec Marketing & Manufacturing Co., Inc.
 - 3. KUREX DR VOX, Euclid Chemical.
 - CURE & SEAL WB, SpecChem.
- F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.8 RELATED MATERIALS

- A. Expansion and Isolation Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber. Thickness 1/2 inch unless otherwise indicated. Acceptable products include, but are not limited to:
 - 1. Fibre Expansion Joint, W.R. Meadows, Inc.
- B. Vapor Barrier: See Division 7 specifications.

- C. Slab Granular Base Course: Clean crushed stone, crushed gravel, or manufactured or natural sand. Material shall be compactable. Rough or sharp materials which may puncture the vapor barrier shall not be used.
- D. Dovetail Anchor Slots: Hot-dipped galvanized sheet steel, not less than 0.0336 inch thick with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- E. Latex Bonding Agent: ASTM C 1059, Type I or II, non-redispersible, acrylic emulsion or styrene butadiene.
- F. 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.
- G. Epoxy Anchoring Adhesive: ASTM C 881, two-component epoxy resin, supplied in manufacturer's standard side-by-side cartridge and dispensed through a mixing nozzle supplied by the manufacturer, of class and grade to suit requirements.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch 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 or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.
- B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch.
 - 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 or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.10 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

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- 1. Proportion normal weight structural concrete according to ACI 211.1 and ACI 301.
- 2. Proportion lightweight structural concrete according to ACI 211.2 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Maximum Unit Weight of Lightweight Concrete:
 - 1. Calculated Equilibrium Unit Weight: 110 lb/cu. ft. plus or minus 3 lb/cu. ft., unless otherwise indicated, as determined by ASTM C 567, section 9.2.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
- E. Maximum Slump:
 - 1. Concrete containing high-range water-reducing admixture or plasticizing admixture: 8 inches, after admixture is added to concrete with verified slump of 2 to 4 inches.
 - 2. Other concrete: 4 inches, plus or minus one inch.
- F. 28-Day Compressive Strength: As indicated. Water-cementitious materials ratio shall not exceed 0.50 for slabs-on-grade and elevated slabs.
- G. Air Content: In exterior concrete which is exposed to weather, add air-entraining admixture to result in concrete at point of placement having an air content of 5.5 percent within a tolerance of plus or minus 1.5 percent. Footings and other subterranean concrete do not require airentrainment.
- H. Do not air entrain concrete in trowel-finished interior floors and suspended slabs except where air entrainment is required to achieve specified unit weights for lightweight concrete, or where a certain entrained air content is specified by the applicable UL fire-rated assembly. Do not allow entrapped air content in non-air-entrained concrete to exceed 3 percent.
- Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- J. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- K. Concrete Mix for Polished Concrete Areas: Concrete mix for slabs on grade which are scheduled to receive polished concrete shall comply with the following requirements:
 - 1. Maximum water-cement ratio shall not exceed 0.45.
 - 2. No air entrainment is permitted.
 - 3. No fly ash is permitted.
 - 4. 28-day compression strength shall be 4000 psi.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. In walls, slabs, and beams where runs of continuous bars too long to be fabricated from single bars, fabricate reinforcing so that lap splices in alternate bars are staggered.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
 - When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Job site mixing is not permitted.
- C. Fiber Reinforcement: In concrete where fiber reinforcement is indicated, uniformly disperse synthetic fibers in concrete mixture.

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 concrete 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 347R as abrupt or gradual, as follows:
 - 1. Class A. 1/8 inch for smooth-formed finished surfaces.
 - 2. Class D, 1 inch for rough-formed finished surfaces which will be permanently concealed from view.
- D. Construct forms tight enough to prevent loss or leakage 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 vertical to 1.5 horizontal.
 - 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.

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- 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, water, 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, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required.
- B. Conduits, Pipes, and Sleeves: Conduits are not permitted in elevated slabs or slabs on grade. Conduits, pipes and sleeves shall be permitted to be embedded in other concrete elements only with approval of the Structural Engineer. Embedded items must meet the following requirements:
 - 1. Conduits, pipes and sleeves shall be made only of materials not harmful to concrete. Aluminum is not permitted.
 - 2. Diameter of items shall not be larger than 1/3 the thickness of the wall, footing, or beam in which they are embedded.
 - 3. Items shall not be spaced closer than 3 diameters on center.

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 for 24 hours provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained. Retaining walls and basement walls may not be backfilled until after 7 days minimum and after the concrete has achieved 100 percent of 28-day design compressive strength as verified by compression test results.
- 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.

3.4 SDelete this section for Boudreaux Group, Jumper Carter Sease, Studio 3 and Quackenbush projects (see paragraph 2.10B). Include this section for other architects, including LS3P.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. In walls, slabs, and beams where runs of continuous bars too long to be fabricated from single bars, install reinforcing so that lap splices in alternate bars are staggered.
- D. Before concrete is placed, accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. "Wet-sticking" of dowels, anchor bolts and reinforcing is not permitted. **Do not weld or tack weld reinforcing bars** unless indicated on the drawings or authorized by the Structural Engineer.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets so that length of overlap measured between outermost cross wires of each fabric sheet is not less than one spacing of cross wires plus 2 inches. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- G. Where blockouts are formed in slabs, unless otherwise indicated provide two #4 diagonal bars, 4'-0" long, at each corner of the blockout in the middle of the depth of the slab.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Provide construction joints at all locations where concrete placement is terminated resulting in concrete elements not being completed in a single monolithic placement. 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. Provide keys at construction joints using preformed galvanized steel or wood bulkhead forms, unless otherwise indicated. Embed keys at least 1-1/2 inches 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. Locate joints in continuous wall footings as required to facilitate construction.
 - 6. In areas with terrazzo or hard tile, coordinate joint locations to match joints in terrazzo or tile.

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- C. Contraction (Control) Joints in Slabs on Grade: Construct contraction joints in slabs on grade to form patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab thickness unless otherwise indicated.
 - Contraction joints shall be cut as soon as possible after slab finishing as may safely be done without dislodging aggregate or raveling joint edges. Joints shall be cut within 12 hours after concrete is placed.
 - 2. If joint pattern is not shown, provide contraction joints at a maximum spacing of 15 feet in each direction. Locate to conform to bay spacing where possible (at column centerlines, half bays, third bays.)
 - 3. In areas with terrazzo or hard tile, coordinate joint locations to match joints shown in terrazzo or tile.

3.7 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. Do not add water to concrete during delivery, at Project site, or during placement, unless water has been withheld from the mix for this purpose.
- C. Deposit concrete continuously or in 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 specified. Deposit concrete to avoid segregation.
- D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches 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 mix constituents to segregate.
- E. 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, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

- F. 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.
 - When the average daily outdoor temperature is expected to fall below 40 deg F for three successive days, or when freezing temperatures may occur during the first 24 hours after concrete placement, deliver and maintain concrete temperature within the temperature range required by ACI 306.1. The average daily outdoor temperature is the average of the highest and lowest temperature during the period from midnight to midnight.
 - 2. Uniformly heat water and/or aggregates before mixing to obtain a concrete mixture temperature at point of placement within the temperature range required by ACI 306.1.
 - 3. Temperatures specified to be maintained shall be those measured at the concrete surface, whether the surface is in contact with formwork, insulation, or air.
 - 4. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 5. Do not use salt or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
 - 6. Do not use calcium chloride.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is included in calculation of total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- H. Blockouts in concrete walls to allow for erection of steel columns and beams shall be filled with concrete after the steel is erected and plumbed.

3.8 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.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view, to receive a rubbed finish, or to be covered with a coating material applied directly to the concrete. This is the concrete surface imparted by selected 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.
- C. Rubbed Finish: Apply a grout-cleaned rubbed finish as follows to smooth-formed finished concrete where indicated. Rubbed finish shall be done when the air temperature is at least 40 deg F and rising. All finishing on an area shall be completed the same day it is started.
 - 1. Surfaces to be grout cleaned shall be steel brushed to remove laitance and scale and to reveal partly obscured air bubble holes. Uneven form joints shall be ground smooth.

- 2. Combine one part portland cement to one and one-half parts fine sand by volume, with sufficient water to produce a grout having the consistency of thick paint. Blend standard and white portland cement in amounts determined by trial patches so that final color of dry grout will produce the color desired by the architect.
- 3. Thoroughly dampen concrete surfaces and cover with an application of grout.
- Immediately after application of the grout, the surface shall be scoured with a cork float or other suitable material. This floating shall completely fill all holes and other irregularities in the surface.
- 5. When the grout is of such plasticity that it will not be pulled from the holes, remove excess grout by scraping and rubbing with a clean float of sponge rubber or burlap.
- 6. When the grout is thoroughly dry, the surface shall be vigorously rubbed with dry burlap to completely remove any dried grout. No visible film of dry grout shall remain.
- 7. Obtain approval of a sample area from Architect before proceeding with Work.
- 8. Final product shall be uniform in color and texture.
- 9. Keep surfaces damp for at least 36 hours after rubbing.
- 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.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: All slabs shall first receive a float finish. Machine floating shall not be used until the concrete surface will support a finisher on foot without more than a 1/4 inch indentation.
- C. Trowel Finish: After applying float finish, apply first trowel finish 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 indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, wood flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, stain, or another thin film-finish coating system.
 - 2. Slabs on grade which are scheduled to receive polished concrete shall receive a hard steel trowel finish (3 passes).
 - 3. On lightweight concrete slabs containing entrained air, machine floating shall be started as late as possible and hard and prolonged troweling shall be avoided.
 - 4. Finish surfaces to the following tolerances, according to ASTM E 1155:
 - 5. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot-long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/8 inch.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and to surfaces where terrazzo, ceramic or quarry tile is to be installed by thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

- 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes, beam pockets, column pockets, and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete 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 of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide 3000 psi normal weight concrete fill for steel pan stair treads, landings, and associated items. Screed, tamp, and trowel-finish concrete surfaces. At stair landings, provide plain-steel welded wire fabric, of the same size used in adjacent floor slabs, located at mid-depth of the concrete fill.

3.11 CONCRETE PROTECTION 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 305R for hot-weather protection of concrete.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss exceeding 0.1 pounds per square foot per hour, based on chart in ACI 305R, 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. Continuous water-fog spray.
- b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
- Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period of seven days.
- 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period of seven days.
- F. Remove curing and sealing materials from floor slabs, without damaging concrete surfaces, by method recommended by curing and sealing manufacturer after the curing period in areas where floor stains, coatings, tile, and other floor finish materials are to be applied if recommended by the floor finish manufacturer.
- G. At polished concrete areas, use one of the moisture curing methods listed above. Do not use curing or sealing compounds.

3.12 POLISHED CONCRETE FLOOR TREATMENTS

- A. During grinding operations, apply a liquid crack and gap filler to fill pinholes, small air voids, microcracks and other gaps in the concrete surface. Apply product in accordance with the manufacturer's recommendations. Acceptable products include, but are not limited to:
 - 1. Consolideck Grind-N-Fill, Prosoco.
- B. During grinding operations, apply a liquid hardener and densifier. Apply product in accordance with the manufacturer's recommendations. Acceptable products include, but are not limited to:
 - 1. H&C Clear Liquid Hardener & Densifier, H&C.
- C. After grinding operations are complete apply a protective finish material to provide a gloss finish and improve stain resistance. Apply product in accordance with the manufacturer's recommendations. Acceptable products include, but are not limited to:
 - LSGuard, Prosoco.
 - H&C Lithium Protective Finish, H&C.

3.13 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 seven 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.

3.14 BONDING NEW CONCRETE TO EXISTING CONCRETE

A. At locations where new concrete is placed adjacent to existing concrete, unless indicated otherwise, clean and roughen the face of the existing concrete and provide a bonding agent in accordance with the manufacturer's recommendations.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Concrete which will be exposed to view in the finished structure shall be restored to its original intended appearance or shall be removed and replaced. 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 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 in any dimension, down to solid concrete but not less than 1 inch in depth. 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.
 - 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 an inconspicuous location 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 by using 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 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 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 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 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix 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 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.

3.16 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., plus one set for each additional 50 cu. yd. more than the first 25 cu. yd.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for a given concrete mix, 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; one test at point of placement for each composite sample. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample of air-entrained concrete.

- 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 90 deg F and above.
- 5. Density: ASTM C138/C138M, fresh density 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; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
- 7. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimen at 7 days two at 28 days, and hold one specimen in reserve for later testing if necessary.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix 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.
- D. Test results shall be reported in writing to Architect, Structural Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project name, date of concrete placement and testing, location of concrete batch in Work, mix identification including design compressive strength at 28 days, slump, compressive breaking strength, and type of break for both 7-and 28-day tests. Air content and concrete temperature results shall also be provided when applicable.
- E. Special inspector shall monitor the installation of post-installed concrete anchors and reinforcing. Before installation of each type anchor or reinforcing begins, the inspector shall verify that the contractor's proposed installation procedure conforms with the manufacturer's printed installation instructions (MPII). The inspector shall monitor the initial installation of each type of anchor or reinforcing to verify conformance with the (MPII) and shall monitor periodically thereafter.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive devices will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Special inspector shall make additional tests of concrete at Contractor's expense when test results indicate that slump, air entrainment, compressive strength, or other requirements have not been met, as directed by Architect. Special inspector may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect. Contractor shall fill core-drilled holes with non-shrink grout unless directed otherwise by Architect.

END OF SECTION 033000

SECTION 051200 - 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes structural steel.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts in concrete.
 - 2. Division 4 Section "Unit Masonry" for installing anchor bolts in unit masonry.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of structural steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted snug-tightened, pretensioned, or slip-critical connections.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Mill test reports certifying that structural steel complies with requirements, including chemical and physical properties.
- F. Manufacturer's certificates of compliance certifying that their products, including the following, comply with requirements.
 - 1. Weld filler materials for both shop and field welding.
 - 2. Nonshrink grout.
- G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar to this Project with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to this Project and with a record of successful in-service performance. Fabricator must meet one of the following requirements:
 - A qualified fabricator who is currently certified by the AISC Quality Certification Program for Structural Steel Fabricators and is designated as AISC Certified Fabricator, Standard for Steel Building Structures.
 - 2. Fabricator must maintain detailed written fabrication, material control, and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
- C. Comply with applicable provisions of the following specifications and documents:
 - AISC's "Specification for Structural Steel Buildings."
 - 2. AISC's "Seismic Provisions for Structural Steel Buildings."
 - 3. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
 - 4. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- D. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel."
 - Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
- 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 deterioration.
 - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusted before use.
 - 2. 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.

1.6 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting templates and instructions as required for installation.

PART 2 - PRODUCTS

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2.1 **MATERIALS**

- Α. Structural Steel Shapes, Plates, and Bars: As follows:
 - Wide Flange Shapes and Tees: ASTM A 992. 1.
 - Other Shapes, Plates and Bars: ASTM A 36. 2.
 - Plate Where Indicated 50 ksi: ASTM A572, Grade 50. 3.
- Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B or C. В.
- C. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- D. Headed Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, coldfinished carbon steel, AWS D1.1, Type B with ceramic ferrules. Stud heights shown on the drawings are net lengths after welding. Studs used for composite beams with steel deck shall extend not less than 11/2 inches above the top of the steel deck.
- E. Anchor Rods, Nuts, and Washers: As follows:
 - 1. Anchor Rods: ASTM F 1554, Grade 36.
 - 2. Nuts: ASTM A 563, heavy hex carbon steel nuts.
 - Washers: ASTM F 436, Type 1, hardened carbon steel.
 - Plate Washers: ASTM A 36, carbon steel plate washers in accordance with Table 14-2 of AISC's "Steel Construction Manual", Thirteenth Edition, 1/4 inch plate thickness for anchor rods up to 1 inch diameter, 3/8 inch plate thickness for anchor rods larger than 1 inch diameter.
- F. High-Strength Bolts, Nuts, and Washers: As follows:
 - 1. All bolts shall be of domestic manufacture.
 - 2. Bolts: ASTM A 325, Type 1, heavy hex steel structural bolts.
 - 3. Nuts: ASTM A 563, heavy hex carbon steel nuts.
 - Washers: ASTM F 436, flat, circular carbon steel washers.
 - Twist-Off Type Tension Control Bolts: ASTM F 1852, Type 325.
 - Finish: Plain, uncoated.
- G. Threaded Rods: ASTM A 36.
- Η. Forged Steel Hardware:
 - 1. Clevises. Turnbuckles: AISI C 1035.
 - 2. Clevis Pins: AISI C 1018 or AISI C 1035.
 - Eye Bolts, Eye Nuts: ASTM A 489. 3.
 - Sleeve Nuts: AISI C 1018, Grade 2.
 - Finish: Plain, Uncoated. 5.
- I. Welding Electrodes: Comply with AWS requirements.
 - 1. Electrodes shall be E70XX.
 - 2. All electrodes for welding ASTM A 992 steel shall be low hydrogen electrodes with a maximum of 16 ml of diffusible hydrogen per 100 g of deposited weld metal.
 - 3. Electrodes for all welds in moment connections, including shear tabs and stiffener plates, shall have a minimum Charpy V-Notch toughness of 20 foot-pounds at -20 degrees F, and 40 foot-pounds at 70 degrees F.

2.2 PRIMER AND PAINT

- A. See the Architectural drawings and Division 9 Sections for areas which are scheduled to receive a paint topcoat and for topcoat paint systems.
- B. Primer for Steel not to Receive Topcoat: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79.
- C. Primer for Steel to Receive Topcoat: Comply with Division 09 painting Sections, or if not specified in Division 09 painting Sections, use the following:
 - 1. Interior Steel: SSPC Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.
 - 2. Exterior Steel: SSPC Paint 25 BCS, Type II, zinc oxide, alkyd, linseed oil primer.
- D. Primer for Steel which Receives Intumescent Paint: Use a primer which is approved by the intumescent paint supplier.
- E. Primer color may be selected by contractor, however only one single color of primer may be incorporated in the Work.
- F. Galvanizing Repair Paint: Conform to ASTM A 780 or Military Specification MIL-P-21035A. Acceptable products include, but are not limited to:
 - 1. Galvacon GC-243 Cold Galvanizing Compound, Lanco.
 - 2. Zinga, ZingaMetall.
 - 3. Rust-Oleum Stops Rust Cold Galvanizing Spray, Rust-Oleum.
 - 4. ZRC Cold Galvanizing Compound, ZRC Worldwide.

2.3 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. Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Five Star Grout; U.S. Grout Corp.
 - 2. Masterflow 713; Master Builders.
 - 3. Sonneborn Sonogrout 10K; ChemRex, Inc.
 - 4. NS Grout, Euclid Chemical Company.
 - 5. SC Multipurpose Grout, SpecChem, LLC.
 - 6. Enduro 50; Conspec.

2.4 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. Mark and match-mark materials for field assembly.
 - Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
 - 4. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.

- Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- 6. Welds which will be exposed to view in the completed structure shall have a neat and uniform appearance. Such welds shall be continuous, not intermittent. Plates which are exposed to view on bottoms of beams shall be straight and aligned at joints, and shall be butt welded together at joints with all welds ground smooth.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - Plane thermally cut edges to be welded.
- C. Headed Shear Connectors: Prepare steel surfaces as recommended by manufacturer of headed shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.
- D. At roof edges where joist extensions occur to support a continuous edge angle or bent plate, extend the top portion of beams which are parallel with joists same as the adjacent joist extensions unless indicated otherwise.
- E. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning.
- F. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- G. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
- H. Stairs: Hangers, brackets, posts and other supports for steel stairs shall be located so that they are concealed within walls or other areas not visible to view.
- I. Tube Members: Provide ¾" minimum cap plates on tube columns which support beams unless otherwise indicated. Provide ¼" closure plates on ends of all other tube members unless another connection is indicated. Where the tube end is exposed to view, grind closure plate smooth and flush with tube face all around, including at curved corners of tube.
 - On tube members which will be exposed to view in the completed structure, the seam on the tube shall be oriented away from view. For columns, locate seam facing towards a wall, and for beams, locate seam on upper surface of tube unless indicated otherwise.

2.5 SHOP CONNECTIONS

- A. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
 - 1. Bolts: ASTM A325 high-strength bolts, unless otherwise indicated.
 - 2. Connection Type: Snug tightened, unless indicated as pretensioned or slip-critical.
- B. Welded Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

 Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

2.6 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed-on fireproofing.
 - 5. Top flanges of beams to receive field welded headed shear connectors or field welded rebar.
 - Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces as follows:
 - 1. Steel not to Receive Topcoat: SSPC-SP 1 "Solvent Cleaning", followed by SSPC-SP 2 "Hand Tool Cleaning."
 - 2. Interior Steel to Receive Topcoat: Comply with Division 09 painting Sections, or if not specified in Division 09 painting Sections, use SSPC-SP 1 "Solvent Cleaning", followed by SSPC-SP 2 "Hand Tool Cleaning."
 - 3. Exterior Steel to Receive Topcoat: SSPC-SP 6 "Commercial Blast Cleaning."
 - 4. Faying surfaces and surfaces adjacent to bolt heads and nuts shall be free of dirt and foreign material. Faying surfaces at slip-critical connections shall also be free of scale, except tight mill scale, and free of coatings, including inadvertent overspray.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness complying with Division 09 painting Sections, but not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A123.
- B. Galvanize shelf angles, steel lintels in exterior walls, and other items as indicated.
- C. Where tubes or pipes in exterior elements exposed to the weather have vent holes for galvanizing, the vent holes shall be closed using plug welds and then ground smooth and flush. Holes shall be closed after galvanizing and then painted with galvanizing repair paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before erection proceeds, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until 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.
 - 1. Where temporary shoring is required for composite deck construction, do not remove shoring until cast-in-place concrete has attained its 70 percent of its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. Base Plates and Bearing Plates: Clean concrete and masonry bearing surfaces of bondreducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 - 1. Set base plates and bearing plates for structural members on wedges, shims, or leveling nuts as required.
 - 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 grouting.
 - 3. Grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - a. Comply with manufacturer's instructions for proprietary grout materials.
- 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 forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Splice members only where indicated.
- F. Remove welded identification tags, erection bolts and clips on all steel which will be exposed to view in the completed structure; fill holes with plug welds; and grind smooth at exposed surfaces. Remove paper tags and stickers which will interfere with or show through painting.
- G. Finish sections thermally cut during erection equal to a sheared appearance.
- H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

I. Brick shelf angles shall be welded to the supporting structure only after concrete slabs are in place.

3.4 FIELD CONNECTIONS

- A. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
 - 1. Bolts: ASTM A325 high-strength bolts, unless otherwise indicated.
 - 2. Connection Type: Snug tightened, unless indicated as pretensioned or slip-critical.
 - 3. Tensioned bolts: For bolted connections indicated as pretensioned or slip-critical, use twist-off type tension control bolts.
- B. Welded Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - 1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
 - 3. Welds which will be exposed to view in the completed structure shall have a neat and uniform appearance. Such welds shall be continuous, not intermittent. Plates which are exposed to view on bottoms of beams shall be straight and aligned at joints, and shall be butt welded together at joints with all welds ground smooth.
 - 4. Shielded Metal Arc Welding (SMAW) or Flux Cored Arc Welding (FCAW) are acceptable welding processes for shop or field welding. FCAW-S (self-shielded) shall not be mixed with any other welding process in the same weld in moment connections.
- C. Headed Shear Connectors: Weld headed shear connectors through deck to supporting members using automatic end welding according to AWS D1.1 and manufacturer's written instructions.
 - 1. Do not use shielded metal arc welding ("stick" welding) to weld headed shear connectors unless limited access prevents using automated equipment. Where limited access prevents using automated equipment, studs may be welded by hand using a 5/16" fillet weld all around.
 - At start of each welding operation, operator shall weld two headed shear connectors and visually verify that they exhibit full 360 degree flash. Studs shall then be bent to an angle of approximately 30 degrees from vertical. Satisfactory visual and bend tests shall be obtained on two consecutive headed shear connectors before production welding commences.
 - 3. Remove and discard ferrules after welding headed shear connectors.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform field inspections and tests and to prepare test reports.
 - 1. Special inspector will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

- B. Contractor shall ensure that no items which are to be tested or inspected are covered up by earth, concrete, deck or other materials before testing and inspection are complete.
- C. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- D. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- E. Periodically inspect steel frame joint details for compliance with approved construction documents.
- F. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. Verify that washers are installed as required by RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 2. Snug-Tightened Connections: Visually verify that all plies of the connected elements have been brought into firm contact.
- G. Provide continuous visual inspection of all multi-pass fillet welds, all single-pass fillet welds greater than 5/16", and all complete and partial penetration groove welds. Provide periodic visual inspection of single-pass fillet welds less than or equal to 5/16".
- H. Field-welded headed shear connectors shall be inspected and tested according to requirements of AWS D1.1 for stud welding, proper stud height, and as follows:
 - 1. Headed shear connectors shall be visually inspected to verify the presence of a continuous 360-degree weld flash. Bend tests will be performed by bending to an angle of 15 degrees from vertical when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any headed shear connector.
 - 2. Ten percent of headed shear connectors, including those which do not pass the visual inspection described above and additional connectors selected at random, shall be tested by bending to an angle of 15 degrees from vertical. Connectors which pass the bend test may be left in the bent position.
 - 3. Bend tests will be conducted on the adjacent headed shear connectors on each side when weld fracture occurs on a headed shear connector.
- I. Masonry reinforcing steel which is field welded to structural steel shall be inspected as follows:
 - 1. Verify that all reinforcing steel which is to be welded conforms to ASTM A 706.
 - 2. At each beam or other structural steel member, the first welded reinforcing bar shall be bent to an angle of 30 degrees and then bent back into place. Before being covered with masonry, all reinforcing bars shall be hit with a hammer after welding to verify that welds do not fracture.

3.6 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

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STRUCUTRAL STEEL FRAMING

B. Galvanized Surfaces: All exposed galvanized surfaces which have been damaged by shipping, handling, welding or other operations shall be repaired. Surfaces to be repaired shall be clean, dry, and free of oil, grease, welding slag or flux and corrosion products. Apply galvanizing repair paint according to the manufacturer's instructions to attain the required dry-film thickness.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Composite floor deck.
 - Accessories.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel Framing" for field-welded headed shear connectors.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: For each type of accessory indicated, submit details and thicknesses. For each type of deck, submit structural properties, thicknesses, and maximum unshored construction spans.
- C. Underwriters' Label: Where compliance with a UL fire-rated assembly is required as indicated on the architectural drawings, provide certification that steel deck units are identical to those units tested for fire resistance per ASTM E 119 and listed in Underwriters' Laboratories "Fire Resistance Directory".
- D. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing details, deck openings, special jointing, and accessories.
- E. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed steel deck installations similar to this Project with a record of successful in-service performance.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to the Architect, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel," and AWS D1.3, "Structural Welding Code-Sheet Steel."

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- D. AISI Specifications: Calculate structural properties of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."
- E. Underwriters' Label: Where compliance with a UL fire-rated assembly is required as indicated on the architectural drawings, provide steel deck units identical to those units tested for fire resistance per ASTM E 119 and listed in Underwriters' Laboratories "Fire Resistance Directory".

1.5 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 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers whose products may be included in the Work include, but are not limited to, the following:
 - 1. New Millennium Building Systems.
 - 2. Epic Metals Corp.
 - 3. United Steel Deck, Inc.
 - 4. Vulcraft, Division of Nucor.
 - 5. Wheeling Corrugating Co.

2.2 GENERAL

- A. Deck which is to receive spray-applied fireproofing shall be free of lubricants and oils which would impair the adhesion of the fireproofing. The deck manufacturer shall certify that the deck is UL classified and has been fire tested with the appropriate fireproofing material.
- B. For galvanized deck which is to be field painted, contractor shall coordinate with the decking supplier prior to ordering to verify that all exposed decking schedule to be painted has a paintcompatible passivator that does not inhibit proper bonding of the paint per the painting manufacturer.

2.3 COMPOSITE FLOOR DECK

- A. Composite Steel 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. 30, and the following:
 - 1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40 minimum, G60 zinc coating.
 - 2. Deck Profile Type, Depth, Thickness and Structural Properties: As indicated on the structural drawings.

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- Α. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Screws: Corrosion-resistant, hexagonal washer head, self-drilling carbon-steel screws.
- C. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33 ksi, not less than 0.0358-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- D. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (14 gage) thick, of same material and finish as deck, with 3-inch-wide flanges and recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- E. Column Closures, End Closures, Z-Closures, Girder Fillers and Cover Plates: Steel sheet, of same material and finish as deck, not less than 0.0358-inch design uncoated thickness.
- F. Galvanizing Repair Paint: ASTM A 780 or SPC-Paint 20.

PART 3 - EXECUTION

3.1 **EXAMINATION**

Examine supporting members and field conditions for compliance with requirements for Α. installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30. manufacturer's written instructions, and requirements in this Section and on the drawings.
- B. Fabricate deck panels in lengths to span three or more supports where possible.
- C. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- D. Locate decking bundles to prevent overloading of supporting members.
- E. Place deck panels and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side-lap interlocks.
- F. Place deck panels flat and square and fasten to supporting members without warp or deflection.
- Cut and neatly fit deck panels and accessories around openings and other work projecting G. through or adjacent to decking.
- Η. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.

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STEEL DECKING

- I. All screws should penetrate the joined materials so that there are not less than 3 exposed threads. Screws should be installed and tightened in accordance with the screw manufacturer's recommendations.
- J. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- K. Install mechanical fasteners according to deck manufacturer's instructions.

3.3 COMPOSITE FLOOR DECK INSTALLATION

- A. Deck Layout: Lay out deck panels so that solid concrete occurs over the tops of all girders. Provide girder fillers on one or both sides of girders if required.
- B. Fasten floor deck panels to steel supporting members by 5/8 inch diameter arc spot (puddle) welds as follows:
 - 1. Weld Spacing: Space welds at 12 inches at each support.
 - 2. Headed shear connectors welded through deck may be substituted for puddle welds.
- C. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, using the following methods:
 - 1. Weld, button punch, or screw side laps with self-drilling No. 10 diameter or larger screws, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, or at closer spacing if recommended by the manufacturer.
 - 2. Weld perimeter with 5/8 inch diameter puddle welds at 12 inches on center.
- D. End Bearing: Install deck ends over supporting members with butted end joints with a minimum end bearing of 1-1/2 inches:
- E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations.
- F. 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 decking. Provide closures at all required locations whether shown structural drawings or not.
- G. Deck Span: If the deck span exceeds the manufacturer's maximum allowable span for the applicable span condition (single, double, or triple), the contractor shall provide a continuous row of shoring at midspan of the deck before concrete is placed.
- H. Cleaning Deck: Clean top surface of deck if mud or other materials are present which would affect the bond of concrete to the deck.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field quality control inspections of roof deck connections:
 - 1. Visually inspect welds, weld size and spacing.

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- B. Special inspector will report results of inspections promptly to Architect and Contractor.
- C. Provide additional connections to replace connections not in compliance with specified requirements.

3.5 REPAIRS, REINFORCEMENT AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair rust spots, welds, burned areas, and damaged areas of galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Reinforcement of Openings: Unless other reinforcing is shown on the structural drawings, reinforce openings with any dimension larger than 6 inches as follows
 - 1. Openings 6 inches to 12 inches: Reinforce with 0.0358-inch steel sheet, 6 inches wider than opening in all directions. Attach to top surface of deck with No. 10 diameter screws or welds at 6 inch spacing along each side. Attach to deck before opening is cut.
 - 2. Openings 12 inches to 18 inches: Reinforce with 2 inch x 2 inch x 1/4 inch steel angles. Place angles perpendicular to flutes, extended minimum two flutes each side of opening. Weld to top surface of deck with welds at 6 inch spacing along each side of angles. Attach to deck before opening is cut.
 - 3. Where openings are in deck supporting slabs, provide pour stops around openings in addition to reinforcing indicated above. Cut deck out of opening after concrete has been in place a minimum of seven days.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

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SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior load-bearing wall framing.
 - 2. Interior load-bearing wall framing.
 - 3. Exterior non-load-bearing wall framing.
 - 4. Exterior soffit and fascia framing.
 - 5. Bracing for top of exterior storefront at entries.
 - 6. Exterior ceiling joist framing.
 - 7. Exterior hat channel framing.
 - 8. Other items indicated on the structural drawings to be by the light gage framing supplier (or the synonymous term cold-formed framing supplier).
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel Framing" for masonry shelf angles.
 - 2. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
 - 3. Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads and Criteria: As indicated on the structural drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Wall Framing: Horizontal deflection of 1/600 of the wall height for walls with brick or other masonry veneer. 1/360 for walls with other types of cladding. For purposes of deflection calculations, the wind load may be taken as 0.7 times the components and cladding 50-year wind loads in the applicable code. Strength calculations must be based on the full components and cladding 50-year wind loads.
 - b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 psf, or seismic load, whichever is greater.

- Floor Joist Framing: Vertical deflection of 1/480 of the span for live loads and I/360 for total load.
- Roof Rafter Framing: Vertical deflection of 1/360 of the horizontally projected span for total load.
- e. Ceiling Joist Framing: Vertical deflection of 1/360 of the span for total load.
- 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 3/4 inch.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing General Provisions."
 - Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing Header Design."
 - 2. Design exterior wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For professional engineer.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - Mechanical fasteners.
 - 4. Vertical deflection clips.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- 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 for this Project.

- C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing General Provisions."
 - Comply with AISI's "Standard for Cold-Formed Steel Framing Header Design."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Allied Studco.
 - 2. AllSteel Products, Inc.
 - 3. California Expanded Metal Products Company.
 - 4. Clark Steel Framing.
 - 5. Consolidated Fabricators Corp.; Building Products Division.
 - 6. Craco Metals Manufacturing, LLC.
 - 7. Custom Stud, Inc.
 - 8. Dale/Incor.
 - 9. Design Shapes in Steel.
 - 10. Dietrich Metal Framing; a Worthington Industries Company.
 - 11. Formetal Co. Inc. (The).
 - 12. Innovative Steel Systems.
 - 13. MarinoWare; a division of Ware Industries.
 - 14. Quail Run Building Materials, Inc.
 - 15. SCAFCO Corporation.
 - 16. Southeastern Stud & Components, Inc.
 - 17. Steel Construction Systems.
 - 18. Steeler, Inc.
 - 19. Super Stud Building Products, Inc.
 - 20. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet at Shear Panels: ASTM A 653, ASTM A 792, or ASTM A 875, metallic coated, of grade and coating weight as follows:

- 1. Grade: Structural Steel (SS) Grade 33.
- 2. Coating: G60.
- 3. Thickness: As indicated on the structural drawings.
- B. Other Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - Minimum Base-Metal Thickness: 0.0428 inch (18 gage) [0.0538 inch (1.37 mm)], except studs to which exterior storefront, curtain wall, or windows are attached shall be 16 gage minimum.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs. except tracks to which exterior storefront, curtain wall, or windows are attached shall be 16 gage minimum.
 - 2. Flange Width: 1-1/4 inches.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (18 gage) [0.0538 inch (1.37 mm)].
 - 2. Flange Width: 1-5/8 inches.
- D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:
 - 1. Minimum Base-Metal Thickness: [0.0428 inch (1.09 mm)]
 - 2. First option in subparagraph below is minimum top flange width recognized by AISI's "Standard for Cold-Formed Steel Framing Header Design." Coordinate with wall width.
 - 3. Top Flange Width: [1-1/2 inches (38 mm)] [1-5/8 inches (41 mm)] [2 inches (51 mm)] [2-1/2 inches (63 mm)].

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (18 gage), except studs to which exterior storefront, curtain wall, or windows are attached shall be 16 gage minimum.
 - 2. Flange Width: 1-5/8 inches.
 - 3. Section Properties: As required to meet the structural design criteria.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs, except tracks to which exterior storefront, curtain wall, or windows are attached shall be 16 gage minimum.
 - 2. Flange Width: 1-1/4 inches.

2.5 SOFFIT, FASCIA, CEILING JOIST FRAMING, AND BACKUP FOR COMPOSITE METAL PANELS

- A. Steel Framing: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (18 gage), except studs and tracks to which exterior storefront, curtain wall, or windows are attached shall be 16 gage minimum.
 - 2. Flange Width: 1-5/8 inches.
 - 3. Section Properties: As required to meet the structural design criteria.
- B. Where framing is for backup of composite metal panels, provide continuous 2" x 2" x 18 gage angles at all corners.

2.6 Hat Channels:

- A. Manufacturer's standard structural hat channels, of depths indicated, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (18 gage).
 - 2. Section Properties: As required to meet structural design criteria.

2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Gusset plates.
 - 7. Stud kickers, knee braces, and girts.
 - 8. Joist hangers and end closures.
 - 9. Hole reinforcing plates.
 - 10. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153. Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Holdowns at Shear Panels: Provide Simpson holdown indicated or equal.
- G. Welding Electrodes: Comply with AWS standards.

2.9 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads. Unless larger dimensions are indicated on Shop Drawings, ¾" minimum clearance shall be maintained between screws and edges of members, and ¾" minimum oncenter spacing shall be maintained between adjacent screws.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

- 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding or screw fastening. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads. Unless larger dimensions are indicated on Shop Drawings, ¾" minimum clearance shall be maintained between screws and edges of members, and ¾" minimum oncenter spacing shall be maintained between adjacent screws.
- D. In multistory buildings, do not install wall studs until the concrete slabs above and below the studs have been poured.
- E. Install framing members in one-piece lengths unless splice connections are indicated.
- F. Install manufactured connectors in accordance with the manufacturer's recommendations. The size and number of fasteners shall be as specified by the manufacturer.
- G. Framing around openings where windows, curtain wall, storefront, and louvers in exterior walls (headers, jambs, sills) are attached shall be 16 gage minimum.
- H. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place,

undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

- I. At exterior walls where wall stud framing is interrupted by steel beams and wall sheathing or insulation boards run continuous past the beam, provide vertical stud infill framing in the exterior sides of webs of beams at the same spacing as the wall studs. Minimum base metal thickness shall be not less than minimum base metal thickness required for exterior wall studs in this specification. Infill framing is required whether shown on the drawings or not.
- J. Fasten structural hat channels to supporting construction as shown on Shop Drawings.
- K. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of expansion joints.
- L. Install insulation, specified in Division 7, in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- M. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- N. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: **As shown on Shop Drawings**.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: 16 inches, unless indicated otherwise.
- C. Set studs plumb.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads or provide additional studs as required.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced in rows not more than 48 inches apart. Fasten at each stud intersection. Use one of the following methods:
 - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 8 inches deep.
 - 2. Bridging: Combination of flat, taut, steel sheet straps and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges. Straps shall be minimum 1-1/4 inch wide and minimum 0.0329 inch (20 gage) thick.
 - 3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom tracks, except where deflection tracks are used. Space studs as follows:
 - 1. Stud Spacing: 16 inches, except where otherwise indicated or where closer spacing is required by the engineering analysis.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs spaced in rows not more than 48 inches apart using one of the methods below. Fasten at each stud intersection.

- 1. Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- 2. Combination of flat, taut, steel sheet straps of width and thickness indicated and studtrack solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- 3. Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install headers, sills, and jamb studs at openings as required to resist wind and seismic loads and to transfer these loads to the structure.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 SOFFIT, FASCIA, AND CEILING JOIST INSTALLATION

- A. Provide light gage framing for soffits, fascia, and exterior ceilings as indicated on the architectural and structural drawings. All required items may not be shown on the structural drawings.
 - 1. Dimensions and details shall be as shown on the architectural drawings.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a special inspector to perform tests and inspections and prepare test reports.
- B. Special inspector shall verify the manufacturer's procedure for material control meets the requirements of IBC section 1704.3.
- C. Special inspector shall verify in the field that the following is in accordance with the Drawings and approved shop drawings:
 - 1. Member sizes, configurations, and spacings.
 - 2. Connections.
 - 3. Bracing and bridging.
 - 4. Shear wall panel construction including holdowns.
- D. Special inspector will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work where test results or inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

COLD-FORMED METAL FRAMING

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.
- B. The extent of miscellaneous metal work is shown on the drawings and includes items fabricated from iron steel shape, plates, bars, strips, tubes, cables, pipes and castings which are not a part of the structural steel or other metal systems in other sections of these specifications, and miscellaneous aluminum items and shapes.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 04 2731 Reinforced Unit Masonry: Placement of metal fabrications in masonry.
- D. Section 05 5113 Metal Pan Stairs.
- E. Section 05 5116 Metal Floor Plate Stairs.
- F. Section 05 5213 Pipe and Tube Railings.
- G. Section 09 9113 Exterior Paint.
- H. Section 09 9123 Interior Paint.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2005.
- B. ANSI A14.3 American National Standard for Ladders -- Fixed -- Safety Requirements; 2002.
- C. ASTM A 36/A 36M Standard Specification for Carbon Structural Steel; 2008.
- D. ASTM A 53/A 53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2007.
- E. ASTM A 123/A 123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2009.
- F. ASTM A 153/A 153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- G. ASTM A 283/A 283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2003 (Reapproved 2007).
- H. ASTM A 325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2009a.
- ASTM A 325M Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- J. ASTM A 501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.
- K. ASTM B 209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2007.
- L. ASTM B 209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2007.

- M. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire. Profiles. and Tubes: 2008.
- N. ASTM B 221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2007.
- O. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.
- P. AWS D1.1/D1.1M Structural Welding Code Steel; American Welding Society; 2010.
- Q. AWS D1.2/D1.2M Structural Welding Code Aluminum; American Welding Society; 2003, and Errata 2004.
- R. SSPC-Paint 15 Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- S. SSPC-Paint 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- T. SSPC-SP 2 Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.01 MATERIALS - GENERAL

- A. For the fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
- B. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.
- C. Materials shall be free from defects impairing strength, durability and appearance and of the best commercial quality.

2.02 MATERIALS - STEEL

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 501 hot-formed structural tubing.
- C. Plates: ASTM A 283.
- D. Steel Bars and Bar Size Shapes: ASTM A306, Grade 65, or ASTM A36.
- E. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, hot-dip galvanized finish.
- F. Slotted Channel Framing: ASTM A 653, Grade 33.

- G. Slotted Channel Fittings: ASTM A 1011/A 1011M.
- H. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
- Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type II Organic, Level 1, Type III zinc dust complying with VOC limitations of authorities having jurisdiction.
 - 1. Galvanizing Repair Paint shall be ZRC Galvilite as manufactured by ZRC Worldwide or approved equal.

2.03 MATERIALS - GRAY IRON CASTINGS

A. ASTM A48, Class 30.

2.04 MATERIALS - MALLEABLE IRON CASTINGS:

A. ASTM A47, Grade as selected.

2.05 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B 209 (ASTM B 209M), 5052 alloy, H32 or H22 temper.
- C. Bolts, Nuts, and Washers: Stainless steel.
- D. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.06 ACCESSORIES

- A. Masonry Anchorage Devices: Hilti "Sleeve Expansion Anchors" or Hilti "HAS Adhesive Anchors" as indicated or approved equal.
- B. Toggle Bolts: Tumble wing type: FS FF B 588, a type, class and style as required.
- C. Fasteners: Provide zinc coated fasteners, with galvanizing complying with ASTM A153, for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
- D. Welding Materials: Provide the type and alloy of filler metal and electrodes in compliance with the recommendations of the producer of the metal to be welded and as required for color match, strength and compatibility in the fabricated items.

2.07 FABRICATION

- A. Field measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.
- B. Form Exposed Work: True to line and level with accurate angles and surfaces and straight sharp edges.
- C. Fit and shop assemble items in largest practical sections, for delivery to site.
- D. Fabricate items with joints tightly fitted and secured.
- E. Continuously seal joined members by continuous welds.

- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
 - Provide setting drawings, templates, instructions and directions for installation of anchorage devices such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery with other work to avoid delay.
- J. Shop Painting: Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded and galvanized surfaces, unless otherwise specified. Apply one shop coat of lead-free rust inhibitive alkyd metal primer to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection.

2.08 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, and masonry; galvanized finish.
- C. Lintels: As detailed; galvanized finish. See structural drawings for lintel schedule.
- D. Carpenter's Iron Work: Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or other structures. Manufacture or fabricate items of sizes, shapes and dimensions required. Furnish malleable iron washers for head nuts which bear on wood structural connections, elsewhere, furnish steel washers.
- E. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish where detailed.
- F. Continuous Steel Angle at loading dock edge: As detailed; galvanized finish. See architectural drawings for size and location.

2.09 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements. Provide minimum 2.0 oz/sq ft galvanized coating. Grade 85.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

2.10 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: high performance organic coating.
- B. Interior Aluminum Surfaces: high performance organic coating.
- C. High Performance Organic Coating System: AAMA 2604 multiple coat, thermally cured fluoropolymer system; color as selected from manufacturer's standard colors.
- Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.11 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication and are intended for bolted or screwed field connections.
- C. Do not cut or abrade members with finishes which cannot be completely restored in the field. Where cutting, welding and grinding are required for fitting and jointing of the work, restore finishes to eliminate any evidence of such corrective work.
- D. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Field weld components indicated.

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METAL FABRICATIONS

- F. Perform field welding in accordance with AWS D1.1/D1.1M.
- G. Obtain approval prior to site cutting or making adjustments not scheduled.
- H. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counter flashings, and metal cap flashing by Metal Building Manufacture
- B. Gutters and Supports, Downspout, Outspouts. By Metal Building Manufacturer
- D. Reglets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 Unit Masonry: Through-wall metal flashings in masonry.
- B. Section 06 1000 Rough Carpentry: Wood nailers.
- C. Section 07 2726 Vapor Permeable Fluid-Applied Air Barrier Membrane: Through-wall membrane flashings in masonry.
- D. Section 07 4113 Metal Roof Panels: Additional flashings associated with Metal Roofing.
- E. Section 07 5216 Modified Bitumen Roofing: Additional flashings associated with Built-up Roofing.
- F. Section 07 54 00 Thermoplastic Single-Ply Roofing: Additional flashings associated with PVC Roofing.
- G. Section 07 7200 Roof Accessories: Roof-mounted units.
- H. Section 07 9005 Joint Sealers.
- Section 08 4500 Insulated Translucent Fiberglass Sandwich Panel Wall & Roof Assemblies

1.03 REFERENCE STANDARDS

- A. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; latest edition.
- B. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2005.
- C. ANSI/SPRI ES-1 American National Standard for Edge Systems used with Low Slope Roof Systems.
- D. ASTM A 653/A 653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009a.
- E. ASTM B 32 Standard Specification for Solder Metal; 2008.
- F. ASTM B 209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2007.
- G. ASTM B 209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2007.
- H. ASTM B 370 Standard Specification for Copper Sheet and Strip for Building Construction; 2009.
- ASTM B 749 Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2003 (Reapproved 2009).
- J. ASTM D 226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.
- K. ASTM D 4479 Standard Specification for Asphalt Roof Coatings Asbestos-Free; 2007.

- L. ASTM D 4586 Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007.
- M. NRCA Roofing and Waterproofing Manual, fifth edition.
- N. SMACNA (ASMM) Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003.

1.04 SUBMITTALS

- A. See Section 01 3300 Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Selection Samples; Submit as follows:
 - 1. Submit two samples, 6" x 6" in size of each available metal finish color.
 - 2. Manufactured items: 1'-0" length in style and finishes specified.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and the NRCA Roofing and Waterproofing Manual and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.
- C. All flashing, sheet metal, gutters and downspouts, and other flashings associated with roofing work and Translucent Roof Assemblies shall be provided and installed by roofing contractor and included in the roofing warranty.

1.06 PERFORMANCE

- A. Coordinate the work with other work for the correct sequencing of items which make up the entire membrane of system of weatherproofing and waterproofing and rain drainage.
- B. It is required that the flashing and sheet metal work be permanently watertight and not deteriorate in excess of manufacturer's published limitations.
- C. Sheet metal flashing and trim shall withstand wind loads, structural movement, thermally induced movement and exposure to weather without failing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.
- C. Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Reject damaged material and remove from project site.

1.08 WARRANTY

- A. Finish shall be guaranteed against fading, color change, chalking, peeling, cracking, chipping or delaminating for a period of 20 years.
- B. Flashing shall be guaranteed against water tightness and included in the roofing warranty. See Section 07 5216 Modified Bitumen Roofing, Section 07 5400 Thermoplastic Single-Ply Roofing and Section 07 4113 Metal Roof Panels.
- C. Warrant other flashing and sheet metal work to be free of defects in materials and workmanship. Warranty period shall be two years.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Architectural Metals: Shall be .040 pre-finished aluminum by the same manufacturer supplying metal roofing specified in Section 07 41 13 where shown on plans and as required for details. Colors shall be selected by the architect.
- B. Steel Sheet (Galvalume): Aluminum-zinc alloy-coated SS (structural steel) sheet conforming to ASTM A 792/A 792M; minimum AZ55 coating.
 - b. Steel Thickness: Minimum 24 gauge, 0.024 inch.
- C. Pre-Finished Galvanized Steel: (At all exposed flashing) ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.0276 inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's standard colors. Metal flashing associated with metal roofing shall match metal roofing panels.
 - 3. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as selected from manufacturer's standard colors.
 - a. Sheet metal shall be supplied by Metal Roof Panels contractor by same manufacturer as Metal Wall Panels as specified in Section 07 4113.
- D. Lead: ASTM B 749, 2.5 lb/sq ft thick.
- E. Copper: ASTM B370, cold rolled 22 oz/sq ft thick; natural finish.
- F. Aluminum: ASTM B 209; .040 inch thick or as indicated on drawings and elsewhere in the specifications.

2.02 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work: Matching or compatible with material being installed, noncorrosive, size and gage required for performance.
- C. Underlayment: ASTM D 226, organic roofing felt, Type II ("No. 30").
- D. Slip Sheet: Rosin sized building paper.
- E. Primer: Zinc chromate type.
- F. Protective Backing Paint: Asphaltic mastic, ASTM D 4479 Type I.
- G. Bituminous Coating: FS TT C 494, or Mil C 18480, or SSPC Paint 12, cold applied bituminous mastic, compounded for 15 mil dry film-thickness coatings.
- H. Sealant: See Section 07900.
- I. Plastic Cement: ASTM D 4586, Type I.
- J. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape; Springlok Flashing System, Type SM manufactured by Fry Reglet or approved equal.
- K. Solder: ASTM B 32; Sn50 (50/50) type.

2.03 FABRICATION

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with SHEET METAL FLASHING AND TRIM 07 6200 - Page 3 of 8

SHEET METAL FLASHING AND TRIM

details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual", NRCA Roofing and Waterproofing Manual, and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems. Form sheet metal work with clear, sharp and uniform arises.

- B. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams for non-moving seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams. Fill seams with exterior sealant as specified in Section 07 9005 Joint Sealers.
- F. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards. Sealant shall be installed in such a manner to be protected from UV deterioration.
- G. Tin edges of copper sheet to be soldered. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- I. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- J. Fabricate flashings to allow toe to extend 2 inches over roofing cap sheet. Return and brake edges.
- K. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.
- L. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.
- M. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- N. Cap Flashing: Provide sheet metal cap flashing at top edges of base flashings and as shown on drawings.
- O. Parapet Cap: Parapet cap shall be 24 gauge galvanized steel. Cap shall be installed in 12' long lengths minimum with butt type joints. Furnish a 6" joint plate to provide positive expansion and contraction. Provisions shall be made for concealed anchorage of the face of the cap with continuous hold-down clips. All corners shall be pre-fabricated to insure water tight joints. All caps to be set straight and true.
- P. Gravel Stops: Galvanized steel gravel stops shall be 24 gauge thick of size and shape detailed. Finish to match exposed flashing as specified herein.
 - Provide gravel stops and fascia at exposed edges of all built-up roofs as indicated on the drawings. Gravel stops and fascia shall be formed from 8 to 10 foot sheets of sheet metal

- as long as possible with no more than one piece less than 10' long in a single run.
- 2. One flange shall be formed to extend not less than 6" on to the roof. Do not face nail gravel stops.
- 3. The top of the gravel stop shall extend not less than 1" in height above the level of the built-up roofing. The bottom of the fascia portion shall have 3/4" fold bent outward at a 45 degree angle and shall be hooked over a previously installed continuous edge strip fabricated from 24 gage galvanized steel.
- 4. End joints shall lap 3" with the back member taper cut.
- 5. The lap of the roof and the gravel stop shall be coated with non-hardening mastic. A minimum allowance of 1/4" per 10 foot length must be made for expansion.
- 6. Cover plate expansion joints formed to the exact profile of gravel stop and fascia may be used
- 7. Polymer Clad Metal: Gravel stop for PVC roffing system is to be 24 GA PVC coated metal with a 24 GA Galvalume Edge Cover of color as selected by architect to match other metal fascia colors. Cleats 22 GA galvanized metal. Any surfaces exposed to view shall not have the polymer coating exposed. Only the pre-finished fluoropolymer aluminum surface is to be exposed
- Q. Counterflashings: Solder all seams. Provide circular copper covers soldered and mechanically attached to all penetrations. Covers shall extend 2" beyond all edges.
- R. Pitch Pockets: If required on drawings, shall be manufactured of 22 oz. copper in size as required for conditions. Solder all seams.
- S. Pitch Pocket Hats: Shall be fabricated of 22 ounce copper. Attached with pop rivets and seal joints. Provide for all new and existing pitch pockets. Covers shall extend 2" beyond all edges.
- T. Curb Flashing: At unexposed locations, 22 oz copper where noted on drawings. Solder all seams.
- U. Plumbing Vents: Shall be of 4 lb. lead turned into vent 1" minimum.
- V. Scuppers: Roof Scuppers and Overflows, where indicated, shall be manufactured of 12 Ga. stainless steel as shown on plans. All seams shall be welded for water tightness. Prime prior to flashing with roofing felts. Wrap exposed stainless steel with metal matching parapet caps or brick color as determined by the Architect.
- W. Miscellaneous Exposed Flashing: Shall be match exposed flashing as specified herein.
- X. Reglets: Reglets shall be Fry Reglet Springlok Flashing System, Type SM snap lock, as shown on plans or approved equal.
- Y. Slip Sheet: 5 lb/square red rosin building paper conforming to FS UU-B-790, Type I, Style 1b.
- Z. Fasteners: Same material or compatible with sheet metal being fastened. Provide type, length and gauge recommended by the producer of the metal sheets. Fasteners shall not invalidate finish warranty.
 - 1. Nails: Flathead, needle point, not less than 12 ga. and of sufficient length to penetrate substrate 1" minimum.
 - 2. Expansion Shields: Lead or bronze sleeves.
 - 3. Screws: Self-tapping type, with round heads.
 - 4. Bolts: Furnished complete with nuts and washers.
 - 5. Rivets: Round head, solid shank.
 - 6. Blind Clips and Cleats: Same gauge as sheet metal.
 - 7. Termination Bar: 1" high, continuous.

2.04 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: Reference Standard: SMACNA Architectural Sheet Metal Manual, Profile as indicated on drawings.

SHEET METAL FLASHING AND TRIM

- 1. Gutters and Brackets to be .125 aluminum unless noted otherwise in details.
- 2. 1" wide .050" thick internal aluminum stap 30" o c. with continuous .125 thick external hanger at bottom (see Details)
- 3. Include expansion joints not exceeding 40 feet maximum for long runs, locations recommended by manufacturer and approved by architect.
- B. Downspouts: Rectangular profile. Provide 3 downspout straps per 10' section.
- C. Outspouts: Fully welded into the gutter profile as noted on drawings
- D. Accessories: Profiled to suit gutters and downspouts.
 - 1. Anchorage Devices: In accordance with SMACNA requirements.
 - 2. Gutter Supports: For Straight Run Gutters Exterior and Interior
 - 3. Downspout Supports: Brackets.
- E. Exterior Finish: Kynar-500 from manufacturer's full range of colors. Color as selected by architect. Finish color at components adjacent to translucent wall and roof panels are to match the Kynar-500 metalic finish and color of the roof and wall panel frame and trim.
- E. Splash Pans: Same metal type as downspouts, formed to 12" x 30" inches size; rolled sides of 1 inch high for inverted pan placement.
- F. Downspout Boots: Cast iron as indicated on plumbing documents. Coordinate downspout tie-in with plumbing and civil.
- G. Seal metal joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.
- C. Do not proceed until unsatisfactory conditions have been corrected. Commencement of the work of this section shall indicate acceptance of substrate.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.
- D. Underlayment: Where metal is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of 15 lb. Roofing felt.

3.03 INSTALLATION

- A. Roofing Contractor shall supervise the installation of counter flashings, metal reglets, nailing strips, roofing penetrations and all other miscellaneous flashing or work that will be in contact with the built-up roofing or preformed metal roofing. Isolate dissimilar metals in contact with each other with a layer of felt or by a coating of plastic cement. Separate aluminum work from dissimilar metals, wood and from cementitious materials with a 15 mil dry film thickness bituminous coating to either the substrate or to aluminum.
- B. Conform to drawing details, approved shop drawings, and standard details from SMACNA

Architectural Sheet Metal Manual or NRCA Roofing and Waterproofing Manual.

- 1. Counter Flashings: SMACNA Architectural Sheet Metal Manual, Detail 4-4C.
- 2. Roof Penetration Flashing: SMACNA Architectural Sheet Metal Manual, Detail 4-14B.
- All Roof Edge Flashing and Trim: ANSI/SPRI ES-1
- C. Underlayment: Where metal is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of 15 lb. Roofing felt.
- D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- E. Secure flashings in place using concealed fasteners for all flashings exposed to view. Use exposed fasteners only where permitted.(at concealed locations).
 - 1. Secure sheet metal items using continuous cleats, clips and blind fasteners as indicated.
- F. Apply plastic cement compound between metal flashings and felt flashings.
- G. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- H. All metal flashing, counterflashing, pitch pans, and reglets shall be formed on a bending brake. Shaping, trimming and hand seaming is to be done on a bench, insofar as is practical with the proper sheet metal working tools. Angles, bends and folds, which are interlocking the metal, shall be made with allowances for expansion and contraction to avoid buckling and/or fullness.
- I. Counterflashing: Extend into the wall as shown and turned up and shall extend down face of wall overlapping the base flashing 4" and end laps shall be at least 4". Butter all joints. Install counter flashings in reglets or receivers. Secure in a waterproof manner.
- J. Perform field joining of lengths as specified for shop fabrication. Factory form and join interior and exterior corners and similar transactions.
- K. Seaming: Form seams in direction of flow. Seams shall be flatlock with cleats filled with exterior sealant. Lap seams occurring in members sloping 45° or more 4" minimum and bed in flashing cement.
- L. Install exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- M. Seal metal joints watertight.
- N. Secure gutters and downspouts in place using concealed fasteners.
- O. Slope gutters 1/4 inch per foot minimum.
- P. Connect downspouts to downspout boots where shown on drawings. Grout connection watertight.
- Q. Set splash pans under downspouts.

3.04 SOLDER JOINTS

- A. Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work:
 - 1. Do not solder aluminum.
 - 2. Pretinning is not required for the following metals:
 - a. Lead.
 - b. Lead-coated copper.
 - c. Terne-coated stainless steel.

SHEET METAL FLASHING AND TRIM

3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.05 PLUMBING VENTS

A. After vents through roof have been set by plumber, they shall be flashed in accordance with roofing manufacturer's printed recommendations. Roofing contractor shall be responsible for flashing all plumbing vents, roof drains, etc.

3.06 CLEANING AND PROTECTION:

- Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.
- B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4001, 01 4523 along with product related sections for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements. See Section 07 5216 Modified Bitumen Roofing, Section 07 5400 Thermoplastic Single-Ply Roofing and Section 07 4113 Metal Roof Panels for additional quality control requirements.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal Framing Components
- B. Metal Wall Panels and Trim
- C. Metal Roof Panels and Trim
- D. Metal Building Accessories

1.2 RELATED SECTIONS

- A. Section 03 15 00- Placement of anchor bolt, leveling plates and grout.
- B. Section 03 30 00- Cast-in-place concrete.
- C. Section 05 21 00 Steel joist framing.
- D. Section 05 31 00 Steel decking.
- E. Section 08 31 00 Overhead doors.
- F. Section 08 50 00 Windows.
- G. Section 09 90 00 Painting: Finish painting of primed steel surfaces.

1.3 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC):
 - 1. AISC Specification for Structural Steel Buildings.
 - 2. AISC Serviceability Design Considerations for Low-Rise Buildings
- B. American Iron and Steel Institute (AISI):
 - 1. AISI North American Specification for the Design of Cold-Formed Steel Structural Members
- C. American Welding Society (AWS):
 - 1. AWS D1.1 / D1.1M Structural Welding Code Steel.
 - 2. AWS D1.3 / D1.3M Structural Welding Code Sheet Steel
- D. Association for Iron & Steel Technology (AISE):
 - AISE 13 Specifications for Design and Construction of Mill Buildings.
- E. ASTM International (ASTM):
 - 1. ASTM A 36 Standard Specification for Carbon Structural Steel
 - 2. ASTM A 48 Specification for Gray Iron Castings

- ASTM A 123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- 4. ASTM A 307 Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
- 5. ASTM A 325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- 6. ASTM A 354 Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
- 7. ASTM A 475 Specification for Zinc-Coated Steel Wire Strand
- 8. ASTM A 490 Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
- 9. ASTM A 500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- 10. ASTM A 529 Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
- 11. ASTM A 563 Specification for Carbon and Alloy Steel Nuts
- ASTM A 572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- 13. ASTM A 653 / A 653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- 14. ASTM A 792 / A 792M Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
- 15. ASTM A 992 Standard Specification for Structural Steel Shapes.
- 16. ASTM A 1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- 17. ASTM A 1039 Specification for Steel, Sheet, Hot Rolled, Carbon, Commercial, Structural, and High-Strength Low-Alloy, Produced by Twin-Roll Casting Process
- 18. ASTM E 96 / E 96M Standard Test Methods for Water Vapor Transmission of Materials.
- 19. ASTM E 108—Spread-of Flame Testing: Class 1A Rating.
- 20. ASTM E 283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 21. ASTM E 331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 22. ASTM E 1592 Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
- 23. ASTM E 1646 Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
- 24. ASTM E 1680 Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
- 25. ASTM E 2140 Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
- 26. ASTM F 436 Specification for Hardened Steel Washers
- 27. ASTM F 1145 Specification for Turnbuckles, Swaged, Welded, Forged
- 28. ASTM F 1554 Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- F. IAS International Accreditation Service
- G. LGSI Light Gauge Steel Institute
- H. SJI Steel Joist Institute
- I. Florida Product Approval:
 - Nucor CFR approved under file number FL4891

- J. FM Global:
 - 1. FMRC Standard 4471 Approval Standard for Class 1 Roofs for Hail Damage Resistance, Combustibility, and Wind Uplift Resistance.
- K. Metal Building Manufacturers Association (MBMA):
 - 1. MBMA Metal Building Systems Manual
- L. Underwriters Laboratories (UL):
 - 1. UL 580 Standard for Tests for Uplift Resistance of Roof Assemblies

1.4 DEFINITIONS

- A. Metal Building System: A building system that will employ:
 - Either continuous or simple-span 'Z' or 'C'-shaped cold-formed purlins or open-web steel joists for support of the roof cladding.
 - Simple-span 'Z' or 'C'-shaped cold-formed purlins or open-web steel joists for support of the steel wall cladding.
 - Three-plate, built-up rigid space frames and/or cold-formed 'C' or hot-rolled I-shaped post-and-beam framing to support the roof and wall secondary members.
 - All systems (cladding, roof and wall secondary, lateral primary framing, and longitudinal bracing) work together to provide resistance to vertical and lateral loading demands.
- B. Gable Symmetrical: A continuous frame building with the ridge in the center of the building, consisting of tapered or straight columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (inset in the column line). The rafters may or may not have interior columns.
- C. Gable Asymmetrical: A continuous frame building with an off-center ridge, consisting of tapered or straight columns and tapered or straight rafters. The eave height and roof slope may differ on each side of the ridge. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.
- D. Single-Slope: A continuous frame building which does not contain a ridge, but consists of one continuous slope from side to side. The building consists of straight or tapered columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.
- E. Lean-To (LTO): A building extension, which does not contain a ridge, but consists of one continuous slope from side to side. These units usually have the same roof slope and girt design as the building to which they are attached and supported by.
- F. Roof Slope: Pitch expressed as inches of rise for each 12" of horizontal run.
- G. Building Width: Measured from outside to outside of sidewall secondary structural member (girt).
- H. Building Eave Height: A nominal dimension measured from the finished floor to top flange of eave strut.
- I. Building Length: Measured from outside to outside of endwall secondary structural member.
- J. Auxiliary Loads: Dynamic loads induced by cranes, conveyors, or other material handling systems.

- K. Collateral Loads: The weight of any non-moving equipment or material, such as ceilings, electrical or mechanical equipment, sprinkler systems, plumbing, or ceilings.
- L. Dead Load: The actual weight of the building system (as provided by the metal building supplier) supported by a given member.
- M. Floor Live Loads: Loads induced on a floor system by occupants of a building and their furniture, equipment, etc.
- N. Roof Live Loads: Loads produced by maintenance activities, rain, erection activities, and other movable or moving loads but not including wind, snow, seismic, crane, or dead loads.
- O. Roof Snow Loads: Gravity load induced by the weight of snow or ice on the roof, assumed to act on the horizontal projection of the roof.
- P. Seismic Loads: Loads acting in any direction on a structural system due to the action of an earthquake.
- Q. Wind Loads: The loads on a structure induced by the forces of wind blowing from any horizontal direction.

1.5 DESIGN REQUIREMENTS

A. General

- 1. The building manufacturer will use standards, specifications, recommendations, findings and/or interpretations of professionally-recognized groups such as AISC, AISI, AWS, ASTM, CSA, CWB, MBMA, Federal Specifications, and unpublished research by MBMA as the basis for establishing design, drafting, fabrication, and quality criteria, practices, and tolerances. The Manufacturer's design, drafting, fabrication and quality criteria, practices, and tolerances shall govern, unless specifically countermanded by the contract documents.
- 2. Design structural mill sections and built-up plate sections in accordance with:
 - a. Code-appropriate edition of AISC's "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", ANSI/AISC 360 ASD method.
- 3. Cold-Formed steel structural members and panels will generally be designed in accordance with "Specifications for the Design of Cold-Formed Steel Structural Members", 2007 Edition, ANSI/AISI S-100-07 or CAN CSA S136-07.
- 4. Design weldments per the following:
 - a. Structural Welding
 - 1) Design per AWS D1.1, "Structural Welding Code Steel", Latest Edition.
 - b. Cold-Formed Welding
 - 1) Design per AWS D1.3, "Structural Welding Code Sheet Steel", Latest Edition.

B. Design Code:

- 1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:
 - a. Governing Building Code: International Building Code (IBC).
 - b. Year/Version: IBC 2015

C. Design Loads:

- 1. Dead Load Weight of the building system as determined by manufacturer.
- 2. Roof Live Load 20 psf reducible for frames
- 3. Collateral Load 3 psf + sprinkler load
- 4. Roof Snow Load:
 - a. Ground Snow Load 10 psf.

- b. Snow Exposure Coefficient (Ce) 1
- c. Thermal Coefficient (Ct) 1.
- d. Roof Snow Load 7 psf
- 5. Wind Load:
 - a. Wind Speed 115 mph
 - b. Wind Exposure C
- 6. Seismic Load:
 - a. Spectral response acceleration for short periods (Ss) .334
 - b. Spectral response acceleration for 1-sec. period (S1) _.122
 - c. Site Class –D assumed.
- 7. Auxiliary Loads: Auxiliary loads shall include dynamic loads, such as cranes and material handling systems, and will be defined in the Contract Documents.
- D. General Serviceability Limits:
 - Deflection Limits shall be in accordance with the applicable provisions of the Metal Building Systems Manual (MBMA), latest edition.
 - 2. Vertical Deflections:
 - Roof Secondary (Purlins) L/150.
 - b. Main Frame roof beams L/180.
 - 3. Horizontal Deflections:
 - a. Wall Secondary (Girts) L/90.
 - b. Main Frames H/60.
 - 4. Vertical deflection limits apply for snow load (50-year mean-recurrence interval) plus collateral load, or the code required live load. The horizontal drift and deflections limits apply for the loads induced by a basic wind speed corresponding to a 10 year mean-recurrence interval.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - Installation methods.
- C. Shop Drawings: Provide complete erection drawings for the proper identification and assembly of all building components. Drawings will show anchor bolt settings, transverse cross-sections, sidewall, endwall and roof framing, flashing and sheeting, and accessory installation details.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.
- F. Certifications: Shop drawings and design analysis shall bear the seal of a registered professional engineer upon request. Design analysis shall be on file and furnished by manufacturer upon request.
- G. Bill of Materials: Bills of material shall be furnished and shall include item weights.
- H. Preventative Maintenance Manual.

- I. Welder's Certifications: Certification of welder qualifications shall be furnished as specified by the Project Engineer.
- J. Submit certification verifying that the metal roof system has been tested and approved by Underwriter's Laboratory as Class 90.
- K. Submit certification verifying that the metal standing seam roof system has been tested in accordance with ASTM E 1592 test protocols.

1.7 QUALITY ASSURANCE

- A. Manufacturer / Fabricator Qualifications:
 - 1. All primary products specified in this section will be supplied by a single IAS AC 472 Accredited Manufacturer /Fabricator with a minimum of five (5) years' experience.
- B. Weldments/Welder/Weld Inspection Qualifications:
 - Welding inspection and welding inspector qualification for structural steel shall be in accordance with AWS D1.1, "Structural Welding Code Steel", latest edition. Welding inspection and welding inspector qualification for cold-formed steel shall be in accordance with AWS D1.3, "Structural Welding Code Sheet Steel", latest edition.
- C. Erector Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
- D. Design: Standard drawings and design analysis must bear the seal of a registered professional engineer. Design analysis must be on file and furnished by manufacturer upon request.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials in accordance with manufacturer's instructions.
 - Keep materials in manufacturer's original, unopened containers and packaging until installation.
 - 3. Do not store materials directly on ground.
 - 4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
 - 5. Protect materials and finish during storage, handling, and installation to prevent damage.
- C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.9 WARRANTY

A. Building System Warranty

- 1. Furnish manufacturer's standard warranty for the metal building system, excluding paint.
- 2. The manufacturer shall warranty the metal building system against failure due to defective material or workmanship for a period of one (1) year from date of shipment.
- 3. The liability under this warranty shall be limited to furnishing, but not dismantling or installing, necessary replacement material F.O.B. manufacturer's plant. In no event shall the manufacturer be liable for loss of profits, or other incidental, consequential, or special damages.

B. Standing Seam Roof Weathertightness Warranty

1. Furnish manufacturer's weathertightness warranty for a maximum of 20 years against leaks in standing seam roof panels, arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions.

C. Roof and Wall Paint Finish Warranty

- 1. Paint Systems
 - a. Furnish manufacturer's standard warranty for the metal panel paint system against chipping, peeling, blistering, fading in excess of 5 NBS Hunter units as set forth in ASTM-D-2244, and chalking in excess of 8 units as set forth in ASTM-D-4214.
 - b. The warranty shall be for a period of 30 years from the date of shipment for PVDF paint systems.
 - c. The warranty shall be for a period of 25 years from the date of shipment for silicone-polyester paint systems.

2. Galvalume® systems

- a. Furnish manufacturer's standard warranty for the Galvalume® panels against rupture, structural failure, or perforation due to normal atmospheric conditions.
- b. The warranty shall be for a period of 20 years from the date of shipment for Galval-ume® systems.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Nucor Building Systems; http://www.nucorbuildingsystems.com
- B. Equal products by: Butler Building Systems; CECO Building Systems; Varco Pruden Building Systems; or approved equals.

2.2 MATERIALS

A. Primary Framing Steel:

1. Steel for hot rolled shapes must conform to the requirements of ASTM Specifications A-36, A-572 or A-992, with minimum yield of 36 or 50 ksi, respectively.

- 2. Steel for built-up sections must conform to the requirements of ASTM A-1011, A-1018, A-529, A-572 or A-36 as applicable, with minimum yield of 42, 46, 50, or 55 ksi as indicated by the design requirements.
- 3. Round Tube must conform to the requirements of ASTM A-500 Grade B with minimum yield strength of 42 ksi.
- 4. Square and Rectangular Tube must conform to the requirements of ASTM A-500 Grade B with a minimum yield strength of 46 ksi.
- 5. Steel for Cold-Formed Endwall "C" sections must conform to the requirements of ASTM A-1011 or A-1039 Grade 55, or ASTM A-653 Grade 55 with minimum yield strength of 55 ksi.
- 6. X-bracing will conform to ASTM A-36 or ASTM A-529 for rod and angle bracing or ASTM A-475 for cable bracing.

B. Secondary Framing Steel:

- Steel used to form purlins, girts and eave struts must meet the requirements of ASTM A-1011 or ASTM A-1039 Grade 55 for primed material or ASTM A-653 Grade 55 for galvanized material with a minimum yield of 55 ksi.
- Design Thicknesses Gauge to be determined by design to meet specified loading conditions.

C. Panels:

- 1. Roll-formed Galvalume®, pre-painted Galvalume® or Galvanized G90 Exterior-Side and G60 Interior-Side.
- 2. Standing Seam Panels must have:
 - a. 50 percent minimum aluminum-zinc alloy- coating and conform to ASTM A-792 or ASTM A-653 with a minimum yield of 50 ksi.
- 3. Through-fastened panels must have:
 - a. 50 percent minimum aluminum-zinc alloy coating and conform to ASTM A-792 or ASTM A-653 with a minimum yield of 50 ksi.
- 4. Panel Finish:
 - a. SP Finish: Modified Siliconized Polyester paint system with a 25-year finish warrantv.
 - b. PVDF Finish: 70% PVDF paint system with a 30-year finish warranty.

D. Panel Fasteners:

- 1. For Galvalume® and Painted finished roof panels: Long Life Cast Zinc head.
- 2. For wall panels: Coated carbon steel.
- 3. Color of exposed fastener heads to match the wall and roof panel finish.
- 4. Concealed Fasteners: Self-drilling type, of size required.
- E. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.

F. Roof Clips:

- 1. All clips must have factory-applied mastic and designed so that movement between the panel and the clip does not occur.
- 2. Short or Tall Fixed clips; shall be either 3 ½ inches (89mm) or 4 ½ inches (114mm) in height. Used for applications where only a moderate amount of thermal expansion and contraction in the roof panel is expected.
- 3. Short or Tall Sliding clips: shall be either 3 ½ inches (89mm) or 4 ½ inches (114mm) in height and provide either 1-7/8 inches or 3 7/8 inches of travel for panel thermal expansion and contraction, depending on clip choice.

G. Sealant And Closures:

1. Sidelaps: Factory applied non-skinning Butyl mastic.

- 2. Endlaps, Eave, Ridge Assembly, and Gable Flashings: Field applied 100% solids butylbased elastomeric tape sealant, furnished in pre-cut lengths.
- 3. Outside Closures: Closed-cell, plastic or metal
- 4. Inside Closures: Closed-cell, plastic or metal

2.3 PRIMARY FRAMING

- A. Rigid Frames: Fabricated as welded built-up "I" sections or hot-rolled sections.
 - 1. Frame Design: Gable Symmetrical.
 - 2. Frame Type: Clear-Span.
 - 3. Frame Type: Multi-Span.
- B. Rigid Frame Columns:
 - 1. Straight/Uniform depth
 - 2. Tapered
- C. Rigid Frame Rafters:
 - 1. Straight/Uniform depth
 - Tapered
- D. Endwall Frames / Roof Beams: Fabricated as mill-rolled sections or built-up "I" sections depending on design requirements. Fabricate endwall columns of cold-formed "C" sections, mill-rolled sections, or built-up "I" sections depending on design requirements.
- E. Interior Columns: Columns supporting rafters of mainframes shall be of the following cross-section type(s):
 - 1. Pipe (Round HSS).
 - 2. Tube (Square HSS).
 - 3. "I"-Shaped (Built-Up or Mill-Rolled depending on design requirements).
- F. Finish: Red-Oxide or Gray Primer, or galvanized (pre coated galvanized cold-form, hot-dipped otherwise).
- G. Field Bolted Connections: All field bolted connections shall be designed and detailed utilizing ASTM A-325 or A-490 depending on design requirement.

2.4 SECONDARY FRAMING

- A. Purlins and Girts: Purlins and girts shall be cold-formed "Z" sections with stiffened flanges. Flange stiffeners shall be sized to comply with the requirements of the latest edition of AISI and LGSI. They shall be pre-punched at the factory to provide for field bolting to the rigid frames. They shall be simple or continuous span as required by design. Connection bolts will install through the purlin/girt webs, not purlin/girt flanges.
- B. Purlins (Excluding Open Web Joists): Horizontal structural members which support roof coverings.
 - 1. Depth: To be determined by design (8", 10" or 12")
 - 2. Maximum Length: To be determined by design.
 - 3. Finish: Red Oxide Primer.

- 4. Finish: Gray Primer.
- 5. Finish: Pre-Coated Galvanized.
- C. Girts: Horizontal structural members that support vertical panels.
 - 1. Depth: To be determined by design (8", 10", or 12")
 - 2. Maximum Length: To be determined by design.
 - 3. Finish: Red Oxide Primer.
 - 4. Finish: Gray Primer.
 - 5. Finish: Pre-Coated Galvanized.
- D. Eave Struts: Unequal flange, cold-formed "C" sections or "Z" purlins.
 - 1. Depth: To be determined by design (8", 10" or 12")
 - 2. Maximum Length: To be determined by design.
 - 3. Finish: Red Oxide Primer.
 - 4. Finish: Gray Primer.
 - 5. Finish: Pre-Coated Galvanized.
- E. Base Framing: Base members to which the base of the wall covering may be attached to the perimeter of the slab. Secured to the concrete slab with mechanical anchors.
 - 1. Formed base sill.
 - Base channel.
 - a. With flashing.
 - b. Without flashing.
 - 3. Base angle.
 - a. With flashing.
 - b. Without flashing.
 - 4. Base girt.
 - a. With flashing.
 - b. Without flashing.
 - 5. Finish: Red Oxide Primer.
 - 6. Finish: Gray Primer.
 - 7. Finish: Pre Coated Galvanized.
- F. Nucor Building Systems roof joist system.
 - 1. Open web, parallel chord, simple span load carrying members suitable for the direct support of roof systems utilizing material sizes and yield strengths as required.
 - ClearBay™ roof joist system with reduced bridging on qualified "CFR" projects.
 - 3. Bridging
 - a. All Bolted
 - b. Welded
 - 4. Joist attachment
 - a. Welded
 - b. All Bolted (No welding required)
 - c. Alt. Bolted (Some welding required)
 - 5. Open web members shall be fabricated of material that conforms to the material specifications designated by the Steel Joist Institute as acceptable for this product.
- G. Nucor VR16 II™ Roof Panel: A mechanically seamed pan-type standing seam roof panel with concealed clips. Installed directly over purlins. Tested in accordance with ASTM E 1646 and E 1680 for water penetration and air infiltration, and per ASTM E1592 for wind uplift capacity.
 - 1. Gauge: 24

- 2. Dimensions: 16 inches (406mm) wide by 2 inches (51mm) high.
- 3. Clips: Tall Sliding.
- 4. Clips: Short Sliding.
- 5. Finish/Color: As specified in Article 2.8 PANEL FINISH.

2.5 WALL PANELS

- A. Nucor Classic[™] Wall Panel: A through-fastened sidewall panel with 1 1/4 inch (32mm) ribs at 12 inches (305mm) on center. The area between the ribs is reinforced to minimize oil-canning.
 - 1. Gauge: 24.
 - 2. Dimensions: 36 inches (915mm) wide by 1 1/4 inch (32mm) high.
 - 3. Finish/Color: As specified in Article 2.8 PANEL FINISH.

2.6 ACCESSORIES

- A. Canopies: Overhanging or projecting roof structures off the sidewall or endwall with the extreme end usually unsupported. For aesthetic application or to cover entrance or walkway.
- B. Roof Line Trim:
 - 1. Trim Type: Sculptured Eave/Rake Trim.
 - 2. Trim Type: Low-Eave Gutter / Sculptured Rake Trim.
- C. Purlin Extensions: Overhanging or projecting roof structure at the end of a building.
- D. Framed Openings: Used to frame out doors, windows, louvers, and any other openings. Refers to the framing members and flashing which surround an opening and includes jambs, header and or sill, trim, and fasteners.
- E. Walk Doors: Personnel entry doors.
 - 1. Size: As noted on the Contract Drawings.
 - 2. Accessories: As noted on the Contract Drawings
 - 3. Size: 3 foot by 7 foot (914x2133mm) Single Leaf.
 - 4. Size: 6 foot by 7 foot (1219x2133mm) Double Leaf.
 - 5. Other as shown on drawings.
- F. Windows: Self-flashing, fixed and operable.
 - 1. Type / Size: As noted on the Contract Drawings.
 - 2. Type: Fixed Glass as shown on drawings.
 - 3. Type: Operable Windows as shown on drawings
- G. Soffit Panels:
 - 1. Nucor Reverse Classic[™] Wall Panel: Reverse-rolled wall panel with 1 1/4 inch (32mm) ribs at 12 inches (305mm) on center with semi-concealed fasteners.
 - a. Gauge: 26
 - b. Dimensions: 36 inches (915mm) wide by 1 1/4 inch (32mm) high.
 - c. Finish: As specified in Article 2.8 PANEL FINISHES.

- H. Facades: Decorative structural and panel system projecting from the face of a wall panel.
- I. Valley Gutter: Gutter used to carry off water from attached buildings or multi-gabled buildings. Standard valley gutter is 14 gauge pre-galvanized 10 foot (3048mm) sections, field welded in place (gutter liner and drainage members by others).
- J. Roof Curbs: Welded units fabricated for Metal Roof application. Minimum 18 gauge Galvalume™ coated steel, with welds cleaned and treated with protective coating compatible with the Galvalume™ substrate.
 - 1. Top of curb to be level with ground, with $1\frac{1}{2}$ top flange.
 - 2. Curb walls insulated with 1 ½"-3lb.density fiberglass insulation.
 - 3. Welded cricket on upslope side of curb to divert water.
 - 4. Metal or plastic rib covers supplied loose for flexibility when installing curb.
 - 5. Standard sub-frame shall be minimum 16 gauge steel.
 - 6. All fasteners and sealants required for installation shall be furnished by Roof Curb manufacturer.
- K. Roof Vents: Accessories used on the roof to allow air to pass through.
 - 1. Gravity Ridge Vents: Can be used as single unit or continuous.
 - a. Size: as shown on drawings.
- L. Pipe Flashings: Aluminum base with EPDM boot. The base flange must bend to form a seal with surface irregularities or roof pitch.
 - 1. Size: 1/4" to 4" (6 to 102mm) Pipe
 - 2. Size: 4" to 7" (102 to 178mm) Pipe
 - 3. Size: 7" to 13" (178 to 330mm) Pipe

2.7 PANEL FINISHES

- A. Roof Panel:
 - 1. Galvalume® (GM)
 - 2. Cool Roof Colors:
 - a. Nucor PVDF Panel Paint System (PVDF Resin, 30-year Finish Warranty):
 - 1) Color: Regal White (RW)
 - Nucor PVDF Panel Paint System (PVDF Resin, 30-year Finish Warranty):
 - a. Color: As selected by the architect from the manufacturer's 8 standard colors
- B. Wall Panel:
 - Nucor PVDF Panel Paint System (PVDF Resin, 30-year Finish Warranty):
 - a. Color: As selected by the architect from the manufacturer's 8 standard colors
- C. Soffit Panel:
 - 1. Nucor Standard Panel Paint System (Siliconized Polyester Resin, 25-year Finish Warranty):
 - a. Color: As selected by the architect from the manufacturer's 8 standard colors
- D. Nucor PVDF Panel Paint System (PVDF Resin, 30-year Finish Warranty):
 - a. Color: As selected by the architect from the manufacturer's 8 standard colors

2.8 FABRICATION

A. General:

- 1. Shop-fabricate all framing members for field bolted assembly. The surfaces of the bolted connections must be smooth and free from burrs or distortions.
- 2. Shop connections must conform to the manufacturer's standard design practices as defined in this section. Certification of welder qualifications will be furnished when required and specified in advance.
- 3. All framing members must carry an identifying mark.

B. Primary Framing:

- 1. Plates, Stiffeners and Related Members.: Factory weld base plates splice plates, cap plates, and stiffeners into place on the structural members.
- 2. Bolt Holes and Related Machining: Shop fabricate base plates, splices and flanges to include bolt connection holes. Shop fabricated webs to include bracing holes.
- 3. Secondary structural connections (purlins and girts) to be ordinary bolted connections, which may include welded clips.
- 4. Manufacturer is responsible for all welding inspection in accordance with the manufacturer's IAS Accreditation or CAN/CSA A660 Certification. Special inspection by the buyer or owner may be done in the manufacturer's facility and must be noted on the Contract Documents.
- 5. Non-Destructive Testing (NDT) NDT shall be performed and documented as required by the governing building code for this project.

C. Open-Web Roof Joists:

- Purlins for 'long-bay' building layouts shall consist of open-web bar joists designed under Steel Joist Institute (SJI) specifications by an SJI-Certified Joist Manufacturer for the prescribed loads.
- 2. The Nucor ClearBay™ Joist system includes joist bridging and joist-seat-to-supporting structural connections using 3/8" diameter self-drilling bolts made from ASTM A354 Grade BD steel.
- 3. Field welding of joist bridging and seats is an alternative method for connection of joists to supporting primary structural members.

D. Zee Purlins:

Fabricate purlins from cold-formed "Z" sections with stiffened flanges. Size flange stiffeners
to comply with the requirements of the latest edition of AISI. Connection bolts will install
through the webs, not the flanges.

E. Girts

1. Girts must be simple or continuous span as required by design. Connection bolts will install through the webs, not the flanges.

F. Bracing:

- 1. Diagonal Bracing:
 - a. Wind bracing in the roof and/or walls need not be furnished where it can be shown that the diaphragm strength of the roof and/or wall covering is adequate to resist the applied wind or seismic forces. Diagonal bracing in the roof and sidewalls may be used to resist longitudinal loads (wind, crane, etc.) in the structure if diaphragm action cannot be used.
 - b. Diagonal bracing will be furnished to length and equipped with hillside washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors. If load requirements so dictate, bracing may be of structural angle and/or pipe, bolted in place.

- 2. Special Bracing: When diagonal bracing is not permitted in the sidewall, a rigid frame type portal or fixed base column will be used. Shear walls can also be used where adequate to resist the applied wind or seismic forces.
- 3. Flange Braces: The compression flange of all primary framing must be braced laterally with angles connecting to the bottoms chords of purlins or to the webs of girts so that the flange compressive stress is within allowable limits for any combination of loading.

4. Bridging:

a. Laterally bridge the top and bottom chords of the open-web bar joists as required by design thereof and specified on the building erection drawings.

G. Standing Seam Panels - General:

- 1. One side of the panel is configured as female, having factory applied hot-melt mastic inside the female seam. The female side will hook over the male side and when seamed creates a continuous lock, forming a weathertight seam.
- 2. Panels are factory notched at both ends so that field installation can commence or terminate from either end of the building. Panels cannot start at both ends of the building and work towards each other.
- 3. Maximum panel length is 55 feet (16,764mm) unless otherwise noted in the Contract Documents.

4. Endlaps:

- a. Endlaps must have a 16 gauge backup plate and have the (8) endlap joint fasteners installed in dimpled locations in the flat with (1) endlap joint fastener installed in each trapezoid shoulder for a total of (10) fasteners at each endlap.
- b. Apply mastic between the panels and secured with #12-14 x 1 1/4 inch (32mm) self-drilling fasteners through the panels and backup plate to form a compression joint.
- c. "Through-the-Roof" fasteners may only be used at endlaps and eaves.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates and other embedment's to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads equal in intensity

to design loads. Remove temporary supports when permanent structural framing connections and bracing are in place, unless otherwise indicated.

3.3 INSTALLATION

- A. The erection of the building system shall be performed by a qualified erector, in accordance with the appropriate erection drawings, erection guides and /or other documents furnished by manufacturer, using proper tools, equipment and safety practices.
- B. Erection practices shall conform to "Common Industry Practices", Section 6, MBMA (LR)-Building Systems Manual.
- C. There shall be no field modifications to primary structural members except as authorized and specified by manufacturer.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PART 1 - GENERAL REQUIREMENTS

1-01 SCOPE OF WORK

WORK INCLUDED: Furnish all necessary labor, material, plant and equipment, including materials and equipment not specifically mentioned but necessary to complete the work in a neat, correct, and workmanlike manner, to include:

- 1) Feeders, panelboards, and distribution equipment.
- 2) Complete branch circuit wiring system for lighting, receptacles, equipment, and outlets.
- 3) Lighting fixtures, wall switches, receptacles and outlets.
- 4) Line voltage connections to equipment furnished under other Sections of these specifications, including disconnects, where indicated.
- 5) Hangers and Supports for Electrical Systems, see Section 260529.
- 6) Vibration and Seismic Controls for Electrical Systems, see Section 260548.
- 7) Surge Suppression Device (SPD), see Section 264313.
- 8) Data, Telecommunications, Intrusion Alarm, and Card Access Systems, see Section 270500. All components and system equipment.
- 9) Public Address System, see Section 275116.
- 10) Fire Alarm System, see Section 283100.

SPECIAL NOTE: The provisions of the Instructions to Bidders, General Conditions, Supplementary General Conditions and all applicable requirements of Division 1 shall govern the work under this Division the same as if incorporated herein.

1-02 EQUIPMENT WIRING

Furnish and install power circuits to and line voltage connections to all equipment furnished and installed by other trades, including disconnects, where indicated. Disconnect switches to be furnished, installed, and wired under Division 26 unless noted otherwise in the Design Documents.

Furnish and install receptacles for equipment furnished with cord and plug, such as electric water coolers, kitchen equipment with cord and plug, computer and data processing equipment, portable welders, shop equipment, and other equipment indicated on the drawings.

CONTROL WIRING: Raceways, wiring, and control devices (thermostats, pressure switches, program clocks, etc.) for low voltage HVAC control systems and other mechanical and plumbing systems shall be furnished and installed under Division 23, unless otherwise indicated on the drawings or specified in this Division.

ROOFTOP HVAC UNITS: Power circuits for rooftop HVAC units shall rise thru the inside of the HVAC unit curb into the bottom of the unit and out to the disconnect switch mounted on the unit. The Electrical Contractor shall coordinate this work closely with the Mechanical Contractor in the field to avoid conflicts with ductwork.

MOTOR STARTERS / VFDs: All Motor Starters and Variable Frequency Drives (VFDs) for HVAC-related equipment that are not factory-mounted and prewired shall be furnished by the Mechanical Contractor, installed and power wired by the Electrical Contractor unless noted otherwise on the Design Documents. Refer to Mechanical Drawings for locations and quantities of Motor Starters and VFDs.

VOLTAGE: The Electrical Contractor shall supply power to equipment at the voltage indicated on the electrical drawings. The Electrical Contractor and the other applicable trades will be held responsible for coordinating the equipment voltages, the control equipment wiring, and the location and type of disconnect required to comply with the equipment manufacturer's requirements, the USC AIKEN, STATE PROJECT NO.: FP00000036

National Electric Code, and applicable local building codes. IF EQUIPMENT IS SUPPLIED AT A VOLTAGE OTHER THAN THAT PROVIDED, THE GENERAL CONTRACTOR AND SUBCONTRACTORS WILL BE HELD RESPONSIBLE FOR MAKING ANY NECESSARY ADJUSTMENTS TO CORRECT THE CONFLICT, AT NO COST TO THE OWNER, TO THE SATISFACTION OF THE ELECTRICAL ENGINEER.

1-03 **EXISTING CONDITIONS**

The Contractor will be held responsible for having visited the site and having familiarized himself with the existing conditions prior to submitting his bid.

1-04 COORDINATION

OTHER TRADES: All work under this Section shall be coordinated with other trades to ensure proper location of outlets and equipment connections, and to minimize conflicts with structural members, duct work, piping, etc. Conflicts between equipment and/or material locations shall be corrected as directed by the Architect-Engineer at no additional cost to the Owner.

UTILITIES: The service locations, arrangement and metering for electrical and telephone service entrances shall be coordinated in detail with those utilities. All provisions necessary for these services shall be provided in the Electrical Contractor's bid, unless otherwise indicated.

1-05 **CODES AND PERMITS**

Installation and materials shall be in accordance with the applicable versions of the National Electrical Code, the International Building Code, and all local codes. Apply and pay for all permits and fees required for this construction.

1-06 **DRAWINGS**

The drawings and specifications shall be considered as complementary, one to the other, so that materials and labor indicated, called for, or implied by either shall be furnished and installed as if required by both. Where a disagreement exists between the plans and specifications, the item or arrangements of better quality, greater quantity, or higher cost shall be included in the base bid. Any discrepancies between the drawings, specifications, and field conditions shall be resolved with the Engineer prior to commencing work. All agreements shall be verified in writing.

RECORD DRAWINGS: The Contractor shall maintain one set of clean blueprints for "RECORD" drawings. All changes, revisions, or modifications to the project shall be recorded daily on these drawings with redline pencil. Upon completion of the project, these redline drawings shall be turned over to the Engineer for preparation of final Record Drawings. All changes, revisions, or modifications on the redline drawings provided to the Engineer shall be noted in red or shall be highlighted in yellow. Failure to comply with the above criteria may result in rejection of the Record Drawings by the Architect-Engineer.

1-07 MAINTENANCE AND OPERATING MANUALS

The Contractor shall furnish the Owner two (2) complete maintenance and operating manuals for each piece of equipment and material furnished under this project. These manuals shall be bound in hard cover binders with tabs for each section item or piece of equipment. The manuals shall be furnished to the Engineer prior to the final observation, and final acceptance shall not be given until the Owner's maintenance personnel are instructed in maintenance and operation of all systems.

1-08 **GUARANTEE**

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All materials and labor furnished under this Section of the specifications shall be guaranteed by the Contractor to be free from defects for a period of one year from the date of acceptance. The Contractor shall repair or replace any deficiencies reported in the guarantee period promptly after notification, without any additional compensation from the Owner. LED lamps are included in this warranty. Incandescent, fluorescent, & HID lamps are excluded from this warranty, except that all lamps shall be operational on the date of acceptance.

1-09 MATERIALS

UL LISTING: All materials shall be listed by Underwriter's Laboratories, or an approved equal testing laboratory, and shall bear the "UL" Label, where applicable.

SUBSTITUTIONS: Specific reference in the specifications to any article, device, product, material, fixture, form or type of construction, etc., by name, make or catalog number, with or without the words "or equal" shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition and the Contractor in such cases may, at his option, use any article, device, product, material, fixture, form or type of construction, which in the judgment of the Architect-Engineer, expressed in writing prior to bidding as specified below, is equal to that herein named.

Requests to substitute materials or equipment considered by the Contractor as equal to those specified shall be submitted for review to the Architect-Engineer ten (10) days before bids are taken. Requests shall be accompanied by samples, descriptive literature, and engineering information, as necessary to fully identify and appraise the product. No increase in the contract sum will be considered when requests are not accepted. If the item is found to be equal, the Architect-Engineer will issue an Addendum making it a part of the Contract Documents prior to bidding.

1-10 SUBMITTALS

Electrical shop drawings shall be submitted in one complete package containing all items required by this specification and all other Division 26-28 specifications. Partial shop drawing submittals may be rejected by the Architect-Engineer.

Exceptions: Fire Alarm System CAD drawings, Lighting Control System CAD drawings, and Allowanced Light Fixtures may be submitted separately if additional time is needed to prepare these shop drawings.

Refer to Section 260510 - Electrical Submittals for additional information.

PART 2 - MATERIALS

2-01 GENERAL REQUIREMENTS

COORDINATION: Coordinate arrangement, mounting, and support of electrical equipment to allow maximum possible headroom (unless specific mounting heights that reduce headroom are indicated), to provide for ease of disconnecting the equipment with minimum interference to other installations, to allow right of way for piping and conduit installed at required slope, and so connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

ELECTRICAL ROOM LAYOUT: Submit an Electrical Room layout drawing for each Electrical Room reflecting dimensions of actual equipment provided. Provide clearances per table 110.26(a)(1) of the NEC.

2-02 GROUNDING

INSULATED CONDUCTORS: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

BARE COPPER CONDUCTORS:

- 1) Solid Conductors: ASTM B3.
- 2) Stranded Conductors: ASTM B8.
- 3) Tinned Conductors: ASTM B33.
- 4) Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
- 5) Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
- 6) Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- 7) Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

GROUNDING BUS: Rectangular bars of annealed copper, 1/4 by 2 inches in cross section, unless otherwise indicated; with insulators.

BOLTED CONNECTORS FOR CONDUCTORS AND PIPES: Copper or copper alloy, bolted pressure-type, with at least two bolts.

WELDED CONNECTORS: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

GROUND RODS: Copper-clad steel; 3/4 inch by10 feet in diameter.

2-03 RACEWAYS AND FITTINGS

GALVANIZED RIGID CONDUIT (GRC): UL 6 and ANSI C80.1 with full weight screwed fittings. Bushings shall be malleable iron. Bushings 1 1/4" and larger shall have insulated throat and grounding lug.

INTERMEDIATE GRADE METALLIC CONDUIT (IMC): UL 1242 and ANSI C80.6, galvanized, with full weight screwed fittings. Bushings shall be as specified above.

ELECTRICAL METALLIC TUBING (EMT): UL 797 and ANSI C80.3 with steel compression or setscrew type fittings. Die-cast fittings are not acceptable. Fittings 1 1/4" and larger shall have nylon insulated throat. Indented or drive-on fittings are not acceptable. Conduit used for Fire Alarm System wiring shall be red, similar to Allied Fire Alarm EMT.

FLEXIBLE STEEL CONDUIT (GREENFIELD): UL 1. Fittings shall be steel.

LIQUIDTIGHT FLEXIBLE STEEL CONDUIT (SEALTITE): UL 360. Fittings shall be steel compression type.

PLASTIC CONDUIT (PVC): Schedule 40 polyvinylchloride. NEMA Standard TC-2 and TC-3 and UL Standards. Conduit, solvent, and fittings shall all be supplied by the same manufacturer. PVC is not permitted above grade.

2-04 WIRE AND CABLE

UL STANDARDS: UL 44 and UL 83.

CONDUCTOR: Copper, soft drawn, per ASTM B3 and comply with NEMA WC 70. Sizes No. 12 and 10 shall be solid conductor. Sizes No. 8 and larger shall have Class B concentric stranding per ASTM B8. Stranded conductors may not be used on No. 12 and No. 10 circuits.

INSULATION: 600 Volt, 90°C rated, comply with NEMA WC 70. Type THHN-THWN-MTW, unless noted otherwise.

SPLICING MATERIALS:

No. 10 and smaller: Acceptable wire nuts or insulated crimped splice caps.

No. 8 and larger: Bronze or copper split bolts, or tinned compression connectors.

(Polaris insulated splice blocks may not be used on this project).

Insulation shall be Scotch No. 23 rubber tape and Scotch No. 33 plastic tape, or approved equivalent method.

Power feeders shall not be spliced.

TYPE MC CABLE: Metal-clad cable, Type MC, rated 600 V or less, UL 1569, RoHS compliant, as manufactured by AFC, Encore Wire, or acceptable equivalent.

TYPE MC-PCS CABLE: Metal-clad cable with Class 2 / Class 3 control cables, Type MC-PCS, rated 600 V or less, UL 1569, RoHS compliant, and meets NEC 725.136(I)(1) & NEC 725.136(I)(2). AFC MC Lite Luminary Series, Encore Wire M-LED Series, Southwire MC-PCS Duo, or acceptable equivalent.

2-05 BOXES AND WIREWAYS

OUTLET BOXES: Galvanized sheet steel per UL 514. "Through-wall" boxes <u>SHALL NOT BE USED</u>. Back-to-back mounting of boxes is not permitted. All outlet boxes 4"x4" or smaller located on opposite sides of a rated wall shall have a minimum of 24" horizontal spacing or shall be protected with listed putty pads. All outlet boxes larger than 4"x4" (communications outlets, etc.) located in rated walls shall be protected with listed putty pads.

Box sizes shall be as follows:

- 1) Wall Receptacle Outlets: 4" square by 2 1/8" deep with plaster ring as required.
- 2) Wall Communications and Computer Outlets: 4 11/16" square by 2 1/8" deep with one gang plaster ring. Provide box with 1 1/4" conduit knockouts.
- 3) TV Wall Outlets: 4 11/16" square by 2 1/8" deep with one gang plaster ring. Provide box with 1 1/4" conduit knockouts.
- 4) Ceiling outlets: 4" square or octagonal by 1 1/2" or 2 1/8" deep with stud or ears where required for fixture support.
- 5) Indoor Surface Mounted Outlets: Wiremold V5744S-2 surface metal box unless noted otherwise on the drawings (steel boxes and EMT conduit may be used in equipment rooms, janitor's closets, storage rooms).
- 6) Exposed Outlets: Malleable iron or heavy duty cast aluminum with threaded hubs, Type FS, FD, or GS. Manufactured by Crouse Hinds, Appleton, Killark, or approved equal. Die cast boxes are not acceptable.

SUPPORT FOR RECESSED BOXES IN MASONRY WALLS: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

SUPPORT FOR RECESSED BOXES IN STUD WALLS: Support boxes from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose. Box brackets reliant on support legs pressed against back of opposing wall are not acceptable.

WIREWAYS, PULL BOXES AND JUNCTION BOXES: UL 50. NEMA 250, Type 12 unless otherwise indicated. Code gage galvanized sheet steel, aluminum, or steel primed and painted after fabrication. Manufactured by Square D, Austin Berryhill, Hoffman Engineering, B-Line Systems, or approved equal. Wireways shall have hinged covers.

HANDHOLES: Polymer Concrete unless otherwise indicated, see details on drawings. As manufactured by Hubbell (Quazite), Armorcast, CDR Systems, or acceptable equivalent.

2-06 WIRING DEVICES

MANUFACTURERS: All wiring devices shall be Hubbell Extra Heavy-Duty Specification Grade Series or equivalent of Arrow Hart Premium Industrial Spec Grade, Pass and Seymour Industrial Extra Heavy-Duty Spec Grade, or Leviton Industrial Spec Grade, unless specifically noted otherwise. If devices not meeting the specifications are supplied, they shall be removed, discarded, and new devices meeting the specification shall be furnished & installed by the Electrical Contractor at no cost to the Owner or the Engineer.

RECEPTACLES: 20A, 125V, 3 wire grounding, NEMA 5-20R, side and back wired, with impact resistant nylon face and standard color as selected by Architect.

- "TR" denotes Tamper-Resistant receptacle. Tamper Resistant receptacles shall be listed Tamper-Resistant receptacles per NEC Article 406.11, typical for receptacles in Dwelling Units, Kindergartens, and Childcare Areas.
- "CR" denotes indoor Corrosion Resistant receptacle. Indoor Corrosion Resistant receptacles shall be listed Weather/Corrosion Resistant receptacles per NEC Article 406.8.
- "WR" denotes weather-resistant receptacle. Weather-resistant receptacles shall be listed Weather/Corrosion Resistant receptacles per NEC Article 406.8 and shall include a standard flat wet location cover.
- "WP" denotes weatherproof receptacle. Weatherproof receptacles shall be listed Weather/Corrosion Resistant receptacles per NEC Article 406.8 and shall include an "In-Use" style wet location cover.
- 1) Duplex Receptacle: P&S 5362A-X or Hubbell HBL-5362-X
- 2) Duplex Receptacle, Tamper Resistant (NEC 406.11): P&S TR63-X or Hubbell HBL-5362-X-TR
- Duplex Receptacle, Corrosion Resistant (NEC 406.8): P&S WR5362-X or Hubbell HBL-5362-X-WR
- 4) Single Receptacle: P&S 5361-X or Hubbell HBL-5361-X
- 5) Isolated Ground Duplex Receptacle: P&S IG5362-X or Hubbell IG-5362-X

GFCI RECEPTACLES: Feed Thru type, 20A, 125V, NEMA 5-20R, standard color as selected by Architect. All GFCI Receptacles shall be listed Tamper Resistant (NEC 406.11) and Weather Resistant (NEC 406.8).

- 1) GFCI Duplex Receptacle: P&S 2097TR-X or Hubbell GFR5362SG-X
- 2) Faceless GFCI: P&S 2087-X or Hubbell GFSTBF20-X

SWITCHES: 20A, 120/277V, side and back wired, ivory color. Single pole, double pole, three way, or four way, as indicated on the drawings. Standard color as selected by Architect.

- 1) Single Pole Switch: P&S PS20AC1-X or Hubbell HBL-1221-X
- 2) Double Pole Switch: P&S PS20AC2-X or Hubbell HBL-1222-X
- 3) Three Way Switch: P&S PS20AC3-X or Hubbell HBL-1223-X
- 4) Four Way Switch: P&S PS20AC4-X or Hubbell HBL-1224-X

SPECIAL RECEPTACLES: Specification grade, rating as specified on the drawings.

COVER PLATES: Provide plates to suit the devices.

- 1) Finished interior walls: Jumbo Stainless Steel.
 - Receptacles noted on drawings as dedicated for computers shall include a factory engraved jumbo stainless steel coverplate labeled "COMPUTER". See Electrical Symbols and Power Plans on drawings to identify dedicated computer receptacle.
- 2) Exposed outlets: Galvanized steel.
- 3) Wet and damp locations: Weatherproof "In Use" type with shallow lockable cover, Legrand WIUCED Series or equivalent. Provide plate kits to suite devices.

OUTDOOR PEDESTAL: 30" outdoor power pedestal with aluminum or stainless steel construction (silver) and (2) 20A WR GFCI receptacles mounted behind WP cover. Wiremold XCSPP2GRR-SV or equivalent of Ace Manufacturing APR Marine Series, IPLC IP3 Series, PEDOC Power Solutions Pedestal, or other acceptable equivalent pedestal.

2-07 INTERIOR LIGHTING

FIXTURE SCHEDULE: See Drawings.

PRE-PAINTED STEEL: Fixture bodies manufactured from pre-painted steel <u>shall be painted after fabrication</u>, unless noted otherwise on the drawings.

LAMPS AND DRIVERS: Refer to Lighting Fixture Schedule and Lighting Fixture Schedule Notes on Drawings.

LENSES: Virgin acrylic plastic. Nominal thickness of fluorescent fixture lenses shall be 0.125" unless noted otherwise.

2-08 EXTERIOR LIGHTING

CONCRETE AND REINFORCING: Concrete for light pole foundations shall conform to the requirements of ASTM C-387 and shall be rated for 3000 psi minimum compressive strength at 28 days. Reinforcing steel shall be deformed steel reinforcement bars conforming to the requirements of ASTM A-615, Grade 60.

ANCHOR BOLTS: Anchor bolts shall be provided as recommended by the pole manufacturer. Anchor bolts shall meet the requirements of ASTM A-576, Grades 1025 to 1055 inclusive, with a minimum yield strength of 50,000 psi. Anchor bolts and hardware shall be hot dipped galvanized in accordance with ASTM A-153. Two nuts, two lockwashers, and one flat washer shall be furnished with each anchor bolt.

LUMINAIRES: Luminaires shall be lamp type, wattage, style, and manufacturer as specified in the fixture schedule on the drawings.

LIGHTING POLES: Poles shall be as specified on the drawings and in the proposal and shall be manufactured in accordance with AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals". Poles shall be rated for 100 MPH wind load with 1.3 gust factor using effective projected area of the proposed luminaire and luminaire mounting bracket for the wind load.

ALUMINUM LIGHTING POLES: Poles and accessories shall be spun aluminum, as specified, with medium bronze enamel finish. Each pole shall be shall be provided with a luminaire mounting bracket. Aluminum poles shall be provided with a cast aluminum base welded to the lower end. After bonding or welding, the base shall develop the full strength of the adjacent shaft to resist bending

action. Removable anchor bolt covers shall be provided with each pole. Covers shall be secured to the base plate with stainless steel screws. A transformer base shall be provided with each pole.

CONNECTIONS: In-line connections for lighting circuits which are located in the base of each pole shall be fused connector kits, Bussman Type HEB, Buchannan Type D65, or approved equal. One kit shall be used for each ungrounded conductor.

2-09 LIGHTING CONTROLS

LOW VOLTAGE SWITCHING: <u>See details and notes on drawings.</u> Low voltage digital switching system shall be as specified on the drawings. Hubbell NX controls. No substitutes. Furnish and install all relays, modules, network cards, programming, software, and/or other relay panel hardware necessary for a complete and operational lighting control system. Furnish and install all emergency force-on contactors required for operation of emergency lighting upon loss of normal power. All low voltage digital wall switches to include factory engraved buttons unless specifically noted otherwise on the drawings. <u>Provide commissioning of lighting control system as noted on the drawings.</u>

<u>K-12 SCHOOLS:</u> All low voltage wiring in K-12 applications shall be run in metal conduit, unless noted otherwise on the drawings.

OCCUPANCY SENSORS: <u>See details and notes on drawings</u>. Occupancy sensors shall be as specified on the drawings, as manufactured by Hubbell. <u>Provide all power packs and mounting hardware necessary to provide a complete and operable system</u>. If a sensor other than that specified is used, furnish and install any additional sensors necessary to provide comparable coverage. Verify spacing requirements with sensor manufacturer and install accordingly. <u>Provide commissioning of occupancy sensors as noted on the drawings</u>.

- 1) It shall be the Contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. It shall be the Contractor's responsibility to make all proper adjustments to assure owner's satisfaction with the occupancy system.
- 2) It shall be the manufacturer's responsibility to verify all proper adjustments and train owner's personnel to ensure owners satisfaction with the occupancy system. This service shall be provided at no additional cost to the owner or the Architect/Engineer.
- 3) Upon completion of the installation, the system shall be completely commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control system. This service is provided at no additional cost to the owner. The Electrical Contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the scheduled commissioning date. Upon completion of the system fine tuning the factory authorized technician shall provide the proper training to the owner's personnel in the adjustment and maintenance of the sensors.
- 4) The Contract Documents are diagrammatic and only establish the minimum number and type of sensor required in each space. The Contractor shall furnish additional sensors as necessary to provide the required coverage. The Contractor may not reduce the number of sensors in a space or change the sensor type in a space without written permission from the Engineer and the Owner. In order to provide coverage for the controlled area and accommodate all Owner occupancy requirements, all rooms/spaces shall have between ninety (90) and one hundred (100) percent coverage. Layout of occupancy sensors on the Contract Documents represents the basis of design. The occupancy sensor supplier shall furnish shop drawings and printed material indicating layout of sensors, raceway, and wiring required to control the lighting indicated on the contract drawings. No change order will be

allowed for additional sensors, raceway, wiring, power supplies, satellite relays, etc., required on shop drawings by the occupancy sensor supplier. Where power supplies are required for operation of the occupancy sensors, but are not shown on the lighting plans, the power supplies must be included as part of the base bid for this project.

CONTACTORS: Electrically held type, with 120 volt or 277 volt coil (see drawings), Hand-Off-Auto selector switch, and NEMA 1 enclosure. Contactors shall be 30 amp, 4 pole, unless otherwise noted. Manufactured by Square D, General Electric, or Eaton. Provide engraved nameplate for each contactor identifying load served.

LINE VOLTAGE PHOTOCELLS: Rated 1800 volt-amps 120V, 208V-277V, or 480V as noted on the drawings, adjustable slide gate, Precision Type "T", or equal of Intermatic, Paragon, or Tork.

LINE VOLTAGE TIME CLOCK: 7-day, 2-channel, 120V electronic programmable time control with two SPDT contacts, NEMA 3R case, 24-hour clock format, leap year correction, and daylight savings time adjustment. Intermatic ET1725CR or equivalent of Tork.

0-10V WALL BOX DIMMERS: Dimmers shall be slide type wall box dimmers with on/off operation, as manufactured by Hubbell. See Electrical Drawings for additional information. Dimmer wiring shown on the Drawings is for information purposes only. The Contractor shall verify the dimmer wiring requirements with the dimmer manufacturer prior to start of work and install accordingly. Provide all wiring required to provide specified dimming and on/off operation.

2-10 SAFETY SWITCHES AND FUSES

SWITCHES: NEMA Standard HD, heavy-duty type, 3 pole, 480 or 240 volt, as indicated, with Class R fuse clips. Manufactured by Square D, General Electric, or Eaton.

FUSES: Time delay type, UL Class RK5. Bussman Fusetrons, or approved equal of Chase-Shawmut or General Electric.

NAMEPLATE: Provide engraved nameplate for each safety switch identifying load served, voltage, and fed-from identification. Example:

AHU-1, 480-3-60 FED FROM HA-15

2-11 PANELBOARDS

STANDARDS: UL 67 and NEMA PB-1.

MANUFACTURERS: Siemens, Square D, General Electric, Eaton

CONSTRUCTION: Code gage cabinet with clamping trim cover and locking doors, keyed alike. Cabinets shall be minimum 20" wide with hinged trim (door-in-door). Busses shall be for bolt-in breakers with full sized neutral bus. Provide ground bus in each panelboard. Provide separate insulated ground bus where indicated on the drawings (Isolated Ground panelboards).

ENCLOSURE: Flush or surface mounted, NEMA 1, NEMA 3R, or NEMA 4X as indicated on drawings.

- 1) Front: Surface-mounted fronts, match box dimensions; Flush-mounted fronts, overlap box.
- Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover. <u>Provide typewritten circuit directory for each panel identifying load served and room</u> location. Identify spares in pencil.

- 3) Panels and Trim Finishes: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two (2) coat, baked-on finish consisting of prime coat and thermosetting topcoat.
- 4) Hinged Trim (Door-In-Door).

CIRCUIT BREAKERS: Molded case bolt in type. Breakers shall be rated for the specified panelboard interrupting capacity rating in RMS symmetrical amperes. Two and three pole breakers shall have common internal trip. Branch mounted main breakers are not permitted unless specifically noted on the drawings.

CIRCUIT NUMBERING: Circuit numbering and breaker layout to match Contract Documents. Where circuit numbering is not permanently engraved, the manufacturer's plastic numbering strips shall be used. Paper numbers are not acceptable and may not be used.

BREAKER COORDINATION: Manufacturer shall provide coordination between feeder breakers and upstream devices. These coordination settings shall be made in the field by a manufacturer's field technician and documented. A letter confirming the setting and providing the setting information shall be provided prior to energization of the switchboard.

NAMEPLATE: Provide engraved nameplate for each panel identifying panel name, voltage, phase, and fed-from identification. Example:

PANEL HA 480/277V, 3PH FED FROM MSB-2

2-12 TRANSFORMERS

MANUFACTURERS: Square D, General Electric, or Eaton. Dry type transformers manufactured per NEMA standard ST-20, UL 506, UL 1561, ANSI C57.12.91, and ANSI C89.2. <u>Transformers shall be compliant with DOE 2016 Efficiency requirements per EPAct 2015/10 CFR Part 431 standards, tested according to NEMA TP-2.</u>

DESIGN: 150°C rise maximum. 220°C insulation system.

TAPS: Four 2.5 per cent, 2 FCAN, 2 FCBN minimum. Adjust secondary taps in field as required to achieve desire voltage (120/208V, etc.).

NOISE: Sound level shall be tested and comply with ANSI C89.2.

ENCLOSURES: Indoor, ventilated type, unless otherwise noted. Mount transformers 6" off of wall per UL and manufacturer requirements.

PAD: Unless noted otherwise, mount transformer on 6" concrete pad per manufacturer's recommendations. Pad shall extend 4" beyond transformer on all sides. Pad shall have 3/4" chamfer on all sides.

SEISMIC: Provide transformers that are constructed to withstand seismic forces specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems." Fasten transformer to pad per the manufacturer's instructions, use vibration pads similar to Cooper Vibra Trol Series.

NAMEPLATE: Provide engraved nameplate for each transformer identifying transformer name, voltage, phase, and fed-from identification. Example:

XFMR T-1

480V TO 208/120V, 3PH FED FROM MSB-14

2-13 FLOOR BOXES

ONE GANG BOXES (Plastic): Wiremold 881 or Steel City 68P Series with 100 cu. in. capacity and standard conduit tappings of (4) 3/4" and (2) 1". Floor plate assembly shall be Wiremold 895TGFI or P-60-GFCI for hard floors and Wiremold 895GFI or P-60-CACP-GFCI for carpet. Provide adapter rings as required. Verify colors (brass or aluminum) with architect prior to ordering. Equivalent boxes and cover plates by Carlon, Hubbell, FSR, or Wiremold.

MULTI-GANG BOXES (Plastic): Wiremold 880MP or Steel City 640P Series with 85.5 cu. In. capacity per gang, aluminum adjusting ring, and partitions. Standard conduit tappings of 1", 3/4", and 1/2". Floor plate assembly for each outlet shall be Wiremold 828GFIT w/827 (2-gang), 837(3-gang) or P-64-GFCI-AL for hard floors and Wiremold 828GFIT w/827GFIT (2-gang), 837 GFIT (3-gang) or P-64-CACP-GFCI-AL for carpet. Provide adapter rings as required. Verify colors (brass or aluminum) with architect prior to ordering. Equivalent boxes and cover plates by Carlon, Hubbell, FSR, or Wiremold.

Each Communications gang must be capable of accepting a minimum of (4) Category 6 jacks.

POKE-THRU FLOOR OUTLETS: On above-grade floors with a shallow slab, poke-thru devices may be substituted if written permission is obtained from the Engineer and Architect, and provided each poke-thru is capable of accepting the specified number of receptacles plus a minimum of (4) Category 6 jacks. Wiremold RC4 Series, or equivalent, finish as selected by Architect.

CONCRETE OR WOOD COMPATIBLE FLOOR BOXES (MULTI-PURPOSE ROOM AND STAGE AREA): Wiremold Evolution Series EFB45 with EFB8-MB mounting bracket, (2) EFB10-DP receptacle device plates with 20A duplex receptacles, (2) EFB10-DEC decorator device plates, and EFB45BTXX flush style cover with solid lid (XX=verify color), or equivalent floor box by Steel City or FSR.

2-14 CABLE MANAGEMENT

CABLE TRAYS: Cable trays shall be run above ceiling in corridors and attached and/or supported from wall per the manufacturer's requirements. Furnish and install 18" wide wire mesh type cable trays with 6" loading depth, as manufactured by Mono-Systems, B-Line Systems, Cablofil, MP husky, or Atlas. Trays shall be furnished in maximum lengths of 12 ft and shall have rounded edges and smooth surfaces. Trays shall be furnished with all fittings, spacers, and supports necessary for a complete system, and shall comply with NEMA Standard VE-1.

FIRE RATED WALL PENETRATIONS: Where cable trays and/or signal cables penetrate rated walls the Electrical Contractor shall furnish and install a UL Listed rated assembly, Specified Technology, Inc. (STI) EZ-Path Triple Cable Pathway System, or equivalent system by Legrand, Cooper, Metacaulk, 3M, or Hilti. See details on drawings.

2-15 NAMEPLATES AND WARNING SIGNS

NAMEPLATE: Provide engraved 3-ply laminated plastic nameplates for each panelboard, safety switch, transformer, enclosed circuit breaker, contactor, and lighting control panel. Attach to equipment cover using metal screws, rivets, or industrial epoxy cement. Manufacturer's sticky-back adhesive is not acceptable. Use 1/4" white letters on black field for normal power items. Use 1/4" white letters on red field for emergency power items (generator).

METAL-BACKED, BUTYRATE WARNING SIGNS: Weather-resistant, nonfading, preprinted, celluloseacetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors,

legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 10 by 14 inches.

2-16 TELEPHONE AND COMPUTER SYSTEMS

Telephone and computer conduits, outlet boxes, cable tray, equipment mounting boards, grounding, and convenience outlets shall be provided as indicated on the drawings.

WIRING: Provide telephone and computer conduit with pull wires as indicated on the drawings.

PART 3 - EXECUTION

3-01 GENERAL REQUIREMENTS

WORKMANSHIP: All work shall be installed in a neat and orderly manner. Devices, cabinets, covers, fixtures, exposed raceways, etc., shall be aligned parallel or perpendicular to the building walls, ceiling, and floor. Wiring in panelboards and cabinets shall be neatly looped and laced, and not wadded. The Owner reserves the right to require repair or replacement of defective workmanship and material without additional compensation to the Contractor.

SUPPORTS: Conduits, boxes, cabinets, enclosures, lighting fixtures, etc., shall be securely supported by structural members or structural walls at intervals required by the NEC or as recommended by the manufacturer. Plaster, gypsum board, acoustical tile, and other ceiling and wall finish materials shall not be used for support.

Recessed light fixtures and recessed ceiling speakers shall be independently supported by two (2) or four (4) #12 steel hanger wires. Hanger wires shall be hung within 10 degrees of plumb, and shall be securely tied to structural members such as steel joists or beams, or to steel angles or tubing which bridge structural members. In addition to hanger wires, recessed light fixtures shall be securely fastened to the ceiling framing member per the requirements of NEC 410.36(B). All wiring located above fire rated assemblies must comply with the requirements of NEC 300.11(A)(1).

CUTTING, PATCHING, AND PAINTING: The Electrical Contractor shall perform all boring, drilling, and cutting of walls, ceilings, and floors as required to install and support his raceways and equipment. Provide rough patching to seal penetrations through walls, ceilings, and floors. Finish patching and painting will be performed by the General Contractor.

FIRE WALL PENETRATIONS: Penetrations through fire rated walls and floors shall be sealed to maintain the integrity of the fire rating. Raceways through penetrations shall be in metal raceways. Penetration openings shall be sealed after the installation of the raceway with UL-49 listed fire retardant material in accordance with Section 078413. Through penetrations of conduits and cables of fire resistance rated walls must comply with Section 714.3.1 of the IBC. Through penetrations of fire resistance ceiling assemblies must comply with section 714.4.1.1 of the IBC. The design intent is for all Firestopping for this project to be performed by a single firestopping subcontractor, refer to additional specifications within Project Manual and coordinate with the Architect.

Where cable trays and/or signal cables penetrate rated walls the Electrical Contractor shall furnish and install a UL Listed rated assembly, Specified Technology, Inc. (STI) EZ-Path Triple Cable Pathway System, or equivalent system by Legrand, Cooper, Metacaulk, 3M, or Hilti. See details on drawings.

ROOF PENETRATIONS: Do not penetrate roof or flashing unless permitted, in writing, by the Architect-Engineer.

TRENCHING AND BACKFILL: The Electrical Contractor shall perform all excavation, trenching, and backfilling necessary to install his work. Trenches shall be run after final grades are established, and shall be run at 24 inches minimum depth from finished grades. Contact all underground utilities (electric, telephone, cable TV, gas, water, sewer) and establish locations of underground utilities prior to digging. Damages to underground utilities will be repaired by the Owner of the line, and the Contractor responsible for such damage will pay all costs of repairs. After completion of backfilling operations, restore the disturbed areas to their original condition by leveling, raking, seeding and mulching.

3-02 GROUNDING

CODE: Entire system shall be grounded and bonded in accordance with the requirements of Article 250 of the National Electrical Code. Comply with UL 467 for grounding and bonding materials and equipment. Comply with IEEE C2 grounding requirements.

GROUNDING CONDUCTORS: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

GROUNDING BUS: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated. Install bus on insulated spacers 1 inch, minimum, from wall 6 inches above finished floor, unless otherwise indicated.

FEEDERS AND BRANCH CIRCUITS: Each feeder raceway shall be bonded to every cabinet, pull box, etc., to which it is connected by grounding bushings and bonding jumpers sized per NEC Table 250.122. Each branch circuit raceway must be connected to every cabinet, pull box, outlet box, etc., with double locknuts. Separate grounding conductors shall be installed on all feeders and on all lighting, receptacle and equipment branch circuits, whether indicated on the drawings or not. Size per NEC 250.122.

RECEPTACLES AND FIXTURES: Bond grounding terminal of each receptacle and fluorescent fixture to its outlet box with No. 12 green ground wire. Self-grounding receptacles are not acceptable as a substitute for this requirement.

DRY-TYPE TRANSFORMERS: Bond transformer secondary to building steel with full sized equipment grounding conductor per NEC Table 250.66.

GROUND ROD TESTS: Prior to connecting ground rods to ground ring or grounding conductor, each ground rod shall be tested for earth resistance. Test method shall be Biddle fall of potential method, or approved equivalent method. Notify Engineer seven (7) calendar days prior to performing testing. Tests shall not be performed within seven (7) days of measurable rainfall (greater than 0.01 inches). Should the resistance of any ground rod exceed 25 ohms, or lesser value when specified, notify Engineer for further action. Furnish to the Engineer a written certification of the testing, listing each ground rod as identified in the Drawings, and the resulting value of resistance, and any further corrective action taken.

3-03 RACEWAYS

WIRING: All wiring shall be installed in raceways, unless noted. Raceways shall be run concealed, unless noted.

UNDERGROUND FEEDER CONDUIT, COMMUNICATIONS CONDUIT, AND DUCT BANKS:

1) Use GRC or PVC schedule 40 for underground conduit and duct bank installations.

- 2) Where required concrete encasement shall be either 2000 psi or 3000 psi.
- 3) Red colored concrete encasement, where required, shall use a red pigment integrally mixed into the concrete. Dry shake or broadcast coloring agents are not to be used.
- 4) For concrete encased conduits use manufactured PVC spacers and mounts for support and spacing of the conduits. Do not use concrete blocks, pipes, or other means to support and space conduits that are to receive concrete encasement.
- A metallic backed marking tape shall be installed 12" above all underground feeder conduits, service entrance communications conduit, and duct banks.

FEEDERS:

- 1) Feeders shall be run in GRC, IMC, or EMT where run exposed.
- 2) Feeders shall be run in GRC, IMC, or EMT where run concealed in walls or ceilings
- 3) Feeders shall be run in GRC or PVC where run underground.
- 4) Where PVC is used, elbows for turn-outs and risers shall be GRC.
- 5) PVC is not permitted above grade.
- 6) Metal conduits installed in contact with earth shall be painted with 2 coats Rustoleum paint or other acceptable preservative.

BRANCH CIRCUITS:

- 1) Branch circuits shall be run concealed where practical.
- Branch circuits run concealed in walls or ceilings shall be run in EMT, GRC, or IMC, except that
 Type MC Cable and Type MC-PCS Cable may be used for lighting branch circuits as indicated
 in 3.04 below.
- 3) Branch circuits run exposed to weather (wet or damp location) on exterior walls, canopies, ceilings, or on roofs shall be run in GRC or IMC with screwed fittings.
- Branch circuits run exposed in dry, finished spaces shall be run in Wiremold surface metal raceway.
- 5) Branch circuits run exposed in interior damp locations, unfinished spaces (attics), and unoccupied spaces (storage room, equipment rooms, janitor's closet) may be run in EMT in lieu of Wiremold.
- 6) Branch circuits run underground shall be run in GRC, IMC, or Schedule 40 PVC plastic conduit.
- 7) All interior conduit homeruns to panelboards shall be run overhead in EMT, GRC, or IMC unless noted otherwise on the drawings.
- 8) Underground conduits shall be run 24" minimum below grade.
- 9) Metal conduits installed in contact with earth shall be painted with 2 coats Rustoleum paint or other acceptable preservative.
- 10) Where plastic conduits are indicated, transition from plastic to GRC or IMC below grade or slab and rise with GRC or IMC. PVC is not permitted above grade.
 - EXCEPTION 1: Plastic conduit may enter floor mounted switchboards.
 - EXCEPTION 2: Plastic conduit risers are acceptable where run concealed from under floor conduit to a receptacle or switch box in a masonry wall that is no more than 48" above finished floor.
- 11) Branch circuit wiring for receptacle circuits may be run under floor in PVC, except that homeruns to panelboards must be run overhead in metal conduit. Transition from PVC to metal conduit as noted above.

FIRE ALARM SYSTEM CONDUIT: Conduit used for Fire Alarm System wiring shall be red, similar to Allied Fire Alarm EMT, except where noted otherwise on the drawings.

FLEXIBLE CONDUITS: Recessed light fixtures located in accessible ceilings may be connected to an outlet box above the ceiling thru flexible conduit "whips". Run a separate ground wire in all conduit, including flexible fixture whips. DO NOT loop flexible conduit from one fixture to another. Manufacturer-supplied Metal-clad cable fixture whips (#18 AWG) shall be permitted for light fixture whips provided they include a ground wire and do not exceed 6' in length.

Final connections to motors, motor driven equipment, transformers, and vibrating equipment shall be made thru flexible conduit, 36" maximum length. "Sealtite" flexible metal conduit shall be installed outdoors, in equipment rooms, and in wet locations.

PULL WIRES: Raceways for wiring by others or for future shall contain a No. 14 galvanized steel pull wire or equivalent plastic cord with 200 lb. tensile strength.

INSTALLATION: Ream raceways, butt ends into couplings, 3 quarter bends per run maximum, plug raceways until wiring is pulled in place. Exposed conduits shall be run parallel and perpendicular to walls, floor, and ceiling. Multiple conduit runs shall be racked using Unistrut or Kindorf channels and pipe clamps. Install conduits in concrete slabs between the top and bottom layers of reinforcing steel. Maximum size of conduits in slabs is 1 inch. Crossing of conduits in slabs shall be avoided, if possible.

PULL BOXES: Maximum length between pull points shall be 200 ft. for pulls with two 90 degree bends, and 100 ft for pulls with three 90 degree bends. Furnish and install pullboxes, junction boxes, handholes, or conduit bodies where bends or pulling lengths exceed these specifications.

EXPANSION JOINTS: Furnish and install expansion joints where conduit crosses building expansion joints and for straight runs exceeding 100 ft. in length.

PLASTIC CONDUIT: Do not damage conduit while making field bends and offsets, cutting and joining conduit. Use GRC elbows where length between pulls exceeds 100 ft. Clean conduit prior to applying solvent. Ensure that conduit extends fully into coupling or fitting when making joints.

MINIMUM SIZE: Home runs to panelboards shall be 3/4" minimum, otherwise raceways shall be 1/2" minimum, except that flexible conduit shall be 3/8" minimum.

FIRESTOPPING: Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

TEST AND INSPECTIONS: After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3-04 WIRE AND CABLE

MINIMUM SIZE: No. 12 for power circuits, No. 16 for control circuits, unless noted. Where home run exceeds 75 ft. length on 120 volt circuits, use No. 10 minimum.

COLOR CODE: No. 12 and No. 10 shall have color-coded insulation. No. 8 and larger shall be marked at all terminals and joints with color-coded tape. Color code as follows:

<u>Voltage</u>	Phase A	Phase B	Phase C	<u>Neutral</u>	Grounding
208/120	Black	Red	Blue	White	Green
480/277	Brown	Orange	Yellow	Grav	Green

INSTALLATION: Ensure that raceway system is complete and that conductors will be free from moisture or physical damage prior to installing conductors. Install all conductors at the same time. Do not exceed cable manufacturer's recommended pulling tension for conductors. Where required, lubricate cables with Ideal Yellow 77, Burndy Slikon, or other acceptable cable lubricant. Do not use lubricants that are not acceptable to the Architect-Engineer.

SPLICING: Splices on Sizes No. 10 and smaller shall be made with wire nuts. Splices on Sizes No. 8 and larger shall be made with split bolt connectors, compression connectors, or solderless lugs. Splices shall be insulated with two or more layers of Scotch 23 rubber tape covered with two or more layers of Scotch 33 plastic tape, or acceptable equivalent method.

CONNECTIONS: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Absent published values, use those specified in IL 486A and UL 486B.

MULTIWIRE BRANCH CIRCUITS: Shared or common neutrals are not permitted on this project for multiwire branch circuits. The Contractor shall pull a separate neutral for all 120V & 277V circuits.

TYPE MC-PCS CABLE: Type MC-PCS Cable may be used for interior, concealed 0-10V dimmed lighting branch circuits located above accessible lay-in ceilings, except that circuiting between spaces and homeruns to panelboards shall be in EMT, circuiting for lights in corridors and lights in stairs shall be in EMT, and Type MC Cable may not penetrate rated walls or floors. Type MC-PCS Cable shall be supported in accordance with the requirements of NEC 330.30.

3-05 BOXES

WALL OUTLETS: Flush mounted, unless noted. Boxes shall be securely mounted to wall studs or be grouted in masonry. Boxes shall have single or multi-gang plaster rings, as required. "Through-wall" boxes <u>SHALL NOT BE USED</u>. Back-to-back mounting of boxes is not permitted. Boxes on opposite sides of a rated wall shall have a minimum of 24" horizontal spacing or shall be protected with listed putty pads. Locate boxes so that cover or plate will not span different building finishes.

RECESSED BOXES IN MASONRY WALLS: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

RECESSED BOXES IN STUD WALLS: Support boxes from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CEILING OUTLETS: Flush mounted or concealed above ceiling. Boxes for fixture support shall have study or ears as required and shall be securely supported by adjustable bar hangers or steel angle.

JUNCTION BOXES, PULL BOXES, AND WIREWAYS: Shall be sized and installed as indicated on the drawings or where required by NEC for pulling or splicing wiring. All junction boxes and pull boxes shall be accessible. Junction boxes and pull boxes shall not be located above inaccessible ceilings.

HANDHOLES: See details on drawings.

LOCATIONS: Verify door swings and mount switches on strike side, 6" from jamb. Verify counter heights and arrangement prior to setting boxes. The Owner reserves the right to move any outlet by as much as 10 ft. from its indicated location at no additional cost, provided the Contractor is notified prior to roughing in.

3-06 WIRING DEVICES

INSTALLATION: Devices shall be installed as indicated on the drawings and wired in accordance with the manufacturer's instructions. Install conductors at each outlet with at least 6-inches of slack.

MASKING: Devices shall be masked to prevent painting of faces and handles during construction. Do not install cover plates until clean-up has been completed.

COVER PLATES: Cover plates shall be installed on all wiring devices, telephone and computer outlets, junction boxes, and outlet connections.

3-07 INTERIOR LIGHTING

LOCATION: Install fixtures symmetrically on ceiling or ceiling grid as indicated on the drawings and as directed on the job.

MOUNTING: Support all fixtures securely from structural or framing members with adjustable bars, metal angles, threaded rods or other acceptable methods - Installation shall comply with NEC 314.27. Support recessed fixtures as specified in paragraph 3-01 - Installation shall comply with NEC 410.36(B).

Suspended linear fluorescent direct/indirect fixtures in classrooms, offices, conference rooms, and other finished interior spaces shall be suspended using aircraft cable as indicated on the drawings, unless noted otherwise.

Suspended industrial fixtures, high-bay fixtures, low-bay fixtures, etc. located in warehouses, industrial facilities, and other larger spaces with exposed ceilings shall be suspended using threaded rods and the Electrical Contractor shall furnish and install unistrut or other structural member as required to support fixtures. Mount so bottom of fixture is as close to bottom of beam or truss as possible, unless noted otherwise.

3-08 EXTERIOR LIGHTING

PLACING LIGHTS. The poles shall be installed at the approximate locations indicated in the plans. The Contractor shall stake out the exact locations and obtain approval from the Engineer prior to commencing construction.

LIGHT POLE FOUNDATION. The pole foundation shall be installed on undisturbed soil as shown on the details. If the soil is unsuitable, then the foundation depth shall be increased to an adequate depth as directed by the Engineer. Conduits, anchor bolts, and reinforcing steel shall be provided as indicated on the drawings and as recommended by the pole manufacturer. Concrete shall be placed in the excavated hole against undisturbed earth to an elevation 4 inches below the finished ground line, and in an approved form from 4 inches below ground line to the finished top of foundation elevation, as specified. The top and formed portion of the foundation shall have all edges chamfered. The portion of the foundation above, and at least 2 inches below finished grade shall be given a smooth trowelled finish.

POLES. Poles shall be set on the foundation and bolted in place. Double nuts shall be supplied with the anchor bolts and utilized to plumb the pole. Poles shall be set plumb, with no rake or lean. Each bolt shall be provided with a flat washer, two lock washers, and two nuts.

LUMINAIRES. Luminaires shall be installed, leveled, and aimed in accordance with the recommendations of the manufacturer and as indicated on the drawings. Contractor shall take particular care to prevent spill light and glare from the floodlights. Wiring within the pole shall be Type SO cord, supported at the top of the pole with a cable clamp or attachment clip to prevent tension on the cable splices or connections to the floodlights. Floodlights and luminaires shall be connected to balance the loading between all phases on the supply circuit. Floodlights and luminaires shall be thoroughly cleaned after completion of installation, and all aiming devices and clamps securely tightened.

3-09 LIGHTING CONTROLS

QUALITY CONTROL: Verify operation of each lighting control device, and adjust time delay and sensitivity settings. Lighting control devices that fail tests and inspections are defective work. See details and notes on drawings for additional information.

ADJUSTING: When requested within 12 months of date of Substantial Completion, provide onsite assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. See details and notes on drawings for additional information.

DEMONSTRATION: Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training." See details and notes on drawings for additional information.

3-10 SAFETY SWITCHES

LOCATION: Mount switches where shown on drawings and within sight of equipment served. Mount in a readily accessible location unless noted. Verify fuse sizes with equipment manufacturer's requirements.

3-11 PANELBOARDS

INSTALLATION: Mount panelboards so that the center grip of the operating handle of the highest circuit breaker in the panelboard is not more than 6'-7" (2.0 meters) above the floor when in its highest position per the requirements of NEC 240.24(A). Bottom of panelboard to be a minimum of 12" above the floor except where a lower height is required to comply with NEC 240.24(A). Connect circuits as indicated on the drawings, observing correct color code and numbering. Mark all wires in panelboard with circuit number.

DIRECTORY: <u>Provide typewritten circuit directory for each panel identifying load served and room location.</u> Identify spares in pencil. Panelboard schedules must comply with NEC 408.4, including listing room description and room number for each load. Turn all spare breakers off.

<u>ARC-FLASH HAZARD WARNING LABELS:</u> Provide warning labels for all panels, switchboards, switchgear, and industrial control panels per the requirements of NEC 110.16. Labels to read,

DANGER ARC FLASH & SHOCK HAZARD APPROPRIATE PERSONAL PROTECTION EQUIPMENT REQUIRED

3-13 TRANSFORMERS

PAD: Mount transformer on 6" concrete pad per manufacturer's recommendations. Pad shall extend 4" beyond transformer on all sides. Pad shall have 3/4" chamfer on all sides. Fasten transformer to pad per the manufacturer's instructions, use vibration pads similar to Cooper Vibra Trol Series.

PROTECTION: Protect transformer and all components from weather during construction period.

TRANSFORMER: Install and level transformer per manufacturer's instructions.

TAPS: Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 2 percent at maximum load conditions. Submit recording and tap settings as test results.

3-14 FLOOR BOXES

CAST IRON FLOOR BOXES: Set metal floor boxes level and flush with finished floor surface.

PLASTIC FLOOR BOXES: Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3-15 CABLE MANAGEMENT

CABLE TRAY INSTALLATION: Comply with recommendations in NEMA VE 2. Install as a complete system, including all necessary fasteners, hold-down clips, splice-plate support systems, barrier strips, hinged horizontal and vertical splice plates, elbows, reducers, tees, and crosses. Remove burrs and sharp edges from cable trays.

SUPPORT: Fasten cable tray supports to building structure and install seismic restraints.

3-16 NAMEPLATES AND WARNING SIGNS

INSTALLATION: Verify identity of each item before installing identification products. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

3-17 TELEPHONE AND COMPUTER SYSTEMS

REQUIREMENTS: Verify telephone and computer equipment space requirements and outlet locations with Owner prior to roughing in. Telephone and computer service conduits, equipment mounting boards, grounding, and convenience outlets shall be provided as indicated on the drawings.

WIRING: Provide telephone and computer conduit with pull wires as indicated on the drawings. Minimum size conduit is 3/4".

3-18 COMPLETION OF WORK

TESTS AND FINAL REVIEW: Upon completion of work, the entire system shall be completely operational and tested to conform with these specifications and drawings, and shall be reviewed by the Architect-Engineer. All defects in workmanship and material shall be immediately corrected without additional compensation to the Contractor.

The final review of the electrical installation by the Engineer cannot be provided until the following items have been submitted to the Engineer for review:

- 1) Letter from the Electrical Contractor on company letterhead indicating that the installation is complete and ready for a final review.
- 2) Written documentation that the Lighting Control System and Occupancy Sensor Commissioning has been provided in accordance with the design documents.
- 3) Written confirmation that the Lighting Control System and the Occupancy Sensor Training has been provided or at a minimum has been scheduled in accordance with the design documents.
- 4) Breaker Coordination letter confirming the setting and providing the setting information of circuit breakers in accordance with the design documents.
- 5) Signed and dated certificate indicating that the specified functional tests of the Fire Alarm System have been performed.

Failure to submit the above documentation prior to requesting the Engineer's Final Review of the project may result in delays in providing the final review. The Engineer assumes no liability for delays in the project resulting from failure to provide the proper documentation.

The system will not be considered complete until Record Documents are provided and training of facility personnel on the system operation is complete. This facet of the services to be provided by the Contractor is deemed very important to the satisfactory completion of the contract and the installation cannot be deemed complete until these services have been provided in accordance with the Contract Documents.

CLEAN UP: Upon completion of all installations and prior to final acceptance by the Owner, remove all debris from the site. Clean and touch up paint on fixture lenses and trims, cabinets, enclosures, cover plates, etc.

END OF SECTION 260500

PART 1 - GENERAL REQUIREMENTS

1-01 SUMMARY

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

1-02 ELECTRICAL SUBMITTALS

Electrical shop drawings shall be submitted in one complete package containing all items required by this specification and all other Division 26-28 specifications. Partial shop drawing submittals may be rejected by the Architect-Engineer.

Exceptions: Fire Alarm System CAD drawings, Lighting Control System CAD drawings, and Allowanced Light Fixtures may be submitted separately if additional time is needed to prepare these shop drawings. Submit written request to Architect/Engineer for extension with a timeline schedule indicating submittal date for items to be submitted separately.

1-03 ELECTRICAL SUBMITTAL FORMAT

FILE TYPE: Electrical submittals to be submitted digitally and shall be pdf documents divided into categories as indicated below.

SUBMITTAL TRANSMITTAL LETTER: The submittal package shall include a single transmittal letter saved as a separate pdf file indicating the following:

- The project name and address
- The date of submission
- The Electrical Contractor name and address
- The General Contractor name and address
- The Construction Manager name and address (if applicable)
- A list of each submittals category (use categories listed below)
- Any applicable remarks and/or comments
- Signature of transmitter

SUBMITTAL CATEGORY COVER SHEET: The digital submittal shall be divided into submittal categories as indicated below. <u>Each submittal category shall be saved as a separate pdf file with a cover sheet indicating the following:</u>

- The project name
- The submittal category (category names to match those listed below where applicable)
- The date of submission
- The Electrical Contractor name and address
- The name and address of the firm or entity that prepared the submittal.
- Any applicable remarks and/or comments

Submittals not meeting the above criteria may be rejected.

Refer to the sample Category Cover Sheet at the end of this specification section.

ELECTRICAL SUBMITTAL CATEGORIES: Within 30 days after award of contract and before any materials are delivered to the site, submit a digital set of Electrical Submittals in pdf format to the Architect-Engineer on each of the following categories/materials:

- 1) Section 260500, 2-01: Submit an electrical room layout drawing for each electrical room reflecting dimensions of actual equipment provided. Provide clearances per Table 110.26(a)(1) of the NEC.
- 2) Section 260500, 2-02: Grounding and Ground Rod Test Method/Equipment.
- 3) Section 260500, 2-03: Raceways and Fittings.
- 4) Section 260500, 2-04: Wire and Cable.
- 5) Section 260500, 2-05: Boxes and Wireways.
- 6) Section 260500, 2-06: Wiring Devices.
- 7) Section 260500, 2-07 & 2-08: Lighting Fixtures (Including Lamps and Ballasts).
- 8) Section 260500, 2-09: Lighting Controls (Cut Sheets and Drawings).
- 9) Section 260500, 2-10, 2-11, & 2-12: Switchgear (Disconnect Switches, Panelboards, and Transformers).
- 10) Section 260500, 2-13: Floor Boxes.
- 11) Section 260500, 2-14: Cable Management (Cable Tray, Cable J-Hooks, Fire Wall Penetration Assembly).
- 12) Section 260500, 2-15: Nameplates.
- 13) Section 260529: Hangers and Supports for Electrical Systems (Including Engineer's calculations where required).
- 14) Section 260548: Vibration and Seismic Controls for Electrical Systems.
- 15) Section 264313: Surge Protection Device (SPD).
- 16) Section 270500: Data, Telecommunications, Intrusion Alarm, and Card Access System.
- 17) Section 283100: Fire Alarm System.

OPTIONAL FEATURES: Clearly identify options requiring selection by Architect/Engineer.

RESUBMITTALS: Make resubmittals in same format as initial submittal. Note date and content of previous submittal. Note date and content of revision in label or title block and clearly indicate extent of revision.

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

USE FOR CONSTRUCTION: Retain complete copies of submittals on Project site (either a digital copy or a hard copy is acceptable provided it is readily accessible). Use only final action submittals that are marked as such from the Engineer's action stamp.

1-04 ELECTRICAL SUBMITTAL SCHEDULE

SCHEDULE: Within 45 days after award of contract and before any materials are delivered to the site, submit a digital set of Electrical Submittals in pdf format to the Architect-Engineer. If additional time is needed, submit a written request to Architect/Engineer for extension with a timeline schedule indicating revised submittal date.

No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

No extension of the Contract Time will be authorized because of failure to transmit submittals in the proper format.

1-05 ELECTRICAL SUBMITTAL REJECTION

Failure to comply with the above criteria may result in rejection of the submittal by the Architect-Engineer. Refer to Division 1 for additional Submittal requirements.

ELECTRICAL SUBMITTALS

PART 2 - NOT APPLICABLE

PART 3 - EXECUTION

3-01 CONTRACTOR'S ACTIONS

GENERAL: The primary purpose of submitting electrical shop drawings is to demonstrate the way by which the Contractor proposes to comply with the design concept expressed in the Contract Documents for the portions of work that require submittals.

CONTRACTOR REVIEW: Prior to submittal to the Engineer, the Contractor shall review shop drawings for compliance with the Contract Documents.

No electrical equipment or materials shall be ordered or installed by the Contractor prior to receipt of properly reviewed shop drawings. The Contractor may not perform any portion of the work for which the Contract Documents require submittal and review of shop drawings prior to receipt of properly reviewed shop drawings.

Failure to comply with the above criteria may require the removal by the Contractor of any equipment or materials installed prior to receipt of properly reviewed electrical shop drawings, at no cost to the Owner or the Architect/Engineer.

3-02 ENGINEER'S ACTIONS

GENERAL: Engineer will not review submittals that do not bear Contractor's approval/acceptance stamp and will return them without action.

ELECTRICAL SUBMITTALS: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate actions required.

INCOMPLETE OR PARTIAL SUBMITTALS: Incomplete or partial submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 260510

ELECTRICAL SUBMITTAL CATEGORY COVER SHEET

PROJECT NAME: Sample Project Middle School

SUBMITTAL CATEGORY: Section 260500, 2-05 & 2-06 - Lighting Fixtures (Including Lamps and

Ballasts)

DATE OF SUBMISSION: May 01, 2017

ELECTRICAL CONTRACTOR: ABCD Electrical Contractor, 123 Main Street, Anywhere, SC 29999

SUBMITTAL PREPARER: WXYZ Lighting, Inc. 456 Elm Street Somewhere, SC 21111

REMARKS/COMMENTS: Color selections needed for types C1 and W4 fixtures.

PART 1 - GENERAL REQUIREMENTS

1-01 SUMMARY

SECTION INCLUDES:

- 1) Hangers and supports for electrical equipment and systems.
- 2) Construction requirements for concrete bases where specified.

1-02 PERFORMANCE REQUIREMENTS

Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1-03 SUBMITTALS

Product Data: For steel slotted support systems.

Shop Drawings: Shop Drawings shall be signed and sealed by a qualified professional engineer and shall show fabrication and installation details and include calculations for the following:

- a. Trapeze hangers. Include Product Data for components.
- b. Steel slotted channel systems. Include Product Data for components.
- c. Equipment supports.

Welding Certificates.

1-04 QUALITY ASSURANCE

- Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- 2) Comply with NFPA 70.

PART 2 - PRODUCTS

2-01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- 1) Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 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:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - i. Allied Tube & Conduit.
 - ii. Cooper B-Line, Inc.; a division of Cooper Industries.
 - iii. ERICO International Corporation.
 - iv. GS Metals Corp.
 - v. Thomas & Betts Corporation.
 - vi. Unistrut; Tyco International, Ltd.

- vii. Wesanco, Inc.
- c. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
- d. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
- e. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- f. Channel Dimensions: Selected for applicable load criteria.
- 2) Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- 3) Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- 4) Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- 5) Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - a. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - i. 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:
 - ii. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Hilti Inc.
 - ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - MKT Fastening, LLC.
 - Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - b. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - i. 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:
 - ii. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Cooper B-Line, Inc.; a division of Cooper Industries.
 - Empire Tool and Manufacturing Co., Inc.
 - Hilti Inc.
 - ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - MKT Fastening, LLC.
 - c. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - d. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - e. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - f. Toggle Bolts: All-steel springhead type.
 - g. Hanger Rods: Threaded steel.

2-02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- 1) Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3-01 APPLICATION

- 1) Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- 3) Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - a. Secure raceways and cables to these supports with two-bolt conduit clamps.
- 4) Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3-02 SUPPORT INSTALLATION

- Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- 2) Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- 3) Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- 4) Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - a. To Wood: Fasten with lag screws or through bolts.
 - b. To New Concrete: Bolt to concrete inserts.
 - c. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - d. To Existing Concrete: Expansion anchor fasteners.
 - e. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - f. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts; beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69; or spring-tension clamps.
 - g. To Light Steel: Sheet metal screws.
 - h. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes,

transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3-03 INSTALLATION OF FABRICATED METAL SUPPORTS

- 1) Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- 2) Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- 3) Field Welding: Comply with AWS D1.1/D1.1M.

3-04 CONCRETE BASES

- Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- 2) Use 3000-psi, 28-day compressive-strength concrete.
- 3) Anchor equipment to concrete base.
 - Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - c. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3-05 PAINTING

- 1) Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- 2) Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- 3) Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

PART 1 - GENERAL REQUIREMENTS

1-01 SUMMARY

SECTION INCLUDES:

- 1) Isolation pads.
- 2) Spring isolators.
- 3) Restrained spring isolators.
- 4) Channel support systems.
- 5) Restraint cables.
- 6) Hanger rod stiffeners.
- 7) Anchorage bushings and washers.

1-02 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading (verify with Contract Documents and with the project Structural Engineer of Record):
 - a. Site Class as Defined in the IBC: D.
 - b. Assigned Seismic Use Group or Building Category as Defined in the IBC:
 - i. Component Importance Factor for Main Panel, Life Safety Systems, Emergency Generator, Emergency Power Distribution for Life Safety and Equipment, Fire Alarm, and all Communications: 1.5.
 - ii. Component Importance Factors for all else: 1.0.
 - iii. Component Response Modification Factor: As Defined in the IBC and ASCE 7.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.
- A. The Electrical Contractor shall be responsible for providing restraints to resist the earthquake effects on the electrical system. The requirements for these restraints are found in the International Building Code and ASCE 7.
- B. The Electrical Contractor shall refer to the latest edition of the "Seismic Restraint Manual Guidelines for Mechanical System" published by SMACNA for guidelines to determine the correct restraints for sheet metal ducts, piping, and conduit, etc.
- C. The Electrical Contractor shall retain the services of a Professional Structural Engineer registered in the State, to design seismic restraint elements required for this project. The engineer's computations, bearing his professional seal, shall accompany shop drawings which show Code compliance. Computations and shop drawings shall be submitted for review prior to the purchasing of materials, equipment systems, and assemblies.

1-03 ACTION SUBMITTALS

1) Product Data: For the following:

- a. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
- b. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - i. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - ii. Annotate to indicate application of each product submitted and compliance with requirements.
- Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
- 2) Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.
 - b. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
 - c. Field-fabricated supports.
 - d. Seismic-Restraint Details:
 - Design Analysis: To support selection and arrangement of seismic restraints.
 Include calculations of combined tensile and shear loads.
 - ii. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.

1-04 INFORMATIONAL SUBMITTALS

- 1) Welding certificates.
- 2) Field quality-control test reports.

1-05 QUALITY ASSURANCE

- Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- 3) Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- 4) Comply with NFPA 70.

PART 2 - PRODUCTS

2-01 VIBRATION ISOLATORS

- 1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ace Mountings Co., Inc.
 - b. Amber/Booth Company, Inc.
 - c. California Dynamics Corporation.
 - d. Isolation Technology, Inc.
 - e. Kinetics Noise Control.
 - f. Mason Industries.
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation.
 - i. Vibration Mountings & Controls, Inc.
- 2) Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
- 3) Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - a. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - b. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - c. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - d. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - e. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
 - f. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- 4) Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limitstop restraint.
 - a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - b. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 - c. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - d. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - e. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - f. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2-02 SEISMIC-RESTRAINT DEVICES

- 1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber/Booth Company, Inc.
 - b. California Dynamics Corporation.
 - c. Cooper B-Line, Inc.; a division of Cooper Industries.
 - d. Hilti Inc.

- e. Loos & Co.; Seismic Earthquake Division.
- f. Mason Industries.
- g. TOLCO Incorporated; a brand of NIBCO INC.
- h. Unistrut; Tyco International, Ltd.
- 2) General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an evaluation service member of ICC-ES.
- 3) Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- 4) Restraint Cables: ASTM A 603 galvanized-steel or ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- 5) Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections of reinforcing steel angle clamped to hanger rod. Do not weld stiffeners to rods.
- 6) Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- 7) Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- 8) Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- 9) Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- 10) Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3-01 APPLICATIONS

- 1) Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an evaluation service member of ICC-ES or other agency acceptable to authorities having jurisdiction.
- Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3-02 SEISMIC-RESTRAINT DEVICE INSTALLATION

- 1) Equipment and Hanger Restraints:
 - a. Install restrained isolators on electrical equipment.
 - b. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).

- c. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES or an agency acceptable to authorities having jurisdiction providing required submittals for component.
- Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- 3) Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- 4) Drilled-in Anchors:
 - a. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
 - b. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - c. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - d. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - e. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - f. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3-03 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

1) Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3-04 FIELD QUALITY CONTROL

- 1) Tests and Inspections:
 - a. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - b. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 - c. Test to 90 percent of rated proof load of device.
 - d. Measure isolator restraint clearance. Measure isolator deflection.
 - e. Verify snubber minimum clearances. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- Remove and replace malfunctioning units and retest as specified above. Prepare test and inspection reports.

3-05 ADJUSTING

1) Adjust isolators after isolated equipment is at operating weight.

VIBRATION AND SEISMIC CONTROLS FOR ELEC SYS

2) Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation. Adjust active height of spring isolators. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548

PART 1 - GENERAL REQUIREMENTS

1-01 SCOPE OF WORK

WORK INCLUDED: Furnish all necessary labor, material, plant and equipment, including materials and equipment not specifically mentioned but necessary to complete the work in a neat, correct, and workmanlike manner.

1-02 CODES AND STANDARDS

All work shall comply with the requirements of Section 260500 – Electrical Basic Materials and Methods. Each surge suppressor shall be UL 1449-Fourth Edition and UL 1283 listed.

1-03 WARRANTY

Each surge suppressor shall have a minimum 20-year warranty.

1-04 SUBMITTALS

Within thirty (30) days after the award of the contract, submit six (6) sets of shop drawings and equipment specifications to the Architect-Engineer for review. Shop drawings shall include specification sheets on all surge suppressors to be furnished.

Submittals shall include UL 1449 4th Edition Listing documentation verifiable by visiting www.uL.com, clicking "Certifications" link, searching using UL Category Code: VZCA and VZCA2:

- 1. Short Circuit Current Rating (SCCR)
- 2. Voltage Protection Ratings (VPRs) for all modes
- 3. Maximum Continuous Operating Voltage rating (MCOV)
- 4. I-nominal rating (I-n)
- 5. SPD shall be UL listed and labeled as Type 1 or Type 2 applications

PART 2 - PRODUCTS

2-01 SURGE SUPPRESSOR FOR COMPUTER PANELBOARDS

MANUFACTURERS: Innovative Technology, EFI Electronics, Square D, Eaton, Liebert, SSI, or APT.

SURGE PROTECTIVE DEVICE FEATURES

- A. SPD shall be UL 1449 4th Edition listed and labeled verifiable by visiting www.UL.com, clicking "Certifications" link, searching using UL Category Code: VZCA.
- B. SPD shall be UL 1449 listed and labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- C. SPD shall be UL 1449 labeled as Type 1 intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal over temperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- D. SPD shall be UL 1449 labeled with 20kA I-nominal (I-n) (verifiable at UL.com) as recommended for UL 96A Lightning Protection Master Label and NFPA 780.

- E. Suppression components shall utilize heavy duty Metal Oxide Varistor (MOV) technology.
- F. True 10-Mode Protection paths: SPD shall provide "directly connected protection elements" between all possible modes of protection: L-N, L-G, L-L, and N-G for Wye systems.
- G. If a dedicated breaker for the SPD is not provided in the switchboard, the service entrance SPD shall include an integral UL Recognized disconnect switch. A dedicated breaker shall serve as a means of disconnect for distribution SPDs.
- H. SPD shall meet or exceed the following criteria:
 - 1. Minimum surge current capability (single pulse rated) per phase shall be:
 - a. Service Entrance, Emergency Power Switchboards, and MCC applications: Innovative Technologies PTE-240 Series or equal with 10-Mode protection. Minimum surge current capability shall be 240 KA per phase.
 - b. Lighting and Power Distribution panelboards 400 amps. and above: Innovative Technologies PTE160 Series with minimum surge current capability of 160 KA per phase
 - Lighting and Power branch panelboards below 400 amps: Innovative Technologies PTE080 with minimum surge current capability of 80 KA per phase
 - 2. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	N-G
208Y/120V	700V	700V	700V
480Y/277V	1000V	1000V	1000V

3. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) for L-N, L-G, and N-G modes of protection (verifiable at UL.com):

System Voltage	Allowable System Voltage Fluctuation (%)	MCOV
208Y/120V	25%	150V
480Y/277V	20%	320V

- I. SPD shall include a serviceable, replaceable module (excluding Distribution).
- J. Service Entrance SPD shall be complimentary UL 1283 listed for EMI/RFI filtering with minimum attenuation of up to 50dB from 10kHz 100MHz.
- K. SPD shall have a warranty for a period of twenty (20) years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.
- L. Service Entrance SPDs shall be equipped with the following diagnostics:
 - 1. Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
 - 2. Audible alarm with on/off silence function and diagnostic test function (excluding branch).
 - 3. Form C dry contacts
 - 4. Surge Counter
 - No other test equipment shall be required for SPD monitoring or testing before or after installation.

- M. Distribution Panels SPDs shall be equipped with the following diagnostics:
 - 1. Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
 - 2. Audible alarm with on/off silence function and diagnostic test function (excluding branch).
 - 3. Form C dry contacts
 - 4. No other test equipment shall be required for SPD monitoring or testing before or after installation.

LEADS: #10 THHN. For optimum performance, mount surge arrestor adjacent to the panel so that leads are kept as short as possible, straight, and tightly taped.

ENCLOSURE: NEMA 4 or NEMA 12 steel enclosure, locknut and washer included.

PART 3 - EXECUTION

3-01 INSTALLATION

Furnish and install systems in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of Section 260500.

3-02 CONDUIT AND WIRING

See Section 260500, Basic Materials and Methods. All wiring shall be run in raceways.

3-03 COMPLETION OF WORK

Upon completion of work, the entire system shall be completely operational and tested to conform to these specifications and drawings, and shall be reviewed by the Architect-Engineer. All defects in workmanship and material shall be immediately corrected without additional compensation to the Contractor.

END OF SECTION 264313

SECTION 310523 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 - 1. Driveways and roadways.
 - 2. Parking lots.
 - 3. Curbs and gutters.
 - 4. Walkways.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Samples: 10-lb sample of exposed aggregate.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or adhesive.
 - 8. Joint fillers.
- F. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.
- G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Architect's approval of mockups before starting construction.
 - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 - 5. Demolish and remove approved mockups from the site when directed by Architect.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
 - 1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixes.
 - c. Ready-mix concrete producer.
 - d. Concrete subcontractor.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves of a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
- C. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- E. Plain Steel Wire: ASTM A 82, as drawn.
- F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.
- B. Portland Cement: ASTM C 150, Type I or II.
 - 1. Fly Ash: ASTM C 618, Class F or C.

- 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.
- D. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
 - 1. Class: 1N.
 - 2. Maximum Aggregate Size: 3/4 inch nominal.
 - 3. Do not use fine or coarse aggregates containing substances that cause spalling.
- E. Water: ASTM C 94.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Fibrillated Fibers:
 - a. Fibrasol F; Axim Concrete Technologies.
 - b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
 - c. Forta CR; Forta Corporation.
 - d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

- F. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Finishing Aid Concentrate; Burke Group, LLC (The).
 - b. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - c. Sure Film; Dayton Superior Corporation.
 - d. Eucobar; Euclid Chemical Co.
 - e. Lambco Skin; Lambert Corporation.
 - f. E-Con; L&M Construction Chemicals, Inc.
 - g. Finishing Aid; Symons Corporation.
 - 2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
 - a. Res-X Cure All Resin; Burke Group, LLC (The).
 - b. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
 - c. Day-Chem Rez Cure; Dayton Superior Corporation.
 - d. Kurez DR; Euclid Chemical Co.
 - e. #64 Resin Cure; Lambert Corporation.
 - f. L&M Cure DR; L&M Construction Chemicals, Inc.
 - g. Resi-Chem C309; Symons Corporation.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.
- C. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.
 - 1. Color: As indicated.
- D. Glass Beads: AASHTO M 247.
- E. Wheel Stops: Precast, air-entrained concrete; 2500-psi minimum compressive strength; approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter of 3/4 inch, minimum length 10 inches.
- F. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 - 2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
 - 1. Do not use Owner's field quality-control testing agency as the independent testing agency.
- C. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:
 - 1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
 - 2. Air Content: 6.0 percent for 1-inch maximum aggregate.
 - 3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
- H. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drumtype batch machine mixer.
 - 1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.

- 2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
- 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

- A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
 - 1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 - 2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 3. Provide tie bars at sides of pavement strips where indicated.
 - 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 - Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - a. Radius: 1/4 inch.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

- F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
 - 1. Radius: 1/4 inch.

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, at Project site, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
 - Consolidate concrete along face of forms and adjacent to transverse joints with an
 internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side
 forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate
 with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as

specified for formed concrete. If results are not approved, remove and replace with formed concrete.

- K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- L. 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 air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- M. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION 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 follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing

operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 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 lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
 - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
 - 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
 - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
 - 8. Joint Spacing: 3 inches.
 - 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 10. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.

- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal..

3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 5 inches into pavement.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing shall be performed according to the following requirements:
 - 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 - 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
 - 7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
 - 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

- C. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.
- E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 310523

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Preparing subgrades for slabs-on-grade, walks, pavements and turf and grasses.
- 2. Excavating and backfilling for buildings and structures.
- 3. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

- A. Backfill: Soil material 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. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions and beyond the additional excavation referenced on pages 6 & 7 of the subsurface exploration report as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- E. Fill: Soil materials used to raise existing grades.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- G. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

H. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Preexcavation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core

encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

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

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

- 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrowtine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
- 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

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

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil.
- D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

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

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.
 - 5. Compact over-excavation in the building pad area per pages 6 & 7 of the subsurface exploration report.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. 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 materials to depth required; recompact and retest until specified compaction is obtained.

3.15 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.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 312500 – EROSION AND SEDIMENTATION 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 SUMMARY

- A. This Section includes the following:
 - 1. Erosion control materials and methods.
- B. Related Sections:
 - 1. 311000 Site Clearing
 - 2. 312000 Earth Moving

1.3 DEFINITIONS

A. Soil disturbing activities include but are not limited to: Clearing and grubbing, excavation for utilities and foundations, roadway and parking lot construction, construction or modification of site drainage, grading, and preparation for final seeding.

1.4 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with provisions of the following:
 - 1. City of Aiken.
 - 2. South Carolina Department of Health and Environmental Control.

Test Method

Synthetic Filter Fabric for silt fences.

PART 2 - PRODUCTS

2.1 SILT FENCES.

Provide pervious sheet of polypropylene, nylon, or polyethylene fabric conforming to the following physical and hydraulic characteristics: Physical Properties (Min.)		
Grab Tensile, lbs.	W120/F100	ASTM-D-4632
Grab Elongation, %	15	ASTM-D-4632
Mullen Burst, psi	275	ASTM-D-3786
Puncture, lbs.	65	ASTM-D-4833
Trapezoidal Tear, lbs.	50	ASTM-D-4533
UV Resistance, %	80	ASTM-D-4355
AOS, US Sieve #	30/40	ASTM-D-4751
Permittivity gal/min-sq. ft.	90	ASTM-D-4491

Requirement

- A. Filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120 F.
- B. Support Posts: 4 foot 2 x 2 wood.
- C. Utilize standard strength synthetic filter fabric for sediment barriers. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints.

2.2 STRAW MATERIALS

- A. Straw Bales: Oat or wheat straw, free from weeds, viable weed seeds, foreign matter detrimental to plant life, and dry.
 - 1. Grass hay bales are not acceptable.
 - 2. In order to prevent deterioration of the bindings, all bales shall be either wire-bound or string-tied so that bindings are oriented around the sides rather than along the tops and bottoms of the bales.
- B. Erosion Control Matting: Approximately 70% straw, 30% coconut fiber between two layers of photo degradable polypropylene netting.

2.3 GRASS

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

- B. Seed Species: State-certified seed of grass species, as follows:
 - 1. Brown top millet: March 1 through August 14.
 - 2. Rye Grain and Annual Rye Grass: August 15 through February 28.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Place all erosion and sediment control measures prior to any soil disturbance activity.
- B. Conform to the requirements of the appropriate regulatory agency for the State.

3.2 INSTALLATION, GENERAL

- A. Install straw bales at local drainage ways to prevent silt intrusion upon adjacent drainage courses. Remove straw bales following establishment of vegetation cover and utilize as mulch at swales or on steep slopes.
- B. Prior to construction, install silt fence along the downhill construction limits in accordance with the erosion control standard detail to prevent silt intrusion upon adjacent land.
- C. Install sediment and erosion control measures on the down slope toe of all top soil stock piles.

3.3 DUST CONTROL

- A. In areas subject to surface and air movement of dust, where on-site or off-site damage is likely to occur, one or more of the following preventive measures shall be taken for dust control:
- B. Minimize the period of soil exposure through the use of temporary ground cover and other temporary stabilization practices.
- C. Sprinkle the site with water until surface is wet. Repeat as needed.

3.4 INSTALLATION OF SILT FENCES

- A. Provide silt fences at the following general locations:
 - Immediately upstream of the point(s) of runoff discharge from a site before flow becomes concentrated.
 - 2. Below disturbed areas where runoff may occur in the form of overland flow.
 - 3. Along the down slope toe of all top soil stock piles.
 - 4. Around all storm structures.

B. Construction of Fence:

- 1. Space support posts at a maximum 6 feet on center. Drive securely into the ground a minimum of 24 inches.
- 2. Staple or wire the filter fabric to the fence post, extending6 inches of the fabric on the ground. Do not staple filter fabric to trees.
- 3. Splice filter fabric only at a support post, overlapping fabric a minimum of 6 inches, and seal.
- 4. Do not exceed 36 inches in height.

C. Maintenance.

- 1. Inspect silt fences and filter barriers immediately after each rainfall and at least daily during prolonged rainfall.
- 2. Inspect Silt fences for depth of sediment,

- a. Remove Sediment deposits after each storm event and when deposits reach approximately 1/3 the height of the barrier or when the sediments limit or prevent the flow of water through the fabric hydraulic.
- b. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded.
- 3. Inspect silt fences for tears in the fabric, and the attachment of the fabric to the fence posts. Inspect post for continued firm embeddement. Repair any deficiencies immediately.
- 4. Replace filter fabric promptly if it shows signs of decomposition or deterioration that limits its effectiveness.

3.5 INSTALLATION OF STRAW BALE EROSION CONTROL

- A. Provide Straw bale erosion control fences at the following general locations:
 - 1. Sheet flow applications: Place Straw bales in a single row, lengthwise on the contour with ends of adjacent bales tightly abutting one another.
 - 2. Channel flow applications: Place Straw bales in a single row, lengthwise and oriented perpendicular to the direction of flow with ends of adjacent bales tightly abutting one another.
- B. The barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.
- C. Excavate a trench the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches.
- D. Place straw bales in trench and anchor each bale securely with at least 2 stakes or rebar driven through the bale to a minimum depth of 12 inches. Drive the first stake in each bale toward the previously laid bale, forcing the bales together.
- E. Fill the gaps between bales with straw to prevent water from escaping between the bales.
- F. Backfill the excavated soil against the barrier. Backfill shall conform to the ground level of the downhill side and shall be built up to 4 inches against the uphill side of the barrier.
- G. Scatter Loose straw over the area immediately uphill from straw bale barrier.
- H. Maintenance:
 - 1. Inspect straw bales frequently and repair or replace bales promptly as needed.
 - 2. Straw bale carriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

3.6 INSTALLATION OF EROSION CONTROL MATTING

- A. Provide erosion control matting on all slopes over six feet high. Install, secure and maintain matting according to manufacturer's written instructions.
- B. Maintain matting until an acceptable vegetative cover is in place.

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3.7 TEMPORARY GRASSING

- A. Provide temporary seeding on exposed surfaces that will not be brought to final grading or permanent cover treatment within 21 days of the exposure to reduce erosion and sedimentation by stabilizing exposed soils.
- B. Check seeded areas regularly for bare spots, washouts, and healthy growth to assure that a good stand of grass is being maintained. Reseed areas that fail to establish vegetation cover as soon as such areas are identified.

END OF SECTION 312500